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description of the environment

CAPL planning area

Document ID:	**ABU-COP-02890**
Revision ID:	**3.0**
Revision Date:	**23 July 2021**
Next Revision Due	**23 July 2022**
Information Sensitivity:	**Company Confidential**

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Document information

Document Number	ABU-COP-02890	**Revision**	3.0
Document Owner	David Smith	**Department Owner**	HSE Regulatory Affairs Team Lead

Revision history

Rev No.	Description	Date	Prepared By	Approved By
1.0	Issued for use	01 May 2020	A Fertch	D Salins
2.0	Updated with Offshore Areas incorporated into Planning Area	11 September 2020	A Fertch	D Salins
3.0	Annual review	23 July 2021	M Carey	D Smith

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1 introduction

1.1 Purpose

This document describes the environment within Chevron Australia Pty Ltd's (CAPL's) Planning Area (PA) (Figure 1-1), which is the total area in which CAPL's activities may interact with the environment. This document applies to all CAPL operations and is to be used for each Environment Plan (EP) submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) after this document's initial acceptance.

Each EP will define an environment that may be affected (EMBA) by its specific petroleum activity. The EMBA for each activity will most likely be based on conservative stochastic spill modelling thresholds; based on the knowledge gained from previous stochastic modelling from CAPL's activities, all EMBAs are expected to fall within this PA. If an EMBA from an individual EP extends outside the PA, this document will be revised, and the PA extended to incorporate that EMBA.

1.2 Regulatory context

The Commonwealth Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009 detail the information that must be included in an EP. Specifically:

Regulation 13(2) states that the environment plan must:

> *(a) describe the existing environment that may be affected by the activity; and*
>
> *(b) include details of the particular relevant values and sensitivities (if any) of that environment.*

Regulation 4 defines the environment as:

> *(a) ecosystems and their constituent parts, including people and communities; and*
>
> *(b) natural and physical resources; and*
>
> *(c) the qualities and characteristics of locations, places and areas; and*
>
> *(d) the heritage value of places;*
>
> *and includes*
>
> *(e) the social, economic and cultural features of the matters mentioned in paragraphs (a), (b), (c) and (d).*

Regulation 13(3) further provides that, without limiting paragraph (2)(b) of Regulation 13(2), particular relevant values and sensitivities may include any of these:

> (a) the world heritage values of a declared World Heritage property within the meaning *of the EPBC Act;*
>
> *(b) the national heritage values of a National Heritage place within the meaning of that Act;*
>
> *(c) the ecological character of a declared Ramsar wetland within the meaning of that Act;*

(d) the presence of a listed threatened species or listed threatened ecological community within the meaning of that Act;

(e) the presence of a listed migratory species within the meaning of that Act;

(f) any values and sensitivities that exist in, or in relation to, part or all of:

(i) a Commonwealth marine area within the meaning of that Act; or

(ii) Commonwealth land within the meaning of that Act.

Specific to the description of the environment, NOPSEMA's *Environment Plan Content Requirement* guidance (Ref. 1) states:

The level of detail within the plan should be appropriately scaled to the nature of the impacts and risks to the particular values and sensitivities. For example, the environment that may be affected by planned operations will need to be described in a greater level of detail than areas exposed to low levels of hydrocarbon in the unlikely event of a worst-case hydrocarbon release.

Consequently, CAPL has taken the approach that this document provides information suitable for summarising the particular values and sensitivities in order to inform the impact and risk evaluation for CAPL operations. However, if additional information is available for specific locations (typically an operational area for a specific activity) and if this information can be used to further influence or inform the impact and risk assessment, this additional information will be included in the 'Description of the Environment' section of the individual EP.

1.3 Review and revision

The information provided in this document is derived from various referenced desktop sources. As a minimum, this document will be reviewed annually to include any relevant changes to source documents, which may include State (Western Australian [WA])/Commonwealth Management Plans, Recovery Plans, Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) status, or new published research.

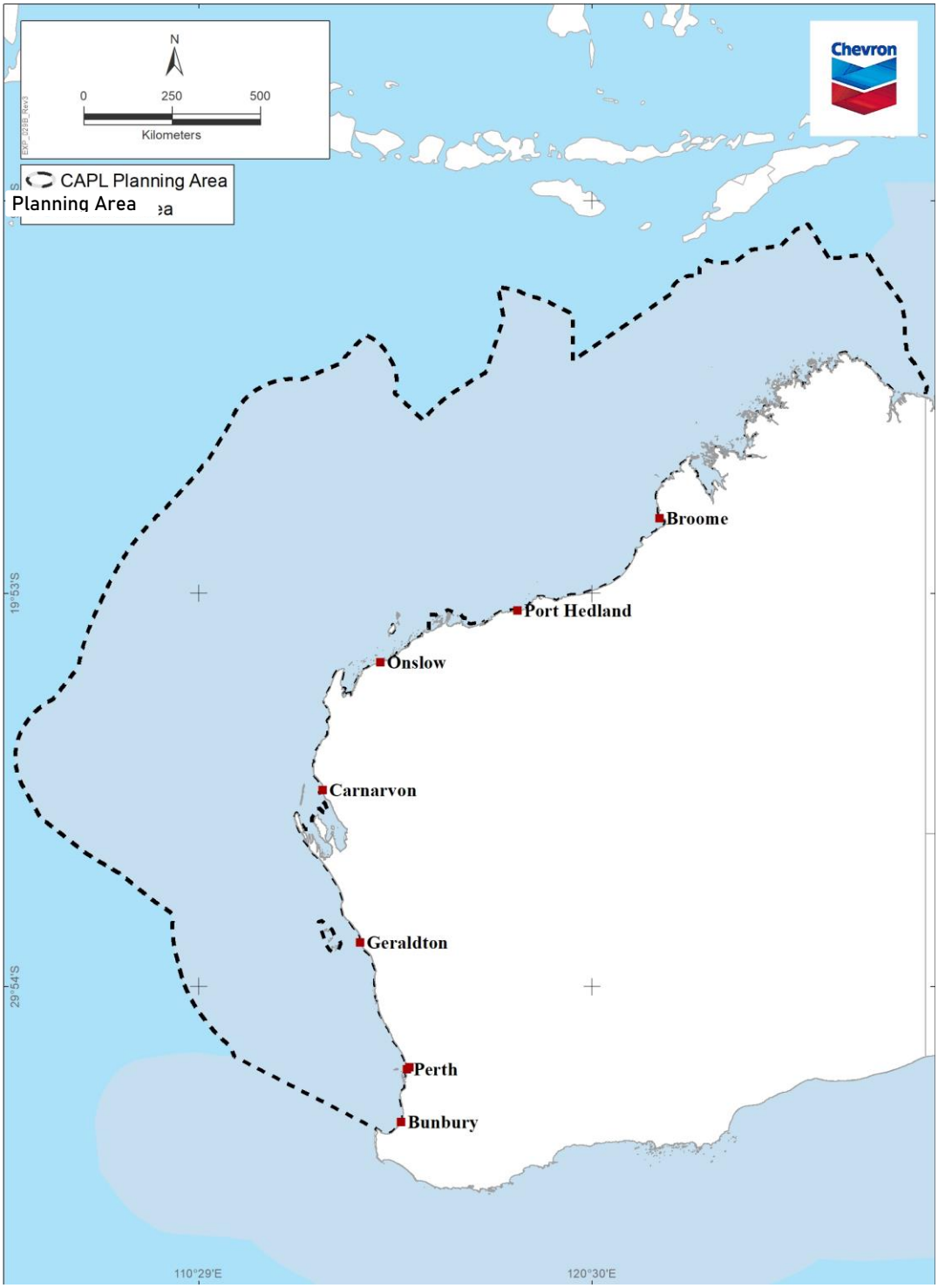


Figure 1-1: CAPL's planning area

2 matters of national environmental significance

2.1 World Heritage properties

Properties nominated for World Heritage listing are inscribed on the list only after they have been carefully assessed as representing the best examples of the world's cultural and natural heritage. At the time of writing this document, Australia has 20 properties on the World Heritage List (Ref. 2; Ref. 3).

The list of Australia's World Heritage areas (Ref. 2) and a protected matters search (Ref. 4; appendix a) show that two World Heritage properties are within the PA. Table 2-1 summarises value of these World Heritage properties (Ref. 2).

Table 2-1: World Heritage properties

World Heritage property	Brief overview of values^
Shark Bay	On the Indian Ocean coast at the most westerly point of Australia, Shark Bay's waters, islands, and peninsulas covering a large area of ~2.2 million hectares (of which about 70% are marine waters) have a number of exceptional natural features, including one of the largest and most diverse seagrass beds in the world. However, it is for its stromatolites (colonies of microbial mats that form hard, dome-shaped deposits, which are said to be the oldest life forms on earth), that the property is most renowned. The property is also famous for its rich marine life including a large population of dugongs and provides a refuge for a number of other globally threatened species.
The Ningaloo Coast	The Ningaloo Coast is located on WA's remote coast along the East Indian Ocean. The property holds a high level of terrestrial species endemism and high marine species diversity and abundance. An estimated 300 to 500 Whale Sharks aggregate annually coinciding with mass coral spawning events and seasonal localised increases in productivity. The marine portion of the nomination contains a high diversity of habitats that includes lagoon, reef, open ocean, the continental slope, and the continental shelf. Intertidal systems such as rocky shores, sandy beaches, estuaries, and mangroves are also found within the property. The most dominant marine habitat is the Ningaloo reef, which sustains both tropical and temperate marine fauna and flora, including marine reptiles and mammals. The main terrestrial feature of the Ningaloo Coast is the extensive karst system and network of underground caves and water courses of the Cape Range. The karst system includes hundreds of separate features such as caves, dolines, and subterranean water bodies and supports a rich diversity of highly specialised subterranean species. Above ground, the Cape Range Peninsula belongs to an arid ecoregion recognised for its high levels of species richness and endemism, particularly for birds and reptiles.

^ *Source: Ref. 2.*

2.2 National Heritage places

The National Heritage List is Australia's list of natural, historic, and Indigenous places of outstanding significance to the nation. The National Heritage List spatial database (Ref. 5) describes the place name, class (Indigenous, natural, historic), and status.

A search of the National Heritage List spatial database (Ref. 5) and a protected matters search (Ref. 4; appendix a) revealed that several National Heritage places occur in the PA (Table 2-2). The information presented in Table 2-2 outlines the nominator's Summary Statement of Significance sourced from the Australian Heritage Database (Ref. 6).

Table 2-2: National Heritage places

National Heritage place	Class	Summary of significance^
Batavia Shipwreck Site and Survivor Camps Area 1629 – Houtman Abrolhos	Historic	Wrecked on 4 June 1629, the *Batavia* is the oldest of the known Verenigde Oost-Indische Compagnie wrecks on the WA coast. Because of its relatively undisturbed nature, the archaeological investigation of the wreck itself has revealed a range of objects of considerable historical value. The recovered sections of the hull of the *Batavia* have been reconstructed in the Western Australian Maritime Museum and provides information on 17th century Dutch ship building techniques, while the remains of the cargo carried by the vessel have provided economic, and social evidence of the operation of the Dutch port at Batavia (now Jakarta) in the early 17th century.
Dampier Archipelago (including Burrup Peninsula)	Indigenous	The Dampier Archipelago located about 1,550 km north of Perth. On the magnificent Dampier Archipelago in WA, where the striking red earth of the Burrup Peninsula meets the blue Indian Ocean, rock engravings thought to number in the millions and other significant sites are helping us learn more about our Indigenous heritage. Made up of islands, reefs, shoals, channels and straits, and covering a land area of around 400 km^2, the Burrup Peninsula is 27 km long and 4 km wide. Many important native plants, animals and habitats are found in the area. The Archipelago was formed 6-8,000 years ago when rising sea levels flooded what were once coastal plains. The underlying rocks are amongst the oldest on earth, formed in the Archaean period more than 2,400 million years ago. The Dampier Archipelago was included in the National Heritage List on 3 July 2007.
Dirk Hartog Landing Site 1616 – Cape Inscription Area	Historic	Cape Inscription is the site of the oldest known landings of Europeans on the WA coastline, and is associated with a series of landings and surveys by notable explorers over a 250-year period. The first known European landing on the west coast of Australia was by Dirk Hartog of the Dutch East India Company's ship the *Eendracht* at Cape Inscription on 25 October 1616. Hartog left a pewter plate, inscribed with a record of his visit and nailed to a post left standing upright in a rock cleft on top of the cliff. This plate is the oldest extant record of a European landing in Australia. Hartog's discovery had a major impact on world cartography. After leaving the island, he sailed northwards charting the coastline of WA to 22° south. As a result, a known part of the coastline of WA appeared on world maps for the first time, replacing the mythical southern continent of 'Terra Australis Incognita'.
HMAS Sydney II and *HSK Kormoran* Shipwreck Sites	Historic	The naval battle fought between the Australian warship *HMAS Sydney II* and the German commerce raider *HSK Kormoran* off the WA coast during World War II (November 1941) was a defining event in Australia's cultural history. *HMAS Sydney II* was Australia's most famous warship of the time and this battle has forever linked the stories of these warships to each other. The tragic loss of *HMAS Sydney II* and its entire crew of 645 following the battle with *HSK Kormoran* remains Australia's worst naval disaster.
Lesueur National Park*	Natural	The Lesueur National Park (inland from Green Head, WA) contains an exceptional concentration of plant species richness and endemism. It is estimated to contain >900 plant species, including nine plant taxa that are endemic to the National Park and 111 taxa that are endemic to the surrounding region. A further 81 plant taxa are at the northern or southern limit of their distribution, which is significant for the evolution of new species (Ref. 7).

National Heritage place	Class	Summary of significance^
		The Lesueur National Park is one of the most important places in Australia for demonstrating species richness and endemism within the Proteaceae plant family, including the genera of Banksia, *Hakea*, *Dryandra*, *Grevillea*, and *Isopogon* (Ref. 8). The Lesueur National Park contains outstanding species richness and endemism in several other plant families such as: the Fabaceae family, including the genera of *Gastrolobium* (poison pea), *Daviesia* (bitter pea) and *Jacksonia* (dogwood); the Myrtaceae family, including the genera of *Verticordia* (feather flower) and *Melaleuca* (paper bark); the Haemodoraceae family (bloodroots, conostyles and kangaroo paws); the Stylidiaceae family (triggerplants); and the Droseraceae family (sundews) (Ref. 8).
Shark Bay, Western Australia	Natural	Shark Bay is on the most western point of the Australian coast. The region is one of the few properties inscribed on the World Heritage List (see Table 2-1) for all four outstanding natural universal values: • as an outstanding example representing the major stages in the Earth's evolutionary history • as an outstanding example representing significant ongoing ecological and biological processes • as an example of superlative natural phenomena • containing important and significant habitats for in situ conservation of biological diversity. 25% of vascular plants (283 species) are at the limits of their range in Shark Bay. Many vegetation formations and plant species are found only in the interzone area. The area south of Freycinet Estuary contains the unique type of vegetation known as tree heath. There are also at least 51 species endemic to the region and others that are considered new to science. The Shark Bay region is an area of major zoological importance, primarily due to habitats on peninsulas and islands being isolated from the disturbance that has occurred elsewhere. Of the 26 species of endangered Australian mammals, five are found on Bernier and Dorre Islands. These are the Boodie or Burrowing Bettong, Rufous Hare Wallaby, Banded Hare Wallaby, the Shark Bay Mouse, and the Western Barred Bandicoot. The Shark Bay region has a rich avifauna with over 230 species, or 35%, of Australia's bird species having been recorded. A number of birds attain their northern limit here, such as the Regent Parrot, Western Yellow Robin, Blue-breasted Fairy-wren, and Striated Pardalote. The region is also noted for the diversity of its amphibians and reptiles, supporting nearly 100 species. Again, many species are at the northern or southern limit of their range. The area is also significant for the variety of burrowing species, such as the Sandhill Frog, which, apparently, needs no surface water. Shark Bay contains three endemic sand-swimming skinks, and 10 of the 30 dragon lizard species found in Australia. The 12 species of seagrass in Shark Bay make it one of the most diverse seagrass assemblages in the world. Seagrass covers >4,000 km^2 of the bay, with the 1,030 km^2 Wooramel Seagrass Bank being the largest structure of its type in the world. Seagrass has contributed significantly to the evolution of Shark Bay as it has modified the physical, chemical, and biological environment as well as the geology and has led to the development of major marine features, such as Faure Sill. The barrier banks associated with the growth of seagrass over the last 5,000 years has, with low rainfall, high evaporation, and low

National Heritage place	Class	Summary of significance^
		tidal flushing, produced the hypersaline Hamelin Pool and L'Haridon Bight. This hypersaline condition is conducive to the growth of cyanobacteria, which trap and bind sediment to produce various mats and structures including stromatolites. Stromatolites represent the oldest form of life on Earth. They are representative of life forms from ~3,500 million years ago. Hamelin Pool contains the most diverse and abundant examples of stromatolite forms in the world. Shark Bay is renowned for its marine fauna. For example, the Shark Bay population of about 10,000 Dugong is one of the largest in the world, and dolphins abound, particularly at Monkey Mia. Humpback Whales use Shark Bay as a staging post in their migration along the WA coast. This species was reduced by past exploitation from an estimated population of 20,000 on the west coast to 500–800 whales in 1962; the population is now estimated at 2,000–3,000. Green and Loggerhead Turtles are found in Shark Bay near their southern limits; they nest on Dirk Hartog Island and Peron Peninsula beaches. Dirk Hartog Island is the most important nesting site for Loggerhead Turtles in WA. Shark Bay is also an important nursery ground for larval stages of crustaceans, fishes, and medusae (jellyfish).
The Ningaloo Coast	Natural	The integration of the Ningaloo Reef and Exmouth Peninsula karst system as a cohesive limestone structure is at the heart of the natural heritage significance of the Ningaloo Coast. The modern Ningaloo Reef, Exmouth Peninsula karst, and the wave-cut terraces, limestone plains, Pleistocene reef sediments of Exmouth Peninsula, and associated marine, terrestrial, and subterranean ecosystems, including the Muiron Islands, demonstrate a geological, hydrological, and ecological unity, which harmonises the region's present ecosystem functions with its evolutionary history as a time-series of coral reefs and an evolving karst system. The history of coral reefs during the last 26 million years is chronicled in the limestone parapets and wave-cut terraces of Cape Range, which record previous high water levels. Demonstrating late Quaternary deformation at a passive continental margin, the uplifted Neogene wave-cut terraces and fossil reefs that fringe Exmouth Peninsula, and the submerged fossil reef terraces that form the substrate of the modern reef, in immediate juxtaposition with the undeformed modern Ningaloo Reef, contribute to an understanding of the mechanisms that led to the modern character of the west coast of Australia. Archaeological deposits in the rock shelters on Cape Range show Aboriginal people had a comprehensive and sophisticated knowledge of edible and non-edible marine resources between 35,000 and 17,000 years ago. The rock shelters of Exmouth Peninsula are outstanding because they provide the best evidence in Australia for the use of marine resources during the Pleistocene, including their uses as food and for personal adornment. The evidence for standardisation in size and manufacture of the shell beads found at Mandu Creek rock shelter, coupled with the fact they provide the earliest unequivocal evidence for the creation of personal ornaments in Australia, demonstrates a high degree of creative and technical achievement.
The West Kimberley	Natural	The National Heritage listing of the West Kimberley recognises the natural, historic, and Indigenous stories of the region that are of outstanding heritage value to the nation. These and other fascinating stories about the west Kimberley are woven together in

National Heritage place	Class	Summary of significance^
		the following description of the region and its history, including a remarkable account of Aboriginal occupation and custodianship over the course of more than 40,000 years. The Kimberley occupies more than 420,000 km^2 on the north-western margin of the Australian continent. Its rocky coastline edges the Indian Ocean, and off the coast lie thousands of islands, many fringed with coral. The Mitchell Plateau (Ngauwudu) rises to nearly 800 m above sea level at its centre, in places dropping into steep escarpments, and losing altitude as it approaches the sea. Further south, Yampi Peninsula lies in a transitional area between the high rainfall of tropical north Kimberley and the drier conditions characteristic of central WA. These different environments meet in a complex landscape of plains, dissected sandstone plateaus, and rugged mountains. The central Kimberley, which includes the periphery of north Kimberley plateau country and the King Leopold Ranges, is very rugged; the physical structures here were formed by significant geological events, which folded rocks intensely, many thousands of millions of years ago. That such evidence of a distant past can today be seen so clearly in the landscape is due to the region's remarkable geological stability. This stability has also allowed the much more recent appearance of extensive limestone ranges, built from the remains of an extraordinary reef complex which, more than 300 million years ago, rivalled the Great Barrier Reef in size. The ranges have since eroded to form complex networks of caves and tunnels. Dinosaur footprints and tracks are another remarkable remnant of past life in the Kimberley; they are exposed in many places in the Broome sandstone, along the western length of Dampier Peninsula. This coastline is subject to one of the highest tidal ranges in the world, and many of the fossil footprints can only be seen for short periods during very low tides. Inland of Dampier Peninsula, south of the broad floodplains of the Fitzroy River, the distinctive red of the pindan country opens onto a vast expanse of desert. Throughout the Kimberley, where water meets land—in estuaries, mangroves and mudflats, in moist vine thickets, along the banks of rivers and creeks, around waterholes or soaks—there is an abundance of plants and animals, some of which live only in the Kimberley, while others may have travelled from the far side of the world to nest or breed here.

^ Source: Ref. 6.
** Identified in the protected matters search (appendix a) but located inland and thus not expected to be exposed to CAPL's activities.*

2.3 Commonwealth Heritage places

The Commonwealth Heritage List is a list of Indigenous, historic, and natural heritage places owned or controlled by the Australian Government. The Commonwealth Heritage List (Ref. 9) describes the place name, class (Indigenous, natural, historic), and status.

A search of the Commonwealth Heritage List and a protected matters search (appendix a; Ref. 4) revealed that Commonwealth Heritage Places occur in the PA (Table 2-3). The information presented in this table outlines the Nominator's Summary Statement of Significance sourced from the Australian Heritage Database (Ref. 6).

Table 2-3: Commonwealth Heritage places

Commonwealth Heritage place	Class	Summary of significance^
Ashmore Reef National Nature Reserve (External territories list)	Natural	Ashmore Reef (which is an atoll that includes four low-lying uninhabited sand islands) has major significance as a staging point for wading birds migrating between Australia and the northern hemisphere, including 43 species listed on the China–Australia Migratory Bird Agreement (CAMBA) and/or the Japan–Australia Migratory Bird Agreement (JAMBA). The place provides habitat for three species of sea snake; *Aipysurus apraefrontalis*, *A. foliosquama*, and *A. fuscus* with very restricted distributions. *Aipysurus fuscus* is endemic to Ashmore Reef. Ashmore Reef supports extremely high concentrations of breeding seabirds, many of which are nomadic and typically breed on small isolated islands. Breeding colonies of 17 species of seabirds have been recorded. The islands are regarded as supporting some of the most important seabird rookeries on the Sahul Shelf, including large (1,000 to 50,000 breeding pairs) breeding colonies of Sooty Tern (*Sterna fuscata*), Crested Tern (*S. bergii*), Bridled Tern (*S. anaethetus*) and Common Noddy (*Anous stolidus*), and smaller breeding colonies of Little Egret (*Egretta alba*), Eastern Reef Egret (*E. sacra*), Black Noddy (*Anous minutus*), White-tailed Tropic Bird (*Phaethon lepturus*), and Red-tailed Tropic Bird (*P. rubricauda*). The place is also important for providing breeding habitat for Green (*Chelonia mydas*) and Hawksbill Turtles (*Eretmochelys imbricata*). Ashmore Reef exhibits a higher diversity of marine habitats compared with other North West Shelf reefs. The place supports an exceptionally diverse marine fauna, particularly corals (255 species in 56 genera) and molluscs (433 species), and is regarded as having the highest diversity of sea snakes (12 species) in the world. Other highly diverse fauna include birds (78 species), decapod crustaceans (99 species), echinoderms (178 species), and fish (569 species). Species of conservation significance recorded at Ashmore Reef include: the nationally endangered Little Tern (*Sterna albifrons*) and Loggerhead Turtle (*Caretta caretta*), and the nationally vulnerable Green Turtle (*Chelonia mydas*) and Hawksbill Turtle (*Eretmochelys imbricata*). The place also includes species not previously recorded or only rarely recorded in Australia including: three bird species(Brown Hawk Owl [*Ninox scutulata*], White-tailed Tropic Bird [*Phaethon lepturus*], and Black Noddy [*Anous minutus*]); five hermatypic coral species; and 13 fish species. Ashmore Reef is an important scientific reference area for migratory seabirds, sea snakes, and marine invertebrates. It has been the site of several major scientific expeditions and is the subject of ongoing scientific monitoring of biological diversity, fauna populations, and breeding activity. Ashmore Reef is the type locality for two species of sea snake—*Aipysurus apraefrontalis* and *A. foliosquama*. Ashmore Reef is significant for its history of human occupation and use. Although the reef may have been known to the Rottinese people (Rote is an island in modern-day Indonesia) for many centuries, the first description is probably that contained in Eredia (1600) if accepted, this may be the first description of Ashmore Reef, which is now part of Australia. Ashmore Reef is believed to have been visited by fisherman from Rote Island since the early 18th century, as well as by Makassans and Bajau ('Sea Gypsies') and people from the island of Seram. The Ashmore Reef islands were used both for fishing and as a staging point for voyages to the southern reefs off Australia's coast. Occupation by these seafarers, particularly from the area east of Madura (Indonesia), on the islands

Commonwealth Heritage place	Class	Summary of significance^
		occurred intermittently during the 1930s. Visits recommenced in 1947 following World War II and have continued. The islands are also significant for phosphate mining, which lead to their annexation by Great Britain and ultimate transfer to the Australian Government in 1934. Physical evidence of these former occupations exists and would be particularly significant in archaeological terms. Such evidence may include original wells and grave sites and would include evidence of disturbance from early phosphate mining.
Cliff Point Historic Site (WA list)	Historic	The Cliff Point Historic Site, individually significant within the area of Garden Island, is important as it was the first site inhabited by Governor Stirling's party in 1829 when founding the colony of WA, and as WA's first official non-convict settlement. The site was initially occupied by Captain Charles Fremantle before the arrival of Captain Stirling. The party occupied the site for two months before a move was made to the Swan River settlement on the mainland. The Cliff Point Historic Site is important as the site of first settlement in WA and is highly valued by the community for its cultural associations. The Cliff Point Historic Site, also known as Sulphur Town, after *HMS Sulphur* was chosen in 1828 by Governor Stirling to transport settlers to the new colony and is important for its association with Governor Stirling and Captain Charles Fremantle.
Garden Island (WA list)	Natural	Garden Island was the first site occupied by Governor Stirling's party in 1829 when founding the colony of WA; it was also the site of the first official non-convict settlement in WA. The Cliff Point Historic Site on Garden Island, also known as Sulphur Town, was initially occupied by Captain Charles Fremantle before the arrival of Captain Stirling, and is listed separately in the Register (Reg. No. 10657). The party occupied the site for two months before they moved to the Swan River settlement on the mainland. Garden Island, and in particular the Cliff Point Historic Site, is highly valued for its cultural associations as the site of first settlement in WA and is important for its association with Governor Stirling and Captain Charles Fremantle. In 1911, the Commonwealth resumed Garden Island from WA for use as a naval base. The strategic role of Garden Island and Cockburn Sound, which was secured for coastal defence in World War II, is illustrated by defence installations including Challenger or J Gun Battery, and the Scriven, Beacon, and Collie Battery complexes, supported by a range of service structures. Challenger Battery is listed separately in the Register at Reg. No. 18968. The absence of feral predators means that Garden Island provides a significant refuge for animals vulnerable to predation on the mainland. Due to its isolation from the WA mainland, the island is relatively free of disturbance from humans or introduced animals. Species of particular interest include the Tammar Wallaby (*Macropus eugenii*), Carpet Python (*Morelia spilota*), and the Lined Skink (*Lerista lineata*). Populations of the 14 species of reptile and the Tammar Wallaby have been isolated from mainland populations for 6,000–7,000 years. In particular, the population of the Tammar Wallaby on Garden Island is morphologically distinct from all other populations. The vegetation on Garden Island differs in structure and composition from vegetation on nearby Rottnest Island and the adjacent mainland (e.g., eucalypts and banksia, which are common on the mainland, are absent from the island). Due to a low fire frequency, the vegetation on Garden Island is older and denser than that on the mainland. The northern end of the island supports

Commonwealth Heritage place	Class	Summary of significance^
		some of the oldest stands of the rare Rottnest Island Pine (*Callitris preissii*), with most trees dating from the 1920s. Other species that are now rare in the region include the Cheesewood (*Pittosporum phylliraeoides* var. *phylliraeoides*) and Rottnest Teatree (*Melaleuca lanceolata*). The parabolic sand dunes on the western side of Garden Island are among the best-preserved dunes of the Quindalup soil unit, which is widespread in coastal WA. It is likely that Indigenous values exist at this place. The Australian Heritage Commission (AHC) has not yet identified, documented, or assessed these values for National Estate significance.
HMAS Sydney II and *HSK Kormoran* Shipwreck Sites (External territories list)	Historic	The naval battle fought between the Australian warship *HMAS Sydney II* and the German commerce raider *HSK Kormoran* off the WA coast during World War II was a defining event in Australia's cultural history. *HMAS Sydney II* was Australia's most famous warship of the time and this battle has forever linked the stories of these warships to each other. The tragic loss of *HMAS Sydney II* and its entire crew of 645 following the battle with *HSK Kormoran*, remains Australia's worst naval disaster and sent shockwaves throughout the Australian community in November 1941. The battle between *HMAS Sydney II* and *HSK Kormoran* had far-reaching consequences for developing Australia's defences. The loss of *HMAS Sydney II* was the first and most significant in a succession of Australian naval losses that directly threatened the security of Australia and its surrounding seas, having occurred only 17 days before the Japanese launched their attacks in Southeast Asia and the Northern Pacific. The aftermath of the sinking of *HMAS Sydney II* and subsequent warship losses saw a major shift in Australian military and political doctrine away from defending Australia by defending the British Empire to that of direct defence of the Australian mainland and the development of a defence alliance with the United States. The discovery and inspection of *HMAS Sydney II* and *HSK Kormoran* in 2008 has enabled reconciliation of theory and known historical fact concerning the battle with the archaeological evidence present in the remains. This physical evidence was pivotal to the findings of the 2009 *HMAS Sydney II* Commission of Inquiry (Cole Inquiry), and allowed some circumstances of the loss of *HMAS Sydney II* to be better understood. It has also enabled the study of unique technological features that allowed *HSK Kormoran* to avoid identification as a warship when approaching *HMAS Sydney II* until reaching point blank range for the weapons of the time. The surprise achieved by using these technologies was a major factor in the destruction of *HMAS Sydney II*. During the relatively short but conspicuous career of *HMAS Sydney II*, it was commanded by two of the most highly regarded and respected officers serving in the Royal Australian Navy at that time (Captain J.A. Collins and Captain J. Burnett). Their association with *HMAS Sydney II* is significant in both their naval careers and of the ship itself. The 2008 discovery of *HMAS Sydney II* and *HSK Kormoran* has highlighted the ongoing importance of these shipwrecks and their stories to the wider Australian community. The stories of these two ships are not only valued by the family and friends of the servicemen who died but also by veterans, defence personnel, and the Australian community in general. The location, interpretation, and memorialisation of these shipwrecks also provides some closure for the families.
J Gun Battery	Historic	Garden Island is important as the first site occupied by Governor Stirling's party in 1829 when founding the colony of Western

Commonwealth Heritage place	Class	Summary of significance^
(WA list)		Australia and as the first official non-convict settlement in WA. The Cliff Point Historic Site, also known as Sulphur Town, was occupied in the first instance by Captain Charles Fremantle before the arrival of Captain Stirling, and is listed separately in the Register (Reg. No. 10657). The party occupied the site for two months before a move was made to the Swan River settlement on the mainland. Garden Island, and in particular the Cliff Point Historic Site, is highly valued by the community for its cultural associations as the site of first settlement in WA and is important for its association with Governor Stirling and Captain Charles Fremantle. Garden Island was selected as the base for a naval base in 1911 and resumed by the Commonwealth. The strategic role of the island and Cockburn Sound, secured for coastal defence in the Second World War 1939–1945, is illustrated by defences including Challenger or J Battery and the Scriven, Beacon, and Collie Battery complexes, supported by a range of service structures. Challenger battery is listed separately in the Register at Reg. No. 18968. The absence of feral predators means that Garden Island provides a significant refuge for animals vulnerable to predation on the mainland. Due to its isolation from the WA mainland, the island is relatively free of disturbance from humans or introduced animals. Species of particular interest include the Tammar Wallaby (*Macropus eugenii*), Carpet Python (*Morelia spilota*), and the Lined Skink (*Lerista lineata*). Populations of the 14 species of reptile and the Tammar Wallaby have been isolated from mainland populations for 6,000–7,000 years. In particular, the population of the Tammar Wallaby on Garden Island is morphologically distinct from all other populations. The vegetation on Garden Island differs in structure and composition from vegetation on nearby Rottnest Island and the adjacent mainland. For example, eucalypts and banksia, which are common on the mainland, are absent from the island. Due to a low fire frequency, the vegetation on Garden Island is older and denser than that on the mainland. The northern end of the island has some of the oldest stands of the rare Rottnest Island pine (*Callitris preissii*), with most trees dating from the 1920s. Other species that are now rare in the region include the Cheesewood (*Pittosporum phylliraeoides* var. *phylliraeoides*) and Rottnest Teatree (*Melaleuca lanceolata*). The parabolic sand dunes on the western side of the island are among the best-preserved dunes of the Quindalup soil unit, which is widespread in coastal WA. It is likely that Indigenous values exist at this place. The AHC has not yet identified, documented, or assessed these values for National Estate significance.
Lancelin Defence Training Area (WA list)	Natural	The Lancelin Defence Training Area (DTA) is at the northern end of the Swan Coastal Plain, an area of exceptionally diverse flora and fauna. Much of Lancelin is dominated by species-rich Banksia woodlands and Myrtaceous/Proteaceous heaths. The floristic mosaic of *Banksia attenuata – B. menziessi* low woodlands, wet heaths, and low-heath communities represent significant vegetation remnants that are poorly conserved and under-represented in the conservation reserve system. The Lancelin DTA contains wetlands that are important in the hydrogeological system of the region. The Namming freshwater wetland suite contains a high diversity of habitats, is an important breeding site for waterfowl, and acts as a drought refuge for both waterfowl and other fauna.

Commonwealth Heritage place	Class	Summary of significance^
		The Lancelin DTA is close to the boundary of two major zoogeographic regions, the semi-arid Eyrean zone, and the Bassean, or south-western zone of WA. This accounts in part for the high vertebrate fauna richness, particularly for reptiles and frogs, with eight frog species recorded in the large, seasonal Walyengarra Lake. Several species occur at the edge of their distribution range within the place. Reptile species that are at, or near, the southern limit of their distribution in the Lancelin DTA include the skink *Lerista planiventralis* and the snake *Simoselaps littoralis*. Many bird species are at or near their northern limit of distribution here, including the Southern Emu Wren (*Stipiturus malachurus*), and the Spotted Pardalote (*Pardalotus punctata*), while several are at their southern limits, including the Pied Butcherbird (*Cracticus nigrogularis*), and the Pied Honeyeater (*Certhionyx variegatus*). The vegetation community known as Tall Heath—comprising *Calothamnus quadrifidus*, *Dryandra sessilis*, and *Hakea trifurcata*—is near the southern limit of its distribution within the Lancelin DTA. Stands of Tuart (*Eucalyptus gomphocephala*) are significant as this area is close to this restricted species' northern limit. Several flora species found in the place are listed as poorly known or rare (Priority species) in WA, including species that are known from only a few populations that are under threat. The Lancelin DTA occurs within a narrow strip along the central and south WA coast where a number of reptile species have restricted distributions. Species with restricted distributions that occur here include the legless lizards *Aclys concinna*, *Pletholax gracilis*, and *Delma grayii* and the skinks *Ctenotus australis* and *Lerista praepedita.*
Learmonth Air Weapons Range Facility (WA list)	Natural	The geomorphology of Cape Range, of which the Learmonth Air Weapons Range (AWR) Facility is a part, is of considerable importance in documenting sea level and landform changes since the late Cenozoic Era (~1.8 million years ago). A series of emergent reef complexes, which represent several periods of coral reef development, are striking elements of the geomorphology of the western side of the Learmonth AWR Facility and Cape Range. The ages of these reef terraces are key to understanding of the timing of uplift events. The coastal plain of Cape Range contains a network of subterranean waterways, comprising caverns and fissures in the limestone beneath the coastal plain. Of these, Bundera Sinkhole, found within the Learmonth AWR Facility, is the only deep anchialine system known in Australia, and is the only continental anchialine system known in the southern hemisphere. Anchialine systems are cave systems with restricted exposure to open air, with subterranean connections to the sea, and showing marine and terrestrial influences. Anchialine systems are noted both for their relict fauna and their high species richness. The physicochemical environment in Bundera Sinkhole is very complex, and is associated with biogeochemical processes that are likely to be important for maintaining the unique community contained in this system. The cave fauna of Cape Range, including that within the Learmonth AWR Facility at Bundera Sinkhole, is of exceptional biogeographical importance. Much of the fauna developed a long time ago, with a number of species of the aquatic cave fauna (stygofauna) originating in the Tethys Sea ~170 million years ago. Bundera Sinkhole supports several species of aquatic stygofauna, many of which are endemic to the sinkhole or to Cape Range. Many of the stygofauna species have their closest known affinities

Commonwealth Heritage place	Class	Summary of significance^
		with the fauna of anchialine caves on either side of the North Atlantic. This narrow cave is also the only known southern hemisphere site for a crustacean from the class Remipedia (*Lasionectes exleyi*). *L. exleyi* is listed as endangered at both State and Commonwealth levels. This species is widely separated from related species found in the North Atlantic. Bundera Sinkhole is also the only known locality in the southern hemisphere for another crustacean species: *Danielopolina* sp. Nov. Several other crustacean species found in Bundera Sinkhole are likely to have originated from the Tethys Sea, including: *Stygiocaris lancifera* (the Lance-beaked Cave Shrimp); two copepods from the Calanoida order (*Bunderia* sp. and *Stygocyclopia* sp.); and another copepod, *Halicyclops spinifer*. Many of these species also have widely separated distributions (e.g. *Halicyclops* is confined in Australia to Cape Range, but is also found in Iran, Brazil, and India). The Lance-beaked Cave Shrimp is listed as rare or likely to become extinct at the State level. The gastropod *Iravadia* sp. is found in brackish water in Bundera Sinkhole, and represents the first marine/estuarine stygophile recorded from the region. A fish species, the Blind or Cave Gudgeon *Milyeringa veritas*, also occurs here—it is one of only two vertebrate species known in Australasia that is confined to caves. This species is listed as vulnerable at the national level. *Prionospio thalanji* sp. nov., a worm from the Spionidae family, has been described from Bundera Sinkhole. Other species from this genus are predominantly marine, and this is the first global record of a spionid occurring in a cave environment. The ecosystems represented in the caves of the Cape Range and subterranean waterways under the coastal plains of the peninsula, including in the Learmonth AWR Facility at Bundera Sinkhole, are rare in WA. Only a small number of cave ecosystems exist in WA, and Bundera Sinkhole, along with other caves at Cape Range, are the only example in Australia of an orogenic (formed during a mountain building phase) limestone from the Tertiary Period (between 65 million and 1.8 million years ago). Stygofauna throughout the world is of considerable scientific interest, yielding important information concerning the evolution of life on earth. The stygofauna at Cape Range, including species found within the Learmonth AWR Facility at Bundera Sinkhole, give insights into the origin of Australian fauna, changes in climate since the Miocene Epoch, and the biogeographical history of the continent Several species of vertebrate terrestrial fauna at Cape Range, including within the Learmonth AWR Facility, are of biogeographical importance because they form isolated populations, or populations at the limit of their range. The reptile fauna is of particular biogeographical significance, with a number of species or subspecies occurring here with highly restricted distributions. The Learmonth AWR Facility supports six southern reptile species that are at, or close to, their northern geographic limit: *Diplodactylus ornatus*, *Ctenotus fallens*, *Lerista lineopunctulata*, *L. praepedita*, *Morethia lineoocellata*, and *Vermicella littoralis*. All these species are found on the western coastal dunes, and are largely restricted to the coastal corridor. All are endemic to southern WA and restricted to sandy coastal habitats along the western coast. The Learmonth AWR Facility supports several plant species that are either endemic, or mainly limited to the Cape Range peninsula, with at least ten endemic flora species occurring here.

Commonwealth Heritage place	Class	Summary of significance^
Mermaid Reef – Rowley Shoals (WA list)	Natural	Mermaid Reef is characterised by environmental conditions that are rare for shelf-edge reefs and are known only in the Rowley Shoals in WA; these conditions include clear, deep oceanic water and large tidal ranges. Species of conservation significance recorded at the place include the nationally vulnerable Green Turtle (*Chelonia mydas*). The Rowley Shoals provide habitat for species not previously been recorded in WA, including 216 fish species, 39 mollusc species, and seven echinoderm species. The Rowley Shoals are regionally important for their fauna diversity, which includes: corals (184 species in 52 genera); molluscs (260 species); echinoderms (90 species); and fish (485 species). Mermaid Reef, together with Clerke and Imperieuse Reefs, has biogeographical significance due to the presence of species that are at, or close to, the limits of their geographic ranges, including fish known previously only from Indonesian waters (e.g. the apogonid *Cheilodipterus singapurensis*, the pomacentrid *Chrysiptera hemicyanea*, the blenniid *Escenius schroederi*, and several gobiids). The monotypic labrid *Conniella apterygia* is endemic to the region of Rowley Shoals and Seringapatam and Scott Reefs. Mermaid Reef is particularly significant as a stepping-stone in the spread of genetic material from the Indonesian archipelago to the reefs to the south. The Rowley Shoals are important for benchmark studies as they are one of the few places off the north-west coast of WA that have been the site of major biological collection trips by the WA Museum. The Rowley Shoals includes the type locality of several fish, including the genus and species of the wrasse *Conniella apterygia* and the serranid species *Pseudanthias sheni*. The place is one of the best morphological examples of shelf-edge reefs in Australian waters and is important for demonstrating their principal structural and developmental characteristics. A shipwreck off the western edge of Mermaid Reef is believed to be that of the British whaling vessel *Lively*, which was lost in the early 1800s.
Ningaloo Marine Area – Commonwealth Waters (WA list)	Natural	Whale Sharks (*Rhincodon typus*) congregate in the Ningaloo Marine Area after the mass coral spawning each autumn in the adjacent Ningaloo Reef (State waters). The place is an important feeding area for the Whale Shark and one of the few places in the world where they are known to congregate regularly in significant numbers. The place is part of the annual migration route for the endangered (Commonwealth) Humpback Whale. They migrate north to Kimberley (WA) breeding grounds in winter (June–August) and south to Antarctic feeding grounds in summer (August–November). Other Commonwealth listed threatened species found in the place are the endangered Blue Whale, Southern Right Whale (*Eubalaena australis*), Loggerhead Turtle, and Southern Giant Petrel (*Macronectes giganteus*); the vulnerable Fin Whale (*Balaenoptera physalis*), Sei Whale (*B. borealis*), Green Turtle, Hawksbill Turtle, Flatback Turtle, Soft-plumaged Petrel (*Pterodroma mollis*), Great White Shark (*Carcharodon carcharias*), and Grey Nurse Shark (*Carcharias taurus*). Other significant species include the Dugong, Spinner Dolphin (*Stenella longirostris*), Yellow-nosed Albatross (*Diomedea chlororhynchos*) and Osprey (*Pandion haliaetus*). Marine turtle density is exceptionally high in the place; Green Turtles are the most abundant, exceeding the highest densities recorded in the Great Barrier Reef Marine Park (Queensland). The place is on the migratory route of many trans-equatorial wader bird species, and provides valuable feeding grounds for many migratory seabirds, including 11 species protected under JAMBA and/or CAMBA including the Wedge-tailed Shearwater (*Puffinus pacificus*), Wilson's Storm Petrel (*Oceanites oceanicus*), Lesser

Commonwealth Heritage place	Class	Summary of significance^
		Frigatebird (*Fregata ariel*), Crested Tern (*Sterna bergii*), and White-winged Tern (*Chlidonias leucoptera*). The place is an important breeding area for billfish, and is one of the few areas in the world where aggregations of several species (Black Marlin, Blue Marlin, Striped Marlin, and sailfish) occur. The place is an important feeding area for manta rays in autumn and winter and significant for tuna migration and potentially important for juvenile Southern Bluefin Tuna (*Thunnus maccoyii*). The Ningaloo Marine Area provides opportunities for scientific research in many different fields related to aspects of the place's unique and interesting features. Past, current, and ongoing research is being undertaken by academic and research institutions, including: the Department of Biodiversity, Conservation and Attractions (WA), Commonwealth Scientific and Industrial Research Organisation (CSIRO), Australian Institute of Marine Science (AIMS), Murdoch University (WA), University of WA, Edith Cowan University (WA), and James Cook University (Queensland). Areas of research include tourism, marine ecology, whales, marine turtles, Whale Sharks, fish, and oceanography. The Ningaloo Marine Area has many historic associations for European exploration and development of the North West Cape and northern WA, including pearling and whaling activities. To date eight shipwrecks dating from 1811 to 1923 have been discovered in the area. Other Indigenous and non-Indigenous cultural values of National Estate significance may exist in this place, but the AHC has not yet identified, documented, or assessed these values.
Scott Reef and Surrounds – Commonwealth Area (External territories list)	Natural	Scott Reef is a significant component of a disjointed chain of shelf-edge reefs separated from Indonesia by the Timor Trough. It is regionally significant both because of its high representation of species not found in coastal waters off WA and for the unusual nature of its fauna, which has affinities with the oceanic reef habitats of the Indo-West Pacific as well as the reefs of the Indonesian region. Scott Reef is important for its contribution to understanding long-term geomorphological and reef formation processes and past environments—its sedimentary sequence extends back to include sediments from the Triassic Period. The place has biogeographical significance due to the presence of species that are at, or close to, the limits of their geographic ranges, including fish known previously only from Indonesian waters (e.g. *Cheilodipterus singapurensis*, *Chrysoptera hemicyanea*, *Ecsenius schroederi*, and several gobiids). In addition, some coral species may be endemic to Scott Reef. The reef's isolation and large size may predispose it for the evolution of genetically distinct subspecies or endemic species. Several species are currently only known from Scott Reef, including 51 fish species, 14 mollusc species, six echinoderm species, and the seagrass *Thalassia hemprichii*. Scott Reef is of biogeographical significance due to its connectivity in terms of gene flow and coral spore movement to surrounding reefs such as Ashmore Reef and Rowley Shoals. Scott Reef has enormous habitat diversity and is considered a hot spot of fish diversity. Scott Reef is characterised by environmental conditions that are rare for shelf atolls; these conditions include clear, deep oceanic water and large tidal ranges. Scott Reef has nationally vulnerable Green Turtles (*Chelonia mydas*), which are genetically distinct from those on near-coastal sites in WA, from the Lacepede Islands to North West Cape. The sand cays of the place are important habitat for migrating animals in the largely landless expanse of the Timor Sea. They are an important staging area for birds, particularly

Commonwealth Heritage place	Class	Summary of significance^
		migrants to and from Australia. Seventeen of the 25 bird species identified on Scott Reef are on CAMBA and/or JAMBA lists. Scott and Seringapatam Reefs together are regionally important for the diversity of their fauna, which includes corals (224 species in 56 genera); molluscs (279 species); decapod crustacea (56 species); echinoderms (117 species); and fish (558 species). Scott Reef is important for scientific research and benchmark studies due to its great age, the exceptional documentation of its geophysical and physical environmental characteristics, and its use as a site of major biological collection trips and surveys by the WA Museum and AIMS.
Yampi Defence Area (WA list)	Natural	The Yampi Defence Area displays a complex mosaic of landforms in the transition from the sandstone plateaus of the north-west Kimberley, to the broad plains and pindan scrub of the south-west Kimberley. The occurrence of such diverse landscapes within a relatively limited area is unusual. The strong relationship that exists between past orogenic events and the diverse landscape pattern of ridges and valleys is emphasised in the shape of the Yampi Fold Belt, and distinguished by the pronounced ria embayments that characterise the coastline. Landforms originating from rocks within the Yampi Fold Belt and the terrain associated with the Late Devonian Lillyboororaroo Conglomerate are of considerable scientific importance. The erosion of the Lillyboororaroo Conglomerate, which covers the Yampi Fold Belt, has partially exposed a pre-Devonian land surface, the attributes of which have enormous potential to aid our understanding of long-term geomorphological processes and evolution. Suggestions that the Lillyboororaroo Conglomerate remains an original valley fill deposit would attest to very low rates of erosion and long-term landscape stability, reinforcing the scientific importance of the place. The Yampi Defence Area, which is at the crossroads of the Dampierland, Central, and Northern Kimberley biogeographical regions, has a diverse range of ecosystems, displaying an unusual richness of faunal associations and vegetation communities, with >800 plant species (approximately one-third of the described Kimberley flora) being recorded. Previous surveys of the Dampier Peninsula and Walcott Inlet, and the Kimberley Rainforest Survey enable the changing floristic composition to be compared between adjacent areas. On the basis of species richness, indications are that the Yampi Defence Area supports >1,000 species, including undescribed, rare, and fire-sensitive species that are declining elsewhere in the Kimberley. Similarly, the known distributions of vertebrates from the Yampi Peninsula, and locations to the north and south, indicate that a far richer fauna is likely to occur in the place. Fire-protected sandstone communities, typified by healthy mixed-age stands of cypress pine (*Callitris intratropica*) once common throughout the Kimberley are now very rare in northern Australia, and the occurrence of such stands around Secure Bay are important reference sites for similar Kimberley plant communities that are subject to more frequent fire regimes. The extensive sandstone landforms support small isolated patches of rainforest (the south-west limit in the Kimberley of the distribution of rainforest over sandstone), creating important nodes of diversity and refugia that contain many regionally endemic plants, animals, and invertebrates. Granite landforms are of restricted distribution in the Kimberley and mostly occur in drier areas. The high concentration of granite outcrop sequences at Yampi occurs in a higher rainfall zone

Commonwealth Heritage place	Class	Summary of significance^
		resulting in formation of diverse and specialised vegetation communities. Aquatic plants inhabit the ephemeral pools that form in granite depressions, while rock-colonisers populate the granite fissures and scree slopes where run-off water is high. Six plant taxa occur within the place that are endemic to the Yampi Peninsula. Yampi Defence Area is the type locality for the insectivorous plant *Byblis filifolia*, first collected in 1838 during the voyage of *HMS Beagle*. The close juxtaposition of three botanical regions within the place is highlighted by the presence of numerous tropical plant species and several animal taxa that are at the southern edge of their distribution. Merging with these are many arid zone plants at the northern and western edge of their distribution, recognisable as the pindan grades into the taller woodland structure of the north-western Kimberley. The sandstone mesa south of Kimbolton is the southernmost locality for several plant taxa restricted to the fire-protected sandstone ranges of the Kimberley. The diversity of landforms in the place and the resultant high concentration of small refugial habitats support a regionally rich vertebrate fauna and represent the most southerly known extant population of the nationally vulnerable Golden-backed Tree-rat (*Mesembriomys macrurus*) and the most southerly record in the Kimberley of the Sugar Glider (*Petaurus breviceps*). The bird fauna is significant as it represents a suite of species that are at, or near, the southern edge of their range in the semi-humid zone of the Kimberley including the Green-winged Pigeon (*Chalcophaps indica*); the Torres Strait Pigeon (*Ducula bicolor*); and the Little Shrike-thrush (*Colluricincla megarhyncha parvula*). The place is also an important zone of overlap between many northern and southern species and subspecies. The vertebrate fauna shows its closest similarity to those recorded from the wetter areas of the west Kimberley that lie further to the north. The place supports several fauna and flora species that are listed as specially protected, threatened, or having priority status in WA, as well as four fauna species that are nationally vulnerable and one species that is nationally endangered. Other Indigenous and non-Indigenous cultural values of National Estate significance may exist in this place, but the AHC has not yet identified, documented, or assessed these values.

^ *Source: Ref. 6.*

2.4 Wetlands of international importance (listed under the Ramsar Convention)

At the time of writing this document, Australia has 66 Ramsar wetlands that cover >8.3 million ha. Ramsar wetlands are those that are representative, rare, or unique wetlands, or that are important for conserving biological diversity. These are included on the List of Wetlands of International Importance held under the Ramsar Convention (Ref. 10).

The Ramsar Wetlands of Australia spatial dataset (Ref. 11) shows the Ramsar wetlands within the PA (Table 2-4). The Ramsar Convention defines ecological character as the combination of the ecosystem components, processes, benefits and services that characterise the wetland at a given point in time (Ramsar Convention 2005a, Resolution IX.1 Annex A). A summary of the ecological character of the wetlands is described in Table 2-4.

Table 2-4: Ramsar wetlands

Summary of the ecological character of Ramsar wetlands
Ashmore Reef Commonwealth Marine Reserve
Ashmore Reef Commonwealth Marine Reserve is located in the Indian Ocean on the edge of Australia's North West Shelf, ~610 km north of Broome and ~840 km west of Darwin. The Reserve is in Australia's External Territory of Ashmore and Cartier Islands. It is the largest of only three emergent oceanic reefs present within the north-eastern Indian Ocean. The Reserve is comprised of numerous marine habitats and supports a regionally important and diverse range of species. The following summary of ecosystem components, processes and services has been extracted from Hale and Butcher (Ref. 12). **Ecosystem components and processes** • Climate: Arid tropical monsoonal climate. Located outside the main belt of tropical cyclones in the Timor Sea. • Geomorphic setting: Located in an area of high oil and gas reserves, with active hydrocarbon seeps. Geomorphic groups within the site include reef slope, reef crest, reef flat, back reef sands, lagoons and islands. • Tides and currents: Strong seasonal influences of the Indonesian Throughflow and Holloway currents. Internal waves are a feature of the region and Ashmore Reef may act to break these resulting in increased nutrients from the bottom waters. High energy environment with spring tides over 4.5 m and large flushing on tidal cycles. • Water quality: Seasonal variations in temperature and salinity in ocean and lagoon water. Water clarity, turbidity and other water quality parameters remain a knowledge gap. • Vegetation: Five species of seagrass recorded with *Thalassia hemprichii* dominant, comprising over 85% of total cover. Total cover of 470 ha, over 3,000 ha of macroalgae, mostly on reed slope and crest areas. Algae dominated by turf and coralline algae with fleshy macroalgae comprising typically less than 10% of total algae cover. • Marine invertebrates: Ashmore Reef has a diversity of marine invertebrates including hard and soft corals, molluscs, echinoderms and crustaceans. 275 species of hard coral, covering an area of around 700 ha. 39 taxa of soft coral, covering an area of around 300 ha. Total coral cover was low around the time of listing following the 1998 bleaching event but recovered in recent years to baseline levels. Over 600 species of mollusc, including two endemic species. Over 180 species of echinoderm, including 18 species of sea cucumber. Sea cucumber density is highly variable, but on average exceeds 30 per hectare. 99 species of decapod crustacean. • Fish: Over 750 species of fish, including five species of fish and three species of shark listed as threatened. Predominantly shallow water, benthic taxa that are common throughout the Indo-Pacific. Density of small reef fishes is around 20,000 to 40,000 per hectare. Low density of sharks (less than one per hectare). • Seasnakes: Prior to listing there was a high diversity and population, peaking in 1998 with an estimated total population of 40,000 snakes in the site. However, by time of listing in 2002 the site was on a trajectory of decline and diversity and abundance was low. • Turtles: Three species of marine turtle: Green (*Chelonia mydas*), Hawksbill (*Eretmochelyis imbricata*) and Loggerhead (*Caretta caretta*) all of which are listed threatened species. Green Turtles are the most abundant, with a total estimated population of around 10,000. Nesting by two species; Green Turtles and Hawksbill Turtles. • Seabirds and shorebirds: Ashmore Reef supports an abundance and diversity of wetland birds. 72 species of wetland dependent bird recorded within the Ramsar site. 47 species listed under international migratory agreements. Average of around 48,000 seabirds and shorebirds annually. Six species are regularly recorded in numbers greater >1% of the population. Nesting of 20 species, 14 of which regularly breed in the site. • Dugong: Small but significant population, that may breed within the site. Data deficient. **Ecosystem services** • Provisioning services–Freshwater: Indonesian fishers use the freshwater lens at West Island. • Cultural services–Recreation and tourism: Although remote and access is controlled, the site is important for passive recreation such as diving and bird watching.

Summary of the ecological character of Ramsar wetlands

- Cultural services–Cultural heritage and identity: Ashmore Reef has been regularly visited and fished by Indonesians since the early 18th century. West Island contains some archaeological artefacts and graves.
- Cultural services–Scientific and educational: The reef has high value for scientific research because it currently received relatively low use and is ecologically unique within the bioregion.
- Supporting services–Near-natural wetland types: Ashmore Reef supports a number of largely unmodified wetland types.
- Supporting services–Biodiversity: Ashmore Reef is a hotspot of biodiversity within the Timor Province bioregion. Highest biodiversity of reef building corals (275 species from 56 genera). Highest diversity of soft corals (39 taxa). More than 600 species of mollusc. Over 180 species of echinoderm, including 13 species of sea cucumber. Nearly 100 species of decapod crustacean. Over 750 species of finfish. High diversity of seasnakes.
- Supporting services–Physical habitat: The site supports large breeding colonies of seabirds.
- Supporting services–Priority wetland species: The Ramsar site supports 47 species of shorebirds listed under international migratory bird treaties.
- Supporting services–Threatened species: Ashmore Reef supports 62 species listed as threatened at the national and/or international level.

Becher Point Wetlands

The Becher Point Wetlands Ramsar site is a system of about 60 small wetlands located near Rockingham in southwest WA.

Over the past 5,000 years Becher Point advanced seaward, or westwards, in response to falling sea levels, with the new terrestrial land forming a stable beachridge plain.

As the beachridge plain grew westwards, new wetlands formed to the west of the older wetlands. The older wetlands evolved from simple groundwater systems to more complex wetland systems with different hydrological and ecological character. The Becher Point Wetlands Ramsar site covers the younger wetlands in this progression, with the newest wetlands being <1,000 years old and the oldest ~3,000 years old.

The wetlands support sedgelands, herblands, grasslands, open-shrublands, and low open-forests. The sedgelands that occur within the linear wetland depressions of the Ramsar site are a nationally listed threatened ecological community (TEC).

At least four species of amphibians and 21 species of reptiles have been recorded on the site. The site also supports the Southern Brown Bandicoot.

The site is gazetted as a reserve for conservation of flora and fauna. The site, which includes the Port Kennedy Scientific Park, is used for research, education, and recreation.

A formal ecological character description report is currently not available for the Becher Point Wetlands.

Eighty-mile Beach

The Eighty-mile Beach Ramsar site comprises two separate areas: ~220 km of beach and associated intertidal mudflats from Cape Missiessy to Cape Keraudren, and the Mandora Salt Marsh ~40 km to the east. The beach is characterised by extensive (1–4 km wide) intertidal mudflats comprised of fine silt and clay, bounded to the east by a narrow strip of coarse quartz sand and then coastal dunes. The beach is a relatively linear stretch with a few tidal creeks with small extents of the grey mangrove (*Avicennia marina*). Mandora Salt Marsh comprises of a series of floodplain depressions within a linear dune system. The site contains two large seasonal depressional wetlands (Lake Walyarta and East Lake) and a series of small permanent mound springs.

The following summary of ecosystem components, processes and services has been extracted from Hale and Butcher (Ref. 13).

Ecosystem components and processes

- Climate: Semi-arid monsoonal with a prolonged dry period. >80% of rainfall in the wet season (December to March). High inter-annual variability. High occurrence of tropical cyclones.
- The Beach:

Summary of the ecological character of Ramsar wetlands

  - Geomorphology: Extensive intertidal mudflats comprised of fine-grained sediments. Site is backed by steep dunes comprised of calcareous sand.
  - Hydrology: Macro-tidal regime. No significant surface water inflows. Groundwater interactions unknown (knowledge gap).
  - Primary production and nutrient cycling: Data deficient, but organic material deposited from ocean currents driving the system through bacterial or microphytobenthos driven primary production.
  - Invertebrates: Large numbers and diversity of invertebrates within the intertidal mudflat areas.
  - Fish: Data deficient, but anecdotal evidence of marine fish (including sharks and rays) using inundated mudflats.
  - Waterbirds: Significant site for stop-over and feeding by migratory shorebirds. Regularly supports >200,000 shorebirds during summer and >20,000 during winter. High diversity with 97 species of waterbird recorded from the beach. Regularly supports >1% of the flyway population of 20 species.
  - Marine turtles: Significant breeding site for the Flatback Turtle.
- Mandora Salt Marsh:
  - Geomorphology: Wetland formation dominated by alluvial processes. Wetlands were once a part of an ancient estuary. Freshwater springs have been dated at 7,000 years old.
  - Hydrology: Lake Walyarta, East Lake and the surrounding intermittently inundated paperbark thickets are inundated by rainfall and local runoff. Extensive inundation occurs following large cyclonic events. Salt Creek and the mound springs are groundwater fed systems through the Broome Sandstone aquifer.
  - Water quality: Most wetlands are alkaline reflecting the influence of soils and groundwater. Salinity is variable, mound springs are fresh, Salt Creek hyper-saline and Lake Walyarta variable with inundation. Nutrient concentrations in groundwater and groundwater fed systems are high.
  - Primary production and nutrient cycling: Data deficient. However, evidence of boom-and-bust cycle at Lake Walyarta with seasonal inundation.
  - Vegetation: Inland mangroves (*Avicennia marina*) lining Salt Creek are one of only two occurrences of inland mangroves in Australia. Paperbark thickets dominated by the saltwater paperbark (*Melaleuca alsophila*) extend across the site on clay soils which retain moisture longer than the surrounding landscape. Samphire (*Tecticornia* spp.) occurs around the margins of the large lakes. Freshwater aquatic vegetation occurs at Lake Walyarta when inundated and at the mound spring sites year round.
  - Invertebrates: Data limited, but potentially unique species
  - Waterbirds: Significant site for waterbirds and waterbird breeding, particularly during extensive inundation events. 66 waterbirds recorded. Supports >1% of the population of at least two species. Breeding recorded for at least 24 species.

Ecosystem benefits and services

- Provisioning service–Freshwater: The freshwater springs at Mandora Salt Marsh provide drinking water for livestock.
- Provisioning service–Genetic resources: Plausible, but as yet no documented uses.
- Regulating service– Climate regulation: Plausible, but data deficient.
- Regulating service–Biological control of pests: Evidence that many of the shorebirds feed on the adjacent pastoral land and that the incidence of 2.88 million oriental pratincole coincided with locusts in almost plague proportions, upon which the birds fed.
- Cultural Services–Recreation and tourism: The beach portion of the site is important for recreational fishing, tourism, bird watching and shell collecting.
- Cultural Services–Spiritual and inspirational: Spiritually significant for the Karajarri and Nyangumarta and contain a number of specific culturally significant sites. Site has inspirational, aesthetic and existence values at regional, state and national levels.
- Cultural Services–Scientific and educational: Mandora Salt Marsh and Eighty-mile Beach have been the site of a number of significant scientific investigations. In addition, Eighty-mile

Summary of the ecological character of Ramsar wetlands

Beach is a significant site for migratory shorebird monitoring and is currently part of the Shorebirds 2020 program.

- Supporting services: As evidenced by the listing of the Eighty-mile Beach Ramsar site as a wetland of international importance. The system provides a wide range of biodiversity related ecological services critical for the ecological character of the site including:
  - contains exceptionally large examples of wetland types and includes rare wetland types of special scientific interest
  - supports significant numbers of migratory shorebirds
  - supports waterbird breeding
  - supports marine turtles.

Ord River Floodplain

The Ord River Floodplain Ramsar site is located in the northeast of WA, ~8 km east of the town of Wyndham within the Victoria-Bonaparte bioregion. The site covers over 140,000 hectares and lies within the Shire of Wyndham–East Kimberley.

The Ord River Floodplain site contains a wide range of wetland types and includes inland and marine components. The Ramsar site comprises: Parry Lagoons, Ord Estuary, and False Mouths of the Ord.

The following summary of ecosystem components, processes and services has been extracted from Hale (Ref. 14).

Ecosystem components and processes

- Climate: semi-arid monsoonal; 80% of rainfall in the wet season (December to February); on average evaporation exceeds rainfall in 11 of 12 months
- Geomorphology: estuarine reaches of river; tidal flat creek system (False Mouths of Ord); seasonally inundated floodplain with permanent waterholes (Parry Lagoons).
- Hydrology: macro-tidal influence; modified flows from dams upstream; low flow during dry season; higher flows in wet season; overbank flows from the Ord River to Parry Lagoons now low frequency; Parry Creek major source of water for Parry Lagoons (and floodplains)
- Water Quality: estuary is highly turbid; potentially high nutrient levels from upstream agriculture; estuary is a net exporter of nutrients; salinity in estuary varies seasonally (30–35 ppt in dry season; < 4 ppt in wet); Parry Lagoons predominantly fresh; levels of agrichemicals above ANZECC guidelines detected
- Phytoplankton: estuary dominated by diatoms; plankton is predominantly epibenthic
- Vegetation: extensive mangroves in intertidal areas – 15 species; saltmarsh at higher elevations; Parry Lagoons characterised by extensive sedge / grass lands (intermittent inundation); aquatic vegetation in permanent waterholes; wooded swamp surrounding
- Invertebrates: commercially significant taxa include mud crabs and white banana prawns; data deficient for other communities and populations
- Fish: > 50 species (estuarine, marine and freshwater); migratory route for ~17 species; supports threatened taxa listed under the EPBC Act (Freshwater Sawfish, Green Sawfish and Northern River Shark)
- Birds: Regularly supports >20,000 waterbirds; breeding recorded for 16 species; regularly supports >1 % of the population of Plumed Whistling Duck and Little Curlew; supports the EPBC listed species the Australian Painted Snipe
- Crocodiles: supports Saltwater and Freshwater Crocodiles

Ecosystem services

- Provisioning service–Wetland products: commercial fisheries for a number of species of fish, as well as prawns and crabs; genetic resources - plausible, but as yet no documented uses
- Regulating services–Erosion control: mangroves
- Regulating services–Climate regulation: plausible, but data deficient
- Regulating services–Biological control of pests: support of predators of agricultural pests
- Cultural services–Recreation and tourism: site is important for recreational fishing; tourism; bird watching and crocodile watching
- Cultural services–Spiritual and inspirational: spiritually significant for the Miriuwung, Gajerrong and contain a number of specific culturally significant sites; site has inspirational,

Summary of the ecological character of Ramsar wetlands

aesthetic and existence values at regional, state and national levels; the site contains a number of non-indigenous historical sites

- Cultural services–Scientific and educational: focus of scientific research (e.g. CSIRO investigation)
- Supporting services: as evidenced by the listing of the Ord River Floodplain site as a wetland of international importance; the system provides a wide range of biodiversity related ecological services critical for the ecological character of the site including:
  - supporting diverse habitat types
  - supporting critical life stages
  - supporting threatened species
  - supporting waterbird populations
  - supporting fish populations.

Peel-Yalgorup System

The Peel-Yalgorup wetland system, in south-western Australia, is located ~80 km south of Perth within the Swan Coastal Plain bioregion. The 26,000 ha site includes shallow estuarine waters, saline, brackish and freshwater wetlands of the Peel Inlet, Harvey Estuary, several lake systems including Lake McLarty and Lake Mealup and the Yalgorup National Park.

The following summary of ecosystem components, processes and services has been extracted from Hale and Butcher (Ref. 15).

Ecosystem components and processes

- Peel-Harvey Estuary
  - Geomorphology: Shallow bar-built estuary. Narrow connection to the Indian Ocean (Mandurah Channel). Organic sediments (black ooze).
  - Hydrology: Highly seasonal freshwater inflows from direct precipitation and rivers. Limited tidal exchange with the Indian Ocean. Limited groundwater inflows.
  - Water Quality: High concentrations of nutrients (eutrophic) from catchment. Seasonal variability in salinity. Stratification and deoxygenation of bottom waters.
  - Acid Sulfide Soils: Monosulphidic black ooze. Exposed via dredging.
  - Phytoplankton: Winter diatom blooms. Spring Nodularia blooms in the Harvey Estuary.
  - Benthic Plants: Excessive growth of green macroalgae (Cladophora and/or Chaetomorpha) in the Peel Inlet. Smothering of seagrass.
  - Littoral Vegetation: Samphire communities around the shorelines. Paperbark communities in the Harvey River delta.
  - Invertebrates: Commercially significant taxa include blue swimmer crabs and western king prawns. Diverse communities in the estuary and the intertidal zones
  - Fish: Estuarine and marine species. Migratory route for some species.
  - Birds: High diversity and abundance of waterbirds. Regularly supports >20,000 waterbirds (maximum recorded 150,000 individuals). Breeding recorded for 12 species. Regularly supports >1% of the population of 11 species.
- Yalgorup Lakes
  - Geomorphology: Shallow depressional wetlands. No defined surface water inflow or outflow channels.
  - Hydrology: Highly seasonal freshwater in-flows predominantly from groundwater. No surface water outflows.
  - Water quality: Brackish to hypersaline conditions. Seasonal salinity cycles. Low nutrient concentrations. Some lakes exhibit stratification. Highly alkaline (calcium and bicarbonate).
  - Benthic microbial community: Thrombolites in Lake Clifton. Cyanobacterial algal mats across the sediment surface in some lakes.
  - Flora: Small buffer zones. Some areas of paperbark communities.
  - Fauna: Significant site for waterbirds. Large numbers of Shelduck and Black Swans annually. 1% of population of Banded Stilt, Red-necked Stint, Hooded Plover, Shelduck and Musk Duck. Breeding of eight species.

Summary of the ecological character of Ramsar wetlands

- Lakes McLarty and Mealup
  - Geomorphology: Shallow depressional wetlands. No defined surface water inflow or outflow channels.
  - Hydrology: Highly seasonal freshwater inflows predominantly from groundwater. No natural surface water outflows (although there are drains present).
  - Water quality: Fresh to brackish conditions. Alkaline.
  - Flora: Typha across parts of each lake. Sedges on the margins. Paperbark community at higher elevations.
  - Fauna: Important habitat for freshwater invertebrates. Provides habitat for a large diversity and number of waterbirds. Breeding recorded for 12 species of waterbird.

Ecosystem services

- Provisioning services–Wetland products: Commercial fisheries for a number of species of fish, as well as prawns and crabs.
- Regulating services–Pollution control and detoxification: Peel Inlet and Harvey Estuary act as sinks for nutrients from the catchment and a mechanism for discharges to the sea.
- Regulating services–Climate regulation: Data deficient – plausible but not documented. Regulating service–Flood control: Site acts as a receiver for drainage water from the surrounding floodplain.
- Cultural services–Recreation and tourism: The Peel Inlet and Harvey Estuary are important recreational fisheries. Passive recreational activities such as bird watching occur both in the estuarine and wetland areas within the site. The Peel Inlet and Harvey Estuary are important for water based recreational activities and water sports such as boating.
- Cultural services–Spiritual and inspirational: Wetlands and estuarine areas are spiritually significant for the Nyoongar and contain a number of specific culturally significant sites. The site has inspirational, aesthetic and existence values at regional, state and national levels.
- Cultural services–Scientific and educational: The Peel Inlet and Harvey Estuary are the sites for long-term monitoring dating back several decades. Lake Clifton represents one of very few places at which thrombolites can be studied.
- Supporting services–Biodiversity: As evidence by the listing of the Peel-Yalgorup site as a wetland of international importance. The system provides a wide range of biodiversity values including:
  - supporting a wide range of ecological communities
  - supporting a number of regionally, nationally and internationally threatened species
  - supporting a high diversity of species (flora and fauna)
  - supporting a bio-regionally unique community (thrombolites).
- Supporting services–Nutrient cycling: The Peel-Yalgorup system plays a large role in the recycling and discharge of nutrients from the surrounding catchment. Carbon sequestration – data deficient but plausible.

Roebuck Bay

The Roebuck Bay Ramsar site comprises 34,119 ha, mostly occupied by intertidal mudflats. Waters more than 6 m deep at low tide are excluded from the site, which stretches from Campsite (a location on the northern shore of Roebuck Bay) east of the town of Broome, to south of Sandy Point. The soft bottom intertidal mudflats of the northern and eastern shores of Roebuck Bay, and high tide roosts at Bush and Sandy Points are the most biologically significant parts of the site, which was listed for several reasons including, most notably, outstanding shorebird values.

The following summary of ecosystem components, processes and services has been extracted from Bennelongia (Ref. 16).

Ecosystem components and processes

- Climate: The climate of the Broome region is semi-arid, monsoonal with a distinct wet (October to February) and dry season (March to September). Cyclonic flooding during the summer wet season results in periodic inundation of Roebuck Plains and drainage of freshwater off the Plains and through the mangroves.
- Ocean currents: The Indonesian Flowthrough flows westwards from the Pacific to the Indian Ocean. This in turn provides a mass of warm water to the Leeuwin current off Western Australia as it sweeps south along the west coast and east along the south coast.

Summary of the ecological character of Ramsar wetlands

- Tidal variation: Tides in the vicinity of Broome have a very large range (9.5 m), thus exchange through the Bay is high, tidal velocities are relatively high and large mudflats have developed.
- Geomorphology: A megascale irregular curved embayment that contains a wide expanse of intertidal mud and sand flats indented by microscale linear tidal creeks.
- Sediment structure: Three main sediment provinces have been identified: northern sands province, eastern silt and clay province and southern sands province.
- Hydrology: The Broome Sandstone contains the most utilised (Broome water supply) and hence most threatened groundwater resource in the Canning Basin. The Broome Sandstone is generally an unconfined aquifer recharged by direct infiltration from rainfall. The Broome sandstone will be discharging groundwater to the surface or subsurface at the margins of the Roebuck plains and tidal creek systems. There will also be deep submarine groundwater discharge occurring at or below the low tide mark and within Roebuck deeps. The Broome Sandstone will be discharging groundwater to the coupled Roebuck Bay/Roebuck Plains system from all landward directions. This may create freshwater dependant ecological niches which could be threatened by regional water use or pollution. Roebuck Plains produces large amounts of sheetwash into the bay after large cyclonic events or prolonged wet season rains. This will be an important vector for nutrients, organic carbon and freshwater into the bay.
- Water quality: Water quality appears poor, with TP levels, although there is limited information available from similar marine systems for comparison. Consideration has been given to the impact of urban run-off into the marine ecosystem. Agricultural activities may influence water quality from rangeland run-off during flood events.
- Littoral vegetation: Along the sea edge there are mangrove communities. Mangrove detritus is a major source of energy for animals in the mangal and, perhaps, some mudflat species. Behind the mangal is an extensive plain of saline grassland that rises to the pindan plains typical of the western desert. Samphire occurs in the wetter zones. On beach dunes spinifex dominates.
- Plankton and diatoms: Stable isotopes of carbon and nitrogen have shown that plankton and diatoms are a major source of energy for shellfish in the Bay.
- Benthic invertebrates: Roebuck Bay has one of the most diverse arrays of benthic invertebrate infauna for any intertidal ecosystem. Species numbers are dominated by polychaetes. There is a rich assemblage of bivalves that provide an important source of accessible food for shorebirds. The average density of macrobenthic fauna is around 1287 animals per square metre.
- Birds: The bay provides important food resources and refuge for migrating arctic shorebirds. A total of 43 species of waterbirds are recorded for the Bay including 22 species listed in migratory bird agreements.
- Fish: The mudflats and mangrove creeks are nurseries for at least 4 fish species, for commercial prawn species and for mudcrabs
- Marine fauna: Dugongs have been regular and important inhabitants of Roebuck Bay. Earlier records show evidence of Dugongs feeding on extensive seagrass beds in 1986. Loggerhead Turtles and Green Turtles regularly use the Ramsar site as a seasonal feeding area and as a transit area on migration. Flatback Turtles regularly nest in small numbers around Cape Villaret during the summer months.

Ecosystem services

- Provisioning services–Wetland products: Commercial and recreational fisheries for a number of species of fish, prawns and crabs. Aboriginal people continue to make extensive use of the Bay's natural resources.
- Regulating Services–Pollution control and detoxification: No data
- Regulating Services–Climate regulation: No data
- Cultural service–Recreation and tourism: Major tourism and bird-watching venue. Broome is an important destination for national and international tourism. Active recreational fishing and crabbing activities, boating, hovercraft.
- Cultural services–Spiritual and inspirational: Site has inspirational and aesthetic values that are both regional and nationally recognised through travel to Broome. Roebuck Bay is spiritually significant to Aboriginal people belonging to the Yawuru and Jukun groups and contains a number of specific culturally significant sites.

Summary of the ecological character of Ramsar wetlands
• Cultural services–Scientific and educational: Many scientific research programs, especially on shorebirds and mudflat invertebrates, have been based at Roebuck Bay. they have often involved Broome Bird Observatory, near Fall Point. • Supporting Services–Biodiversity: Key location in global flyway for migratory waders. Nursery values for prawns and fish. Seagrass beds for Dugong.

2.5 Listed threatened and migratory species

The Species of National Environmental Significance (SNES) database (Ref. 17) stores maps and point distribution information about species related to the EPBC Act.

The Biologically Important Areas (BIAs) of Regionally Significant Marine Species database (Ref. 18) uses the marine bioregional planning program to identify, describe, and map BIAs for protected species under the EPBC Act. BIAs spatially and temporally define areas where protected species display biologically important behaviours (including breeding, foraging, resting, or migration).

The following information was generated from the Biologically Important Areas of Regionally Significant Marine Species database (Ref. 18), the Species of National Environmental Significance (Public Grids) database (Ref. 17), and a protected matters search (appendix a; Ref. 4).

2.5.1 Marine mammals

Table 2-5 lists the threatened and/or migratory marine mammals that may be present within the PA (Ref. 17; Ref. 4; appendix a).

Table 2-6 lists the individual BIAs for marine mammals and their known seasonal presence within the PA (Ref. 18); these are shown in Figure 2-1.

A review of the Conservation Advices and/or Recovery Plans identified key threats associated with threatened and/or migratory marine mammals that may be present within the PA. These threats and relevant management advice are listed in Table 2-7.

Table 2-5: Threatened and/or migratory marine mammals

Common name	Scientific name	Threatened status	Migratory
Antarctic Minke Whale, Dark-shoulder Minke Whale	*Balaenoptera bonaerensis*		Migratory
Sei Whale	*Balaenoptera borealis*	Vulnerable	Migratory
Bryde's Whale	*Balaenoptera edeni*		Migratory
Blue Whale	*Balaenoptera musculus*	Endangered	Migratory
Fin Whale	*Balaenoptera physalus*	Vulnerable	Migratory
Pygmy Right Whale	*Caperea marginata*		Migratory
Dugong	*Dugong dugon*		Migratory
Southern Right Whale	*Eubalaena australis*	Endangered	Migratory
Dusky Dolphin	*Lagenorhynchus obscurus*		Migratory
Humpback Whale	*Megaptera novaeangliae*	Vulnerable	Migratory

Common name	Scientific name	Threatened status	Migratory
Australian Sea-lion, Australian Sea Lion	*Neophoca cinerea*	Vulnerable	
Australian Snubfin Dolphin	*Orcaella heinsohni*		Migratory
Killer Whale, Orca	*Orcinus orca*		Migratory
Sperm Whale	*Physeter macrocephalus*		Migratory
Indo-Pacific Humpback Dolphin	*Sousa chinensis*		Migratory
Spotted Bottlenose Dolphin (Arafura/Timor Sea populations)	*Tursiops aduncus* (Arafura/Timor Sea populations)		Migratory

Table 2-6: BIAs for regionally significant marine mammals

Common name	Behaviour	Seasonal presence	Occurrence descriptor
Australian Snubfin Dolphin	Breeding	Year-round	Known to occur
	Calving	Year-round	Known to occur
	Foraging	Year-round	Known to occur
	Foraging (high density prey)	Year-round	Known to occur
	Foraging likely	Year-round	Known to occur
	Resting	Year-round	Known to occur
Indo-Pacific Humpback Dolphin	Breeding	Year-round	Known to occur
	Breeding	Year-round	Likely to occur
	Calving	Year-round	Known to occur
	Calving	Year-round	Likely to occur
	Foraging	Year-round	Known to occur
	Foraging	Year-round	Likely to occur
	Foraging (high density prey)	Year-round	Known to occur
	Foraging (high density prey)	Year-round	Likely to occur
	Significant habitat	Year-round	Known to occur

Common name	Behaviour	Seasonal presence	Occurrence descriptor
	Significant habitat – unknown behaviour	Year-round	Likely to occur
Indo-Pacific/Spotted Bottlenose Dolphin	Breeding	Not possible to determine yet	Known to occur
	Calving	Not possible to determine yet	Known to occur
	Foraging	Not possible to determine yet	Known to occur
	Foraging likely	Not possible to determine yet	Known to occur
	Migration likely	Not possible to determine yet	Known to occur
Dugong	Breeding	April/May	Known to occur
	Breeding	Year-round	Known to occur
	Calving	April/May	Known to occur
	Calving	Year-round	Known to occur
	Foraging	April/May	Known to occur
	Foraging	May–September	Known to occur
	Foraging	Year-round	Likely to occur
	Foraging (high density seagrass beds)	April/May	Known to occur
	Foraging (high density seagrass beds)	Year-round	Known to occur
	Migration likely	Year-round	Known to occur
	Nursing	April/May	Known to occur
	Nursing	Year-round	Known to occur
Australian Sea Lion	Foraging (male)	Year-round	Likely to occur
	Foraging (male and female)	Year-round	Known to occur
Blue and Pygmy Blue Whale	Foraging (abundant food source)	Arrive as early as November, with number of animals steadily increasing to peak in March–May. After May the number of whales drops, by late June most animals have	Known to occur

Common name	Behaviour	Seasonal presence	Occurrence descriptor
		left, although a few acoustic detections are made into July (Ref. 19)	
	Foraging (high-density)	Arrive early as Nov with number of animals increasing to peak in March–May. After May the number of whales drops, late June most animals left, a few acoustic detections are made into July (Ref. 19). Satellite tracking data indicates use mid-March-late April,	Known to occur
	Foraging (on migration)	Arrive early as Nov with number of animals increasing to peak in March–May. After May the number of whales drops, late June most animals left, a few acoustic detections are made into July (Ref. 19). Satellite tracking data indicates use mid-March-late April.	Known to occur
Humpback Whale	Calving	Winter	Known to occur
	Migration	Northern migration, late July to September	Known to occur
	Migration	Winter	Known to occur
	Migration (north)	Northern migration, late July to September	Known to occur
	Migration (north and south)	Northern migration, late July to September	Known to occur
	Migration (north and south)	Northern peak July and southward peak October – November (Ref. 19)	Known to occur
	Migration (north and south)	Southbound peak late Sept to mid-Oct. Northward peak mid-June to mid-July	Known to occur
	Migration (south)	Southbound peak late Sept to mid-Oct	Known to occur
	Nursing	Winter	Known to occur
	Resting	Winter	Known to occur
Pygmy Blue Whale	Distribution		Known to occur
	Foraging		Known to occur
	Foraging area (annual high use area)		Known to occur
	Known foraging area		Known to occur

Common name	Behaviour	Seasonal presence	Occurrence descriptor
	Migration	Northern migration (enter Perth canyon January to May; pass Exmouth April to August; continue north to Indonesia). Southern migration (follow WA coastline from October to late December)	Known to occur
		Most use between October and December, peaking in November	Known to occur
Southern Right Whale	Calving buffer	Late autumn, winter, and spring	Known to occur
	Seasonal calving habitat	Late autumn, winter, and spring	Known to occur
Sperm Whale	Foraging (abundant food source)	Summer	Known to occur

Table 2-7: Summary of relevant conservation plans—marine mammals

Species	Relevant Plan / Advice	Key threats / Relevant management advice
Humpback Whale	Conservation Advice for the Humpback Whale 2015–2020 (Ref. 20)	Assessing and addressing anthropogenic noise; shipping, industrial, and seismic surveys • All seismic surveys must be undertaken consistently with the EPBC Act Policy Statement 2.1 – Interaction between offshore seismic exploration and whales. Should a survey be undertaken in or near a calving, resting, foraging area, or a confined migratory pathway then Part B. Additional Management Procedures must also be applied. • For actions involving acoustic impacts (example pile driving, explosives) on Humpback Whale calving, resting, feeding areas, or confined migratory pathways site-specific acoustic modelling should be undertaken (including cumulative noise impacts). • Should acoustic impacts on humpback calving, resting, foraging areas, or confined migratory pathways be identified a noise management plan should be developed. This can include: – the use of shutdown and caution zones – pre- and post-activity observations – the use of marine mammal observers and/or Passive Acoustic Monitoring – Implementation of an adaptive management program following verification of the noise levels produced from the action (i.e. if the noise levels created exceed original expectations). Minimising vessel collisions • Maximise the likelihood that all vessel strike incidents are reported in the national ship strike database. All cetaceans are protected in Commonwealth waters and, the EPBC Act requires that all collisions with whales in Commonwealth waters are reported. Vessel collisions can be submitted to the National Ship Strike Database at https://data.marinemammals.gov.au/report/shipstrike

Species	Relevant Plan / Advice	Key threats / Relevant management advice
		• Ensure the risk of vessel strike on Humpback Whales is considered when assessing actions that increase vessel traffic in areas where Humpback Whales occur and, if required appropriate mitigation measures are implemented to reduce the risk of vessel strike. • Enhance education programs to inform vessel operators of best practice behaviours and regulations for interacting with Humpback Whales.
Blue Whale	Conservation Management Plan for the Blue Whale 2015–2025 (Ref. 21)	Key threats include: • whaling • climate variability and change • noise interference • habitat modification • vessel disturbance • overharvesting of prey. No relevant management advice has been identified.
Sei Whale	Conservation Advice *Balaenoptera borealis* Sei Whale (Ref. 22)	Assessing and addressing anthropogenic noise: • Once the spatial and temporal distribution (including biologically important areas) of Sei Whales is further defined an assessment of the impacts of increasing anthropogenic noise (including from seismic surveys, port expansion, and coastal development) should be undertaken on this species. Minimising vessel collisions: • Ensure all vessel strike incidents are reported in the national vessel strike database (https://data.marinemammals.gov.au/report/shipstrike).
Fin Whale	Conservation Advice *Balaenoptera physalus* Fin Whale (Ref. 23)	Assessing and addressing anthropogenic noise: • Once the spatial and temporal distribution (including biologically important areas) of Fin Whales is further defined an assessment of the impacts of increasing anthropogenic noise (including from seismic surveys, port expansion, and coastal development) should be undertaken on this species. Minimising vessel collisions: • Ensure all vessel strike incidents are reported in the national vessel strike database
Southern Right Whale	Conservation Management Plan for the Southern Right Whale: A Recovery Plan under the *Environment Protection and Biodiversity Conservation Act 1999* 2011–2021 (Ref. 24)	Key threats include: • entanglement • vessel disturbance • whaling • climate variability and change • noise interference • habitat modification. No relevant management advice has been identified.
Australian Sea Lion	Recovery Plan for the Australian Sea Lion	Key threats include: • interactions with the commercial gillnet fishing sector • mortality due to interactions with the rock lobster industry

Species	Relevant Plan / Advice	Key threats / Relevant management advice
	(*Neophoca cinerea*) (Ref. 25)	• deaths caused by fisheries-related marine debris. Other factors that may be contributing to the lack of recovery include: • habitat degradation and interactions with aquaculture operations • human disturbance to colonies • deliberate killings • disease • pollution and oil spills • prey depletion • climate change. No relevant management advice has been identified.

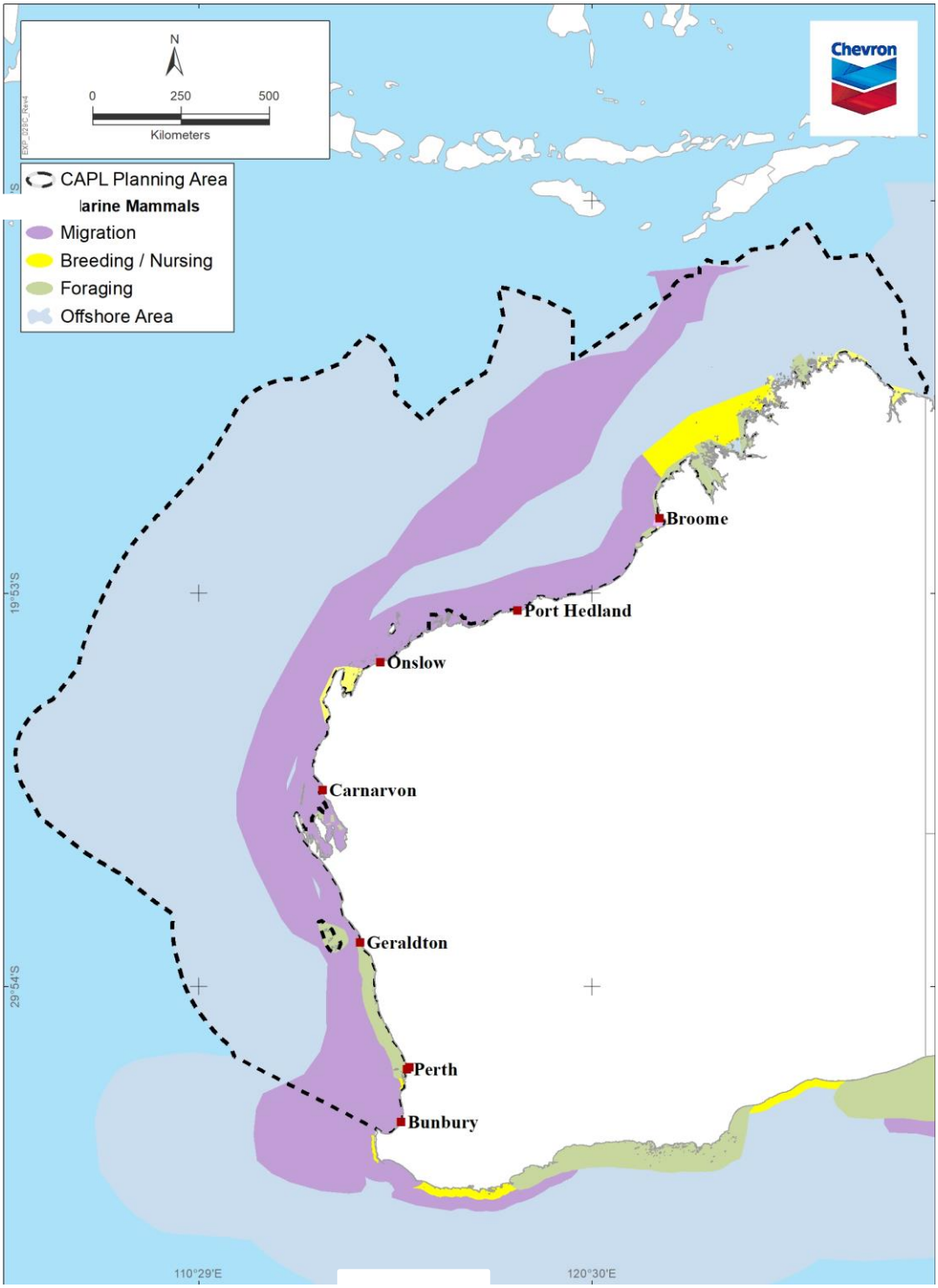


Figure 2-1: BIAs associated with marine mammals

2.5.2 Reptiles

Table 2-8 lists the threatened and/or migratory marine reptile species that may be present within the PA (Ref. 17; Ref. 4; appendix a).

Table 2-9 lists critical nesting habitats within the PA; these are shown on Figure 2-2 (Ref. 26).

Table 2-10 lists the BIAs for marine reptiles and their known seasonal presence within the PA; these are also shown on Figure 2-2 (Ref. 18).

A review of the Conservation Advices and Recovery Plans identified key threats associated with threatened and/or migratory marine reptiles that may be present within the PA. These threats and relevant management advice are listed in Table 2-11.

In addition to the threatened and/or migratory marine reptile species identified in the tables below, an additional 26 listed marine reptile species (all sea snakes except the Freshwater Crocodile [*Crocodylus johnstoni*]) were identified as having the potential to occur within the PA (Ref. 4). Cogger (Ref. 27; Ref. 28) notes that most sea snakes have shallow benthic feeding patterns and are rarely observed in water >30 m deep, indicating that these species are likely to be present in shallow waters.

Table 2-8: Threatened and/or migratory marine reptiles

Common name	Scientific name	Threatened status	Migratory
Short-nosed Seasnake	*Aipysurus apraefrontalis*	Critically Endangered	
Leaf-scaled Seasnake	*Aipysurus foliosquama*	Critically Endangered	
Loggerhead Turtle	*Caretta*	Endangered	Migratory
Green Turtle	*Chelonia mydas*	Vulnerable	Migratory
Salt-water Crocodile, Estuarine Crocodile	*Crocodylus porosus*		Migratory
Leatherback Turtle, Leathery Turtle, Luth	*Dermochelys coriacea*	Endangered	Migratory
Hawksbill Turtle	*Eretmochelys imbricata*	Vulnerable	Migratory
Olive Ridley Turtle, Pacific Ridley Turtle	*Lepidochelys olivacea*	Endangered	Migratory
Flatback Turtle	*Natator depressus*	Vulnerable	Migratory

Table 2-9: Critical habitat for marine turtles

Common name	Location	Seasonal presence	Occurrence descriptor
Loggerhead Turtle	Exmouth Gulf and Ningaloo Coast. 20 km internesting buffer	Nov–May	Known to occur
	Gnaraloo Bay and beaches. 20 km internesting buffer	Nov–May	Known to occur
	Shark Bay, all coastal and island beaches out to the northern tip of Dirk Hartog Island. 20 km internesting buffer	Nov–May	Known to occur
Green Turtle	Mainland east of Mary Island to mainland adjacent to Murrara Island including all offshore islands. 20 km internesting buffer	Nov–Mar	Known to occur
	Ashmore Reef and Cartier Reef. 20 km internesting buffer	Dec–Jan	Known to occur
	Browse Island. 20 km internesting buffer	Nov–Mar	Known to occur
	Scott Reef. 20 km internesting buffer	Nov–Mar	Known to occur
	Adele Island, Lacepede Islands	Nov–Mar	Known to occur

Common name	Location	Seasonal presence	Occurrence descriptor
	Dampier Archipelago. 20 km internesting buffer	Nov–Mar	Known to occur
	Barrow Island, Montebello Islands, Serrurier Island, and Thevenard Island. 20 km internesting buffer	Nov–Mar	Known to occur
	Exmouth Gulf and Ningaloo Coast. 20 km internesting buffer	Nov–Mar	Known to occur
Hawksbill Turtle	Dampier Archipelago, including Delambre Island and Rosemary Island. 20 km internesting buffer	Oct–Feb	Known to occur
	Cape Preston to mouth of Exmouth Gulf including Montebello Islands and Lowendal Islands. 20 km internesting buffer	Oct–Feb	Known to occur
Olive Ridley Turtle	Cape Leveque. 20 km internesting buffer	May–Jul	Known to occur
	Prior Point and Llanggi. 20 km internesting buffer	May–Jul	Known to occur
	Darcy Island. 20 km internesting buffer	May–Jul	Known to occur
	Vulcan Island. 20 km internesting buffer	May–Jul	Known to occur
Flatback Turtle	Cape Domett and Lacrosse Island in the Cambridge Gulf. 60 km internesting buffer	Aug–Sep	Known to occur
	Lacepede Islands. 60 km internesting buffer	Oct–Mar	Known to occur
	Eco Beach – coastal beach near Broome. 60 km internesting buffer	July	Known to occur
	Eighty Mile Beach – coastal beach. 60 km internesting buffer	July	Known to occur
	Cemetery Beach, Port Hedland. 60 km internesting buffer	Oct–Mar	Known to occur
	Mundabullangana Beach. 60 km internesting buffer	Oct–Mar	Known to occur
	Dampier Archipelago, including Delambre Island and Hauy Island. 60 km internesting buffer	Oct–Mar	Known to occur
	Barrow Island, Montebello Islands, coastal islands from Cape Preston to Locker Island. 60 km internesting buffer	Oct–Mar	Known to occur

Table 2-10: BIAs for regionally significant marine reptiles

Common name	Behaviour	Seasonal presence	Occurrence descriptor
Flatback Turtle	Aggregation		Known to occur
	Foraging	Green Turtle aggregation inside of NW Is. Early in summer	Known to occur
	Foraging	January – Flatbacks, Greens	Known to occur
	Foraging	Observations during July, no evidence of turtle activity Oct–Nov for Solitary, Steamboat,	Known to occur

Common name	Behaviour	Seasonal presence	Occurrence descriptor
		Carey, Preston Islands, and Cape Preston	
	Foraging	Year-round	Known to occur
	Internesting		Known to occur
	Internesting buffer	Green Turtle aggregation inside of NW Is. Early in summer	Known to occur
	Internesting buffer	January – Flatbacks, Greens	Known to occur
	Internesting buffer	Summer	Known to occur
	Internesting buffer	Summer (nesting /internesting), year-round	Known to occur
	Mating	Green Turtle aggregation inside of NW Is. Early in summer	Known to occur
	Migrating Corridor	Summer (nesting/interesting) year-round	Known to occur
	Nesting	Green Turtle aggregation inside of NW Is. Early in summer	Known to occur
	Nesting	January – Flatbacks, Greens	Known to occur
	Nesting	Short summer nesting season, predominantly Nov–Mar with peak in January	Known to occur
	Nesting	Summer	Known to occur
Green Turtle	Aggregation	Early summer	Known to occur
	Aggregation		Known to occur
	Basking	Summer	Known to occur
	Foraging	Green Turtle aggregation inside of NW Is. Early in summer	Known to occur
	Foraging	January – Flatbacks, Greens	Known to occur
	Foraging	March–May	Likely to occur
	Foraging	Observations during July, no evidence of turtle activity Oct–Nov for Solitary, Steamboat, Carey, Preston Islands, and Cape Preston	Known to occur
	Foraging	Summer	Known to occur
	Foraging	Summer / possibly year-round	Known to occur
	Foraging	Year-round	Known to occur
	Foraging	Year-round	Likely to occur
	Foraging		Known to occur
	Internesting	Dec–Feb	Known to occur

Common name	Behaviour	Seasonal presence	Occurrence descriptor
	Internesting	Peak season Dec–Jan	Known to occur
	Internesting	Summer	Known to occur
	Internesting	Year-round	Likely to occur
	Internesting		Known to occur
	Internesting buffer	Green Turtle aggregation inside of NW Is. Early in summer	Known to occur
	Internesting buffer	January – Flatbacks, Greens	Known to occur
	Internesting buffer	Peak season Dec–Jan	Known to occur
	Internesting buffer	Summer	Known to occur
	Internesting buffer	Summer (nesting /internesting) year-round	Known to occur
	Internesting buffer	Year-round	Known to occur
	Internesting buffer	Year-round	Likely to occur
	Internesting buffer		Known to occur
	Mating	Green Turtle aggregation inside of NW Is. Early in summer	Known to occur
	Mating	Summer	Known to occur
	Mating	Year-round	Likely to occur
	Mating		Known to occur
	Migrating Corridor	Summer (nesting/interesting) year-round	Known to occur
	Nesting	Green Turtle aggregation inside of NW Is. Early in summer	Known to occur
	Nesting	January – Flatbacks, Greens	Known to occur
	Nesting	Peak season Dec–Jan	Known to occur
	Nesting	Summer	Known to occur
	Nesting	Year-round	Known to occur
	Nesting	Year-round	Likely to occur
	Nesting		Known to occur
Hawksbill Turtle	Foraging	Aggregation inside of NW Is. Early in summer	Known to occur
	Foraging	Observations during July no evidence of turtle activity Oct–Nov for Solitary, Steamboat, Carey, Preston Islands, and Cape Preston	Known to occur

Common name	Behaviour	Seasonal presence	Occurrence descriptor
	Foraging	Year-round	Known to occur
	Foraging	Year-round	Likely to occur
	Internesting	Spring and early summer, peak nesting October	Known to occur
	Internesting buffer	Spring and early summer, peak nesting October	Known to occur
	Internesting buffer	Peak nesting in spring and early summer	Known to occur
	Internesting buffer		Known to occur
	Internesting buffer	Green Turtle aggregation inside of NW Is. Early in summer	Known to occur
	Internesting buffer	Year-round	Known to occur
	Internesting buffer	Year-round	Likely to occur
	Internesting buffer	Peak season Dec–Jan	Likely to occur
	Internesting buffer	Peak nesting in spring and early summer	Likely to occur
	Mating	Green Turtle aggregation inside of NW Is. Early in summer	Known to occur
	Mating	Spring and early summer, peak nesting October	Known to occur
	Mating	Year-round	Known to occur
	Nesting	Green Turtle aggregation inside of NW Is. Early in summer	Known to occur
	Nesting	Peak nesting in spring and early summer	Known to occur
	Nesting	Peak season Dec–Jan	Known to occur
	Nesting	Spring and early summer, peak nesting October	Known to occur
	Nesting	Year-round	Known to occur
	Nesting	Year-round	Likely to occur
	Nesting		Known to occur
Loggerhead Turtle	Foraging	Year-round	Known to occur
	Foraging		Known to occur
	Internesting	Dec–Mar	Known to occur
	Internesting buffer	Dec–Mar	Known to occur
	Internesting buffer	Peak season monitored	Known to occur

Common name	Behaviour	Seasonal presence	Occurrence descriptor
	Internesting buffer		Known to occur
	Nesting	Dec–Mar	Known to occur
	Nesting	Peak season monitored	Known to occur
	Nesting		Known to occur
Olive Ridley Turtle	Foraging		Known to occur

Table 2-11: Summary of relevant conservation plans—marine reptiles

Species	Relevant Plan / Advice	Key Threats / Relevant Management Advice
Caretta caretta (Loggerhead Turtle) *Chelonia mydas* (Green Turtle) *Dermochelys coriacea* (Leatherback Turtle, Leathery Turtle, Luth) *Eretmochelys imbricata* (Hawksbill Turtle) *Natator depressus* (Flatback Turtle)	Recovery Plan for Marine Turtles in Australia (Ref. 29)	Key threats include: • climate change and variability • marine debris • chemical and terrestrial discharge • international take • terrestrial predation • fisheries bycatch • light pollution • habitat modification • Indigenous take • vessel disturbance • noise interference • recreational activities • diseases and pathogens. Details regarding relevant threats: • A3: Reduce the impacts from marine debris • A4: Minimise chemical and terrestrial discharge: – Ensure spill risk strategies and response programs adequately include management for marine turtles and their habitats, particularly in reference to ‘slow to recover habitats’, e.g. nesting habitat, seagrass meadows, or coral reefs – Quantify the impacts of decreased water quality on stock viability – Quantify the accumulation and effects of anthropogenic toxins in marine turtles, their foraging habitats, and subsequent stock viability. • A8: Minimise light pollution: – Artificial light within or adjacent to habitat critical to the survival of marine turtles will be managed such that marine turtles are not displaced from these habitats – Develop and implement best practice light management guidelines for existing and future developments

Species	Relevant Plan / Advice	Key Threats / Relevant Management Advice
		adjacent to marine turtle nesting beaches – Identify the cumulative impact on turtles from multiple sources of onshore and offshore light pollution.
Dermochelys coriacea (Leatherback Turtle, Leathery Turtle, Luth)	Approved Conservation Advice for *Dermochelys coriacea* (Leatherback Turtle) (Ref. 30)	Key threats include: • incidental capture in commercial fisheries • harvest of eggs and meat • ingestion of marine debris • vessel disturbance / boat strike • predation on eggs by wild dogs (*Canis familiaris*), pigs (*Sus scrofa*) and monitor lizards (*Varanus salvator*) • degradation of foraging areas • changes to breeding sites. No relevant management advice has been identified.
Aipysurus apraefrontalis (Short-nosed Sea Snake)	Approved Conservation Advice for *Aipysurus apraefrontalis* (Short-nosed Sea Snake) (Ref. 31)	Key threats include: • changes to the inner region of Ashmore Reef (sand encroachment) that has caused coral outcrops that previously supported high densities of sea snakes to be filled in with sand • increases in water temperatures observed in Ashmore and surrounding reefs associated with El Niño events, which may have impacted the species directly or indirectly by contributing to further habitat degradation • oil and gas exploration, including seismic surveys and exploration drilling • incidental catch and death in commercial prawn trawling fisheries. Unsustainable and illegal fishing practices are recognised as the most significant direct and indirect threat to natural processes and biological diversity in the Ashmore Reef region. No relevant management advice has been identified.
Aipysurus foliosquama (Leaf-scaled Sea Snake)	Approved Conservation Advice for *Aipysurus foliosquama* (Leaf-scaled Sea Snake) (Ref. 32)	Key threats include: • changes to the inner region of Ashmore Reef (sand encroachment) – coral outcrops that previously supported high densities of sea snakes are now filled with sand • increases in water temperatures observed in Ashmore and surrounding reefs associated with El Niño events, which may have impacted the species directly or indirectly by contributing to further habitat degradation • oil and gas exploration, including seismic surveys and exploration drilling • incidental catch and death in commercial prawn trawling fisheries. Unsustainable and illegal fishing practices are recognised as

Species	Relevant Plan / Advice	Key Threats / Relevant Management Advice
		the most significant direct and indirect threat to natural processes and biological diversity in the Ashmore Reef region. No relevant management advice has been identified.

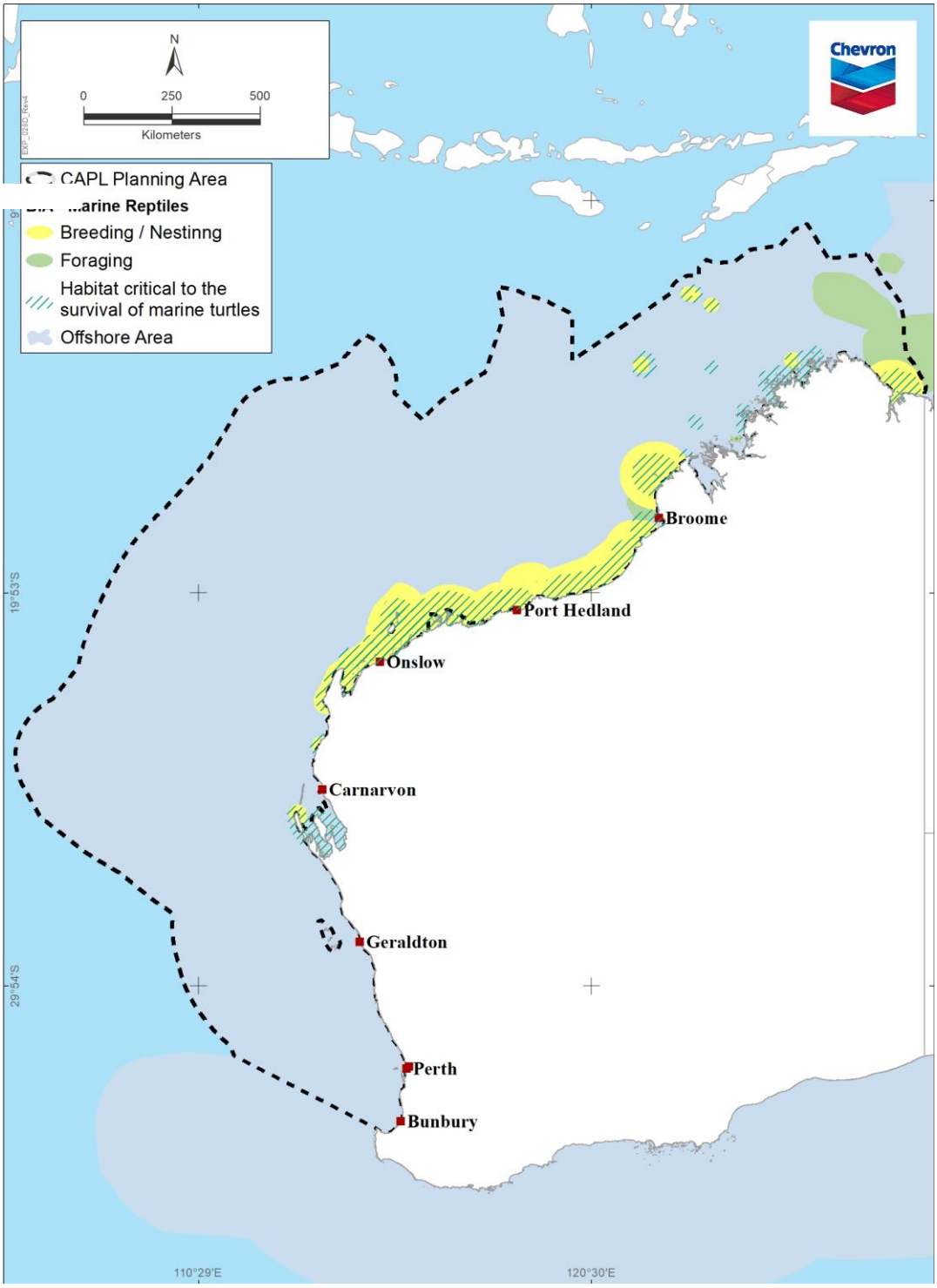


Figure 2-2: BIAs associated with marine reptiles

2.5.3 Fishes, including sharks and rays

Table 2-12 lists the threatened and/or migratory fishes (including sharks and rays) that may be present within the PA (Ref. 17; Ref. 4; appendix a).

Table 2-13 lists the BIAs for fishes (including sharks and rays) and their known seasonal presence within the PA (Ref. 18); these are shown in Figure 2-3.

Within the PA, 61 solenostomid and syngnathid species that are listed marine species have been identified as having the potential to occur (appendix a; Ref. 4).

Almost all syngnathids live in nearshore and inner shelf habitats, usually in shallow coastal waters, among seagrasses, mangroves, coral reefs, macroalgae-dominated reefs, and sand or rubble habitats (Ref. 33; Ref. 34; Ref. 35; Ref. 36). Although two species have been identified in the North-west Marine Region in deeper waters (Winged Seahorse [*Hippocampus alatus*] and Western Pipehorse [*Solegnathus* sp. 2]; Ref. 37), these species were not identified by the SNES search of the PA (Ref. 17).

A review of the Conservation Advices and Recovery Plans identified key threats associated with threatened and/or migratory fishes (including sharks and rays) that may be present within the PA. These threats and relevant management advice are included in Table 2-14.

Table 2-12: Threatened and migratory fishes, including sharks and rays

Common name	Scientific name	Threatened status	Migratory
Narrow Sawfish, Knifetooth Sawfish	*Anoxypristis cuspidata*		Migratory
Grey Nurse Shark (west coast population)	*Carcharias taurus* (west coast population)	Vulnerable	
Oceanic Whitetip Shark	*Carcharhinus longimanus*		Migratory
White Shark, Great White Shark	*Carcharodon carcharias*	Vulnerable	Migratory
Northern River Shark, New Guinea River Shark[#]	*Glyphis garricki*	Endangered	
Speartooth Shark[#]	*Glyphis glyphis*	Critically Endangered	
Shortfin Mako, Mako Shark	*Isurus oxyrinchus*		Migratory
Longfin Mako	*Isurus paucus*		Migratory
Porbeagle, Mackerel Shark	*Lamna nasus*		Migratory
Reef Manta Ray, Coastal Manta Ray, Inshore Manta Ray, Prince Alfred's Ray, Resident Manta Ray	*Manta alfredi*		Migratory
Giant Manta Ray, Chevron Manta Ray, Pacific Manta Ray, Pelagic Manta Ray, Oceanic Manta Ray	*Manta birostris*		Migratory
Blind Gudgeon*	*Milyeringa veritas*	Vulnerable	
Balston's Pygmy Perch[^]	*Nannatherina balstoni*	Vulnerable	
Blind Cave Eel*	*Ophisternon candidum*	Vulnerable	

Common name	Scientific name	Threatened status	Migratory
Dwarf Sawfish, Queensland Sawfish	*Pristis clavata*	Vulnerable	Migratory
Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish#	*Pristis pristis*	Vulnerable	Migratory
Green Sawfish, Dindagubba, Narrowsnout Sawfish	*Pristis zijsron*	Vulnerable	Migratory
Whale Shark	*Rhincodon typus*	Vulnerable	Migratory

** Subterranean fauna species identified in the Protected Matters Search Report (appendix a; Ref. 4) but not expected to be exposed to CAPL's activities.*

 # Species mainly located inland (freshwater and estuarine habitats) identified in the Protected Matters Search Report but with the potential to be present offshore (neritic and intertidal zones) and exposed to CAPL's activities.

^ Freshwater species located inland identified in the Protected Matters Search Report but not expected to be exposed to CAPL's activities.

Table 2-13: BIAs for regionally significant fishes, including sharks and rays

Common name	Behaviour	Seasonal presence	Occurrence descriptor
Dwarf Sawfish	Foraging	All seasons	Known to occur
	Foraging	Use in dry season to early wet (Dec)	Known to occur
	Foraging		Known to occur
	Juvenile	All seasons	Known to occur
	Nursing	All seasons	Known to occur
	Nursing	Use in dry season to early wet (Dec)	Known to occur
	Nursing		Known to occur
	Pupping	All seasons	Known to occur
	Pupping		Known to occur
Freshwater Sawfish	Foraging	All seasons	Known to occur
	Foraging	Pupping occurs from Jan–May	Known to occur
	Foraging	Pupping occurs from Jan–May, more prevalent during the late wet season when mature animals have more water to manoeuvre in	Known to occur
	Juvenile	Pupping occurs from Jan–May	Known to occur
	Nursing	All seasons	Known to occur
	Nursing	All seasons	Likely to occur
	Pupping	Pupping occurs from Jan–May	Known to occur
	Pupping	Pupping occurs from Jan–May	Likely to occur
	Pupping	Pupping occurs from Jan–May, more prevalent during the late wet season when mature animals	Known to occur

Common name	Behaviour	Seasonal presence	Occurrence descriptor
		have more water to manoeuvre in	
Green Sawfish	Foraging		Known to occur
	Nursing		Known to occur
	Pupping		Known to occur
Whale Shark	Foraging	Spring	Known to occur
	Foraging (high density prey)	Apr–Jun, autumn	Known to occur
	Foraging		Known to occur

Table 2-14: Summary of relevant conservation plans—fishes, including sharks and rays

Species	Relevant Plan / Advice	Key Threats / Relevant Management Advice
Pristis zijsron (Green Sawfish, Dindagubba, Narrowsnout Sawfish) *Pristis clavata* (Dwarf Sawfish) *Glyphis garricki* (Northern River Shark) *Glyphis* (Speartooth Shark)	Sawfish and River Sharks Multispecies Recovery Plan (Ref. 38)	Key threats include: • fishing activities including: being caught as bycatch in the commercial and recreational sectors; through Indigenous fishing; and illegal, unreported, and unregulated fishing • habitat degradation and modification. Other potential threats to the species include the collection of animals for display in public aquaria and marine debris. No relevant management advice has been identified.
	Approved Conservation Advice for Green Sawfish (Ref. 39)	The main potential threats to Green Sawfish include: • incidental capture as bycatch and by-product in gillnet and trawl fisheries • illegal capture for fins and rostra • habitat degradation through coastal development. No relevant management advice has been identified.
	Approved Conservation Advice for *Pristis clavata* (Dwarf Sawfish) (Ref. 40)	The main identified threats to Dwarf Sawfish include: • incidental capture as bycatch in commercial and recreational net fishing • illegal, unreported, and unregulated fishing. No relevant management advice has been identified.
	Approved Conservation Advice for *Glyphis garricki* (Northern River Shark) (Ref. 41)	The main identified threats to Northern River Sharks include: • commercial, recreational, and Indigenous fishing activities • IUU fishing • habitat degradation and modification.

Species	Relevant Plan / Advice	Key Threats / Relevant Management Advice
		No relevant management advice has been identified.
	Approved Conservation Advice for *Glyphis* (Speartooth Shark) (Ref. 42)	The main identified threats to Speartooth Sharks include: • commercial, recreational, and Indigenous fishing activities • IUU fishing • habitat degradation and modification. No relevant management advice has been identified.
Rhincodon typus (Whale Shark)	Conservation Advice for the Whale Shark 2015–2020 (Ref. 43)	The most significant threat to Whale Sharks is intentional and unintentional mortality from fishing outside Australian waters. In Australian waters, threats to the recovery of the species include boat strike from large vessels and habitat disruption from mineral exploration, production, and transportation. Other less-important threats include disturbance from domestic tourism operations, marine debris, and climate change. Limited subsistence hunting of Whale Sharks still occurs in some parts of the world. Ecotourism in these regions could provide an alternative income, which would give these communities the means to stop hunting and a reason to conserve the species. No relevant management advice has been identified.
Carcharias taurus (west coast population) (Grey Nurse Shark [west coast population])	Recovery Plan for the Grey Nurse Shark (*Carcharias taurus*) (Ref. 44)	Key threats include: • commercial fishing • recreational fishing • shark finning • shark control activities • ecotourism • aquarium trade.
Carcharodon Carcharias (Great White Shark)	Recovery Plan for the White Shark (*Carcharodon Carcharias*) (Ref. 45)	Key threats include: • mortality related to being caught accidentally (bycatch) or illegally (targeted) by commercial and recreational fisheries, including issues of post release mortality • mortality related to shark control activities such as beach meshing or drum lining (east coast population). Other potential threats to the species include the impacts of illegal trade in White Shark products; ecosystem effects as a result of habitat modification and climate change (including changes in sea temperature, ocean currents, and acidification); and ecotourism, including cage diving. No relevant management advice has been identified.

Species	Relevant Plan / Advice	Key Threats / Relevant Management Advice
Milyeringa veritas (Blind Gudgeon)	Approved Conservation Advice for *Milyeringa veritas* (Blind Gudgeon) (Ref. 46)	The main identified threats to the Blind Gudgeon include: • sedimentation from mining and construction • canal development • water abstraction • point source pollution from sewage • landfill • dumping and mining • diffuse pollution from urban development and petroleum infrastructure. No relevant management advice has been identified.
Nannatherina balstoni (Balston's Pygmy Perch)	Approved Conservation Advice for *Nannatherina balstoni* (Balston's Pygmy Perch) (Ref. 47)	The main identified threat to the Balston's Pygmy Perch is habitat alteration and the introduction of exotic fish species. Habitat alteration is likely to occur through any alterations to inflow and increased salinisation, siltation, and eutrophication that occur through changes to flow regimes (regulation and abstraction), road maintenance, mineral sand exploration and mining, groundwater extraction, and agricultural and forestry practices in the uppermost catchment. No relevant management advice has been identified.

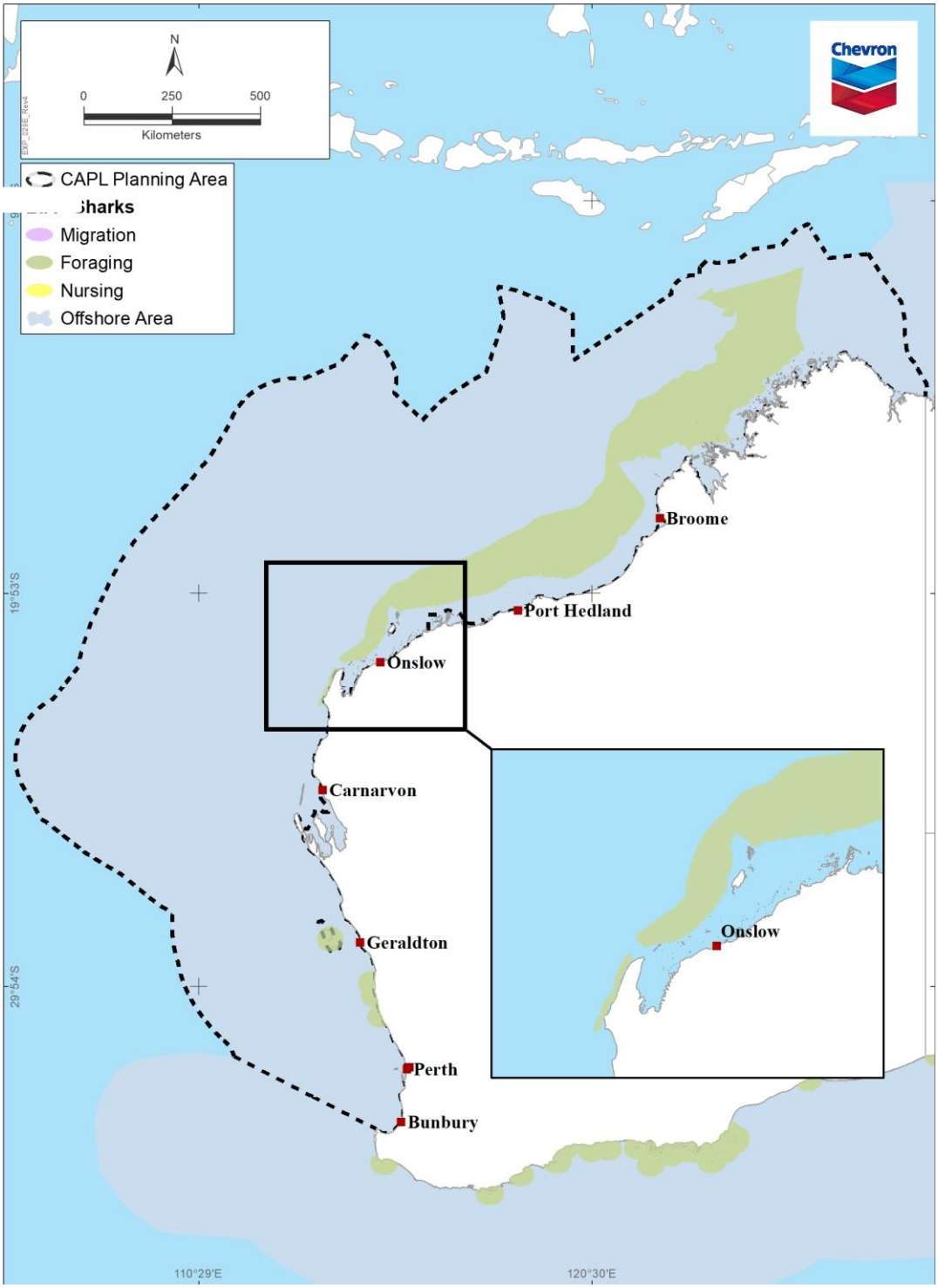


Figure 2-3: BIAs associated with fishes, including sharks and rays

2.5.4 Seabirds and shorebirds

Table 2-15 lists the threatened and/or migratory seabirds and shorebirds that may be present within the PA (Ref. 17; Ref. 4; appendix a).

Table 2-16 lists the BIAs for seabirds and shorebirds and their known seasonal presence within the PA (Ref. 18); these are shown in Figure 2-4.

A review of Conservation Advices and Recovery Plans identified key threats associated with threatened and/or migratory seabirds and shorebirds that may be present within the PA. These threats and relevant management advice are included in Table 2-17.

Table 2-15: Threatened and/or migratory seabirds and shorebirds

Common name	Scientific name	Threatened status	Migratory
Oriental Reed-warbler*	*Acrocephalus orientalis*		Migratory
Common Sandpiper*	*Actitis hypoleucos*		Migratory
Common Noddy	*Anous stolidus*		Migratory
Australian Lesser Noddy	*Anous tenuirostris melanops*	Vulnerable	
Fork-tailed Swift	*Apus pacificus*		Migratory
Flesh-footed Shearwater, Fleshy-footed Shearwater	*Ardenna carneipes*		Migratory
Wedge-tailed Shearwater	*Ardenna pacifica*		Migratory
Ruddy Turnstone*	*Arenaria interpres*		Migratory
Australasian Bittern	*Botaurus poiciloptilus*	Endangered	
Sharp-tailed Sandpiper*	*Calidris acuminata*		Migratory
Sanderling*	*Calidris alba*		Migratory
Red Knot, Knot*	*Calidris canutus*	Endangered	Migratory
Curlew Sandpiper*	*Calidris ferruginea*	Critically Endangered	Migratory
Pectoral Sandpiper*	*Calidris melanotos*		Migratory
Red-necked Stint*	*Calidris ruficollis*		Migratory
Long-toed Stint*	*Calidris subminuta*		Migratory
Great Knot*	*Calidris tenuirostris*	Critically Endangered	Migratory
Streaked Shearwater	*Calonectris leucomelas*		Migratory
Forest Red-tailed Black-Cockatoo, Karrak	*Calyptorhynchus banksii naso*	Vulnerable	
Baudin's Cockatoo, Long-billed Black-Cockatoo	*Calyptorhynchus baudinii*	Vulnerable	
Carnaby's Cockatoo, Short-billed Black-Cockatoo	*Calyptorhynchus latirostris*	Endangered	
Red-rumped Swallow#	*Cecropis daurica*		Migratory
Double-banded Plover*	*Charadrius bicinctus*		Migratory
Greater Sand Plover, Large Sand Plover	*Charadrius leschenaultii*	Vulnerable	Migratory

Common name	Scientific name	Threatened status	Migratory
Lesser Sand Plover, Mongolian Plover	*Charadrius mongolus*	Endangered	Migratory
Oriental Plover, Oriental Dotterel*	*Charadrius veredus*		Migratory
Oriental Cuckoo, Horsfield's Cuckoo	*Cuculus optatus*		Migratory
Amsterdam Albatross	*Diomedea amsterdamensis*	Endangered	Migratory
Tristan Albatross	*Diomedea dabbenena*	Endangered	
Southern Royal Albatross	*Diomedea epomophora*	Vulnerable	Migratory
Wandering Albatross	*Diomedea exulans*	Vulnerable	Migratory
Northern Royal Albatross	*Diomedea sanfordi*	Endangered	
Red Goshawk	*Erythrotriorchis radiatus*	Vulnerable	
Gouldian Finch	*Erythrura gouldiae*	Endangered	
Crested Shrike-tit (northern), Northern Shrike-tit	*Falcunculus frontatus whitei*	Vulnerable	
Lesser Frigatebird, Least Frigatebird	*Fregata ariel*		Migratory
Great Frigatebird, Greater Frigatebird	*Fregata minor*		Migratory
Swinhoe's Snipe*	*Gallinago megala*		Migratory
Pin-tailed Snipe*	*Gallinago stenura*		Migratory
Partridge Pigeon (western)	*Geophaps smithii blaauwi*	Vulnerable	
Oriental Pratincole*	*Glareola maldivarum*		Migratory
Blue Petrel	*Halobaena caerulea*	Vulnerable	
Barn Swallow[#]	*Hirundo rustica*		Migratory
Caspian Tern	*Hydroprogne caspia*		Migratory
Malleefowl	*Leipoa ocellata*	Vulnerable	
Broad-billed Sandpiper*	*Limicola falcinellus*		Migratory
Asian Dowitcher*	*Limnodromus semipalmatus*		Migratory
Bar-tailed Godwit*	*Limosa lapponica*		Migratory
Bar-tailed Godwit (baueri), Western Alaskan Bar-tailed Godwit*	*Limosa lapponica baueri*	Vulnerable	Migratory
Northern Siberian Bar-tailed Godwit, Bar-tailed Godwit (menzbieri)	*Limosa lapponica menzbieri*	Critically Endangered	Migratory
Black-tailed Godwit*	*Limosa limosa*		

Common name	Scientific name	Threatened status	Migratory
Southern Giant-Petrel, Southern Giant Petrel	*Macronectes giganteus*	Endangered	Migratory
Northern Giant Petrel	*Macronectes halli*	Vulnerable	Migratory
White-winged Fairy-wren (Barrow Island), Barrow Island Black-and-white Fairy-wren	*Malurus leucopterus edouardi*	Vulnerable	
White-winged Fairy-wren (Dirk Hartog Island), Dirk Hartog Black-and-White Fairy-wren	*Malurus leucopterus*	Vulnerable	
Grey Wagtail#	*Motacilla cinerea*		Migratory
Yellow Wagtail#	*Motacilla flava*		Migratory
Eastern Curlew, Far Eastern Curlew*	*Numenius madagascariensis*	Critically Endangered	Migratory
Little Curlew, Little Whimbrel*	*Numenius minutus*		Migratory
Whimbrel*	*Numenius phaeopus*		Migratory
Bridled Tern	*Onychoprion anaethetus*		Migratory
Fairy Prion (southern)	*Pachyptila turtur subantarctica*	Vulnerable	
Osprey*	*Pandion haliaetus*		Migratory
Abbott's Booby	*Papasula abbotti*	Endangered	
Night Parrot	*Pezoporus occidentalis*	Endangered	
White-tailed Tropicbird	*Phaethon lepturus*		Migratory
Red-tailed Tropicbird	*Phaethon rubricauda*		Migratory
Red-necked Phalarope*	*Phalaropus lobatus*		Migratory
Ruff (Reeve) *	*Philomachus pugnax*		Migratory
Sooty Albatross	*Phoebetria fusca*	Vulnerable	Migratory
Pacific Golden Plover*	*Pluvialis fulva*		Migratory
Grey Plover*	*Pluvialis squatarola*		Migratory
Princess Parrot, Alexandra's Parrot	*Polytelis alexandrae*	Vulnerable	
Soft-plumaged Petrel	*Pterodroma mollis*	Vulnerable	
Rufous Fantail#	*Rhipidura rufifrons*		Migratory
Australian Painted Snipe	*Rostratula australis*	Endangered	
Roseate Tern	*Sterna dougallii*		Migratory
Little Tern	*Sternula albifrons*		Migratory
Australian Fairy Tern	*Sternula nereis*	Vulnerable	

Common name	Scientific name	Threatened status	Migratory
Masked Booby	*Sula dactylatra*		Migratory
Brown Booby	*Sula leucogaster*		Migratory
Red-footed Booby	*Sula sula*		Migratory
Indian Yellow-nosed Albatross	*Thalassarche carteri*	Vulnerable	
Tasmanian Shy Albatross	*Thalassarche cauta*		Migratory
Shy Albatross, Tasmanian Shy Albatross	*Thalassarche cauta*	Vulnerable	
White-capped Albatross	*Thalassarche cauta steadi*	Vulnerable	
Campbell Albatross, Campbell Black-browed Albatross	*Thalassarche impavida*	Vulnerable	
Black-browed Albatross	*Thalassarche melanophris*	Vulnerable	Migratory
Crested Tern*	*Thalasseus bergii*		Migratory
Grey-tailed Tattler*	*Tringa brevipes*		Migratory
Wood Sandpiper*	*Tringa glareola*		Migratory
Common Greenshank, Greenshank*	*Tringa nebularia*		Migratory
Marsh Sandpiper, Little Greenshank*	*Tringa stagnatilis*		Migratory
Common Redshank, Redshank*	*Tringa totanus*		Migratory
Painted Button-quail (Houtman Abrolhos)	*Turnix varius scintillans*	Vulnerable	
Masked Owl (northern)	*Tyto novaehollandiae kimberli*	Vulnerable	
Terek Sandpiper*	*Xenus cinereus*		Migratory

** Migratory Wetland Species*

 # Migratory Terrestrial Species (unlikely to be encountered in the PA)

Table 2-16: BIAs for regionally significant seabirds and shorebirds

Common name	Behaviour	Seasonal presence	Occurrence descriptor
Australian Lesser Noddy	Foraging (provisioning young)	Year-round	Known to occur
Bridled Tern	Foraging (in high numbers)	Almost entirely a breeding visitor, arriving late September or October and leaving between late February and early May	Known to occur

Common name	Behaviour	Seasonal presence	Occurrence descriptor
Brown Booby	Breeding	Breeding Feb–Oct (but mainly in autumn)	Known to occur
Caspian Tern	Foraging (provisioning young)		Known to occur
Common Noddy	Foraging	Breeding visitor in Abrolhos (mid-August to late April) and further north (May to at least November)	Known to occur
	Foraging (provisioning young)	Breeding visitor in Abrolhos (mid-August to late April) and further north (May to at least November)	Known to occur
Fairy Tern	Breeding	Breeding from July to late September; birds from South-West Marine Region (SWMR) dispersing northwards in winter	Known to occur
	Foraging (in high numbers)	Year-round, but southern birds disperse north in winter	Known to occur
Flesh-footed Shearwater	Aggregation	Late April to late June and late August to early November	Known to occur
Greater Frigatebird	Breeding	Breeding in May–June and August	Known to occur
Great-winged Petrel (macroptera race)	Foraging (provisioning young)	Late January to early December	Known to occur
Lesser Crested Tern	Breeding	Breeding Mar–Jun	Known to occur
Lesser Frigatebird	Breeding	Breeding Mar–Sep	Known to occur
Little Penguin	Foraging (provisioning young)		Known to occur
Little Shearwater	Foraging (in high numbers)	Early January to early December, mainly April to November	Known to occur
Little Tern	Breeding	Breeding recorded in June, July, and October	Known to occur
	Resting	Breeding recorded in June, July, and October	Known to occur
Pacific Gull	Foraging (in high numbers)		Former Range
	Foraging (in high numbers)		Known to occur
Red-footed Booby	Breeding	Breeding in May-June	Known to occur

Common name	Behaviour	Seasonal presence	Occurrence descriptor
Roseate Tern	Breeding	Breeding from mid-March to July; Also birds from SWMR dispersing north in winter	Known to occur
	Foraging	Winter	Known to occur
	Foraging (provisioning young)	Winter	Known to occur
	Resting	Breeding from mid-March to July; birds from SWMR dispersing north in winter	Known to occur
Soft-plumaged Petrel	Foraging (in high numbers)	Mainly March to late September	Known to occur
Sooty Tern	Foraging	Late Aug to early May	Known to occur
Wedge-tailed Shearwater	Breeding	Breeding visitor arriving in mid-August and leaving in April in Pilbara and mid-May in Shark Bay	Known to occur
	Foraging (in high numbers)	Mid-August–May	Known to occur
White-faced Storm Petrel	Foraging (in high numbers)		Known to occur
White-tailed Tropicbird	Breeding	Breeding recorded in May and October	Known to occur

Table 2-17: Summary of relevant conservation plans—seabirds and shorebirds

Species	Relevant Plan / Advice	Key Threats / Relevant Management Advice
Anous tenuirostris melanops (Australian Lesser Noddy)	Conservation Advice for *Anous tenuirostris melanops* Australian Lesser Noddy (Ref. 48)	The main potential threat to breeding colonies is catastrophic destruction of habitat by cyclones. Other threats include: • pollution • oil spills • over-fishing.
Calyptorhynchus banksii naso (Forest Red-tailed Black-Cockatoo) *Calyptorhynchus baudinii* (Baudin's Cockatoo, Long-billed Black-Cockatoo)	Forest Black-Cockatoo (Baudin's Cockatoo *Calyptorhynchus baudinii*) and Forest Red-tailed Black-Cockatoo (*Calyptorhynchus banksii naso*) Recovery Plan (Ref. 49)	Key threats are: • killing by illegal shooting • feral honeybees • habitat loss • nest hollow shortage • nest hollow competition.
	Approved Conservation Advice for *Calyptorhynchus banksii naso* (Forest Red-tailed Black-Cockatoo) (Ref. 50)	The main identified threats to the Forest Red-tailed Black-Cockatoo are: • illegal shooting • habitat loss

Species	Relevant Plan / Advice	Key Threats / Relevant Management Advice
		• nest hollow shortage and competition from other species • injury or death from *Apis mellifera* (European Honey Bees).
	Conservation Advice *Calyptorhynchus baudinii* Baudin's Cockatoo (Ref. 51)	Key threats include: • habitat loss, disturbance, and modifications • fire • invasive species • competition with native species • illegal killing • phytopathogens and pests • climate change.
Calyptorhynchus latirostris (Carnaby's Cockatoo)	Carnaby's Cockatoo (*Calyptorhynchus latirostris*) Recovery Plan (Ref. 52)	Key threats include: • loss of breeding habitat • loss of non-breeding foraging and night roosting habitat • tree health • mining and extraction activities • illegal shooting • illegal taking • climate change • collisions with motor vehicles • disease.
Leipoa ocellate (Malleefowl)	National Recovery Plan for Malleefowl *Leipoa ocellate* (Ref. 53)	Key threats include: • clearing • habitat fragmentation and isolation • grazing • predation • fire (wildfire and intentional burns) • disease, inbreeding, and chemical exposure • climate change.
Macronectes giganteus (Southern Giant Petrel) *Macronectes halli* (Northern Giant Petrel) *Thalassarche carteri* (Indian Yellow-nosed Albatross) *Thalassarche cauta* (Tasmanian Shy Albatross) *Thalassarche cauta* (Shy Albatross)	National Recovery Plan for Threatened Albatrosses and Giant Petrels 2011–2016 (Ref. 54)	Key threats include: • incidental catch resulting from fishing operations • competition with fisheries for marine resources • dependence on discards • marine pollution • climate change • intentional shooting/killing • feral pest species • human disturbance at the nest • parasites and diseases

Species	Relevant Plan / Advice	Key Threats / Relevant Management Advice
Thalassarche cauta steadi (White-capped Albatross) *Thalassarche impavida* (Campbell Albatross, Campbell Black-browed Albatross) Thalassarche melanophris (Black-browed Albatross)		• loss of nesting habitat • competition for nest space • climate change.
Malurus leucopterus edouardi (White-winged Fairy-wren (Barrow Island)	Approved Conservation Advice for *Malurus leucopterus edouardi* (White-winged Fairy-wren [Barrow Island]) (Ref. 55)	The main potential threats to the White-winged Fairy-wren (Barrow Island) include: • introduction of non-endemic fauna, flora, or pathogens • inappropriate fire regime • vegetation clearing • destruction of birds • degradation of habitat by fire and development.
Malurus leucopterus (White-winged Fairy-wren (Dirk Hartog Island))	Approved Conservation Advice for *Malurus leucopterus* (White-winged Fairy-wren (Dirk Hartog Island)) (Ref. 56)	The main identified threats to the White-winged Fairy-wren (Dirk Hartog Island) are: • fire, which can kill birds and/or destroy habitat • degradation through grazing and trampling of habitat by feral goats (*Capra hircus*) • predation by feral cats (*Felis catus*) and house mice (*Mus* sp.)
Pachyptila turtur subantarctica (Fairy Prion (southern))	Conservation Advice *Pachyptila turtur subantarctica* Fairy Prion (southern) (Ref. 57)	Key threats include: • habitat loss, disturbance, and modification • predation.
Papasula abbotti (Abbott's Booby)	Conservation Advice *Papasula abbotti* Abbott's Booby (Ref. 58)	The Abbott's booby breeds only on Christmas Island. The principal reason for the decline of Abbott's Booby is thought to be the clearance of about a third of the former nesting rainforest habitat.
Pezoporus occidentalis (Night Parrot)	Conservation Advice *Pezoporus occidentalis* Night Parrot (Ref. 59)	There are no known threats to this species.
Polytelis alexandrae (Princess Parrot)	Conservation Advice *Polytelis alexandrae* Princess Parrot (Ref. 60)	Potential threats include: • increased intensity of bushfires • habitat degradation from introduced weeds and herbivores

Species	Relevant Plan / Advice	Key Threats / Relevant Management Advice
		• predation by introduced predators • competition with other bird species • disease • illegal collection.
Pterodroma mollis (Soft-plumaged Petrel)	Conservation Advice *Pterodroma Mollis* Soft-plumaged Petrel (Ref. 61)	Key threats include: • accidental introduction of predators to island populations.
Rostratula australis (Australian Painted Snipe)	Approved Conservation Advice for *Rostratula australis* (Australian Painted Snipe) (Ref. 62)	Key threats include: • habitat loss, disturbance, and modification • invasive weeds • trampling, browsing, or grazing • animal predation or competition • fire.
Sternula nereis (Australian Fairy Tern)	Approved Conservation Advice for *Sternula nereis* (Fairy Tern) (Ref. 63)	Key threats include: • predation by introduced animals • disturbance by humans and direct destruction of nests • increasing salinity in waters adjacent to colonies • irregular water management (flooding nests etc.) • weed encroachment • oil spills.
Turnix varius scintillans (Painted Button-quail (Houtman Abrolhos))	Approved Conservation Advice for *Turnix varia scintillans* (Painted Button-quail (Houtman Abrolhos)) (Ref. 64)	Key threats include: • inappropriate fire regimes • competition for food with, or predation of eggs by, the introduced House Mouse (*Mus musculus*) • introduction of non-endemic fauna, flora or pathogens • grazing and trampling of habitat.
Tyto novaehollandiae kimberli (Masked Owl (northern))	Conservation Advice *Tyto novaehollandiae kimberli* Masked Owl (northern) (Ref. 65)	Potential threats include: • decline in food availability • more intense, frequent, and extensive fires, which may also reduce the availability of large trees and hollows • competition for tree hollows • reduction in suitable habitat.

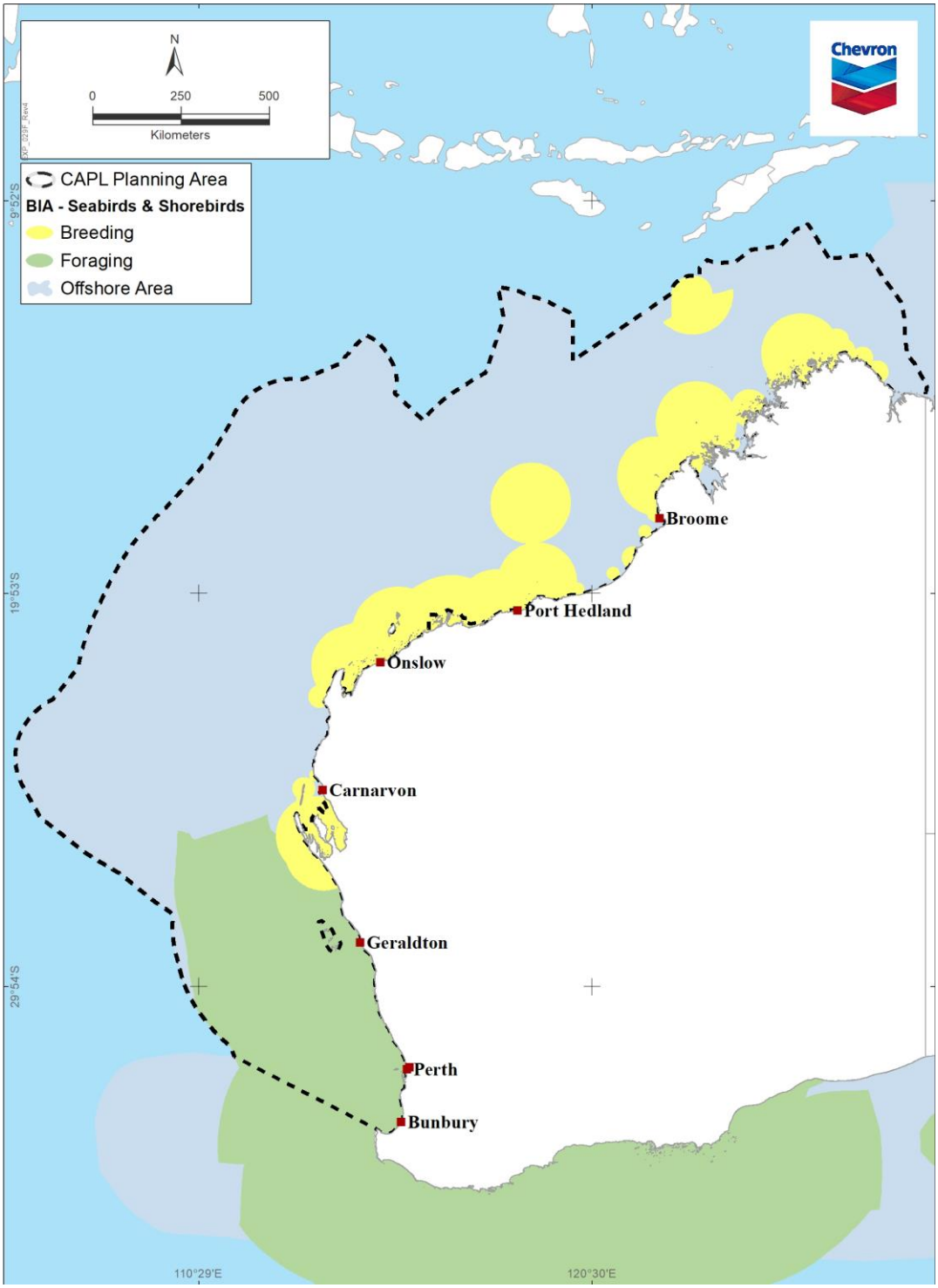


Figure 2-4: BIAs associated with seabirds and shorebirds

2.6 Listed threatened ecological communities

In Australia, three categories exist for listing threatened ecological communities (TECs) under the EPBC Act: critically endangered, endangered, and vulnerable.

In WA, TECs are present in the southwest and in the north around Broome. Table 2-18 summarises these communities (Ref. 66; Ref. 4; appendix a).

Table 2-18: Threated ecological communities

TEC	Summary of significance
Banksia Woodlands of the Swan Coastal Plain ecological community*	The ecological community is a woodland associated with the Swan Coastal Plain of southwest WA. A key diagnostic feature is a prominent tree layer of banksia, with scattered eucalypts and other tree species often present among or emerging above the banksia canopy. The understorey is a species-rich mix of sclerophyllous shrubs, graminoids, and forbs. The ecological community is characterised by a high endemism and considerable localised variation in species composition across its range. (Ref. 67)
Monsoon Vine Thickets on the coastal sand dunes of Dampier Peninsula	The Monsoon Vine Thickets on the coastal sand dunes of Dampier Peninsula ecological community represents certain occurrences of Monsoon Vine thickets in the south-west Kimberley region of WA (within the Dampierland bioregion). The ecological community is predominantly restricted to the coastlines of the Dampier Peninsula from Broome in the south to One Arm Point in the north and on the north-eastern coast of the Peninsula from One Arm Point to Goodenough Bay. The coastal dune environment, being largely of sand, has minimal soil development and is susceptible to erosion from various sources including rising tides, strong winds, and cyclonic activity. Tides of the Dampier Peninsula range up to 11 m and are a major factor affecting the coastal environment where the ecological community occurs. (Ref. 68)
Sedgelands in Holocene dune swales of the southern Swan Coastal Plain	The Rockingham-Becher Plain has been formed through the accumulation of Holocene sediments and contains a continuous depositional history from 7000 BP to present. Wetlands occur within the swales where the water table is close to or at the ground surface in the wetter months of the year. The most typical form is that of the Becher Suite, which is made up of over 250 very small to small sumplands and damplands, many of which contain occurrences of this community. The present known distribution of the sedgelands in Holocene dune swale community as is ~193 ha and is almost entirely located within linear wetland depressions (swales) occurring between parallel sand ridges of the Rockingham-Becher Plain. Additional occurrences include a small area at Yanchep and a small area at Dalyellup. Holocene dunes with wetlands around Preston Beach, south of Lancelin, and at Cheynes Beach may also contain occurrences of this community. (Ref. 69)
Subtropical and Temperate Coastal Saltmarsh	The Subtropical and Temperate Coastal Saltmarsh ecological community occurs within a relatively narrow margin of the Australian coastline, within the subtropical and temperate climatic zones south of the South-east Queensland IBRA bioregion boundary at 23° 37′ latitude along the east coast and south of (and including) Shark Bay at 26° on the west coast. Coastal saltmarsh occurring on islands within the geographic range is also included within the ecological community. The Coastal Saltmarsh ecological community consists mainly of salt-tolerant vegetation (halophytes) including: grasses, herbs, sedges, rushes, and shrubs. Succulent herbs, shrubs, and grasses generally dominate, and vegetation is generally <0.5 m high (with the exception of some reeds and sedges). (Ref. 70)
Thrombolite (microbialite) Community of a Coastal Brackish Lake (Lake Clifton)*	The Lake Clifton thrombolite community is restricted to Lake Clifton, which occurs within the South West Natural Resource Management Region. This ecological community is situated in the Swan Coastal Plain IBRA Bioregion of WA. Lake Clifton is situated within the Yalgorup National Park and is the northernmost lake in the Peel-Yalgorup Lakes System. The main known occurrence of the ecological community is a stretch, ~15 km long and up to 15 m wide, along the north-eastern shoreline of Lake Clifton. There are other small clusters of thrombolites within the lake, also at the northern end. This structure is the largest known example of a living, non-marine microbialite reef in the southern hemisphere. (Ref. 71)

TEC	Summary of significance
Tuart (*Eucalyptus gomphocephala*) Woodlands and Forests of the Swan Coastal Plain ecological community*	The ecological community occurs as woodlands or forests or other structural forms where the primary defining feature is the presence of *Eucalyptus gomphocephala* (Tuart) trees in the uppermost canopy layer. The ecological community includes the assemblage of plants, animals, and other organisms that occur in association with Tuart. The ecological community has a discontinuous distribution in the west of the Swan Coastal Plain, of southwest WA. The Tuart woodlands and forests occur on the Swan Coastal Plain in WA, from Jurien, ~200 km north of Perth, to the Sabina River, near Busselton, 225 km south of Perth. The ecological community occurs mainly on the Spearwood and Quindalup dune systems, which are underlain by Tamala Limestone. (Ref. 72)

** Identified in the protected matters search (appendix a) but located inland and thus not expected to be exposed to CAPL's activities.*

2.7 Commonwealth marine areas

The Commonwealth marine area is any part of the sea, including the waters, seabed, and airspace, within Australia's exclusive economic zone (EEZ) and/or over the continental shelf of Australia, which is not State or Territory waters.

The Commonwealth marine area stretches from three to 200 nautical miles from the coast. Marine protected areas are marine areas that are recognised to have high conservation value (Ref. 73).

2.7.1 Australian Marine Parks

Australian Marine Parks (AMPs), proclaimed under the EPBC Act in 2007 and 2013, are located in Commonwealth waters that start at the outer edge of state and territory waters, generally three nautical miles (~5.5 km) from the shore, and extend to the outer boundary of Australia's EEZ, 200 nautical miles (~370 km) from the shore (Ref. 75).

Table 2-19, Table 2-20, and Table 2-21 summarise the north-west, south-west, and north AMPs present within the PA, including their zones, areas, and International Union for Conservation of Nature (IUCN) categories (Ref. 74; Ref. 4; appendix a).

Table 2-19: Summary of AMPs (North-west Marine Parks)

AMP	Zones, IUCN categories, and zone area	Description	Natural values^
Argo–Rowley Terrace	National Park Zone (II) 36 050 km² Multiple Use Zone (VI) 108 812 km² Special Purpose Zone (Trawl) (VI) 1141 km²	The Argo–Rowley Terrace Marine Park is ~270 km north-west of Broome, WA, and extends to the limit of Australia's EEZ. The Marine Park is adjacent to the Mermaid Reef Marine Park and the WA Rowley Shoals Marine Park. The Marine Park covers an area of 146 003 km² and has	The Marine Park includes examples of ecosystems representative of: • Northwest Transition—an area of shelf break, continental slope, and the majority of the Argo Abyssal Plain. Key topographic features include Mermaid, Clerke, and Imperieuse reefs, which collectively are a biodiversity hotspot • Timor Province—an area dominated by warm, nutrient-poor waters. Canyons are an important feature in this area of the Marine Park and are generally associated with high productivity and aggregations of marine life.

AMP	Zones, IUCN categories, and zone area	Description	Natural values^
		water depths between 220 m and 6000 m. The Marine Park was proclaimed under the EPBC Act on 14 December 2013 and renamed Argo–Rowley Terrace Marine Park on 9 October 2017.	Key ecological features of the Marine Park are: • Canyons linking the Argo Abyssal Plain with the Scott Plateau—an area likely to result in upwelling of nutrient-rich water and aggregations of marine life • Mermaid Reef and Commonwealth waters surrounding Rowley Shoals—an area of enhanced productivity and high species richness, thought to be facilitated by internal wave action generated by internal tides. The Marine Park supports a range of species including species listed as threatened, migratory, marine, or cetacean under the EPBC Act. Biologically important areas within the Marine Park include resting and breeding habitat for seabirds and a migratory pathway for the Pygmy Blue Whale.
Ashmore Reef	Sanctuary Zone (Ia) 550 km² Recreational Use Zone (IV) 34 km²	The Ashmore Reef Marine Park is ~630 km north of Broome and 110 km south of the Indonesian island of Roti. The Marine Park is in Australia's External Territory of Ashmore and Cartier Islands and is within an area subject to a Memorandum of Understanding (MoU) between Indonesia and Australia, known as the MoU Box. The Marine Park covers an area of 583 km² and water depths from <15 m to 500 m. The Marine Park has three vegetated sand cays that are permanently above water: West, Middle, and East islands. The Marine Park was originally proclaimed under the Commonwealth *National Parks and Wildlife Conservation Act 1975* on 16 August 1983 as the Ashmore Reef National Nature	The Marine Park includes examples of ecosystems representative of the Timor Province—a bioregion with a depth range from ~200 m near the shelf break to 5920 m over the Argo Abyssal Plain. The reefs and islands of the bioregion are regarded as biodiversity hotspots. Ashmore Reef is an important feature of the bioregion. Endemism in demersal fish communities of the continental slope is high with two distinct communities identified: one on the upper slope, the other mid slope. Key ecological features of the Marine Park are: • Ashmore Reef and Cartier Island and surrounding Commonwealth waters—areas of enhanced productivity in an otherwise low-nutrient environment, of regional importance for feeding and breeding aggregations of birds and marine life • continental slope demersal fish communities—an area of high-diversity demersal fish assemblages. The marine environment of the Marine Park includes habitats associated with two extensive lagoons, sand flats, shifting sand cays, extensive reef flat, and large areas of seagrass. The reef ecosystems are comprised of hard and soft corals, gorgonians, sponges, and a range of encrusting organisms, with the highest number of coral species of any reef off the Western Australian coast. The Marine Park supports a range of species, including species listed as threatened, migratory, marine, or cetacean under the EPBC Act. Biologically important areas within the

AMP	Zones, IUCN categories, and zone area	Description	Natural values^
		Reserve, and proclaimed under the EPBC Act on 14 December 2013; it was renamed Ashmore Reef Marine Park on 9 October 2017.	Marine Park include breeding, foraging, and resting habitat for seabirds; resting and foraging habitat for migratory shorebirds; foraging, mating, nesting, and internesting habitat for marine turtles; foraging habitat for Dugong; and a migratory pathway for Pygmy Blue Whales. Ashmore Reef Ramsar site The Ashmore Reef Ramsar site includes the largest of the atolls in the region. West Island, Middle Island, and East Island represent the only vegetated islands in the region. Ashmore Reef Ramsar site supports internationally significant populations of seabirds and shorebirds, is important for turtles (Green, Hawksbill and Loggerhead) and Dugong, and has the highest diversity of hermatypic (reef-building) corals on the West Australian coast. It is known for its abundance and diversity of sea snakes. However, since 1998 populations of sea snakes at Ashmore Reef have been in decline.
Carnarvon Canyon	Habitat Protection Zone (IV) 6177 km²	The Carnarvon Canyon Marine Park is ~300 km north-west of Carnarvon. It covers an area of 6177 km² with a water depth range of 1500–6000 m. The Marine Park was proclaimed under the EPBC Act on 14 December 2013 and renamed Carnarvon Canyon Marine Park on 9 October 2017.	The Marine Park includes examples of ecosystems representative of the Central Western Transition — a bioregion characterised by large areas of continental slope; a range of topographic features such as terraces, rises, and canyons; seasonal and sporadic upwelling; and benthic slope communities comprising tropical and temperate species. It includes the Carnarvon Canyon, a single-channel canyon covering the entire depth range of the Marine Park. Ecosystems of the Marine Park are influenced by tropical and temperate currents, deep-water environments, and proximity to the continental slope and shelf. The soft-bottom environment at the base of the Carnarvon Canyon is likely to support species that are typical of the deep sea floor (e.g. holothurians, polychaetes, sea pens). The Marine Park supports a range of species, including species listed as threatened, migratory, marine, or cetacean under the EPBC Act. There is limited information about species' use of this Marine Park.
Cartier Island	Sanctuary Zone (Ia) 172 km²	The Cartier Island Marine Park is ~45 km south-east of Ashmore Reef Marine Park and 610 km north of Broome, WA. Both Marine Parks are located in Australia's External Territory of	The Marine Park includes examples of ecosystems representative of the Timor Province—a bioregion with a depth range from ~200 m near the shelf break to 5920 m over the Argo Abyssal Plain. The reefs and islands of the bioregion are regarded as biodiversity hotspots. Endemism of demersal fish communities of the continental slope is high with two distinct communities identified, one on the upper

AMP	Zones, IUCN categories, and zone area	Description	Natural values^
		Ashmore and Cartier Islands and are also within an area subject to a Memorandum of Understanding (MoU) between Indonesia and Australia, known as the MoU Box. The Marine Park covers an area of 172 km² with water depths from <15 m to 500 m. The Marine Park was originally proclaimed under the Commonwealth *National Parks and Wildlife Conservation Act 1975* on 21 June 2000 as the Cartier Island Marine Reserve, and proclaimed under the EPBC Act on 14 December 2013; it was renamed Cartier Island Marine Park on 9 October 2017.	slope, the other mid slope. Key ecological features represented in the Marine Park are: • Ashmore Reef and Cartier Island and surrounding Commonwealth waters—areas of enhanced productivity in an otherwise low-nutrient environment, of regional importance for feeding and breeding aggregations of birds and marine life • Continental slope demersal fish communities—an area of high diversity in demersal fish assemblages. The Marine Park includes an unvegetated sand island (Cartier Island); mature reef flat; a small, submerged pinnacle (Wave Governor Bank); and two shallow pools to the north-east of the island. It is also an area of high diversity and abundance of hard and soft corals, gorgonians (sea fans), sponges, and a range of encrusting organisms. The reef crests are generally algal dominated, while the reef flats feature ridges of coral rubble and large areas of seagrass. The Marine Park supports a range of species, including species listed as threatened, migratory, marine, or cetacean under the EPBC Act. Biologically important areas within the Marine Park include breeding and foraging habitat for seabirds; internesting, nesting, and foraging habitat for marine turtles; and foraging habitat for Whale Sharks. The Marine Park is important for a range of other species and internationally significant for its abundance and diversity of sea snakes, some of which are listed species under the EPBC Act.
Dampier	National Park Zone (II) 73 km² Habitat Protection Zone (IV) 104 km² Multiple Use Zone (VI) 1074 km²	The Dampier Marine Park is ~10 km north-east of Cape Lambert and 40 km from Dampier extending westwards from the WA state water boundary. The Marine Park covers an area of 1252 km² and a water depth range between <15 m and 70 m. The Marine Park was proclaimed under the EPBC Act on 14 December 2013 and renamed Dampier Marine Park on 9 October 2017.	The Marine Park includes examples of ecosystems representative of the Northwest Shelf Province—a dynamic environment influenced by strong tides, cyclonic storms, long-period swells, and internal tides. The bioregion includes diverse benthic and pelagic fish communities, and ancient coastline thought to be an important sea floor feature and migratory pathway for Humpback Whales. The Marine Park supports a range of species including those listed as threatened, migratory, marine, or cetacean under the EPBC Act. Biologically important areas within the Marine Park include breeding and foraging habitat for seabirds, internesting habitat for marine turtles, and a migratory pathway for Humpback Whales.

AMP	Zones, IUCN categories, and zone area	Description	Natural values^
Eighty Mile Beach	Multiple Use Zone (VI) 10 785 km²	The Eighty Mile Beach Marine Park is located ~74 km north-east of Port Hedland, adjacent to the Western Australian Eighty Mile Beach Marine Park. The Marine Park covers an area of 10 785 km² and a water depth ranges between less than 15 m and 70 m. The Marine Park was proclaimed under the EPBC Act on 14 December 2013 and renamed Eighty Mile Beach Marine Park on 9 October 2017.	The Marine Park includes examples of ecosystems representative of the Northwest Shelf Province—a dynamic environment influenced by strong tides, cyclonic storms, long-period swells, and internal tides. The bioregion includes diverse benthic and pelagic fish communities, and ancient coastline thought to be an important sea floor feature and migratory pathway for Humpback Whales. The Marine Park supports a range of species including species listed as threatened, migratory, marine, or cetacean under the EPBC Act. Biologically important areas within the Marine Park include breeding, foraging, and resting habitat for seabirds; internesting and nesting habitat for marine turtles; foraging, nursing, and pupping habitat for sawfish; and a migratory pathway for Humpback Whales.
Gascoyne	National Park Zone (II) 9132 km² Habitat Protection Zone (IV) 38 982 km² Multiple Use Zone (VI) 33 652 km²	The Gascoyne Marine Park is located ~20 km off the west coast of the Cape Range Peninsula, adjacent to the Ningaloo Reef Marine Park and the Western Australian Ningaloo Marine Park, and extends to the limit of Australia's EEZ. The Marine Park covers an area of 81 766 km² and water depths between 15 m and 6000 m. The Marine Park was proclaimed under the EPBC Act on 14 December 2013 and renamed Gascoyne Marine Park on 9 October 2017.	The Marine Park includes examples of ecosystems representative of: • Central Western Shelf Transition—continental shelf with water depths up to 100 m, and a significant transition zone between tropical and temperate species • Central Western Transition—characterised by large areas of continental slope; a range of topographic features such as terraces, rises, and canyons; seasonal and sporadic upwelling; and benthic slope communities comprising tropical and temperate species • Northwest Province—an area of continental slope comprising diverse and endemic fish communities. Key ecological features of the Marine Park are: • Canyons linking the Cuvier Abyssal Plain and the Cape Range Peninsula—an area resulting in upwelling of nutrient-rich water and aggregations of marine life • Commonwealth waters adjacent to Ningaloo Reef—an area where the Leeuwin and Ningaloo currents interact resulting in enhanced productivity and aggregations of marine life • Continental slope demersal fish communities—an area of high diversity of demersal fish assemblages on the continental slope

AMP	Zones, IUCN categories, and zone area	Description	Natural values^
			• Exmouth Plateau—a regionally and nationally unique deep-sea plateau in tropical waters. Ecosystems represented in the Marine Park are influenced by the interaction of the Leeuwin Current, Leeuwin Undercurrent, and the Ningaloo Current. The Marine Park supports a range of species including species listed as threatened, migratory, marine, or cetacean under the EPBC Act. Biologically important areas within the Marine Park include breeding habitat for seabirds; internesting habitat for marine turtles; a migratory pathway for Humpback Whales; and foraging habitat and migratory pathway for Pygmy Blue Whales.
Kimberley	National Park Zone (II) 6392 km² Habitat Protection Zone (IV) 5665 km² Multiple Use Zone (VI) 62 411 km²	The Kimberley Marine Park is located ~100 km north of Broome, extending from the Western Australian state water boundary north from the Lacepede Islands to the Holothuria Banks offshore from Cape Bougainville. The Marine Park is adjacent to the Western Australian Lalang-garram/Camden Sound Marine Park and the North Kimberley Marine Park. The Marine Park covers an area of 74 469 km² and water depths from less than 15 m to 800 m. The Marine Park was proclaimed under the EPBC Act on 14 December 2013 and renamed Kimberley Marine Park on 9 October 2017.	The Marine Park includes examples of ecosystems representative of: • Northwest Shelf Province—a dynamic environment influenced by strong tides, cyclonic storms, long-period swells, and internal tides. The bioregion includes diverse benthic and pelagic fish communities, and an ancient coastline thought to be an important sea floor feature and migratory pathway for Humpback Whales. • Northwest Shelf Transition—straddles the North-west and North Marine Regions and in the Northwest includes shelf break, continental slope, and the majority of the Argo Abyssal Plain and is subject to a high incidence of cyclones. Benthic biological communities in the deeper parts of the bioregion have not been extensively studied, although high levels of species diversity and endemism occur among demersal fish communities on the continental slope. • Timor Province—water depths (of the bioregion) ranging from ~200 m near the shelf break to 5920 m over the Argo Abyssal Plain. The reefs and islands of the bioregion are regarded as biodiversity hotspots. Endemism in demersal fish communities of the continental slope is high; two distinct communities have been identified on the upper and mid slopes. Key ecological features of the Marine Park are: • the ancient coastline at the 125 m depth contour—where rocky escarpments are thought to provide

AMP	Zones, IUCN categories, and zone area	Description	Natural values^
			biologically important habitats in areas otherwise dominated by soft sediments • the continental slope demersal fish communities—characterised by high diversity of demersal fish assemblages. The Marine Park supports a range of species, including protected species listed as threatened, migratory, marine, or cetacean under the EPBC Act. Biologically important areas within the Marine Park include breeding and foraging habitat for seabirds; internesting and nesting habitat for marine turtles; breeding, calving, and foraging habitat for inshore dolphins; calving, migratory pathway, and nursing habitat for Humpback Whales; migratory pathway for Pygmy Blue Whales; foraging habitat for dugong; and foraging habitat for Whale Sharks.
Mermaid Reef	National Park Zone (II) 540 km²	The Mermaid Reef Marine Park is located ~280 km north-west of Broome, adjacent to the Argo–Rowley Terrace Marine Park and ~13 km from the Western Australian Rowley Shoals Marine Park. The Marine Park covers an area of 540 km² and water depths from less than 15 m to 500 m. The Marine Park was originally proclaimed under the Commonwealth *National Parks and Wildlife Conservation Act 1975* on 10 April 1991 as the Mermaid Reef Marine National Nature Reserve, and proclaimed under the EPBC Act on 14 December 2013 and renamed Mermaid Reef Marine Park on 9 October 2017.	The Marine Park includes examples of ecosystems representative of the Northwest Transition—an area of shelf break, continental slope, and the majority of the Argo Abyssal Plain. Together with Clerke Reef and Imperieuse Reef, Mermaid Reef is a biodiversity hotspot and key topographic feature of the Argo Abyssal Plain. A key ecological feature of the Marine Park is the Mermaid Reef and Commonwealth waters surrounding Rowley Shoals—an area of enhanced productivity and high species richness thought to be facilitated by internal wave action generated by internal tides in the lagoon. Ecosystems of the Marine Park are associated with emergent reef flat, deep reef flat, lagoon, and submerged sand habitats. The Marine Park supports a range of species, including species listed as threatened, migratory, marine, or cetacean under the EPBC Act. Biologically important areas within the Marine Park include breeding habitat for seabirds and a migratory pathway for the Pygmy Blue Whale.
Montebello	Multiple Use Zone (VI) 3413 km²	The Montebello Marine Park is located offshore of Barrow Island and 80 km west of Dampier extending from the Western	The Marine Park includes examples of ecosystems representative of the Northwest Shelf Province—a dynamic environment influenced by strong tides, cyclonic storms, long-period swells, and internal tides. The bioregion includes diverse benthic and pelagic fish communities, and ancient

AMP	Zones, IUCN categories, and zone area	Description	Natural values^
		Australian state water boundary, and is adjacent to the Western Australian Barrow Island and Montebello Islands Marine Parks. The Marine Park covers an area of 3413 km² and water depths from <15 m to 150 m. The Marine Park was proclaimed under the EPBC Act on 14 December 2013 and renamed Montebello Marine Park on 9 October 2017.	coastline thought to be an important sea floor feature and migratory pathway for Humpback Whales. A key ecological feature of the Marine Park is the ancient coastline at the 125 m depth contour where rocky escarpments are thought to provide biologically important habitat in areas otherwise dominated by soft sediments. The Marine Park supports a range of species including species listed as threatened, migratory, marine, or cetacean under the EPBC Act. Biologically important areas within the Marine Park include breeding habitat for seabirds; internesting, foraging, mating, and nesting habitat for marine turtles; a migratory pathway for Humpback Whales; and foraging habitat for Whale Sharks.
Ningaloo	National Park Zone (II) 116 km² Recreational Use Zone (IV) 2319 km²	The Ningaloo Marine Park stretches ~300 km along the west coast of the Cape Range Peninsula, and is adjacent to the Western Australian Ningaloo Marine Park and Gascoyne Marine Park. The Marine Park covers an area of 2435 km² and a water depth range of 30 m to more than 500 m. The Marine Park was originally proclaimed under the *National Parks and Wildlife Conservation Act 1975* on 20 May 1987 as the Ningaloo Marine Park (Commonwealth Waters), and proclaimed under the EPBC Act on 14 December 2013 and renamed Ningaloo Marine Park on 9 October 2017.	The Marine Park includes examples of ecosystems representative of: • Central Western Shelf Transition—continental shelf of water depths up to 100 m, and a significant transition zone between tropical and temperate species • Central Western Transition—characterised by large areas of continental slope; a range of topographic features such as terraces, rises, and canyons; seasonal and sporadic upwelling; and benthic slope communities comprising tropical and temperate species • Northwest Province—an area of continental slope comprising diverse and endemic fish communities • Northwest Shelf Province—a dynamic environment, influenced by strong tides, cyclonic storms, long-period swells, and internal tides. The bioregion includes diverse benthic and pelagic fish communities, and ancient coastline thought to be an important sea floor feature and migratory pathway for Humpback Whales. Key ecological features of the Marine Park are: • Canyons linking the Cuvier Abyssal Plain and the Cape Range Peninsula—an area resulting in upwelling of nutrient-rich water and aggregations of marine life • Commonwealth waters adjacent to Ningaloo Reef—an area where the Leeuwin and Ningaloo currents interact,

AMP	Zones, IUCN categories, and zone area	Description	Natural values^
			resulting in enhanced productivity and aggregations of marine life • Continental slope demersal fish communities—an area of high diversity among demersal fish assemblages on the continental slope. Ecosystems represented in the Marine Park are influenced by interaction of the Leeuwin Current, Leeuwin Undercurrent, and the Ningaloo Current. The Marine Park supports a range of species including species listed as threatened, migratory, marine, or cetacean under the EPBC Act. Biologically important areas within the Marine Park include breeding and or foraging habitat for seabirds; internesting habitat for marine turtles; a migratory pathway for Humpback Whales; foraging habitat and migratory pathway for Pygmy Blue Whales; breeding, calving, foraging, and nursing habitat for dugong; and foraging habitat for Whale Sharks.
Roebuck	Multiple Use Zone (VI) 304 km²	The Roebuck Marine Park is located ~12 km offshore of Broome, and is adjacent to the Western Australian Yawuru Nagulagun/Roebuck Bay Marine Park. The Marine Park covers an area of 304 km² and a water depth range of less than 15 m to 70 m. The Marine Park was proclaimed under the EPBC Act on 14 December 2013 and renamed Roebuck Marine Park on 9 October 2017.	The Marine Park includes examples of ecosystems representative of the Northwest Shelf Province—a dynamic environment influenced by strong tides, cyclonic storms, long-period swells, and internal tides. The bioregion includes diverse benthic and pelagic fish communities, and ancient coastline thought to be an important sea floor feature and migratory pathway for Humpback Whales. The Marine Park supports a range of species including species listed as threatened, migratory, marine, or cetacean under the EPBC Act. Biologically important areas within the Marine Park include breeding and resting habitat for seabirds; foraging and internesting habitat for marine turtles; a migratory pathway for Humpback Whales; and foraging habitat for dugong.
Shark Bay	Multiple Use Zone (VI) 7443 km²	The Shark Bay Marine Park is located ~60 km offshore of Carnarvon, adjacent to the Shark Bay World Heritage Property and National Heritage place. The Marine Park covers an area of 7443 km²,	The Marine Park includes examples of ecosystems representative of: • Central Western Shelf—a predominantly flat, sandy, and low-nutrient area, in water depths 50–100 m. The bioregion is a transitional zone between tropical and temperate species • Central Western Transition—characterised by large areas of continental slope; a range of topographic features such as terraces,

AMP	Zones, IUCN categories, and zone area	Description	Natural values^
		extending from the Western Australian state water boundary, and a water depth range between 15 m and 220 m. The Marine Park was proclaimed under the EPBC Act on 14 December 2013 and renamed Shark Bay Marine Park on 9 October 2017.	rises, and canyons; seasonal and sporadic upwelling; and benthic slope communities comprising tropical and temperate species. Ecosystems represented in the Marine Park are influenced by the Leeuwin, Ningaloo, and Capes currents. The Marine Park supports a range of species including species listed as threatened, migratory, marine, or cetacean under the EPBC Act. Biologically important areas within the Marine Park include breeding habitat for seabirds, internesting habitat for marine turtles, and a migratory pathway for Humpback Whales. The Marine Park and adjacent coastal areas are also important for Shallow-water Snapper.

^ *Source: Ref. 75.*

Table 2-20: Summary of AMPs (South-west Marine Parks)

AMP	Zones, IUCN categories and zone area	Description	Natural values^
Abrolhos	Habitat Protection Zone (IV) 23,239 km² Multiple Use Zone (VI) 56,545 km² National Park Zone (II) 2548 km² Special Purpose Zone (VI) 5729 km²	Abrolhos Marine Park is located adjacent to the Western Australian Houtman Abrolhos Islands, covering a large offshore area extending from the Western Australian state water boundary to the edge of Australia's exclusive economic zone. It is located ~27 km south-west of Geraldton and extends north to ~330 km west of Carnarvon. The northernmost part of the shelf component of the Marine Park, north of Kalbarri, is adjacent to the Shark Bay World Heritage Area. The Marine Park covers an area of 88,060 km² and a water depth range between less than 15 m and 6000 m.	The Marine Park includes examples of ecosystems representative of: • Central Western Province—characterised by a narrow continental slope incised by many submarine canyons and the most extensive area of continental rise in any of Australia's marine regions. A significant feature within the area are several eddies that form off the Leeuwin Current at predictable locations, including west of the Houtman Abrolhos Islands • Central Western Shelf Province—a predominantly flat, sandy, and low-nutrient area, in water depths between 50 and 100 m. Significant sea floor features of this area include a deep hole and associated area of banks and shoals offshore of Kalbarri. The area is a transitional zone between tropical and temperate species • Central Western Transition—a deep ocean area characterised by large areas of continental slope, a range of significant sea floor features including the Wallaby Saddle, seasonal and sporadic upwelling, and benthic slope communities comprising tropical and temperate species • South-west Shelf Transition—a narrow continental shelf that is noted for its

AMP	Zones, IUCN categories and zone area	Description	Natural values^
		The Marine Park was proclaimed under the EPBC Act on 14 December 2013 and renamed Abrolhos Marine Park on 9 October 2017.	physical complexity. The Leeuwin Current has a significant influence on the biodiversity of this nearshore area as it pushes subtropical water southward along the area's western edge. The area contains a diversity of tropical and temperate marine life including a large number of endemic fauna species.
Geographe	National Park Zone (II) 15 km² Habitat Protection Zone (IV) 21 km² Multiple Use Zone (VI) 291 km² Special Purpose Zone (Mining Exclusion) (VI) 650 km²	The Geographe Marine Park is located in Geographe Bay, ~8 km west of Bunbury and 8 km north of Busselton, adjacent to the Western Australian Ngari Capes Marine Park. The Marine Park covers an area of 977 km², extending from the Western Australian state water boundary, and a water depth range between 15 m and 70 m. The Marine Park was proclaimed under the EPBC Act on 14 December 2013 and renamed Geographe Marine Park on 9 October 2017.	The Marine Park includes examples of ecosystems representative of the South-west Shelf Province—an area of diverse marine life, influenced by the warm waters of the Leeuwin Current. The bioregion includes globally important biodiversity hotspots, such as the waters off Geographe Bay. Key ecological features of the Marine Park are: • Commonwealth marine environment within and adjacent to Geographe Bay—the sheltered waters of Geographe Bay support extensive seagrass beds that in turn provide important nursery habitat for a range of marine species • Western Rock Lobster—plays an important trophic role in many of the inshore ecosystems of the South-west Marine Region. Western Rock Lobsters are an important part of the food web on the inner shelf, particularly as juveniles. The Marine Park supports a range of species including species listed as threatened, migratory, marine, or cetacean under the EPBC Act. Biologically important areas within the Marine Park include foraging habitat for seabirds, a migratory pathway for Humpback and Pygmy Blue Whales, and a calving buffer area for Southern Right Whales.
Jurien	National Park Zone (II) 31 km² Special Purpose Zone (VI) 1820 km²	The Jurien Marine Park is located ~148 km north of Perth and 155 km south of Geraldton, adjacent to the Western Australian Jurien Bay Marine Park. The Marine Park covers an area of 1851 km² of continental shelf, extending from the Western Australian state water boundary, and a water depth	The Marine Park includes examples of ecosystems representative of: • South-west Shelf Transition—consists of a narrow continental shelf that is noted for its physical complexity. The Leeuwin Current has a significant influence on the biodiversity of this nearshore area as it pushes subtropical water southward along the bioregion's western edge. The area contains a diversity of tropical and temperate marine life including a large number of endemic fauna species. Key ecological features of the Marine Park are:

AMP	Zones, IUCN categories and zone area	Description	Natural values^
		range between 15 m and 220 m. The Marine Park was proclaimed under the EPBC Act on 14 December 2013 and renamed Jurien Marine Park on 9 October 2017.	• Ancient coastline between 90 m and 120 m depth—high benthic biodiversity and productivity occur where the ancient coastline forms a prominent escarpment • Demersal slope and associated fish communities of the Central Western Province—an area that provides important habitat for demersal fish communities and is characterised by high species diversity and endemism • Western Rock Lobster—plays an important trophic role in many of the inshore ecosystems of the South-west Marine Region. Western Rock Lobsters are an important part of the food web on the inner shelf, particularly as juveniles. The Marine Park supports a range of species including species listed as threatened, migratory, marine, or cetacean under the EPBC Act. Biologically important areas within the Marine Park include foraging habitat for seabirds, Australian Sea Lions, and White Sharks; and a migratory pathway for Humpback and Pygmy Blue Whales.
Perth Canyon	National Park Zone (II) 1241 km² Habitat Protection Zone (IV) 4352 km² Multiple Use Zone (VI) 1816 km²	The Perth Canyon Marine Park is located ~52 km west of Perth and ~19 km west of Rottnest Island. The Marine Park covers an area of 7409 km² and water depths range between 120 m and 5000 m. The Marine Park was proclaimed under the EPBC Act on 14 December 2013 and renamed Perth Canyon Marine Park on 9 October 2017.	The Marine Park includes examples of ecosystems representative of: • Central Western Province—characterised by a narrow continental slope incised by many submarine canyons, including Perth Canyon, and the most extensive area of continental rise in any of Australia's marine regions. A significant feature within the area are the several eddies that form off the Leeuwin Current at predictable locations, including the Perth Canyon • South-west Shelf Province—marine life in this area is diverse and influenced by the warm waters of the Leeuwin Current • South-west Transition—significant features of this area include the submarine canyons that incise the northern parts of the slope and the deep-water mixing that results from the dynamics of major ocean currents when these meet the sea floor, particularly in the Perth Canyon • South-west Shelf Transition—consists of a narrow continental shelf that is noted for its physical complexity. The Leeuwin Current has a significant influence on the biodiversity of this

AMP	Zones, IUCN categories and zone area	Description	Natural values^
			nearshore area as it pushes subtropical water southward along the area's western edge. The area contains a diversity of tropical and temperate marine life including a large number of endemic fauna species. Key ecological features of the Marine Park are: • Perth Canyon and adjacent shelf break, and other west coast canyons—unique sea floor features give rise to ecologically important events of localised productivity and aggregations of marine life. The Perth Canyon is prominent among these canyons because of its large size and ecological importance. The upwelling of deep ocean currents in the canyon creates a nutrient-rich cold-water habitat that attracts feeding aggregations of deep-diving mammals, such as Pygmy Blue Whales and large predatory fish that feed on aggregations of small fish, krill, and squid • Demersal slope and associated fish communities of the Central Western Province—an area that provides important habitat for demersal fish communities and is characterised by high species diversity and endemism • Western Rock Lobster—plays an important trophic role in many of the inshore ecosystems of the South-west Marine Region. Western Rock Lobsters are an important part of the food web on the inner shelf, particularly as juveniles • Mesoscale eddies—important transporters of nutrients and plankton communities that form at predictable locations off the western and south-western shelf break. The Marine Park supports a range of species including species listed as threatened, migratory, marine, or cetacean under the EPBC Act. Biologically important areas within the Marine Park include foraging habitat for seabirds, Antarctic Blue, Pygmy Blue, and Sperm Whales; a migratory pathway for Humpback, Antarctic Blue, and Pygmy Blue Whales; and a calving buffer area for Southern Right Whales.
South-west Corner	National Park Zone	The South-west Corner Marine Park is located adjacent to	The Marine Park includes examples of ecosystems representative of:

AMP	Zones, IUCN categories and zone area	Description	Natural values^
	(II) 54 841 km² Habitat Protection Zone (IV) 95 088 km² Multiple Use Zone (VI) 106 602 km² Special Purpose Zone (Mining Exclusion) (VI) 9550 km² Special Purpose Zone (VI) 5753 km²	the Western Australian Ngari Capes Marine Park, covering an extensive offshore area that is closest to Western Australia state waters ~48 km west of Esperance, 73 km west of Albany, and 68 km west of Bunbury, and extends to the edge of Australia's exclusive economic zone. The Marine Park covers an area of 271 833 km² and a water depth range from <15 m to 6400 m. The Marine Park was proclaimed under the EPBC Act on 14 December 2013 and renamed South-west Corner Marine Park on 9 October 2017.	• Southern Province—includes the deepest ocean areas of the Australian EEZ, reaching depths of ~5900 m, and is characterised by a long continental slope incised by numerous, well-developed submarine canyons, and the Diamantina Fracture Zone, a rugged area of deep sea floor comprising seamounts and many ridges and troughs • South-west Transition—the main features of this area are the Naturaliste Plateau, the deepest submarine plateau along Australia's continental margins. The Plateau supports rich and diverse biological communities. Deep-water mixing results from the dynamics of major ocean currents when these meet the sea floor South-west Shelf Province—marine life in this area is diverse and influenced by the warm waters of the Leeuwin Current. A small upwelling of nutrient-rich water off Cape Mentelle during summer increases productivity locally, attracting aggregations of marine life. Key ecological features of the Marine Park are: • Albany Canyon group and adjacent shelf break—a feature consisting of 32 canyons cut deeply into the steep continental slope. The canyons are believed to be associated with small periodic upwellings that enhance productivity and attract aggregations of marine life • Cape Mentelle upwelling—draws relatively nutrient-rich water from the base of the Leeuwin Current, up the continental slope, and onto the inner continental shelf, where it results in phytoplankton blooms at the surface • Diamantina Fracture Zone—a unique sea floor feature consisting of a rugged, deep-water environment of seamounts and many closely spaced troughs and ridges. The ridges and seamounts can affect water dynamics and flow, enhancing productivity, and may act as 'stepping stones' for species dispersal and migration across the region and the wider abyssal plain • Naturaliste Plateau—the combination of this unique sea floor feature's structural complexity, mixed water dynamics, and relative isolation indicate that it supports deep-water

AMP	Zones, IUCN categories and zone area	Description	Natural values^
			communities with high species diversity and endemism • Western Rock Lobster—plays an important trophic role in many of the inshore ecosystems of the South-west Marine Region. Western Rock Lobsters are an important part of the food web on the inner shelf, particularly as juveniles • Ancient coastline between 90 m and 120 m depth—high benthic biodiversity and productivity occur where the ancient coastline forms a prominent escarpment. The Marine Park supports a range of species including species listed as threatened, migratory, marine, or cetacean under the EPBC Act. Biologically important areas within the Marine Park include foraging habitat for seabirds, Australian Sea Lions, White Sharks, and Sperm Whales; a migratory pathway for Antarctic Blue, Pygmy Blue, and Humpback Whales; and a calving buffer area for Southern Right Whales.
Two Rocks	National Park Zone (II) 15 km² Multiple Use Zone (VI) 867 km²	The Two Rocks Marine Park is located 25 km north-west of Perth, to the north-west of the Western Australian Marmion Marine Park. The Marine Park covers an area of 882 km², extending from the Western Australian state water boundary, and a water depth range from 15 m to 120 m. The Marine Park was proclaimed under the EPBC Act on 14 December 2013 and renamed Two Rocks Marine Park on 9 October 2017.	The Marine Park includes examples of ecosystems representative of the South-west Shelf Transition—an area of narrow continental shelf that is noted for its physical complexity. The Leeuwin Current has a significant influence on the biodiversity of this nearshore area as it pushes subtropical water southward along the area's western edge. The area contains a diversity of tropical and temperate marine life including a large number of endemic fauna species. The inshore lagoons are thought to be important areas for benthic productivity and recruitment for a range of marine species. Key ecological features of the Marine Park are: • Commonwealth marine environment within and adjacent to the west coast inshore lagoons—an area that is regionally important for enhanced benthic productivity, including macroalgae and seagrass communities, and breeding and nursery aggregations for many temperate and tropical marine species • Western Rock Lobster—plays an important trophic role in many of the inshore ecosystems of the South-west Marine Region. Western Rock Lobsters are an important part of the

AMP	Zones, IUCN categories and zone area	Description	Natural values^
			food web on the inner shelf, particularly as juveniles • Ancient coastline between 90 m and 120 m depth—high benthic biodiversity and productivity occur where the ancient coastline forms a prominent escarpment. The Marine Park supports a range of species including species listed as threatened, migratory, marine, or cetacean under the EPBC Act. Biologically important areas within the Marine Park include foraging habitat for seabirds and Australian Sea Lions, a migratory pathway for Humpback and Pygmy Blue Whales, and a calving buffer area for Southern Right Whales.

^ *Source: Ref. 76.*

Table 2-21 Summary of AMPs (North Marine Parks)

AMP Name	Zones, IUCN categories and zone area	Description	Natural values^
Oceanic Shoals	National Park Zone (II) 406 km² Habitat Protection Zone (IV) 6929 km² Multiple Use Zone (VI) 39 964 km² Special Purpose Zone (Trawl) (VI) 24 444 km²	The Oceanic Shoals Marine Park is located west of the Tiwi Islands, ~155 km north-west of Darwin, Northern Territory and 305 km north of Wyndham, Western Australia. It extends to the limit of Australia's exclusive economic zone. The Marine Park covers an area of 71 743 km² and water depths from <15 m to 500 m. The Marine Park was proclaimed under the EPBC Act on 14 December 2013 and renamed Oceanic Shoals Marine Park on 9 October 2017.	The Marine Park includes examples of ecosystems representative of the Northwest Shelf Transition— a dynamic environment influenced by strong tidal currents, upwellings of nutrient-rich waters, and a range of prominent sea floor features. The pinnacles, carbonate banks, and shoals are sites of enhanced biological productivity. Key ecological features of the Marine Park are: • Carbonate bank and terrace systems of the Van Diemen Rise—an area characterised by terraces, banks, channels, and valleys supporting sponges, soft coral, polychaetes, ascidians, turtles, snakes, and sharks • Carbonate bank and terrace system of the Sahul Shelf—an area characterised by terraces, banks, channels, and valleys, supporting sponges, soft corals, sessile filter feeders, polychaetes, and ascidians • Pinnacles of the Bonaparte Basin—an area that contains the largest concentration of pinnacles along the Australian margin, where local upwellings of nutrient-rich water attract aggregations of fish, seabirds, and turtles • Shelf break and slope of the Arafura Shelf—an area characterised by

AMP Name	Zones, IUCN categories and zone area	Description	Natural values^
			continental slope, patch reefs, and hard substrate pinnacles that support >280 demersal fish species. • The Marine Park supports a range of species, including species listed as threatened, migratory, marine, or cetacean under the EPBC Act. Biologically important areas within the Marine Park include foraging and internesting habitat for marine turtles.
Joseph Bonaparte Gulf	Multiple Use Zone (VI) 6346 km² Special Purpose Zone (VI) 2251 km²	The Joseph Bonaparte Gulf Marine Park is located ~15 km west of Wadeye, Northern Territory, and ~90 km north of Wyndham, Western Australia, in the Joseph Bonaparte Gulf. It is adjacent to the Western Australian North Kimberley Marine Park. The Marine Park covers an area of 8597 km² and water depth ranges between <15 m and 100 m. The Marine Park was proclaimed under the EPBC Act on 14 December 2013 and renamed Joseph Bonaparte Gulf Marine Park on 9 October 2017.	The Marine Park includes examples of ecosystems representative of the Northwest Shelf Transition— a dynamic environment influenced by strong tidal currents, monsoonal winds, cyclones, and wind-generated waves. The large tidal ranges and wide intertidal zones near the Marine Park create a physically dynamic and turbid marine environment. The key ecological feature in the Marine Park is the carbonate bank and terrace system of the Sahul Shelf—characterised by terraces, banks, channels, and valleys supporting sponges, soft corals, sessile filter feeders, polychaetes, and ascidians. The Marine Park supports a range of species, including species listed as threatened, migratory, marine, or cetacean under the EPBC Act. Biologically important areas within the Marine Park include foraging habitat for marine turtles and the Australian Snubfin Dolphin.

^ *Source: Ref. 77.*

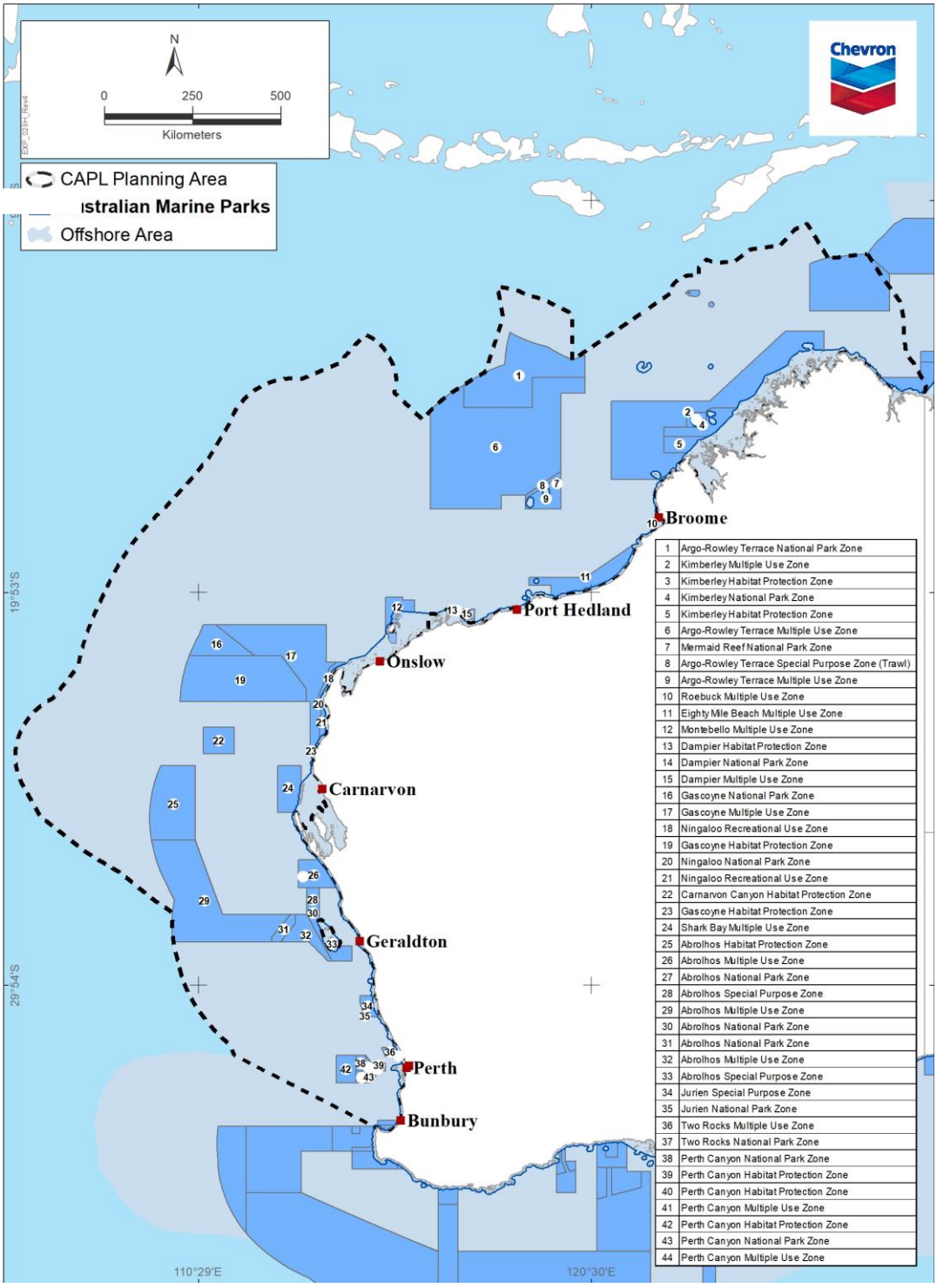


Figure 2-5: Australian Marine Parks

2.7.2 Key ecological features

Key ecological features (KEFs) are elements of the Commonwealth marine environment that are considered to be of regional importance for a region's biodiversity or its ecosystem function and integrity. KEFs meet one or more of these criteria (Ref. 78):

- a species, group of species, or a community with a regionally important ecological role (e.g., a predator, or prey that affects a large biomass or number of other marine species)
- a species, group of species, or a community that is nationally or regionally important for biodiversity
- an area or habitat that is nationally or regionally important for:
  - enhanced or high productivity (such as predictable upwellings—an upwelling occurs when cold nutrient-rich waters from the bottom of the ocean rise to the surface)
  - aggregations of marine life (such as feeding, resting, breeding or nursery areas)
  - biodiversity and endemism (species that only occur in a specific area)
- a unique sea floor feature, with known or presumed ecological properties of regional significance.

KEFs have been identified by the Australian Government on the basis of advice from scientists about the ecological processes and characteristics of the area (Ref. 78).

Table 2-22, Table 2-23, and Table 2-24 list the KEFs located within the PA (Ref. 78; Ref. 4; appendix a).

Table 2-22: Key ecological features of the North-west Marine Bioregion

KEF	Value	Description^
Ancient coastline at 125 m depth contour	Unique sea floor feature with ecological properties of regional significance	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.
Ashmore Reef and Cartier Island and surrounding Commonwealth waters	High productivity and aggregations of marine life	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. 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. Ashmore Reef supports the highest number of coral species of any reef off the west Australian coast.
Canyons linking the Argo Abyssal Plain with the Scott Plateau	High productivity and aggregations of marine life	The canyons linking the Argo Abyssal Plain and Scott Plateau are important features likely to be associated with aggregations of marine life.
Canyons linking the Cuvier Abyssal Plain and the Cape Range Peninsula	Unique sea floor features with ecological properties of regional significance	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. Aggregations of Whale Sharks, manta rays, sea snakes, sharks, large predatory fish, and seabirds are known to occur in this area.

KEF	Value	Description^
Carbonate bank and terrace system of the Sahul Shelf	Unique sea floor feature with ecological properties of regional significance	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. 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). The banks are known to be foraging areas for Loggerhead, Olive Ridley, and Flatback Turtles. Cetaceans and Green and Freshwater Sawfish are likely to occur in the area.
Commonwealth waters adjacent to Ningaloo Reef	High productivity and aggregations of marine life	The Leeuwin and Ningaloo currents interact, leading to areas of enhanced productivity in the Commonwealth waters adjacent to Ningaloo Reef. Aggregations of Whale Sharks, manta rays, Humpback Whales, sea snakes, sharks, large predatory fish, and seabirds are known to occur in this area.
Continental Slope Demersal Fish Communities	High levels of endemism	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.
Exmouth Plateau	Unique sea floor feature with ecological properties of regional significance	The Exmouth Plateau is a regionally and nationally unique deep-sea plateau in tropical waters. 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.
Glomar Shoals	High productivity and aggregations of marine life	The Glomar Shoals are regionally important for their high biological diversity and high localised productivity. 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.
Mermaid Reef and Commonwealth waters surrounding Rowley Shoals	High productivity and aggregations of marine life	The reefs of the Rowley Shoals (including Mermaid Reef) are areas of enhanced productivity and high species richness. 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 resuspension 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.
Pinnacles of the Bonaparte Basin	Unique sea floor feature with ecological properties of regional significance	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. Covering >520 km^2 within the Bonaparte Basin, this feature contains the largest concentration of pinnacles along the Australian margin. The pinnacles of the Bonaparte Basin are thought to be the eroded remnants of

KEF	Value	Description^
		underlying strata; it is likely that the vertical walls generate local upwelling of nutrient-rich water, leading to phytoplankton productivity that attracts aggregations of planktivorous and predatory fish, seabirds, and foraging turtles.
Seringapatam Reef and Commonwealth waters in the Scott Reef Complex	High productivity and aggregations of marine life	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. As two of the few offshore reefs in the north-west, they provide an important biophysical environment in the region.
Wallaby Saddle	High productivity and aggregations of marine life	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.

^ *Source: Ref. 79.*

Table 2-23: Key ecological features of the North Marine Bioregion

KEF	Value	Description^
Carbonate bank and terrace system of the Van Diemen Rise	Unique sea floor feature with ecological properties of regional significance	The bank and terrace system of the Van Diemen Rise is part of the larger system associated with the Sahul Banks to the north and Londonderry Rise to the east; it is characterised by terrace, banks, channels, and valleys. The variability in water depth and substrate composition may contribute to the presence of unique ecosystems in the channels. Species present include sponges, soft corals, and other sessile filter feeders associated with hard substrate sediments of the deep channels; epifauna and infauna include polychaetes and ascidians. Olive Ridley Turtles, sea snakes, and sharks are also found associated with this feature.
Pinnacles of the Bonaparte Basin	Unique sea floor feature with ecological properties of regional significance	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. Covering >520 km^2 within the Bonaparte Basin, this feature contains the largest concentration of pinnacles along the Australian margin. The pinnacles of the Bonaparte Basin are thought to be the eroded remnants of underlying strata; it is likely that the vertical walls generate local upwelling of nutrient-rich water, leading to phytoplankton productivity that attracts aggregations of planktivorous and predatory fish, seabirds, and foraging turtles.

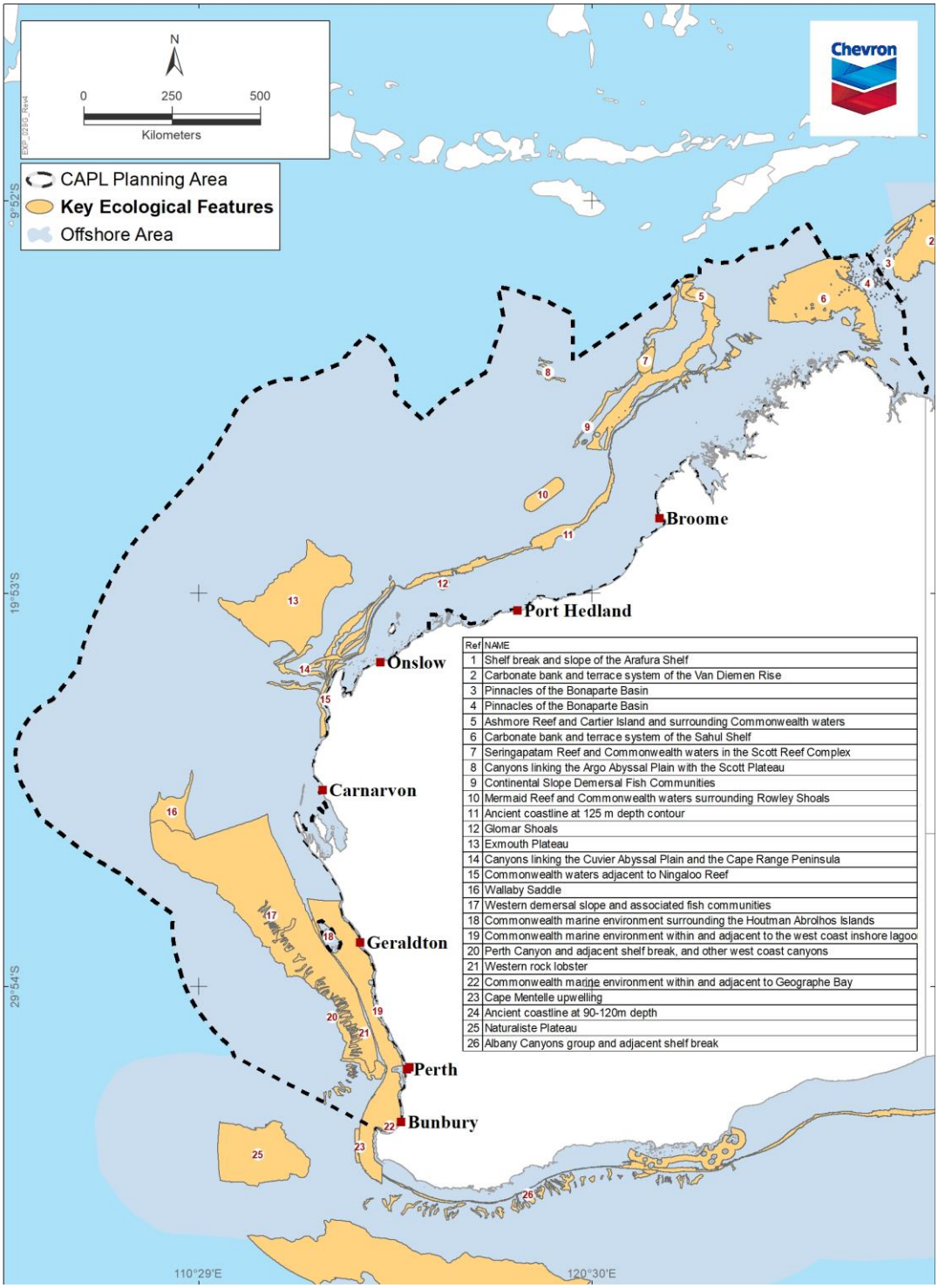
^ *Source: Ref. 80.*

Table 2-24: Key ecological features of the South-west Marine Bioregion

KEF	Value	Description^
Ancient coastline at 90–120 m depth	Relatively high productivity and aggregations of marine life, and high levels of biodiversity and endemism	Benthic biodiversity and productivity occur where the ancient coastline forms a prominent escarpment, such as in the western Great Australian Bight, where the sea floor is dominated by sponge communities of significant biodiversity and structural complexity.
Cape Mentelle upwelling	High productivity and aggregations of marine life	The Cape Mentelle upwelling draws relatively nutrient-rich water from the base of the Leeuwin Current, up the continental slope, and onto the inner continental shelf, where it results in phytoplankton blooms at the surface. The phytoplankton blooms provide the basis for an extended food chain characterised by feeding aggregations of small pelagic fish, larger predatory fish, seabirds, dolphins, and sharks.
Commonwealth marine environment surrounding the Houtman Abrolhos Islands	High levels of biodiversity and endemism	The Houtman Abrolhos Islands and surrounding reefs support a unique mix of temperate and tropical species, resulting from the southward transport of species by the Leeuwin Current over thousands of years. The Houtman Abrolhos Islands are the largest seabird breeding station in the eastern Indian Ocean. They support more than one million pairs of breeding seabirds.
Commonwealth marine environment within and adjacent to Geographe Bay	High productivity and aggregations of marine life, and high levels of biodiversity and endemism	Geographe Bay is known for its extensive beds of tropical and temperate seagrass that support a diversity of species, many of them not found anywhere else. The bay provides important nursery habitat for many species. It is also an important migratory area for Humpback Whales.
Commonwealth marine environment within and adjacent to the west coast inshore lagoons	High productivity and aggregations of marine life	These lagoons are important for benthic productivity, including macroalgae and seagrass communities, and breeding and nursery aggregations for many temperate and tropical marine species. They are important areas for the recruitment of commercially and recreationally important fishery species. Extensive schools of migratory fish visit the area annually, including herring, garfish, tailor, and Australian Salmon.
Naturaliste Plateau	Unique sea floor feature with ecological properties of regional significance	The Naturaliste Plateau is Australia's deepest temperate marginal plateau. The combination of its structural complexity, mixed water dynamics, and relative isolation indicate that it supports deep-water communities with high species diversity and endemism.
Meso-scale eddies (several locations)	High productivity and aggregations of marine life	Driven by interactions between currents and bathymetry, persistent meso-scale eddies form in predictable locations within the meanders of the Leeuwin Current. They are important transporters of nutrients and plankton communities and are likely to attract a range of organisms from the higher trophic levels, such as marine mammals, seabirds, tuna and billfish. The eddies play a critical role in determining species distribution, as they influence the southerly range boundaries of tropical and subtropical species, the transport of

KEF	Value	Description^
		coastal phytoplankton communities offshore and recruitment to fisheries.
Perth Canyon and adjacent shelf break, and other west coast canyons	High biological productivity and aggregations of marine life, and unique sea floor features with ecological properties of regional significance	The Perth Canyon is the largest known undersea canyon in Australian waters. Deep ocean currents rise to the surface, creating a nutrient-rich cold-water habitat attracting feeding aggregations of deep-diving mammals, such as Pygmy Blue Whales and large predatory fish that feed on aggregations of small fish, krill, and squid.
Western demersal slope and associated fish communities	Species groups that are nationally or regionally important to biodiversity	The western demersal slope provides important habitat for demersal fish communities, with a high level of diversity and endemism. A diverse assemblage of demersal fish species below a depth of 400 m is dominated by relatively small benthic species such as grenadiers, dogfish, and cucumber fish. Unlike other slope fish communities in Australia, many of these species display unique physical adaptations to feed on the sea floor (such as a mouth position adapted to bottom feeding), and many do not appear to migrate vertically in their daily feeding habits.
Western Rock Lobster	A species that plays a regionally important ecological role	This species is the dominant large benthic invertebrate in the region. The lobster plays an important trophic role in many of the inshore ecosystems of the South-west Marine Region. Western rock lobsters are an important part of the food web on the inner shelf, particularly as juveniles.

^ *Source: Ref. 81.*



Ref	NAME
1	Shelf break and slope of the Arafura Shelf
2	Carbonate bank and terrace system of the Van Diemen Rise
3	Pinnacles of the Bonaparte Basin
4	Pinnacles of the Bonaparte Basin
5	Ashmore Reef and Cartier Island and surrounding Commonwealth waters
6	Carbonate bank and terrace system of the Sahul Shelf
7	Seringapatam Reef and Commonwealth waters in the Scott Reef Complex
8	Canyons linking the Argo Abyssal Plain with the Scott Plateau
9	Continental Slope Demersal Fish Communities
10	Mermaid Reef and Commonwealth waters surrounding Rowley Shoals
11	Ancient coastline at 125 m depth contour
12	Glomar Shoals
13	Exmouth Plateau
14	Canyons linking the Cuvier Abyssal Plain and the Cape Range Peninsula
15	Commonwealth waters adjacent to Ningaloo Reef
16	Wallaby Saddle
17	Western demersal slope and associated fish communities
18	Commonwealth marine environment surrounding the Houtman Abrolhos Islands
19	Commonwealth marine environment within and adjacent to the west coast inshore lagoo
20	Perth Canyon and adjacent shelf break, and other west coast canyons
21	Western rock lobster
22	Commonwealth marine environment within and adjacent to Geographe Bay
23	Cape Mentelle upwelling
24	Ancient coastline at 90-120m depth
25	Naturaliste Plateau
26	Albany Canyons group and adjacent shelf break

Figure 2-6: Key ecological features

3 Physical environment

3.1 Meteorology

Northwest WA is characterised by an arid, subtropical climate. In summer (between September and March), average daily temperatures range from 21 °C to 36 °C. During winter (May to July), mean daily temperatures range from 14 °C to 29 °C (Ref. 82; Ref. 83). April and August are considered transitional months during which either the summer or winter weather regime may dominate, or conditions may vary between the two (Ref. 83). The area receives relatively low rainfall, although heavy downpours can occur during tropical cyclones and depressions.

Wind patterns in north-west WA are dictated by the seasonal movement of atmospheric pressure systems. During summer, high-pressure cells produce prevailing winds from the north-west and south-west, which vary between 10 and 13 ms^{-1}. During winter, high-pressure cells over central Australia produce north-easterly to south-easterly winds with average speeds of between 6 and 8 ms^{-1}.

The cyclone season in north-west WA runs from November to April, with an average of five tropical cyclones per year (Ref. 84). Summer thunderstorms can have associated winds with gusts exceeding 20 ms^{-1}, but these winds are usually of short duration.

The air quality in the North-west Marine Region is largely unpolluted due to the Region's relative remoteness.

3.2 Oceanography

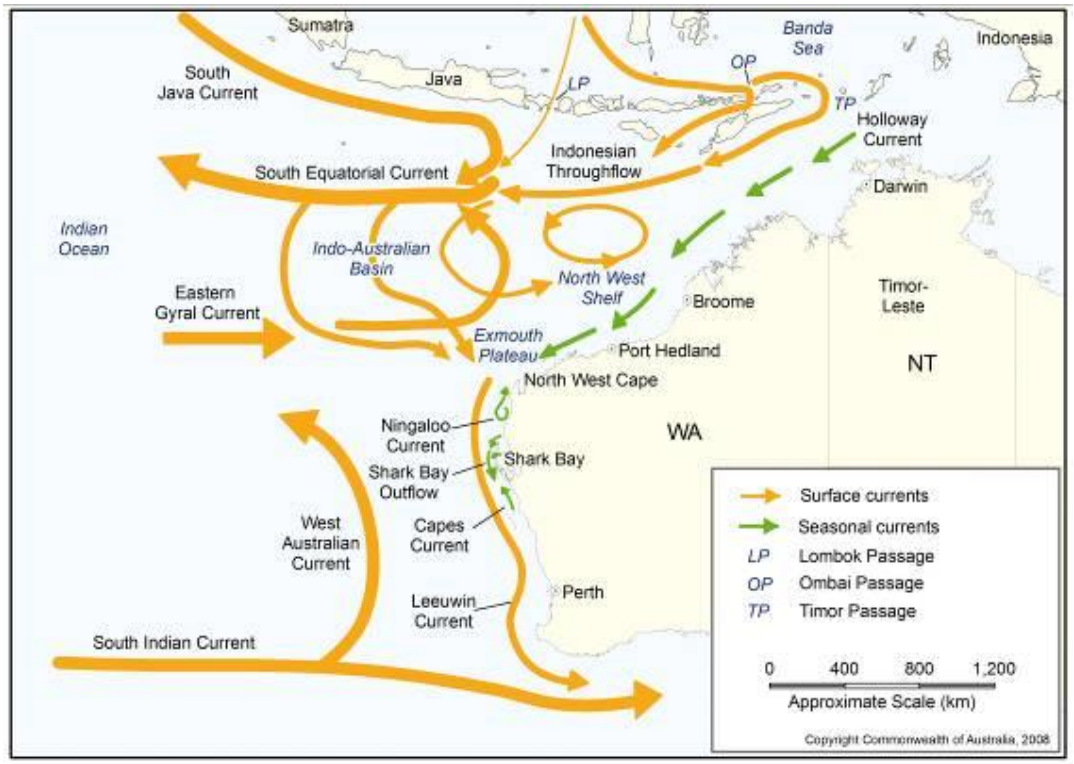
3.2.1 Water temperature

Waters in north-west WA are tropical year-round, with sea surface temperature in open shelf waters reaching ~26 °C in summer, and dropping to ~22 °C in winter. Nearshore temperatures of north-west WA fluctuate through a higher temperature range from ~17 °C in winter to ~31 °C in summer (Ref. 85).

3.2.2 Circulation and currents

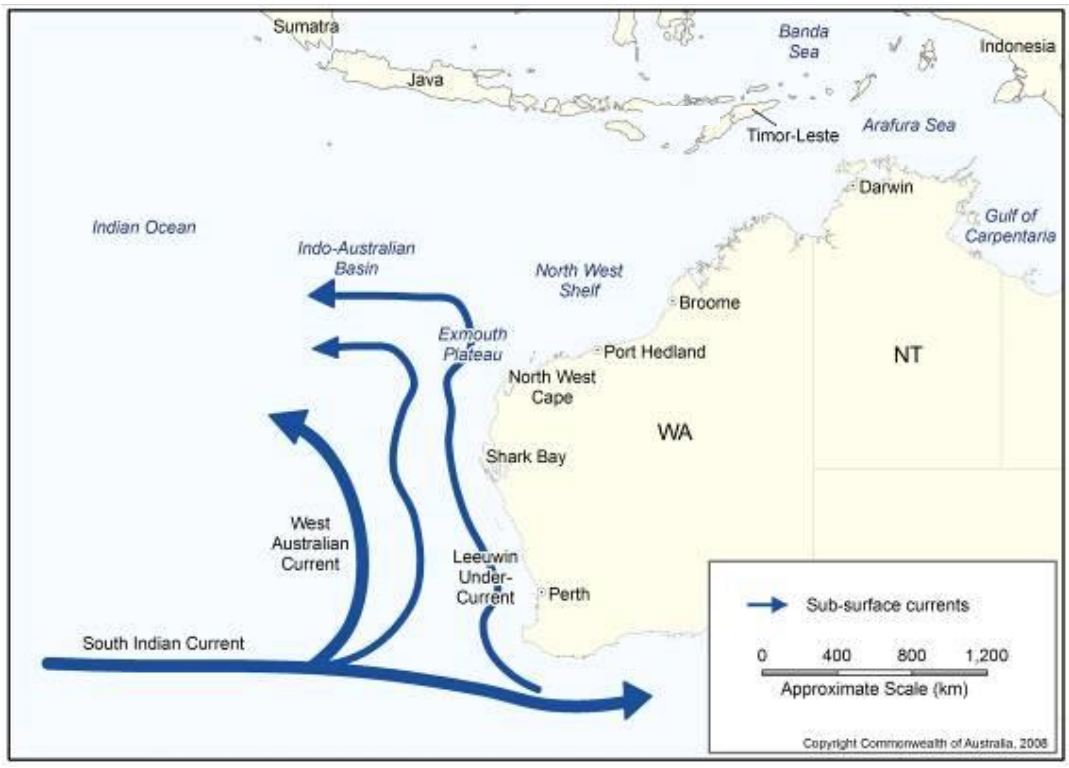
The major surface currents influencing north-west WA flow towards the poles and include the Indonesian Throughflow, the Leeuwin Current, the South Equatorial Current, and the Eastern Gyral Current. The Ningaloo Current, the Holloway Current, the Shark Bay Outflow, and the Capes Current are seasonal surface currents in the region. Below these surface currents are several subsurface currents, the most important of which are the Leeuwin Undercurrent and the West Australian Current. These subsurface currents flow towards the equator in the opposite direction to surface currents (Ref. 79). Figure 3-1 and Figure 3-2 show the main surface and subsurface currents in north-west WA.

Water circulation in north-west WA is strongly influenced by the southward-flowing Indonesian Throughflow. The strength of the Throughflow, and its influence in north-west WA, varies seasonally in association with the north-west monsoon (Ref. 79).



(Source: Ref. 79)

Figure 3-1: Surface and seasonal currents in the region



(Source: Ref. 79)

Figure 3-2: Subsurface currents in the region

3.2.3 Waves

The prevailing oceanic conditions in north-west WA are governed by a combination of sea and swell waves. Local wind-generated seas have variable wave heights, typically ranging from 0 to 4 m under non-tropical cyclone conditions. North-west WA typically experiences a persistent winter swell of ~2 m, generated by low-pressure systems in southern latitudes.

3.2.4 Tides

North-west WA has some of the largest tides along a coastline adjoining an open ocean in the world. Tides increase in amplitude from south to north, corresponding with the increasing width of the continental shelf (Ref. 79). Tidal movements are larger and stronger in the nearshore waters compared to the offshore waters. Tides in the region are broadly categorised as semidiurnal (i.e. two high tides and two low tides per day) with a spring/neap cycle (Ref. 79).

3.3 Marine water quality

3.3.1 Nutrients

North-west WA's surface waters are nutrient-poor due to the Indonesian Throughflow dominating the surface waters of the entire region.

Sporadic and variable nutrient loadings may occur within coastal waters due to changes in river run-off (e.g. Ashburton River), blooms of nitrogen-fixing microbes, tidal mixing, low-frequency circulation, and habitat influences (i.e. mangroves) (Ref. 86).

3.3.2 Turbidity

Water clarity in north-west WA varies according to water movement, depth, and seabed sediment type. Nearshore waters in the region may be relatively turbid as a result of local current-induced resuspension of fine sediments and episodic run-off from adjacent rivers, although there is high spatial and temporal variation. However, some protected coastal areas, such as the lagoon system of the fringing Ningaloo Reef, can be characterised by relatively clear water with low turbidity.

3.3.3 Water chemistry

Salinity varies spatially and temporally in the waters across north-west WA. Water salinity varies between 34.4 and 36.3 g/L in offshore waters around the North West Shelf (Ref. 87).

Wenziker *et al.* (Ref. 87) estimated natural background concentrations for a range of potential contaminants in the waters around the Dampier Archipelago, thus providing baseline information as to the water quality within nearshore waters of the North West Shelf. The contaminants investigated encompassed a range of heavy metals (e.g. cadmium, chromium, copper, lead, mercury, and zinc) and organic chemicals (e.g. polycyclic aromatic hydrocarbons, total petroleum hydrocarbons). The survey identified low background concentrations of metals and organic chemicals, with localised elevations of some contaminants (metals) near the coastal industrial centres and ports (e.g. Dampier). Except for a few select constituents, such as relatively high natural levels of cadmium, the concentrations of metals were low by world standards. Wenziker *et al.* (Ref. 87) recommended that guideline water quality trigger values from the Australian and New Zealand Environment and Conservation Council and Agriculture and

Resource Management Council of Australia and New Zealand (Ref. 88) are suitable for use in the North West Shelf.

3.3.4 Marine geomorphology

The sea floor of north-west WA comprises four general feature types: continental shelf, continental slope, continental rise, and abyssal plain. Most of the region is either continental slope or continental shelf.

3.4 Seabed features

The geomorphology of Australia's continental margin is varied, with several geomorphic features present, including basins, canyons, terraces, seamounts, and plateaus. The key geomorphic features (Ref. 89) that were mapped as potentially occurring within the PA, are:

- abyssal plain/deep ocean floor
- apron/fan
- bank/shoals
- basin
- canyon.

3.5 Marine habitat

The Seamap Australia spatial data layer is a nationally synthesised data product of sea floor marine habitat data (Ref. 90). Australian continental shelf benthic habitat layers in GIS format were collected from various stakeholders around the country, compiled and reviewed by Australian National Data Service and external independent assessors, to produce a national classification of marine habitats.

Seamap Australia spatial data were used to indicate the types of marine habitat present within the PA. Table 3-1 summarises the areas of marine habitat associated with the matters of NES identified in this document.

Table 3-1: Marine habitat and key sensitivities

Matter of national environmental significance	Key sensitivities							Habitat type				
	AMP	KEF	Ramsar wetland	National Heritage	Commonwealth Heritage	World Heritage	TEC	Seagrass	Mangrove	Coral	Saltmarsh	Macroalgae
Ashmore Reef	☒							☒		☒		
Ashmore Reef and Cartier Island and surrounding Commonwealth waters		☒								☒		
Ashmore reef National Nature Reserve			☒							☒		

Matter of national environmental significance	Key sensitivities							Habitat type				
	AMP	KEF	Ramsar wetland	National Heritage	Commonwealth Heritage	World Heritage	TEC	Seagrass	Mangrove	Coral	Saltmarsh	Macroalgae
Ashmore Reef National Nature Reserve					☒					☒		
Carbonate bank and terrace system of the Sahul Shelf		☒								☒		
Carbonate bank and terrace system of the Van Diemen Rise		☒								☒		
Cartier Island	☒							☒		☒		
Commonwealth marine environment in and adjacent to Geographe Bay		☒						☒				
Commonwealth marine environment in and adjacent to the west coast inshore lagoons		☒						☒				☒
Eighty-mile Beach			☒						☒		☒	
Geographe	☒							☒				
Joseph Bonaparte Gulf	☒									☒		
Mermaid Reef – Rowley Shoals					☒					☒		
Ningaloo Coast				☒						☒		
Ningaloo Coast						☒			☒	☒		
Ningaloo Marine Area – Commonwealth Waters					☒					☒		
Oceanic Shoals	☒									☒		
Ord River Floodplain			☒						☒		☒	
Roebuck Bay			☒					☒	☒			
Scott Reef and Surrounds – Commonwealth Area					☒			☒		☒		
Shark Bay						☒		☒				
Shark Bay (Wooramel Seagrass Bank)				☒				☒				
Subtropical and Temperate Coastal Saltmarsh							☒				☒	

Matter of national environmental significance	Key sensitivities							Habitat type				
	AMP	KEF	Ramsar wetland	National Heritage	Commonwealth Heritage	World Heritage	TEC	Seagrass	Mangrove	Coral	Saltmarsh	Macroalgae
The West Kimberley				☒					☒	☒		
Thrombolite (microbial) community of coastal freshwater lakes of the Swan Coastal Plain (Lake Richmond)							☒					☒
Two Rocks	☒							☒				☒

3.6 Shoreline type

The Smartline Coastal Geomorphic Map of Australia (Ref. 91) is a detailed map of the coastal landform types—or geomorphology—of continental Australia and most of its adjacent islands. Using the intertidal classifications provided by the Smartline database, the types of shoreline that are present within the PA, their overall length, and percentage present in the PA is listed in Table 3-2.

Table 3-2: Shoreline type and length within PA

Shoreline type	Length (100 kms)
Unclassified	4608.46
Muddy tidal flats	2162.74
Hard bedrock shore	2151.61
Tidal flats (sediment undifferentiated)	1811.23
Sandy beach undifferentiated	966.09
Fine-medium sand beach	400.78
Hard rock cliff (>5 m)	248.45
Tidal sediment flats (inferred from mangroves)	192.49
Beach (sediment type undifferentiated)	161.49
Fine-medium sandy tidal flats	137.94
Sandy shore undifferentiated	102.32
Sandy tidal flats	68.28
Mixed sandy shore undifferentiated	37.96
Hard rocky shore platform	21.59
Artificial shoreline undifferentiated	13.87
Rocky shore (undifferentiated)	8.84
Boulder revetment	6.98
Sandy tidal flats with coarse stony debris	3.87

Shoreline type	Length (100 kms)
Perched sandy beach (undifferentiated)	2.81
Soft ‘bedrock’ shore	0.39
Concrete dock structures	0.23
Coral shingle beach	0.21

4 Socioeconomic environment

4.1 Commercial shipping

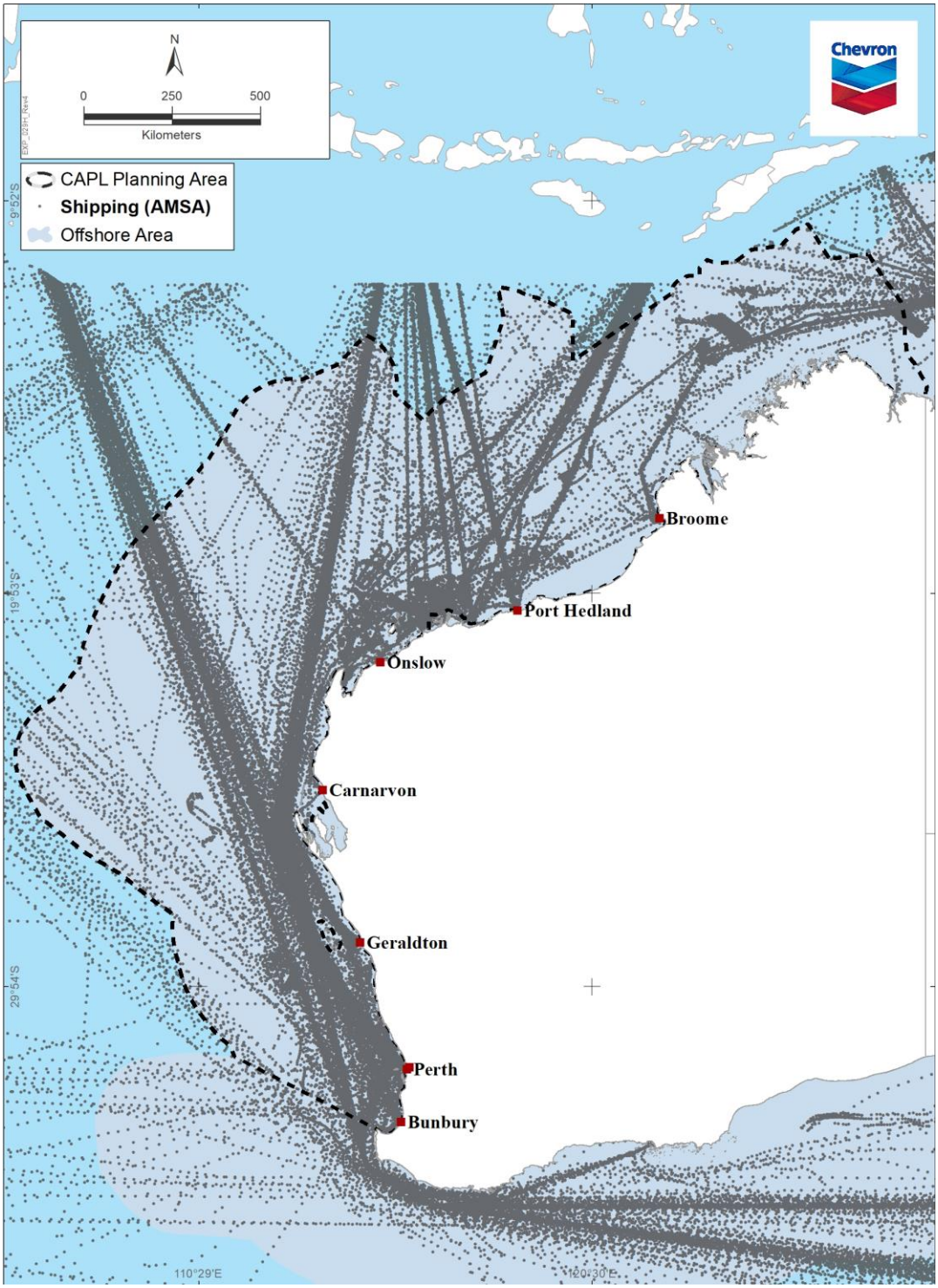
The Australian Maritime Safety Authority (AMSA) uses a satellite automatic identification system (AIS) service that provides AIS data across the Indo-Pacific and Indonesian region. The AIS can send and receive ship information (such as identity, position, course, speed, ship particulars, and cargo information) to and from other ships, suitably equipped aircraft, and shore. It can handle >2,000 reports per minute and updates information as often as every two seconds. Although the AIS is conventionally a line-of-sight radio broadcast system for communication between ships, and between ships and shore stations, recent technological developments have seen satellites adapted for receiving AIS messages from low Earth orbit.

Data provided by shipborne AISs were used to build a point density map from filtered satellite AIS data collected between 1 January 2016 and 31 December 2016 to indicate the level of shipping activity in Australian waters (Ref. 92).

Given the size of the PA, CAPL has reviewed this shipping density information to understand areas within the PA that comprise high activity and are important for the WA economy. Based on this data, the key shipping channels are those between:

- Fremantle, Dampier, and Port Hedland ports to Indonesia
- Fremantle, Dampier, and Port Hedland ports to Timor
- Port of Dampier to various offshore oil and gas developments.

The map also reflects the vessel density in and around known oil and gas facilities and developments within the PA (Figure 4-1).



(Source: Ref. 92)

Figure 4-1: Commercial shipping

4.2 Commercial fishing and aquaculture

Fishing and aquaculture activities are managed under various State and Commonwealth agencies. Table 4-1 and Table 4-2 list and summarise the State and Commonwealth managed fisheries that overlap the PA (Ref. 93; Ref. 94)

Table 4-1: State managed fisheries

Fishery	2019–2020 season summary^
Abalone	The 2019–2020 fishing season reported a commercial catch of 47 t. Catch was below TACC due to low catches in regional areas resulting from economic and accessibility issue.
Abrolhos Islands and Mid-West Trawl	The 2019–2020 fishing season reported a commercial catch of 796 t. Catch within acceptable range. The commercial fishery is in a planned expansion phase.
Broome Prawn	The 2019–2020 fishing season reported a negligible commercial catch. Minimal fishing occurred in 2019.
Cockburn Sound (Crab)	The fishery has been closed since April 2014. In 2019 recruitment and egg production remained below limit reference levels. Decline is consistent with an environmentally limited stock.
Cockburn Sound (Fish Net)	The 2019–2020 fishing season reported a commercial catch of 253 t (nearshore fisheries, total finfish). Metro Zone Garfish fishery closed in 2017. Declines in Garfish and Whitebait consistent with an environmentally limited stock. Review of acceptable catch ranges is required.
Cockburn Sound (Line and Pot)	The Cockburn Sound Line and Pot Managed Fishery record a catch of 32 t during 2018/10.
Exmouth Gulf Prawn	The 2019–2020 fishing season reported a commercial catch of 821 t. All species were within their acceptable catch ranges.
Inner Shark Bay Demersal	The 2019–2020 fishing season reported a commercial catch of 1 t. Incidental catch. Not considered a risk to stocks.
Gascoyne Demersal Scalefish	The 2019–2020 fishing season reported a commercial catch of 33.2 t of Snapper, and 139 t of other demersal species. Snapper spawning biomass was around the limit level. Additional management action undertaken in 2018 including TACC reduction. Management for other demersals adequate.
Kimberley Crab	The 2019–2020 fishing season reported a commercial catch of 7.4 t (Mud Crab). Catch rate: Below threshold, above limit.
Kimberley Gillnet and Barramundi	The 2019–2020 fishing season reported a commercial catch of 47 t (barramundi), and 73 t (total). Catch is above the acceptable range. The level of catch is lower than previous years, and is not considered a risk to stocks as the catch rate remains high.
Kimberley Prawn	The 2019–2020 fishing season reported a commercial catch of 100 t. Banana prawn catch well below acceptable and predicted range. Low effort in 2019.
Mackerel Fishery	The 2019–2020 fishing season reported a commercial catch of 291 t. The Spanish Mackerel catch is within tolerance range due to increased effort in 2019. Nominal catch rates declined in each area.
Marine Aquarium	The 2019 fishing season reported a commercial catch of 11.925 fish.
Nickol Bay Prawn	The 2019–2020 fishing season reported a commercial catch of 254 t. Catch within acceptable range. Banana prawn catches higher than predicted.
Northern Demersal Scalefish	The 2019–2020 fishing season reported a commercial catch of 1,507 t (total), 602 t (Goldband Snapper), 192 t (Red Emperor). Goldband Snapper and Red Emperor catches are above their catch ranges. Catches will be monitored closely in 2020.
Octopus	The 2019–2020 fishing season reported a commercial catch of 453 t. Catch was below TACC due to low catches in regional areas resulting from economic and accessibility issues.

Fishery	2019–2020 season summary^
Onslow Prawn	The 2019–2020 fishing season reported a commercial catch <60 t. Low effort by one boat in 2019.
Pearl Oyster Wildstock	The 2019–2020 fishing season reported a commercial catch of 611,816 oysters (14,022 dive hours). Catch below quota as MOP component was not fully utilised. Catch rates increased from 2018 to 2019.
Pilbara Crab	The 2019 fishing season reported a commercial catch of 19.3 t (Blue Swimmer Crab). Catch rate: Above threshold.
Pilbara Fish Trawl	The 2019–2020 fishing season reported a commercial catch of 2,142 t. Catches are increasing as the demersal scalefish assemblage in the Pilbara region recovers following effort reductions.
Pilbara Trap	The 2019–2020 fishing season reported a commercial catch of 680 t. Catches are increasing as the demersal scalefish assemblage in the Pilbara region recovers following effort reduction.
Pilbara Line	The 2019–2020 fishing season reported a commercial catch of 148 t. Catches are increasing as the demersal scalefish assemblage in the Pilbara region recovers following effort reduction.
Shark Bay Beach Seine and Mesh Net	The 2019–2020 fishing season reported a commercial catch of 175 t. Catch below the acceptable range due to ongoing low levels of effort.
Shark Bay Crab	The 2019–2020 fishing season reported a commercial catch of 529 t. Catch within acceptable range. Spawning and recruitment levels have further increased under the current environmental conditions and harvest levels.
Shark Bay Prawn	The 2019–2020 fishing season reported a commercial catch of 1.214 t. Brown tiger and western king prawn catches below the acceptable range due to lower recruitment levels. Additional management measures were implemented within the season to protect breeding stocks.
Shark Bay Scallop	The 2019–2020 fishing season reported a commercial catch of 657 t (to end of December). . Quota season extended to 30 April. Catch achieved to end of February from Denham Sound is estimated to be 1,370 t and that >90% of the total will be achieved. Northern Shark Bay closed to fishing due to recruitment below limit reference level. Decline is consistent with an environmentally limited stock and continues to be investigated.
Southern Demersal Gillnet & Demersal Longline West Coast Demersal Gillnet & Demersal Longline	The Temperate Demersal Gillnet and Demersal Longline Fishery (TDGDLF) comprises the West Coast Demersal Gillnet and Demersal Longline (Interim) Managed Fishery (WCDGDLF), which operates between 26° and 33°S, and the Joint Authority Southern Demersal Gillnet and Demersal Longline Managed Fishery (JASDGDLF), which operates from 33°S to the WA/SA border. The 2018–2019 fishing season reported a commercial catch of 838 t (sharks and rays) and 132 t (scalefish).
South West Coast Salmon / South Coast Salmon	The 2017–2018 fishing season for the South West Coast Salmon and South Coast Salmon reported a commercial catch of 50 t and 93 t respectively. In 2017, there were ~12 commercial fishers employed in the South Coast Salmon Fishery.
South West Trawl	Only one boat fished in the SWTMF in 2019 for a total of 32 boat days.
Specimen Shell	The 2019 fishing season reported a commercial catch of 7,232 shells.
West Coast Deep Sea Crustacean	The 2019–2020 fishing season reported a commercial catch of 155.7 t. TAC achieved with effort within acceptable range. The standardised catch rate of retained legal crabs is within the acceptable range.

Fishery	2019–2020 season summary^
West Coast Demersal Scalefish	The 2019–2020 fishing season reported a commercial catch of 270 t. Demersal suite catch within range.
West Coast Estuarine	The 2019–2020 fishing season reported a commercial catch of 66 t (Peel Harvey crab), 121 t (Peel Harvey finfish), and 35 t (other West Coast estuaries, crabs, and finfish). Catch and catch rates within acceptable ranges.
West Coast Purse Seine	The 2019–2020 fishing season reported a commercial catch of 527 t (all species). Catch was below quota.
West Coast Rock Lobster	The 2019–2020 fishing season reported a commercial catch of 6400 t. Catch within TACC plus 1.5% water loss i.e. 6400 t.
Western Australian Sea Cucumber	The 2019–2020 fishing season reported a commercial catch of 2 t (Sandfish), and 5 t (Redfish). Limited fishing due to due to planned rotational harvest schedule by industry.

^ *Source: Ref. 95.*

Table 4-2: Commonwealth managed fisheries

Fishery	2018–2019 season summary^
North-West Slope Trawl Fishery	The 2018–2019 fishing season reported a commercial catch of 41.1 t (scampi) and 67.4 t (total), with economic value withheld. The fishery recorded 151 active days comprising 2,869 trawl-hours. Seven permits were in place with four vessels active for the season.
Small Pelagic Fishery	The 2018–2019fishing season reported a commercial catch of 16,093 t. The fishery recorded 197 search-hours with 448 midwater trawl shots. In 2018–2019, 31 entities held quota statutory fishing right (SFRs), with three vessels actively using purse seine methods and one using trawl methods.
Southern Bluefin Tuna Fishery	The 2018–2019fishing season reported a commercial catch of 6,074 t worth an estimated AU$43.41 million. The fishery recorded 1,366 search-hours with 166 shots. In 2018–2019, 82 entities held quota SFRs, with seven vessels actively using purse seine methods and 20 using longline methods.
Western Deepwater Trawl Fishery	The 2018–2019fishing season reported a commercial catch of 53 t with economic value withheld. The fishery recorded 53 active days comprising 492.3 trawl-hours. Four permits were in place with one vessels active for the season.
Western Skipjack Fishery	There has been no fishing effort in the Skipjack Tuna Fishery (STF) since the 2008–2009 fishing season. Variability in the availability of skipjack tuna in the Australian Fishing Zone and the prices received for product influence participation levels in the fishery.
Western Tuna and Billfish Fishery	The 2018–2019fishing season reported a commercial catch of 218 t with the economic value withheld. The fishery recorded 366,821 hooks for the season. 94 entities held quota SFRs, with two vessels actively using pelagic longline and two vessels using minor line methods.

^ *Source: Ref. 96.*

4.3 Recreational fisheries

The WA Department of Primary Industries and Regional Development (DPIRD) conducts state-wide recreational fishing surveys every two years, with the first survey completed in 2011. The survey collects information from more than 3,000 recreational fishers who record their catches in logbooks over a 12-month

period with DPIRD also conducting interviews throughout the State and monitoring the number of boat launches and retrievals using cameras at various boat ramps.

Key findings of the 2017–2018 survey report (Ref. 97) are included in Table 4-3.

Table 4-3: Recreational fishing survey outcomes

Component	Number
Number of participants	~6,000
Number of recreational fishing boat licences issued	~135 000
Most popular species	
Blue Swimmer Crab	Number caught ~667 000
School Whiting	Number caught ~259 000
Fishing effort by bioregion	
West Coast	76%
Gascoyne Coast	11%
North Coast	8%
South Coast	5%

Source: Ref. 97

4.4 Underwater cultural heritage

The Australasian Underwater Cultural Heritage Database (Ref. 98) records all known maritime cultural heritage (shipwrecks, aircraft, relics, and other underwater cultural heritage) in Australian waters. Historic shipwrecks and sunken aircraft (older than 75 years) are protected under the Commonwealth *Underwater Cultural Heritage Act 2018*. Shipwrecks and aircraft that have been underwater <75 years, and other types of underwater cultural heritage, can be protected through individual declaration based on an assessment of heritage significance.

Approximately 667 shipwrecks are present within the PA. Given this number, no additional detail is provided in this document. If shipwrecks are present within an EMBA described in a project-specific EP, CAPL will identify and detail the significance of these shipwrecks in that EP.

4.5 Defence

Table 4-4 lists the Australian Department of Defence's prohibited and training areas that are within the PA (Ref. 99).

Table 4-4: Department of Defence Prohibited and Training Areas

Area Type	Area Name
Practice Areas	Darwin AWR Central
	Learmonth AWR
	North-West Australian Exercise Area
Training Areas	North Australian Exercise Area
	Yampi Field Training Area
	Learmonth AWR
	West Australian Exercise Area

4.6 Tourism

Tourism is an important industry for WA, directly employing 73 200 people and indirectly employing a further 35,600 (Ref. 100). The value of the WA tourism industry is AU$12.9 billion by Gross State Product (Ref. 100). Table 4-5 lists the value of tourism to the state's economy.

Table 4-5: Western Australian Tourism Statistics

	WA Direct Tourism Gross Value Added ($million)	% of WA Direct Tourism Gross Value Added ($million)
Tourism characteristic industries		
Travel agency and tour operator services	$1138	19.1%
Air, water, and other transport	$823	13.8%
Accommodation	$654	11.0%
Cafes, restaurants, and takeaway food services	$552	9.3%
Ownership of dwellings	$370	6.2%
Clubs, pubs, taverns, and bars	$339	5.7%
Motor vehicle hiring	$157	2.6%
Other road transport	$87	1.5%
Casinos and other gambling services	$88	1.5%
Other sports and recreation services	$85	1.4%
Cultural services	$74	1.2%
Rail transport	$64	1.1%
Taxi transport	$56	0.9%
Tourism connected industries		
Automotive fuel retailing	$51	0.9%
Other retail trade	$631	10.6%
Education and training	$384	6.4%
All other industries	$413	6.9%
Total Gross Value Added	**$5966**	**100%**

Source: Ref. 100

5 terms, acronyms, and abbreviations

Table 5-1 defines the acronyms and abbreviations used in this document.

Table 5-1: Term, acronyms and abbreviations

Term, acronym, or abbreviation	Definition
~	Approximately
<	Less/fewer than
>	Greater/more than
AHC	Australian Heritage Commission
AIMS	Australian Institute of Marine Science
AIS	Automatic identification System
AMP	Australian Marine Park
AMSA	Australian Maritime Safety Authority
AU$	Australian dollar
AWR	Air Weapons Range
BIA	Biologically Important Area; a spatially defined area where aggregations of individuals of a species are known to display biologically important behaviours such as breeding, foraging, resting, or migration
BP	Before Present (present = 1950)
CAMBA	China–Australia Migratory Bird Agreement
CAPL	Chevron Australia Pty Ltd
CSIRO	Commonwealth Scientific and Industrial Research Organisation
Diadromous	Fish that spend portions of their life cycles partially in fresh water and partially in salt water
Doline	A shallow depression, either funnel- or saucer-shaped, with a floor covered by cultivated soil, formed by solution in limestone country
DPIRD	Western Australian Department of Primary Industries and Regional Development
DTA	Defence Training Area
EEZ	Exclusive Economic Zone
EMBA	Environment that May Be Affected
Endangered Species	A species that is not critically endangered, but is facing a very high risk of extinction in the wild in the near future.
EP	Environment Plan
EPBC Act	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
g/L	Grams per litre
GIS	Geographic Information System
GVP	Gross Value of Product
ha	Hectare
HMAS	His Majesty's Australian Ship (during World War II)
HMS	His (or Her) Majesty's Ship (British)

Term, acronym, or abbreviation	Definition
HSK	Ship of the German Navy (during World War II)
IBRA	Interim Biogeographic Regionalisation for Australia
IUCN	International Union for Conservation of Nature
IUU	Illegal, unreported, and unregulated
JAMBA	Japan–Australia Migratory Bird Agreement
JASDGDLF	Joint Authority Southern Demersal Gillnet and Demersal Longline Managed Fishery
Karst	An area of irregular limestone in which erosion has produced fissures, sinkholes, underground streams, and caverns.
KEF	Key Ecological Feature
km	Kilometre
km^2	Square kilometre
m	Metre
MoU	Memorandum of Understanding
ms^{-1}	Metres per second
NES	[Matters of] National Environmental Significance, as defined in Part 3, Division 1 of the EPBC Act.
NOPSEMA	National Offshore Petroleum Safety and Environmental Management Authority
PA	Planning Area
PDSF	Pilbara Demersal Scalefish Fisheries
Photic zone	The depth of the water in a lake or ocean that is exposed to sufficient sunlight for photosynthesis to occur. The depth of the photic zone can be greatly affected by turbidity.
Priority Species	A species that does not meet the criteria for listing as Threatened Fauna or Declared Rare Flora, but which either may be suspected to be threatened; or is not threatened, but is rare and in need of ongoing monitoring; or is dependent on ongoing management intervention to prevent it from becoming threatened.
Prokaryote	A unicellular organism without a nucleus
Sessile	Permanently attached directly to the substratum by its base (i.e. immobile), without a stalk or stem
SFR	Statutory fishing right
SNES	Species of National Environmental Significance
Stochastic	Random
Swale	A low place in a tract of land, usually moister than the adjacent higher land
SWMR	South-West Marine Region
t	Tonne
TDGDLF	Temperate Demersal Gillnet and Demersal Longline Fishery
TEC	Threatened Ecological Community
Trophic	Relating to food or nutrition / nutritive processes
Vulnerable Species	A species is listed as vulnerable under the EPBC Act if it is not critically endangered or endangered and it is facing a high risk of extinction in the wild in

Term, acronym, or abbreviation	Definition
	the medium-term future, as determined in accordance with the prescribed criteria.
WA	Western Australia
WCB	West Coast Bioregion
WCDGDLF	West Coast Demersal Gillnet and Demersal Longline (Interim) Managed Fishery

6 references

The following documentation is either directly referenced in this document or is a recommended source of background information.

Where references and citations have been copied from Government Database sources, the database has been referenced but the references as cited by the databases have not been specified here. For source material, please refer to the governmental databases for specific source references.

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appendix a protected matters search report

Australian Government
Department of Agriculture, Water and the Environment

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

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This map may contain data which are ©Commonwealth of Australia (Geoscience Australia), ©PSMA 2015

Coordinates
Buffer: 0.0Km

Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	2
National Heritage Places:	8
Wetlands of International Importance:	6
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	2
Listed Threatened Ecological Communities:	6
Listed Threatened Species:	139
Listed Migratory Species:	106

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	11
Commonwealth Heritage Places:	11
Listed Marine Species:	197
Whales and Other Cetaceans:	41
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	43

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	103
Regional Forest Agreements:	1
Invasive Species:	62
Nationally Important Wetlands:	17
Key Ecological Features (Marine)	24

Details

Matters of National Environmental Significance

World Heritage Properties [Resource Information]

Name	State	Status
Shark Bay, Western Australia	WA	Declared property
The Ningaloo Coast	WA	Declared property

National Heritage Properties [Resource Information]

Name	State	Status
Natural		
Lesueur National Park	WA	Listed place
Shark Bay, Western Australia	WA	Listed place
The Ningaloo Coast	WA	Listed place
The West Kimberley	WA	Listed place
Indigenous		
Dampier Archipelago (including Burrup Peninsula)	WA	Listed place
Historic		
Batavia Shipwreck Site and Survivor Camps Area 1629 - Houtman Abrolhos	WA	Listed place
Dirk Hartog Landing Site 1616 - Cape Inscription Area	WA	Listed place
HMAS Sydney II and HSK Kormoran Shipwreck Sites	EXT	Listed place

Wetlands of International Importance (Ramsar) [Resource Information]

Name	Proximity
Ashmore reef national nature reserve	Within Ramsar site
Becher point wetlands	Within 10km of Ramsar
Eighty-mile beach	Within Ramsar site
Ord river floodplain	Within Ramsar site
Peel-yalgorup system	Within Ramsar site
Roebuck bay	Within 10km of Ramsar

Commonwealth Marine Area [Resource Information]

Approval is required for a proposed activity that is located within the Commonwealth Marine Area which has, will have, or is likely to have a significant impact on the environment. Approval may be required for a proposed action taken outside the Commonwealth Marine Area but which has, may have or is likely to have a significant impact on the environment in the Commonwealth Marine Area. Generally the Commonwealth Marine Area stretches from three nautical miles to two hundred nautical miles from the coast.

Name
EEZ and Territorial Sea
Extended Continental Shelf

Marine Regions [Resource Information]

If you are planning to undertake action in an area in or close to the Commonwealth Marine Area, and a marine bioregional plan has been prepared for the Commonwealth Marine Area in that area, the marine bioregional plan may inform your decision as to whether to refer your proposed action under the EPBC Act.

Name
North
North-west
South-west

Listed Threatened Ecological Communities [Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Name	Status	Type of Presence
Banksia Woodlands of the Swan Coastal Plain ecological community	Endangered	Community likely to occur within area
Monsoon vine thickets on the coastal sand dunes of Dampier Peninsula	Endangered	Community likely to occur within area
Sedgelands in Holocene dune swales of the southern Swan Coastal Plain	Endangered	Community likely to occur within area
Subtropical and Temperate Coastal Saltmarsh	Vulnerable	Community likely to occur within area
Thrombolite (microbialite) Community of a Coastal Brackish Lake (Lake Clifton)	Critically Endangered	Community known to occur within area
Tuart (Eucalyptus gomphocephala) Woodlands and Forests of the Swan Coastal Plain ecological community	Critically Endangered	Community likely to occur within area

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
Birds		
Anous tenuirostris melanops Australian Lesser Noddy [26000]	Vulnerable	Breeding known to occur within area
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat likely to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris tenuirostris Great Knot [862]	Critically Endangered	Roosting known to occur within area
Calyptorhynchus banksii naso Forest Red-tailed Black-Cockatoo, Karrak [67034]	Vulnerable	Species or species habitat known to occur within area
Calyptorhynchus baudinii Baudin's Cockatoo, Long-billed Black-Cockatoo [769]	Endangered	Breeding known to occur within area
Calyptorhynchus latirostris Carnaby's Cockatoo, Short-billed Black-Cockatoo [59523]	Endangered	Breeding known to occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Roosting known to occur within area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Roosting known to occur within area
Diomedea amsterdamensis Amsterdam Albatross [64405]	Endangered	Species or species habitat likely to occur within area
Diomedea dabbenena Tristan Albatross [66471]	Endangered	Species or species habitat likely to occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Erythrotriorchis radiatus Red Goshawk [942]	Vulnerable	Species or species habitat likely to occur within area
Erythrura gouldiae Gouldian Finch [413]	Endangered	Species or species habitat known to occur

Name	Status	Type of Presence
		within area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat known to occur within area
Falcunculus frontatus whitei Crested Shrike-tit (northern), Northern Shrike-tit [26013]	Vulnerable	Species or species habitat likely to occur within area
Geophaps smithii blaauwi Partridge Pigeon (western) [66501]	Vulnerable	Species or species habitat likely to occur within area
Halobaena caerulea Blue Petrel [1059]	Vulnerable	Species or species habitat may occur within area
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat likely to occur within area
Limosa lapponica baueri Nunivak Bar-tailed Godwit, Western Alaskan Bar-tailed Godwit [86380]	Vulnerable	Species or species habitat may occur within area
Limosa lapponica menzbieri Northern Siberian Bar-tailed Godwit, Russkoye Bar-tailed Godwit [86432]	Critically Endangered	Species or species habitat known to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Malurus leucopterus edouardi White-winged Fairy-wren (Barrow Island), Barrow Island Black-and-white Fairy-wren [26194]	Vulnerable	Species or species habitat likely to occur within area
Malurus leucopterus leucopterus White-winged Fairy-wren (Dirk Hartog Island), Dirk Hartog Black-and-White Fairy-wren [26004]	Vulnerable	Species or species habitat likely to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Pachyptila turtur subantarctica Fairy Prion (southern) [64445]	Vulnerable	Species or species habitat known to occur within area
Papasula abbotti Abbott's Booby [59297]	Endangered	Species or species habitat may occur within area
Pezoporus occidentalis Night Parrot [59350]	Endangered	Species or species habitat may occur within area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area
Polytelis alexandrae Princess Parrot, Alexandra's Parrot [758]	Vulnerable	Species or species habitat known to occur within area
Pterodroma mollis Soft-plumaged Petrel [1036]	Vulnerable	Foraging, feeding or related behaviour known to occur within area

Name	Status	Type of Presence
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat known to occur within area
Sternula nereis nereis Australian Fairy Tern [82950]	Vulnerable	Breeding known to occur within area
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	Foraging, feeding or related behaviour may occur within area
Thalassarche cauta Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Turnix varius scintillans Painted Button-quail (Houtman Abrolhos) [82451]	Vulnerable	Species or species habitat likely to occur within area
Tyto novaehollandiae kimberli Masked Owl (northern) [26048]	Vulnerable	Species or species habitat likely to occur within area
Fish		
Milyeringa veritas Blind Gudgeon [66676]	Vulnerable	Species or species habitat known to occur within area
Nannatherina balstoni Balston's Pygmy Perch [66698]	Vulnerable	Species or species habitat likely to occur within area
Ophisternon candidum Blind Cave Eel [66678]	Vulnerable	Species or species habitat known to occur within area
Insects		
Hesperocolletes douglasi Douglas' Broad-headed Bee, Rottnest Bee [66734]	Critically Endangered	Species or species habitat may occur within area
Mammals		
Balaenoptera borealis Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Foraging, feeding or related behaviour known to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Bettongia lesueur Barrow and Boodie Islands subspecies Boodie, Burrowing Bettong (Barrow and Boodie Islands) [88021]	Vulnerable	Species or species habitat known to occur within area
Bettongia lesueur lesueur Burrowing Bettong (Shark Bay), Boodie [66659]	Vulnerable	Species or species habitat known to occur

Name	Status	Type of Presence within area
Bettongia penicillata ogilbyi Woylie [66844]	Endangered	Species or species habitat known to occur within area
Conilurus penicillatus Brush-tailed Rabbit-rat, Brush-tailed Tree-rat, Pakooma [132]	Vulnerable	Species or species habitat likely to occur within area
Dasyurus geoffroii Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat known to occur within area
Dasyurus hallucatus Northern Quoll, Digul [Gogo-Yimidir], Wijingadda [Dambimangari], Wiminji [Martu] [331]	Endangered	Species or species habitat known to occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Breeding known to occur within area
Isoodon auratus auratus Golden Bandicoot (mainland) [66665]	Vulnerable	Species or species habitat likely to occur within area
Isoodon auratus barrowensis Golden Bandicoot (Barrow Island) [66666]	Vulnerable	Species or species habitat known to occur within area
Lagorchestes conspicillatus conspicillatus Spectacled Hare-wallaby (Barrow Island) [66661]	Vulnerable	Species or species habitat known to occur within area
Lagorchestes hirsutus Central Australian subspecies Mala, Rufous Hare-Wallaby (Central Australia) [88019]	Endangered	Translocated population known to occur within area
Lagorchestes hirsutus bernieri Rufous Hare-wallaby (Bernier Island) [66662]	Vulnerable	Species or species habitat known to occur within area
Lagorchestes hirsutus dorreae Rufous Hare-wallaby (Dorre Island) [66663]	Vulnerable	Species or species habitat known to occur within area
Lagostrophus fasciatus fasciatus Banded Hare-wallaby, Merrnine, Marnine, Munning [66664]	Vulnerable	Species or species habitat known to occur within area
Macroderma gigas Ghost Bat [174]	Vulnerable	Species or species habitat known to occur within area
Macrotis lagotis Greater Bilby [282]	Vulnerable	Species or species habitat known to occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Breeding known to occur within area
Mesembriomys gouldii gouldii Black-footed Tree-rat (Kimberley and mainland Northern Territory), Djintamoonga, Manbul [87618]	Endangered	Species or species habitat may occur within area
Neophoca cinerea Australian Sea-lion, Australian Sea Lion [22]	Endangered	Breeding known to occur within area
Osphranter robustus isabellinus Barrow Island Wallaroo, Barrow Island Euro [89262]	Vulnerable	Species or species habitat likely to occur within area
Parantechinus apicalis Dibbler [313]	Endangered	Species or species habitat known to occur

Name	Status	Type of Presence within area
Perameles bougainville bougainville Western Barred Bandicoot (Shark Bay) [66631]	Endangered	Species or species habitat known to occur within area
Petrogale concinna monastria Nabarlek (Kimberley) [87607]	Endangered	Species or species habitat known to occur within area
Petrogale lateralis lateralis Black-flanked Rock-wallaby, Moororong, Black-footed Rock Wallaby [66647]	Endangered	Species or species habitat known to occur within area
Phascogale tapoatafa kimberleyensis Kimberley brush-tailed phascogale, Brush-tailed Phascogale (Kimberley) [88453]	Vulnerable	Species or species habitat likely to occur within area
Pseudocheirus occidentalis Western Ringtail Possum, Ngwayir, Womp, Woder, Ngoor, Ngoolangit [25911]	Critically Endangered	Species or species habitat known to occur within area
Pseudomys fieldi Shark Bay Mouse, Djoongari, Alice Springs Mouse [113]	Vulnerable	Species or species habitat likely to occur within area
Rhinonicteris aurantia (Pilbara form) Pilbara Leaf-nosed Bat [82790]	Vulnerable	Species or species habitat known to occur within area
Saccolaimus saccolaimus nudicluniatus Bare-rumped Sheath-tailed Bat, Bare-rumped Sheathtail Bat [66889]	Vulnerable	Species or species habitat likely to occur within area
Setonix brachyurus Quokka [229]	Vulnerable	Species or species habitat known to occur within area
Trichosurus vulpecula arnhemensis Northern Brushtail Possum [83091]	Vulnerable	Species or species habitat likely to occur within area
Xeromys myoides Water Mouse, False Water Rat, Yirrkoo [66]	Vulnerable	Species or species habitat may occur within area
Other		
Idiosoma nigrum Shield-backed Trapdoor Spider, Black Rugose Trapdoor Spider [66798]	Vulnerable	Species or species habitat may occur within area
Kumonga exleyi Cape Range Remipede [86875]	Vulnerable	Species or species habitat known to occur within area
Plants		
Andersonia gracilis Slender Andersonia [14470]	Endangered	Species or species habitat likely to occur within area
Androcalva bivillosa Straggling Androcalva [87807]	Critically Endangered	Species or species habitat may occur within area
Banksia nivea subsp. uliginosa Swamp Honeypot [82766]	Endangered	Species or species habitat may occur within area
Caladenia bryceana subsp. cracens Northern Dwarf Spider-orchid [64556]	Vulnerable	Species or species habitat may occur within area
Caladenia elegans Elegant Spider-orchid [56775]	Endangered	Species or species

Name	Status	Type of Presence
		habitat likely to occur within area
Caladenia hoffmanii Hoffman's Spider-orchid [56719]	Endangered	Species or species habitat may occur within area
Caladenia huegelii King Spider-orchid, Grand Spider-orchid, Rusty Spider-orchid [7309]	Endangered	Species or species habitat known to occur within area
Caladenia viridescens Dunsborough Spider-orchid [56776]	Endangered	Species or species habitat may occur within area
Chamelaucium sp. Gingin (N.G.Marchant 6) Gingin Wax [88881]	Endangered	Species or species habitat likely to occur within area
Chorizema varium Limestone Pea [16981]	Endangered	Species or species habitat known to occur within area
Conostylis micrantha Small-flowered Conostylis [17635]	Endangered	Species or species habitat may occur within area
Diuris drummondii Tall Donkey Orchid [4365]	Vulnerable	Species or species habitat likely to occur within area
Diuris micrantha Dwarf Bee-orchid [55082]	Vulnerable	Species or species habitat known to occur within area
Diuris purdiei Purdie's Donkey-orchid [12950]	Endangered	Species or species habitat likely to occur within area
Drakaea elastica Glossy-leafed Hammer Orchid, Glossy-leaved Hammer Orchid, Warty Hammer Orchid [16753]	Endangered	Species or species habitat likely to occur within area
Drakaea micrantha Dwarf Hammer-orchid [56755]	Vulnerable	Species or species habitat likely to occur within area
Drummondita ericoides Morseby Range Drummondita [9193]	Endangered	Species or species habitat likely to occur within area
Eucalyptus argutifolia Yanchep Mallee, Wabling Hill Mallee [24263]	Vulnerable	Species or species habitat known to occur within area
Eucalyptus beardiana Beard's Mallee [18933]	Vulnerable	Species or species habitat may occur within area
Eucalyptus x phylacis Meelup Mallee [87817]	Endangered	Species or species habitat likely to occur within area
Grevillea batrachioides Mt Lesueur Grevillea [21735]	Endangered	Species or species habitat may occur within area
Grevillea humifusa Spreading Grevillea [61182]	Endangered	Species or species habitat may occur within area
Hemiandra gardneri Red Snakebush [7945]	Endangered	Species or species habitat likely to occur

Name	Status	Type of Presence
		within area
Leucopogon obtectus Hidden Beard-heath [19614]	Endangered	Species or species habitat may occur within area
Marianthus paralius [83925]	Endangered	Species or species habitat known to occur within area
Minuria tridens Minnie Daisy [13753]	Vulnerable	Species or species habitat known to occur within area
Pityrodia augustensis Mt Augustus Foxglove [4962]	Vulnerable	Species or species habitat likely to occur within area
Seringia exastia Fringed Fire-bush [88920]	Critically Endangered	Species or species habitat may occur within area
Synaphea sp. Fairbridge Farm (D. Papenfus 696) Selena's Synaphea [82881]	Critically Endangered	Species or species habitat may occur within area
Synaphea sp. Serpentine (G.R. Brand 103) [86879]	Critically Endangered	Species or species habitat may occur within area
Thelymitra stellata Star Sun-orchid [7060]	Endangered	Species or species habitat likely to occur within area
Wurmbea calcicola Naturaliste Nancy [64691]	Endangered	Species or species habitat likely to occur within area
Reptiles		
Acanthophis hawkei Plains Death Adder [83821]	Vulnerable	Species or species habitat may occur within area
Aipysurus apraefrontalis Short-nosed Seasnake [1115]	Critically Endangered	Species or species habitat known to occur within area
Aipysurus foliosquama Leaf-scaled Seasnake [1118]	Critically Endangered	Species or species habitat known to occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Breeding known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Breeding known to occur within area
Ctenotus lancelini Lancelin Island Skink [1482]	Vulnerable	Species or species habitat known to occur within area
Ctenotus zastictus Hamelin Ctenotus [25570]	Vulnerable	Species or species habitat known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area
Egernia stokesii badia Western Spiny-tailed Skink, Baudin Island Spiny-tailed Skink [64483]	Endangered	Species or species habitat known to occur within area

Name	Status	Type of Presence
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Breeding known to occur within area
Lepidochelys olivacea Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Foraging, feeding or related behaviour known to occur within area
Liasis olivaceus barroni Olive Python (Pilbara subspecies) [66699]	Vulnerable	Species or species habitat likely to occur within area
Liopholis pulchra longicauda Jurien Bay Skink, Jurien Bay Rock-skink [83162]	Vulnerable	Species or species habitat known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Breeding known to occur within area
Sharks		
Carcharias taurus (west coast population) Grey Nurse Shark (west coast population) [68752]	Vulnerable	Species or species habitat known to occur within area
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Glyphis garricki Northern River Shark, New Guinea River Shark [82454]	Endangered	Breeding known to occur within area
Glyphis glyphis Speartooth Shark [82453]	Critically Endangered	Species or species habitat may occur within area
Pristis clavata Dwarf Sawfish, Queensland Sawfish [68447]	Vulnerable	Breeding known to occur within area
Pristis pristis Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat known to occur within area
Pristis zijsron Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Breeding known to occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Foraging, feeding or related behaviour known to occur within area

Listed Migratory Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Migratory Marine Birds		
Anous stolidus Common Noddy [825]		Breeding known to occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardenna carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Foraging, feeding or related behaviour likely to occur within area
Ardenna pacifica Wedge-tailed Shearwater [84292]		Breeding known to occur within area
Calonectris leucomelas Streaked Shearwater [1077]		Species or species habitat known to occur within area
Diomedea amsterdamensis Amsterdam Albatross [64405]	Endangered	Species or species habitat likely to occur within area
Diomedea dabbenena Tristan Albatross [66471]	Endangered	Species or species habitat likely to occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Breeding known to occur within area
Fregata minor Great Frigatebird, Greater Frigatebird [1013]		Breeding known to occur within area
Hydroprogne caspia Caspian Tern [808]		Breeding known to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Onychoprion anaethetus Bridled Tern [82845]		Breeding known to occur within area
Phaethon lepturus White-tailed Tropicbird [1014]		Breeding known to occur within area
Phaethon rubricauda Red-tailed Tropicbird [994]		Breeding known to occur within area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area
Sterna dougallii Roseate Tern [817]		Breeding known to occur within area
Sternula albifrons Little Tern [82849]		Breeding known to occur within area
Sula dactylatra Masked Booby [1021]		Breeding known to occur within area
Sula leucogaster Brown Booby [1022]		Breeding known to occur within area
Sula sula Red-footed Booby [1023]		Breeding known to occur within area
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	Foraging, feeding or related behaviour may occur within area
Thalassarche cauta Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area

Name	Threatened	Type of Presence
Thalassarche impavida		
Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris		
Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche steadi		
White-capped Albatross [64462]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Migratory Marine Species		
Anoxypristis cuspidata		
Narrow Sawfish, Knifetooth Sawfish [68448]		Species or species habitat known to occur within area
Balaena glacialis australis		
Southern Right Whale [75529]	Endangered*	Breeding known to occur within area
Balaenoptera bonaerensis		
Antarctic Minke Whale, Dark-shoulder Minke Whale [67812]		Species or species habitat likely to occur within area
Balaenoptera borealis		
Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Balaenoptera edeni		
Bryde's Whale [35]		Species or species habitat likely to occur within area
Balaenoptera musculus		
Blue Whale [36]	Endangered	Foraging, feeding or related behaviour known to occur within area
Balaenoptera physalus		
Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Caperea marginata		
Pygmy Right Whale [39]		Foraging, feeding or related behaviour likely to occur within area
Carcharhinus longimanus		
Oceanic Whitetip Shark [84108]		Species or species habitat likely to occur within area
Carcharodon carcharias		
White Shark, Great White Shark [64470]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Caretta caretta		
Loggerhead Turtle [1763]	Endangered	Breeding known to occur within area
Chelonia mydas		
Green Turtle [1765]	Vulnerable	Breeding known to occur within area
Crocodylus porosus		
Salt-water Crocodile, Estuarine Crocodile [1774]		Species or species habitat likely to occur within area
Dermochelys coriacea		
Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area
Dugong dugon		
Dugong [28]		Breeding known to occur within area
Eretmochelys imbricata		
Hawksbill Turtle [1766]	Vulnerable	Breeding known to occur within area

Name	Threatened	Type of Presence
Isurus oxyrinchus		
Shortfin Mako, Mako Shark [79073]		Species or species habitat likely to occur within area
Isurus paucus		
Longfin Mako [82947]		Species or species habitat likely to occur within area
Lagenorhynchus obscurus		
Dusky Dolphin [43]		Species or species habitat likely to occur within area
Lamna nasus		
Porbeagle, Mackerel Shark [83288]		Species or species habitat likely to occur within area
Lepidochelys olivacea		
Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Foraging, feeding or related behaviour known to occur within area
Manta alfredi		
Reef Manta Ray, Coastal Manta Ray, Inshore Manta Ray, Prince Alfred's Ray, Resident Manta Ray [84994]		Species or species habitat known to occur within area
Manta birostris		
Giant Manta Ray, Chevron Manta Ray, Pacific Manta Ray, Pelagic Manta Ray, Oceanic Manta Ray [84995]		Species or species habitat known to occur within area
Megaptera novaeangliae		
Humpback Whale [38]	Vulnerable	Breeding known to occur within area
Natator depressus		
Flatback Turtle [59257]	Vulnerable	Breeding known to occur within area
Orcaella heinsohni		
Australian Snubfin Dolphin [81322]		Species or species habitat known to occur within area
Orcinus orca		
Killer Whale, Orca [46]		Species or species habitat may occur within area
Physeter macrocephalus		
Sperm Whale [59]		Foraging, feeding or related behaviour known to occur within area
Pristis clavata		
Dwarf Sawfish, Queensland Sawfish [68447]	Vulnerable	Breeding known to occur within area
Pristis pristis		
Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat known to occur within area
Pristis zijsron		
Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Breeding known to occur within area
Rhincodon typus		
Whale Shark [66680]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Sousa chinensis		
Indo-Pacific Humpback Dolphin [50]		Breeding known to occur within area
Tursiops aduncus (Arafura/Timor Sea populations)		
Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900]		Species or species habitat known to occur within area
Migratory Terrestrial Species		
Cecropis daurica		
Red-rumped Swallow [80610]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Cuculus optatus		
Oriental Cuckoo, Horsfield's Cuckoo [86651]		Species or species habitat known to occur within area
Hirundo rustica		
Barn Swallow [662]		Species or species habitat known to occur within area
Motacilla cinerea		
Grey Wagtail [642]		Species or species habitat known to occur within area
Motacilla flava		
Yellow Wagtail [644]		Species or species habitat known to occur within area
Rhipidura rufifrons		
Rufous Fantail [592]		Species or species habitat likely to occur within area
Migratory Wetlands Species		
Acrocephalus orientalis		
Oriental Reed-Warbler [59570]		Species or species habitat known to occur within area
Actitis hypoleucos		
Common Sandpiper [59309]		Species or species habitat known to occur within area
Arenaria interpres		
Ruddy Turnstone [872]		Roosting known to occur within area
Calidris acuminata		
Sharp-tailed Sandpiper [874]		Roosting known to occur within area
Calidris alba		
Sanderling [875]		Roosting known to occur within area
Calidris canutus		
Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos		
Pectoral Sandpiper [858]		Species or species habitat known to occur within area
Calidris ruficollis		
Red-necked Stint [860]		Roosting known to occur within area
Calidris subminuta		
Long-toed Stint [861]		Roosting known to occur within area
Calidris tenuirostris		
Great Knot [862]	Critically Endangered	Roosting known to occur within area
Charadrius bicinctus		
Double-banded Plover [895]		Roosting known to occur within area
Charadrius leschenaultii		
Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Roosting known to occur within area
Charadrius mongolus		
Lesser Sand Plover, Mongolian Plover [879]	Endangered	Roosting known to occur within area
Charadrius veredus		
Oriental Plover, Oriental Dotterel [882]		Roosting known to occur within area

Name	Threatened	Type of Presence
Gallinago megala		
Swinhoe's Snipe [864]		Roosting likely to occur within area
Gallinago stenura		
Pin-tailed Snipe [841]		Roosting likely to occur within area
Glareola maldivarum		
Oriental Pratincole [840]		Roosting known to occur within area
Limicola falcinellus		
Broad-billed Sandpiper [842]		Roosting known to occur within area
Limnodromus semipalmatus		
Asian Dowitcher [843]		Roosting known to occur within area
Limosa lapponica		
Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Limosa limosa		
Black-tailed Godwit [845]		Roosting known to occur within area
Numenius madagascariensis		
Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Numenius minutus		
Little Curlew, Little Whimbrel [848]		Roosting known to occur within area
Numenius phaeopus		
Whimbrel [849]		Roosting known to occur within area
Pandion haliaetus		
Osprey [952]		Breeding known to occur within area
Phalaropus lobatus		
Red-necked Phalarope [838]		Roosting known to occur within area
Philomachus pugnax		
Ruff (Reeve) [850]		Roosting known to occur within area
Pluvialis fulva		
Pacific Golden Plover [25545]		Roosting known to occur within area
Pluvialis squatarola		
Grey Plover [865]		Roosting known to occur within area
Thalasseus bergii		
Greater Crested Tern [83000]		Breeding known to occur within area
Tringa brevipes		
Grey-tailed Tattler [851]		Roosting known to occur within area
Tringa glareola		
Wood Sandpiper [829]		Roosting known to occur within area
Tringa nebularia		
Common Greenshank, Greenshank [832]		Species or species habitat known to occur within area
Tringa stagnatilis		
Marsh Sandpiper, Little Greenshank [833]		Roosting known to occur within area
Tringa totanus		
Common Redshank, Redshank [835]		Roosting known to occur within area
Xenus cinereus		
Terek Sandpiper [59300]		Roosting known to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land [Resource Information]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Name
Commonwealth Land -
Defence - EXMOUTH ADMIN & HF TRANSMITTING
Defence - EXMOUTH NAVAL HF RECEIVING STATION (H/F Receiving Station, Learmonth, WA)
Defence - EXMOUTH VLF TRANSMITTER STATION
Defence - HMAS STIRLING-ROCKINGHAM ;HMAS STIRLING - GARDEN ISLAND
Defence - LEARMONTH - AIR WEAPONS RANGE
Defence - LEARMONTH - RAAF BASE
Defence - LEARMONTH RADAR SITE - TWIN TANKS EXMOUTH
Defence - LEARMONTH RADAR SITE - VLAMING HEAD EXMOUTH
Defence - LEARMONTH TRANSMITTING STATION
Defence - YAMPI SOUND TRAINING AREA

Commonwealth Heritage Places [Resource Information]

Name	State	Status
Natural		
Ashmore Reef National Nature Reserve	EXT	Listed place
Garden Island	WA	Listed place
Lancelin Defence Training Area	WA	Listed place
Learmonth Air Weapons Range Facility	WA	Listed place
Mermaid Reef - Rowley Shoals	WA	Listed place
Ningaloo Marine Area - Commonwealth Waters	WA	Listed place
Scott Reef and Surrounds - Commonwealth Area	EXT	Listed place
Yampi Defence Area	WA	Listed place
Historic		
Cliff Point Historic Site	WA	Listed place
HMAS Sydney II and HSK Kormoran Shipwreck Sites	EXT	Listed place
J Gun Battery	WA	Listed place

Listed Marine Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Birds		
Acrocephalus orientalis		
Oriental Reed-Warbler [59570]		Species or species habitat known to occur within area
Actitis hypoleucos		
Common Sandpiper [59309]		Species or species habitat known to occur within area
Anous minutus		
Black Noddy [824]		Breeding known to occur within area
Anous stolidus		
Common Noddy [825]		Breeding known to occur within area
Anous tenuirostris melanops		
Australian Lesser Noddy [26000]	Vulnerable	Breeding known to occur within area
Anseranas semipalmata		
Magpie Goose [978]		Species or species habitat may occur within area
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea ibis		
Cattle Egret [59542]		Species or species habitat may occur within area
Arenaria interpres		
Ruddy Turnstone [872]		Roosting known to occur within area
Calidris acuminata		
Sharp-tailed Sandpiper [874]		Roosting known to occur within area
Calidris alba		
Sanderling [875]		Roosting known to occur within area
Calidris canutus		
Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos		
Pectoral Sandpiper [858]		Species or species habitat known to occur within area
Calidris ruficollis		
Red-necked Stint [860]		Roosting known to occur within area
Calidris subminuta		
Long-toed Stint [861]		Roosting known to occur within area
Calidris tenuirostris		
Great Knot [862]	Critically Endangered	Roosting known to occur within area
Calonectris leucomelas		
Streaked Shearwater [1077]		Species or species habitat known to occur within area
Catharacta skua		
Great Skua [59472]		Species or species habitat may occur within area
Charadrius bicinctus		
Double-banded Plover [895]		Roosting known to occur within area
Charadrius leschenaultii		
Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Roosting known to occur within area
Charadrius mongolus		
Lesser Sand Plover, Mongolian Plover [879]	Endangered	Roosting known to occur within area
Charadrius ruficapillus		
Red-capped Plover [881]		Roosting known to occur within area
Charadrius veredus		
Oriental Plover, Oriental Dotterel [882]		Roosting known to occur within area
Chrysococcyx osculans		
Black-eared Cuckoo [705]		Species or species habitat known to occur within area
Diomedea amsterdamensis		
Amsterdam Albatross [64405]	Endangered	Species or species habitat likely to occur within area
Diomedea dabbenena		
Tristan Albatross [66471]	Endangered	Species or species habitat likely to occur within area
Diomedea epomophora		
Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans		
Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area

Name	Threatened	Type of Presence
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Eudyptula minor Little Penguin [1085]		Breeding known to occur within area
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Breeding known to occur within area
Fregata minor Great Frigatebird, Greater Frigatebird [1013]		Breeding known to occur within area
Gallinago megala Swinhoe's Snipe [864]		Roosting likely to occur within area
Gallinago stenura Pin-tailed Snipe [841]		Roosting likely to occur within area
Glareola maldivarum Oriental Pratincole [840]		Roosting known to occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Halobaena caerulea Blue Petrel [1059]	Vulnerable	Species or species habitat may occur within area
Heteroscelus brevipes Grey-tailed Tattler [59311]		Roosting known to occur within area
Himantopus himantopus Pied Stilt, Black-winged Stilt [870]		Roosting known to occur within area
Hirundo daurica Red-rumped Swallow [59480]		Species or species habitat may occur within area
Hirundo rustica Barn Swallow [662]		Species or species habitat known to occur within area
Larus novaehollandiae Silver Gull [810]		Breeding known to occur within area
Larus pacificus Pacific Gull [811]		Breeding known to occur within area
Limicola falcinellus Broad-billed Sandpiper [842]		Roosting known to occur within area
Limnodromus semipalmatus Asian Dowitcher [843]		Roosting known to occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Limosa limosa Black-tailed Godwit [845]		Roosting known to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area

Name	Threatened	Type of Presence
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat known to occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Numenius minutus Little Curlew, Little Whimbrel [848]		Roosting known to occur within area
Numenius phaeopus Whimbrel [849]		Roosting known to occur within area
Pachyptila turtur Fairy Prion [1066]		Species or species habitat known to occur within area
Pandion haliaetus Osprey [952]		Breeding known to occur within area
Papasula abbotti Abbott's Booby [59297]	Endangered	Species or species habitat may occur within area
Pelagodroma marina White-faced Storm-Petrel [1016]		Breeding known to occur within area
Phaethon lepturus White-tailed Tropicbird [1014]		Breeding known to occur within area
Phaethon rubricauda Red-tailed Tropicbird [994]		Breeding known to occur within area
Phalacrocorax fuscescens Black-faced Cormorant [59660]		Breeding likely to occur within area
Phalaropus lobatus Red-necked Phalarope [838]		Roosting known to occur within area
Philomachus pugnax Ruff (Reeve) [850]		Roosting known to occur within area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area
Pluvialis fulva Pacific Golden Plover [25545]		Roosting known to occur within area
Pluvialis squatarola Grey Plover [865]		Roosting known to occur within area
Pterodroma macroptera Great-winged Petrel [1035]		Foraging, feeding or related behaviour known to occur within area
Pterodroma mollis Soft-plumaged Petrel [1036]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Puffinus assimilis Little Shearwater [59363]		Breeding known to occur within area

Name	Threatened	Type of Presence
Puffinus carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [1043]		Foraging, feeding or related behaviour likely to occur within area
Puffinus huttoni Hutton's Shearwater [1025]		Foraging, feeding or related behaviour known to occur within area
Puffinus pacificus Wedge-tailed Shearwater [1027]		Breeding known to occur within area
Recurvirostra novaehollandiae Red-necked Avocet [871]		Roosting known to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat likely to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat known to occur within area
Sterna albifrons Little Tern [813]		Breeding known to occur within area
Sterna anaethetus Bridled Tern [814]		Breeding known to occur within area
Sterna bengalensis Lesser Crested Tern [815]		Breeding known to occur within area
Sterna bergii Crested Tern [816]		Breeding known to occur within area
Sterna caspia Caspian Tern [59467]		Breeding known to occur within area
Sterna dougallii Roseate Tern [817]		Breeding known to occur within area
Sterna fuscata Sooty Tern [794]		Breeding known to occur within area
Sterna nereis Fairy Tern [796]		Breeding known to occur within area
Stiltia isabella Australian Pratincole [818]		Roosting known to occur within area
Sula dactylatra Masked Booby [1021]		Breeding known to occur within area
Sula leucogaster Brown Booby [1022]		Breeding known to occur within area
Sula sula Red-footed Booby [1023]		Breeding known to occur within area
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	Foraging, feeding or related behaviour may occur within area
Thalassarche cauta Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thinornis rubricollis Hooded Plover [59510]		Species or species habitat known to occur within area
Tringa glareola Wood Sandpiper [829]		Roosting known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat known to occur within area
Tringa stagnatilis Marsh Sandpiper, Little Greenshank [833]		Roosting known to occur within area
Tringa totanus Common Redshank, Redshank [835]		Roosting known to occur within area
Xenus cinereus Terek Sandpiper [59300]		Roosting known to occur within area
Fish		
Acentronura australe Southern Pygmy Pipehorse [66185]		Species or species habitat may occur within area
Acentronura larsonae Helen's Pygmy Pipehorse [66186]		Species or species habitat may occur within area
Bhanotia fasciolata Corrugated Pipefish, Barbed Pipefish [66188]		Species or species habitat may occur within area
Bulbonaricus brauni Braun's Pughead Pipefish, Pug-headed Pipefish [66189]		Species or species habitat may occur within area
Campichthys galei Gale's Pipefish [66191]		Species or species habitat may occur within area
Campichthys tricarinatus Three-keel Pipefish [66192]		Species or species habitat may occur within area
Choeroichthys brachysoma Pacific Short-bodied Pipefish, Short-bodied Pipefish [66194]		Species or species habitat may occur within area
Choeroichthys latispinosus Muiron Island Pipefish [66196]		Species or species habitat may occur within area
Choeroichthys suillus Pig-snouted Pipefish [66198]		Species or species habitat may occur within area
Corythoichthys amplexus Fijian Banded Pipefish, Brown-banded Pipefish [66199]		Species or species habitat may occur within area
Corythoichthys flavofasciatus Reticulate Pipefish, Yellow-banded Pipefish, Network Pipefish [66200]		Species or species habitat may occur within area
Corythoichthys intestinalis Australian Messmate Pipefish, Banded Pipefish		Species or species

Name	Threatened	Type of Presence
[66202]		habitat may occur within area
Corythoichthys schultzi Schultz's Pipefish [66205]		Species or species habitat may occur within area
Cosmocampus banneri Roughridge Pipefish [66206]		Species or species habitat may occur within area
Doryrhamphus dactyliophorus Banded Pipefish, Ringed Pipefish [66210]		Species or species habitat may occur within area
Doryrhamphus excisus Bluestripe Pipefish, Indian Blue-stripe Pipefish, Pacific Blue-stripe Pipefish [66211]		Species or species habitat may occur within area
Doryrhamphus janssi Cleaner Pipefish, Janss' Pipefish [66212]		Species or species habitat may occur within area
Doryrhamphus multiannulatus Many-banded Pipefish [66717]		Species or species habitat may occur within area
Doryrhamphus negrosensis Flagtail Pipefish, Masthead Island Pipefish [66213]		Species or species habitat may occur within area
Festucalex scalaris Ladder Pipefish [66216]		Species or species habitat may occur within area
Filicampus tigris Tiger Pipefish [66217]		Species or species habitat may occur within area
Halicampus brocki Brock's Pipefish [66219]		Species or species habitat may occur within area
Halicampus dunckeri Red-hair Pipefish, Duncker's Pipefish [66220]		Species or species habitat may occur within area
Halicampus grayi Mud Pipefish, Gray's Pipefish [66221]		Species or species habitat may occur within area
Halicampus nitidus Glittering Pipefish [66224]		Species or species habitat may occur within area
Halicampus spinirostris Spiny-snout Pipefish [66225]		Species or species habitat may occur within area
Haliichthys taeniophorus Ribboned Pipehorse, Ribboned Seadragon [66226]		Species or species habitat may occur within area
Heraldia nocturna Upside-down Pipefish, Eastern Upside-down Pipefish, Eastern Upside-down Pipefish [66227]		Species or species habitat may occur within area
Hippichthys penicillus Beady Pipefish, Steep-nosed Pipefish [66231]		Species or species habitat may occur within area
Hippocampus angustus Western Spiny Seahorse, Narrow-bellied Seahorse [66234]		Species or species habitat may occur within

Name	Threatened	Type of Presence
		area
Hippocampus breviceps Short-head Seahorse, Short-snouted Seahorse [66235]		Species or species habitat may occur within area
Hippocampus histrix Spiny Seahorse, Thorny Seahorse [66236]		Species or species habitat may occur within area
Hippocampus kuda Spotted Seahorse, Yellow Seahorse [66237]		Species or species habitat may occur within area
Hippocampus planifrons Flat-face Seahorse [66238]		Species or species habitat may occur within area
Hippocampus spinosissimus Hedgehog Seahorse [66239]		Species or species habitat may occur within area
Hippocampus subelongatus West Australian Seahorse [66722]		Species or species habitat may occur within area
Hippocampus trimaculatus Three-spot Seahorse, Low-crowned Seahorse, Flat-faced Seahorse [66720]		Species or species habitat may occur within area
Histiogamphelus cristatus Rhino Pipefish, Macleay's Crested Pipefish, Ring-back Pipefish [66243]		Species or species habitat may occur within area
Lissocampus caudalis Australian Smooth Pipefish, Smooth Pipefish [66249]		Species or species habitat may occur within area
Lissocampus fatiloquus Prophet's Pipefish [66250]		Species or species habitat may occur within area
Lissocampus runa Javelin Pipefish [66251]		Species or species habitat may occur within area
Maroubra perserrata Sawtooth Pipefish [66252]		Species or species habitat may occur within area
Microgmathus micronotopterus Tidepool Pipefish [66255]		Species or species habitat may occur within area
Mitotichthys meraculus Western Crested Pipefish [66259]		Species or species habitat may occur within area
Nannocampus subosseus Bonyhead Pipefish, Bony-headed Pipefish [66264]		Species or species habitat may occur within area
Phoxocampus belcheri Black Rock Pipefish [66719]		Species or species habitat may occur within area
Phycodurus eques Leafy Seadragon [66267]		Species or species habitat may occur within area
Phyllopteryx taeniolatus Common Seadragon, Weedy Seadragon [66268]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Pugnaso curtirostris Pugnose Pipefish, Pug-nosed Pipefish [66269]		Species or species habitat may occur within area
Solegnathus hardwickii Pallid Pipehorse, Hardwick's Pipehorse [66272]		Species or species habitat may occur within area
Solegnathus lettiensis Gunther's Pipehorse, Indonesian Pipefish [66273]		Species or species habitat may occur within area
Solenostomus cyanopterus Robust Ghostpipefish, Blue-finned Ghost Pipefish, [66183]		Species or species habitat may occur within area
Stigmatopora argus Spotted Pipefish, Gulf Pipefish, Peacock Pipefish [66276]		Species or species habitat may occur within area
Stigmatopora nigra Widebody Pipefish, Wide-bodied Pipefish, Black Pipefish [66277]		Species or species habitat may occur within area
Syngnathoides biaculeatus Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish [66279]		Species or species habitat may occur within area
Trachyrhamphus bicoarctatus Bentstick Pipefish, Bend Stick Pipefish, Short-tailed Pipefish [66280]		Species or species habitat may occur within area
Trachyrhamphus longirostris Straightstick Pipefish, Long-nosed Pipefish, Straight Stick Pipefish [66281]		Species or species habitat may occur within area
Urocampus carinirostris Hairy Pipefish [66282]		Species or species habitat may occur within area
Vanacampus margaritifer Mother-of-pearl Pipefish [66283]		Species or species habitat may occur within area
Vanacampus phillipi Port Phillip Pipefish [66284]		Species or species habitat may occur within area
Vanacampus poecilolaemus Longsnout Pipefish, Australian Long-snout Pipefish, Long-snouted Pipefish [66285]		Species or species habitat may occur within area
Mammals		
Arctocephalus forsteri Long-nosed Fur-seal, New Zealand Fur-seal [20]		Species or species habitat may occur within area
Dugong dugon Dugong [28]		Breeding known to occur within area
Neophoca cinerea Australian Sea-lion, Australian Sea Lion [22]	Endangered	Breeding known to occur within area
Reptiles		
Acalyptophis peronii Horned Seasnake [1114]		Species or species habitat may occur within area
Aipysurus apraefrontalis Short-nosed Seasnake [1115]	Critically Endangered	Species or species habitat known to occur within area

Name	Threatened	Type of Presence
Aipysurus duboisii Dubois' Seasnake [1116]		Species or species habitat may occur within area
Aipysurus eydouxii Spine-tailed Seasnake [1117]		Species or species habitat may occur within area
Aipysurus foliosquama Leaf-scaled Seasnake [1118]	Critically Endangered	Species or species habitat known to occur within area
Aipysurus fuscus Dusky Seasnake [1119]		Species or species habitat known to occur within area
Aipysurus laevis Olive Seasnake [1120]		Species or species habitat may occur within area
Aipysurus pooleorum Shark Bay Seasnake [66061]		Species or species habitat may occur within area
Aipysurus tenuis Brown-lined Seasnake [1121]		Species or species habitat may occur within area
Astrotia stokesii Stokes' Seasnake [1122]		Species or species habitat may occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Breeding known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Breeding known to occur within area
Crocodylus johnstoni Freshwater Crocodile, Johnston's Crocodile, Johnstone's Crocodile [1773]		Species or species habitat may occur within area
Crocodylus porosus Salt-water Crocodile, Estuarine Crocodile [1774]		Species or species habitat likely to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area
Disteira kingii Spectacled Seasnake [1123]		Species or species habitat may occur within area
Disteira major Olive-headed Seasnake [1124]		Species or species habitat may occur within area
Emydocephalus annulatus Turtle-headed Seasnake [1125]		Species or species habitat may occur within area
Enhydrina schistosa Beaked Seasnake [1126]		Species or species habitat may occur within area
Ephalophis greyi North-western Mangrove Seasnake [1127]		Species or species habitat may occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Breeding known to occur within area

Name	Threatened	Type of Presence
Hydrelaps darwiniensis Black-ringed Seasnake [1100]		Species or species habitat may occur within area
Hydrophis atriceps Black-headed Seasnake [1101]		Species or species habitat may occur within area
Hydrophis coggeri Slender-necked Seasnake [25925]		Species or species habitat may occur within area
Hydrophis czeblukovi Fine-spined Seasnake [59233]		Species or species habitat may occur within area
Hydrophis elegans Elegant Seasnake [1104]		Species or species habitat may occur within area
Hydrophis inornatus Plain Seasnake [1107]		Species or species habitat may occur within area
Hydrophis mcdowelli null [25926]		Species or species habitat may occur within area
Hydrophis ornatus Spotted Seasnake, Ornate Reef Seasnake [1111]		Species or species habitat may occur within area
Lapemis hardwickii Spine-bellied Seasnake [1113]		Species or species habitat may occur within area
Lepidochelys olivacea Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Foraging, feeding or related behaviour known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Breeding known to occur within area
Pelamis platurus Yellow-bellied Seasnake [1091]		Species or species habitat may occur within area

Whales and other Cetaceans [Resource Information]

Name	Status	Type of Presence
Mammals		
Balaenoptera acutorostrata Minke Whale [33]		Species or species habitat may occur within area
Balaenoptera bonaerensis Antarctic Minke Whale, Dark-shoulder Minke Whale [67812]		Species or species habitat likely to occur within area
Balaenoptera borealis Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat likely to occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Foraging, feeding or related behaviour known to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Caperea marginata Pygmy Right Whale [39]		Foraging, feeding or related behaviour likely to occur within area
Delphinus delphis Common Dolphin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Breeding known to occur within area
Feresa attenuata Pygmy Killer Whale [61]		Species or species habitat may occur within area
Globicephala macrorhynchus Short-finned Pilot Whale [62]		Species or species habitat may occur within area
Globicephala melas Long-finned Pilot Whale [59282]		Species or species habitat may occur within area
Grampus griseus Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
Hyperoodon planifrons Southern Bottlenose Whale [71]		Species or species habitat may occur within area
Indopacetus pacificus Longman's Beaked Whale [72]		Species or species habitat may occur within area
Kogia breviceps Pygmy Sperm Whale [57]		Species or species habitat may occur within area
Kogia simus Dwarf Sperm Whale [58]		Species or species habitat may occur within area
Lagenodelphis hosei Fraser's Dolphin, Sarawak Dolphin [41]		Species or species habitat may occur within area
Lagenorhynchus obscurus Dusky Dolphin [43]		Species or species habitat likely to occur within area
Lissodelphis peronii Southern Right Whale Dolphin [44]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Breeding known to occur within area
Mesoplodon bowdoini Andrew's Beaked Whale [73]		Species or species habitat may occur within area
Mesoplodon densirostris Blainville's Beaked Whale, Dense-beaked Whale [74]		Species or species habitat may occur within area
Mesoplodon ginkgodens Gingko-toothed Beaked Whale, Gingko-toothed Whale, Gingko Beaked Whale [59564]		Species or species habitat may occur within area

Name	Status	Type of Presence
Mesoplodon grayi Gray's Beaked Whale, Scamperdown Whale [75]		Species or species habitat may occur within area
Mesoplodon layardii Strap-toothed Beaked Whale, Strap-toothed Whale, Layard's Beaked Whale [25556]		Species or species habitat may occur within area
Mesoplodon mirus True's Beaked Whale [54]		Species or species habitat may occur within area
Orcaella brevirostris Irrawaddy Dolphin [45]		Species or species habitat known to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Peponocephala electra Melon-headed Whale [47]		Species or species habitat may occur within area
Physeter macrocephalus Sperm Whale [59]		Foraging, feeding or related behaviour known to occur within area
Pseudorca crassidens False Killer Whale [48]		Species or species habitat likely to occur within area
Sousa chinensis Indo-Pacific Humpback Dolphin [50]		Breeding known to occur within area
Stenella attenuata Spotted Dolphin, Pantropical Spotted Dolphin [51]		Species or species habitat may occur within area
Stenella coeruleoalba Striped Dolphin, Euphrosyne Dolphin [52]		Species or species habitat may occur within area
Stenella longirostris Long-snouted Spinner Dolphin [29]		Species or species habitat may occur within area
Steno bredanensis Rough-toothed Dolphin [30]		Species or species habitat may occur within area
Tursiops aduncus Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area
Tursiops aduncus (Arafura/Timor Sea populations) Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900]		Species or species habitat known to occur within area
Tursiops truncatus s. str. Bottlenose Dolphin [68417]		Species or species habitat may occur within area
Ziphius cavirostris Cuvier's Beaked Whale, Goose-beaked Whale [56]		Species or species habitat may occur within area

Australian Marine Parks [Resource Information]

Name	Label
Abrolhos	Habitat Protection Zone (IUCN IV)
Abrolhos	Multiple Use Zone (IUCN VI)
Abrolhos	National Park Zone (IUCN II)
Abrolhos	Special Purpose Zone (IUCN VI)
Argo-Rowley Terrace	Multiple Use Zone (IUCN VI)
Argo-Rowley Terrace	National Park Zone (IUCN II)
Argo-Rowley Terrace	Special Purpose Zone (Trawl) (IUCN VI)
Ashmore Reef	Recreational Use Zone (IUCN IV)
Ashmore Reef	Sanctuary Zone (IUCN Ia)
Carnarvon Canyon	Habitat Protection Zone (IUCN IV)
Cartier Island	Sanctuary Zone (IUCN Ia)
Dampier	Habitat Protection Zone (IUCN IV)
Dampier	Multiple Use Zone (IUCN VI)
Dampier	National Park Zone (IUCN II)
Eighty Mile Beach	Multiple Use Zone (IUCN VI)
Gascoyne	Habitat Protection Zone (IUCN IV)
Gascoyne	Multiple Use Zone (IUCN VI)
Gascoyne	National Park Zone (IUCN II)
Geographe	Multiple Use Zone (IUCN VI)
Geographe	Special Purpose Zone (Mining
Joseph Bonaparte Gulf	Multiple Use Zone (IUCN VI)
Joseph Bonaparte Gulf	Special Purpose Zone (IUCN VI)
Jurien	National Park Zone (IUCN II)
Jurien	Special Purpose Zone (IUCN VI)
Kimberley	Habitat Protection Zone (IUCN IV)
Kimberley	Multiple Use Zone (IUCN VI)
Kimberley	National Park Zone (IUCN II)
Mermaid Reef	National Park Zone (IUCN II)
Montebello	Multiple Use Zone (IUCN VI)
Ningaloo	National Park Zone (IUCN II)
Ningaloo	Recreational Use Zone (IUCN IV)
Oceanic Shoals	Multiple Use Zone (IUCN VI)
Oceanic Shoals	Special Purpose Zone (Trawl) (IUCN VI)
Perth Canyon	Habitat Protection Zone (IUCN IV)
Perth Canyon	Multiple Use Zone (IUCN VI)
Perth Canyon	National Park Zone (IUCN II)
Roebuck	Multiple Use Zone (IUCN VI)
Shark Bay	Multiple Use Zone (IUCN VI)
South-west Corner	Multiple Use Zone (IUCN VI)
South-west Corner	National Park Zone (IUCN II)
South-west Corner	Special Purpose Zone (Mining
Two Rocks	Multiple Use Zone (IUCN VI)
Two Rocks	National Park Zone (IUCN II)

Extra Information

State and Territory Reserves [Resource Information]

Name	State
Adele Island	WA
Airlie Island	WA
Balanggarra	WA
Bardi Jawi	WA
Barrow Island	WA
Bedout Island	WA
Beekeepers	WA
Bernier And Dorre Islands	WA
Bessieres Island	WA
Boodie, Double Middle Islands	WA
Boullanger, Whitlock, Favourite, Tern And Osprey Islands	WA
Browse Island	WA
Bundegi Coastal Park	WA
Burnside And Simpson Island	WA
Cape Range	WA
Carnac Island	WA
Coulomb Point	WA
Dambimangari	WA

Name	State
Dirk Hartog Island	WA
Escape Island	WA
Giralia	WA
Gnandaroo Island	WA
Houtman Abrolhos Islands	WA
Jarrkunpungu	WA
Jinmarnkur	WA
Jinmarnkur Kulja	WA
Jurabi Coastal Park	WA
Karajarri	WA
Koks Island	WA
Kooljerrenup	WA
Lacepede Islands	WA
Lancelin And Edwards Islands	WA
Leeuwin-Naturaliste	WA
Len Howard	WA
Lesueur	WA
Lesueur Island	WA
Little Rocky Island	WA
Locker Island	WA
Low Rocks	WA
Lowendal Islands	WA
McLarty	WA
Mealup Point	WA
Mijing	WA
Montebello Islands	WA
Muiron Islands	WA
Nambung	WA
Niiwalarra Islands	WA
Nilgen	WA
North Sandy Island	WA
North Turtle Island	WA
Ord River	WA
Pelican Island	WA
Penguin Island	WA
Rottnest Island	WA
Round Island	WA
Serrurier Island	WA
Southern Beekeepers	WA
Swan Island	WA
Tanner Island	WA
Tent Island	WA
Unnamed WA11883	WA
Unnamed WA26400	WA
Unnamed WA28968	WA
Unnamed WA34039	WA
Unnamed WA36913	WA
Unnamed WA36915	WA
Unnamed WA37168	WA
Unnamed WA37338	WA
Unnamed WA37383	WA
Unnamed WA40322	WA
Unnamed WA40828	WA
Unnamed WA40877	WA
Unnamed WA41080	WA
Unnamed WA41160	WA
Unnamed WA41775	WA
Unnamed WA42030	WA
Unnamed WA44665	WA
Unnamed WA44667	WA
Unnamed WA44669	WA
Unnamed WA44672	WA
Unnamed WA44673	WA
Unnamed WA44677	WA
Unnamed WA44682	WA
Unnamed WA44688	WA

Name	State
Unnamed WA46982	WA
Unnamed WA46983	WA
Unnamed WA46984	WA
Unnamed WA48205	WA
Unnamed WA48858	WA
Unnamed WA48968	WA
Unnamed WA49994	WA
Unnamed WA51162	WA
Unnamed WA51943	WA
Uunguu	WA
Victor Island	WA
Wanagarren	WA
Wedge Island	WA
Weld Island	WA
Whalebone Island	WA
Whitmore,Roberts,Doole Islands And Sandalwood Landing	WA
Y Island	WA
Yalgorup	WA
Yampi	WA

Regional Forest Agreements

[Resource Information]

Note that all areas with completed RFAs have been included.

Name	State
South West WA RFA	Western Australia

Invasive Species

[Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence
Birds		
Acridotheres tristis		
Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area
Anas platyrhynchos		
Mallard [974]		Species or species habitat likely to occur within area
Carduelis carduelis		
European Goldfinch [403]		Species or species habitat likely to occur within area
Columba livia		
Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Passer domesticus		
House Sparrow [405]		Species or species habitat likely to occur within area
Passer montanus		
Eurasian Tree Sparrow [406]		Species or species habitat likely to occur within area
Pavo cristatus		
Indian Peafowl, Peacock [919]		Species or species habitat likely to occur within area
Phasianus colchicus		
Common Pheasant [920]		Species or species habitat likely to occur within area
Streptopelia chinensis		
Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Streptopelia senegalensis		
Laughing Turtle-dove, Laughing Dove [781]		Species or species habitat likely to occur within area
Sturnus vulgaris		
Common Starling [389]		Species or species habitat likely to occur within area
Turdus merula		
Common Blackbird, Eurasian Blackbird [596]		Species or species habitat likely to occur within area
Frogs		
Rhinella marina		
Cane Toad [83218]		Species or species habitat known to occur within area
Mammals		
Bos taurus		
Domestic Cattle [16]		Species or species habitat likely to occur within area
Camelus dromedarius		
Dromedary, Camel [7]		Species or species habitat likely to occur within area
Canis lupus familiaris		
Domestic Dog [82654]		Species or species habitat likely to occur within area
Capra hircus		
Goat [2]		Species or species habitat likely to occur within area
Equus asinus		
Donkey, Ass [4]		Species or species habitat likely to occur within area
Equus caballus		
Horse [5]		Species or species habitat likely to occur within area
Felis catus		
Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Feral deer		
Feral deer species in Australia [85733]		Species or species habitat likely to occur within area
Funambulus pennantii		
Northern Palm Squirrel, Five-striped Palm Squirrel [129]		Species or species habitat likely to occur within area
Mus musculus		
House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus		
Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus exulans		
Pacific Rat, Polynesian Rat [79]		Species or species habitat likely to occur within area
Rattus norvegicus		
Brown Rat, Norway Rat [83]		Species or species habitat likely to occur within area
Rattus rattus		
Black Rat, Ship Rat [84]		Species or species habitat likely to occur

Name	Status	Type of Presence
		within area
Sus scrofa		
Pig [6]		Species or species habitat likely to occur within area
Vulpes vulpes		
Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Andropogon gayanus		
Gamba Grass [66895]		Species or species habitat likely to occur within area
Anredera cordifolia		
Madeira Vine, Jalap, Lamb's-tail, Mignonette Vine, Anredera, Gulf Madeiravine, Heartleaf Madeiravine, Potato Vine [2643]		Species or species habitat likely to occur within area
Asparagus aethiopicus		
Asparagus Fern, Ground Asparagus, Basket Fern, Sprengi's Fern, Bushy Asparagus, Emerald Asparagus [62425]		Species or species habitat likely to occur within area
Asparagus asparagoides		
Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Asparagus declinatus		
Bridal Veil, Bridal Veil Creeper, Pale Berry Asparagus Fern, Asparagus Fern, South African Creeper [66908]		Species or species habitat likely to occur within area
Asparagus plumosus		
Climbing Asparagus-fern [48993]		Species or species habitat likely to occur within area
Brachiaria mutica		
Para Grass [5879]		Species or species habitat may occur within area
Cenchrus ciliaris		
Buffel-grass, Black Buffel-grass [20213]		Species or species habitat likely to occur within area
Chrysanthemoides monilifera		
Bitou Bush, Boneseed [18983]		Species or species habitat may occur within area
Chrysanthemoides monilifera subsp. monilifera		
Boneseed [16905]		Species or species habitat likely to occur within area
Cylindropuntia spp.		
Prickly Pears [85131]		Species or species habitat likely to occur within area
Dolichandra unguis-cati		
Cat's Claw Vine, Yellow Trumpet Vine, Cat's Claw Creeper, Funnel Creeper [85119]		Species or species habitat likely to occur within area
Genista linifolia		
Flax-leaved Broom, Mediterranean Broom, Flax Broom [2800]		Species or species habitat likely to occur within area
Genista monspessulana		
Montpellier Broom, Cape Broom, Canary Broom, Common Broom, French Broom, Soft Broom [20126]		Species or species habitat likely to occur within area
Genista sp. X Genista monspessulana		
Broom [67538]		Species or species habitat may occur within area
Hymenachne amplexicaulis		
Hymenachne, Olive Hymenachne, Water Stargrass, West Indian Grass, West Indian Marsh Grass		Species or species habitat likely to occur

Name	Status	Type of Presence
[31754]		within area
Jatropha gossypifolia		
Cotton-leaved Physic-Nut, Bellyache Bush, Cotton-leaf Physic Nut, Cotton-leaf Jatropha, Black Physic Nut [7507]		Species or species habitat likely to occur within area
Lantana camara		
Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892]		Species or species habitat likely to occur within area
Lycium ferocissimum		
African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area
Mimosa pigra		
Mimosa, Giant Mimosa, Giant Sensitive Plant, ThornySensitive Plant, Black Mimosa, Catclaw Mimosa, Bashful Plant [11223]		Species or species habitat likely to occur within area
Olea europaea		
Olive, Common Olive [9160]		Species or species habitat may occur within area
Opuntia spp.		
Prickly Pears [82753]		Species or species habitat likely to occur within area
Parkinsonia aculeata		
Parkinsonia, Jerusalem Thorn, Jelly Bean Tree, Horse Bean [12301]		Species or species habitat likely to occur within area
Pinus radiata		
Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat may occur within area
Prosopis spp.		
Mesquite, Algaroba [68407]		Species or species habitat likely to occur within area
Rubus fruticosus aggregate		
Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii		
Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur within area
Salvinia molesta		
Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665]		Species or species habitat likely to occur within area
Solanum elaeagnifolium		
Silver Nightshade, Silver-leaved Nightshade, White Horse Nettle, Silver-leaf Nightshade, Tomato Weed, White Nightshade, Bull-nettle, Prairie-berry, Satansbos, Silver-leaf Bitter-apple, Silverleaf-nettle, Trompillo [12323]		Species or species habitat likely to occur within area
Tamarix aphylla		
Athel Pine, Athel Tree, Tamarisk, Athel Tamarisk, Athel Tamarix, Desert Tamarisk, Flowering Cypress, Salt Cedar [16018]		Species or species habitat likely to occur within area
Vachellia nilotica		
Prickly Acacia, Blackthorn, Prickly Mimosa, Black Piquant, Babul [84351]		Species or species habitat likely to occur within area
Reptiles		
Hemidactylus frenatus		
Asian House Gecko [1708]		Species or species habitat likely to occur within area
Ramphotyphlops braminus		
Flowerpot Blind Snake, Brahminy Blind Snake, Cacing Besi [1258]		Species or species habitat likely to occur within area

Nationally Important Wetlands [Resource Information]

Name	State
Ashmore Reef	EXT
Bunda-Bunda Mound Springs	WA
Bundera Sinkhole	WA
Cape Range Subterranean Waterways	WA
De Grey River	WA
Eighty Mile Beach System	WA
Exmouth Gulf East	WA
Lake MacLeod	WA
Lake Thetis	WA
Learmonth Air Weapons Range - Saline Coastal Flats	WA
Leslie (Port Hedland) Saltfields System	WA
Mermaid Reef	EXT
Ord Estuary System	WA
Rottnest Island Lakes	WA
Shark Bay East	WA
Yalgorup Lakes System	WA
Yampi Sound Training Area	WA

Key Ecological Features (Marine) [Resource Information]

Key Ecological Features are the parts of the marine ecosystem that are considered to be important for the biodiversity or ecosystem functioning and integrity of the Commonwealth Marine Area.

Name	Region
Carbonate bank and terrace system of the Van	North
Pinnacles of the Bonaparte Basin	North
Ancient coastline at 125 m depth contour	North-west
Ashmore Reef and Cartier Island and surrounding	North-west
Canyons linking the Argo Abyssal Plain with the	North-west
Canyons linking the Cuvier Abyssal Plain and the	North-west
Carbonate bank and terrace system of the Sahul	North-west
Commonwealth waters adjacent to Ningaloo Reef	North-west
Continental Slope Demersal Fish Communities	North-west
Exmouth Plateau	North-west
Glomar Shoals	North-west
Mermaid Reef and Commonwealth waters	North-west
Pinnacles of the Bonaparte Basin	North-west
Seringapatam Reef and Commonwealth waters in	North-west
Wallaby Saddle	North-west
Ancient coastline at 90-120m depth	South-west
Cape Mentelle upwelling	South-west
Commonwealth marine environment surrounding	South-west
Commonwealth marine environment within and	South-west
Commonwealth marine environment within and	South-west
Naturaliste Plateau	South-west
Perth Canyon and adjacent shelf break, and other	South-west
Western demersal slope and associated fish	South-west
Western rock lobster	South-west

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-31.6854 111.3838,-30.4214 110.3839,-28.7096 109.8133,-27.9563 109.7791,-27.0319 108.5808,-26.4157 107.4738,-25.6396 106.4352,-24.5212 105.8532,-23.7338 105.8418,-23.1175 106.1271,-22.5697 106.789,-21.7823 107.3825,-20.0248 107.9645,-18.4156 108.8775,-16.4413 110.7377,-15.2658 111.3996,-14.4327 112.4952,-14.4099 113.1457,-14.0333 114.1043,-13.2686 114.6978,-13.6681 115.2456,-14.7637 115.4852,-15.437 116.2042,-15.049 116.5123,-14.2615 117.7677,-12.8161 118.2231,-12.1161 118.1014,-12.6944 120.0491,-13.9421 120.013,-11.8068 122.8951,-11.3553 123.3054,-11.4466 124.0054,-11.1118 124.5227,-10.9292 125.3748,-10.5336 126.0444,-11.2336 126.5922,-11.2031 127.6573,-10.4119 128.1442,-10.0771 128.1442,-10.0547 128.9033,-15.0663 129.0006,-15.0735 128.0863,-14.7089 128.1617,-13.9731 127.4448,-13.7461 126.9637,-14.1871 126.6423,-14.5893 125.2646,-15.4957 124.4516,-16.4216 124.6089,-16.186 123.5687,-17.1833 123.7342,-16.5875 122.9672,-17.3596 122.1501,-17.9493 122.2039,-19.2063 121.4347,-19.625 120.9721,-20.0762 119.5873,-20.6548 117.4099,-20.3016 116.83,-21.4925 115.4626,-21.8484 114.644,-22.4302 114.3765,-22.6288 113.668,-23.5261 113.755,-24.0899 113.4187,-25.1243 113.5933,-25.9153 113.0411,-26.9189 113.775,-28.0932 114.1696,-29.4877 114.9961,-30.5785 115.0875,-31.7296 115.7179,-33.2752 115.6808,-33.5316 115.0036,-33.4303 110.9954,-31.966 111.5089,-31.6854 111.3838

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact Us page.

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