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# PORT OF GERALDTON MAINTENANCE DREDGE PROJECT 2021: MARINE FAUNA DESKTOP STUDY

Prepared by O2 MARINE

## Purpose

The Environmental Impact Assessment (EIA) presents an assessment of the potential environmental impacts of the planned 2021 maintenance dredging of the Geraldton Port entrance channel and inner harbour, and the nearshore placement of dredged material off the coast of Bluff Point.

This technical appendix provides an assessment of the of the marine fauna that exist within the project area to determine if there were any potential impacts.

## Linkages

The study was informed by:

- Both Commonwealth and State environmental legislation for the protection of marine fauna , ecosystems and biodiversity.
- Reviews of available listings of:
  - Threatened species;
  - Migratory species;
  - Cetaceans (e.g. whales and dolphins) pinnipeds (seals); and
  - Other marine species.

The study supported the development of the Dredge Environmental Management Plan that outlines management measures required to prevent impact to marine fauna. Such controls include the requirement for there to be Marine Fauna Observers on board project vessels.

## Importance

The Marine Fauna Study:

- Identifies key conservation significant species;
- Considers the ecological characteristics of these key species, including critical habitat and ecological windows;
- Describes fisheries that exist around the Project area;
- Identifies existing introduced marine pest species within the Project area; and
- Concludes whether these species' populations may be significantly impacted by the proposed action and should be a focus of the impact assessment.

## Outcomes

The key species identified for the Project are:

- Australian sea lion (*Neophoca cinerea*);
- Humpback whale (*Megaptera novaeangliae*);
- Indo-Pacific bottlenose dolphin (*Tursiops aduncus*); and
- Western rock lobster (*Panulirus cygnus*).

A key finding of this desktop study is that there were no populations or habitats of conservation significant or commercially important fish species within the project area and therefore no species' populations would be significantly impacted by the proposed action.

# Marine Fauna Desktop Study

## Port of Geraldton Maintenance Dredging Project 2021

CLIENT: Mid West Ports Authority
STATUS: Rev 0
REPORT NUMBER: 21WAU-0002 / R210037
ISSUE DATE: 16 August 2021

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## Version Register

| Version | Status | Author | Reviewer | Revision made | Release Authorisation (date and signature) |
|---|---|---|---|---|---|
| A | Draft | E Riboni | D Hanf | - | - |
| B | Draft | E Riboni | R Stevens | Internal review comments addressed | |
| 0 | Final | E Riboni | | | R Stevens 16/08/2021 |

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# Executive Summary

The Mid West Ports Authority (MWPA) is proposing to undertake maintenance dredging within the inner harbour and navigation channel using a trailing suction hopper dredge at the Port of Geraldton, Western Australia. The Project will require dredging of approximately 235,000 m3 of dredging material with disposal of approximately 45,000 m3 of inner harbour dredge material into the Northern Reclamation Dredge Material Placement Area (DMPA) and approximately 190,000 m3 of accumulated sediment in the entrance channel being relocated to a designated Nearshore DMPA.

The EPBC Act (Cth) and EP Act (WA) govern the environmental approval process. They aim to support environmentally sustainable development while protecting environmental values, including biodiversity. 'Marine Fauna' are a key environmental factor to be considered during environmental impact assessment under the EP Act (WA). They are defined as *"Animals that live in the ocean or rely on the ocean for all or part of their lives"* (EPA 2018)**.** The EPA's objective for marine fauna is: *'To protect marine fauna so that biological diversity and ecological integrity are maintained'*.

This marine fauna desktop study:

- Identifies key conservation significant species;
- Synthesises the ecological characteristics of these key species, including critical habitat and ecological windows;
- Describes fisheries that exist around the Project area;
- Identifies existing introduced marine pest species in the Project area; and
- Concludes whether these species' populations may be significantly impacted by the proposed action and should be a focus of the impact assessment.

The study was undertaken in three main parts: an initial search of species likely to be in and around the Project area; identification of conservation significant fauna species likely to occur in the area; and further literature review on key species.

Species were grouped into 'key', 'secondary' and 'Other' levels for focus in Project EIA and EMP, based on their conservation significance and likelihood of occurrence within the Project Area. This approach facilitates the correct proportionality of information to be provided for given species, as it relates to the nature and risk of potentially significant impacts.

Key species identified for the Project are:

- Australian sea lion (*Neophoca cinerea*);
- Humpback whale (*Megaptera novaeangliae*);
- Indo-Pacific bottlenose dolphin (*Tursiops aduncus*); and
- Western rock lobster (*Panulirus cygnus*).

A key finding of this desktop study is that the Project area does not support restricted populations or habitats of conservation significant or commercially important fish species. Species of high conservation significance may occur in the Project area at some time but this is likely to be individuals, and not a significant portion of

the population. It is assumed that standard environmental management controls will be employed during dredging activities, including the use of Marine Fauna Observers (MFOs). Based on this, there is no indication that any species' populations would be significantly impacted by the proposed action. Therefore, marine fauna are not a factor that warrants focus by the impact assessment.

## Acronyms

| Acronym | Habitat preference |
|---|---|
| BIA | Biologically Important Area |
| BC Act | Biodiversity Conservation Act 2016 |
| CITES | Convention on International Trade in Endangered Species |
| Cth | Commonwealth |
| CR | Critically Endangered |
| DAWE | Department of Agriculture, Water and Environment |
| DBCA | Department of Biodiversity, Conservation and Attractions |
| DoE | Department of Environment |
| DoT | Department of Transport |
| DPIRD | Department of Primary Industry and Regional Development |
| DWER | Department of Water and Environmental Regulation |
| EIA | Environmental Impact Assessment |
| EMP | Environmental Management Plan |
| EN | Endangered |
| EP Act | Environmental Protection Act 1986 |
| EPA | Environmental Protection Authority |
| EPBC Act | Environment Protection and Biodiversity Conservation Act 1999 |
| FRM Act | Fish Resources Management Act |
| IMS | Invasive Marine Species |
| IUCN | International Union for the Conservation of Nature |
| MNES | Matters of National Environmental Significance |
| MRL | Mineral Resources Limited |
| NIMPIS | National Introduced Marine Pest Information System |
| PMST | Protected Matters Search Tool |
| VU | Vulnerable |
| WA | Western Australia |
| WCRLMF | West Coast Rock Lobster Managed Fishery |

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# 1. Introduction

The Mid West Ports Authority (MWPA) is proposing to undertake maintenance dredging within the inner harbour and navigation channel using a trailing suction hopper dredge at the Port of Geraldton, Western Australia (Figure 1). The Project will require dredging of approximately 235,000 m3 of dredging material with disposal of approximately 45,000 m3 of inner harbour dredge material into the Northern Reclamation Dredge Material Placement Area (DMPA) and approximately 190,000 m3 of accumulated sediment in the entrance channel being relocated to a designated Nearshore DMPA.

The main purpose of this desktop study is to supplement the project Environmental Impact Assessment (EIA) and Environmental Management Plans (EMPs). All project activities will be constrained to the marine environment (i.e. no coastal or estuarine environments).

## 1.1. Study Objectives

This marine fauna desktop study:

- Identifies key conservation significant species;
- Synthesises the ecological characteristics of these species, including critical habitat and ecological windows;
- Describes fisheries that exist around the Project area;
- Identifies existing introduced marine pest species in the Project area; and
- Concludes whether these species' populations may be significantly impacted by the proposed action and should be a focus of the impact assessment.

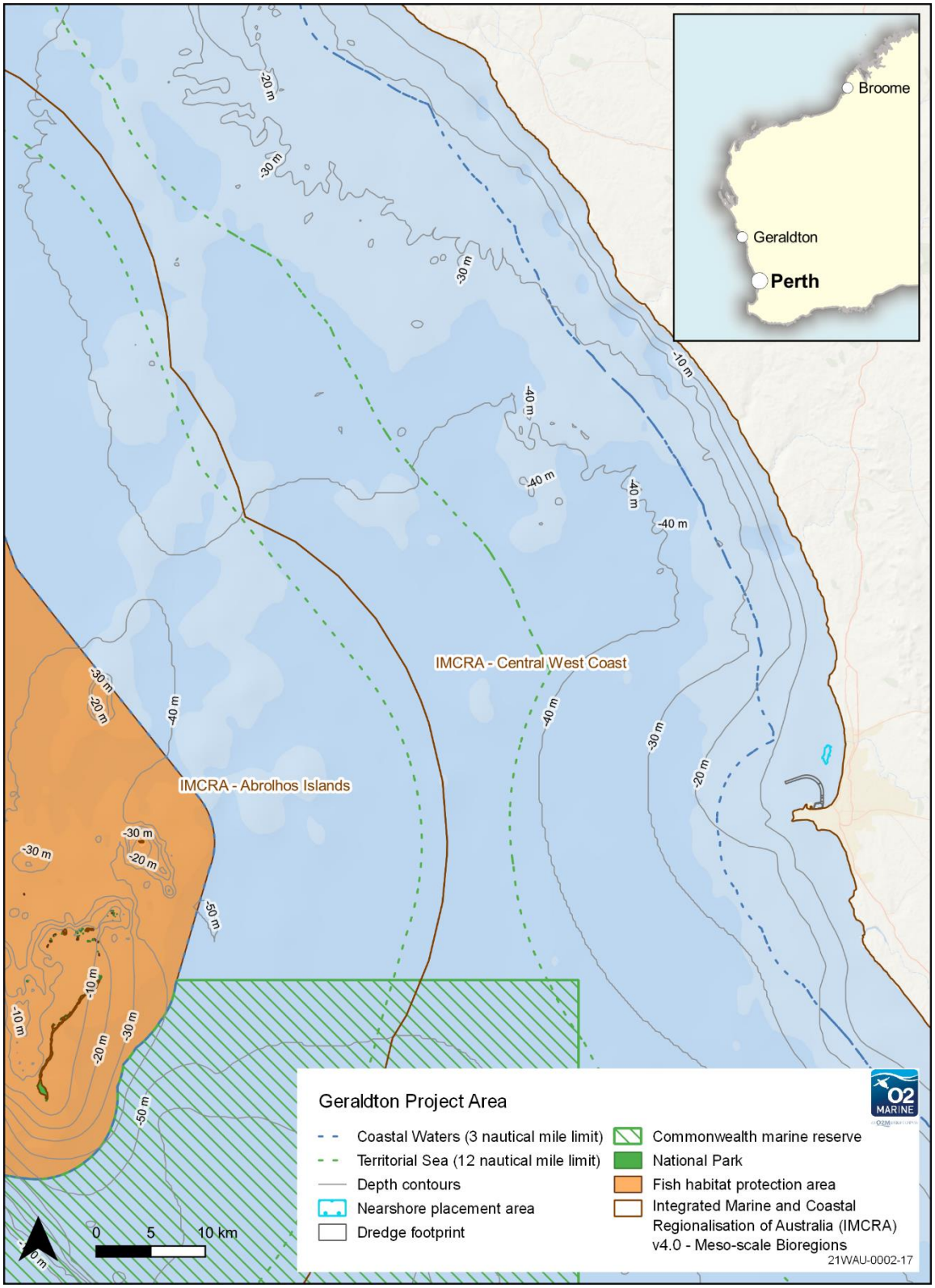


*Figure 1 Project Location and Surrounds*

# 2. Background

## 2.1. Project Description

*Table 1 Summary of the Proposal*

| Project Title | Geraldton Port 2021 Maintenance Dredging Project |
|---|---|
| Proponent Name | Midwest Ports Authority |
| Short Description | Conduct maintenance dredging of accumulated sediments within the inner harbour (~45,000m3) and entrance channel (~190,000m3). Inner harbour sediments have been identified as mildly contaminated and will be placed into the existing land reclamation area north of Berth 7 with tailwater discharge returning to the north-western corner of the inner harbour. Entrance Channel sediments are considered of natural origins and free from contamination and will be sustainably relocated into the natural system at a designated 530,000 m2 nearshore DMPA. |

*Table 2 Location and proposed extent of operational elements*

| Element | Location | Proposed Extent |
|---|---|---|
| Maintenance dredging of accumulated inner harbour sediments | **Figure 2** | Removal of up to ~45,000 m3 sediments from an area of 334,869 m2 via trailing suction hopper dredge. |
| Landside reclamation at existing Northern Reclamation DMPA | **Figure 2** | Placement of up to ~45,000 m3 of dredge material from the inner harbour via pipeline into an existing land reclamation area of 21,833 m2 north of Berth 7. |
| Tailwater return from the Northern Reclamation DMPA | **Figure 2** | Managed tailwater return from land reclamation into the north-western corner of the inner harbour into a temporary Low Ecological Protection Area. |
| Maintenance dredging of accumulated entrance channel sediments | **Figure 2** | Removal of up to ~190,000 m3 sediments from an area of 851,948 m2 via trailing suction hopper dredge. |
| Nearshore placement of dredge material from entrance channel at designated Nearshore DMPA | **Figure 2** | Placement of up to ~190,000 m3 of dredge material from the entrance channel directly at a 529,140 m2 Nearshore DMPA from dredge hopper. |


*Figure 2 Proposed dredging and relocation footprints and associated development envelope*

## 2.2. Marine Fauna Legislation and Regulatory Guidance

Key legislation governing the protection of marine fauna and their habitats in WA are:

- *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (Cth);
- *Environmental Protection Act 1986* (EP Act) (WA)*;*
- *Biodiversity Conservation Act 2016* (BC Act);
- *Conservation and Land Management Act 1984* (CALM Act);
- *Fish Resources Management Act 1994* (FRM Act): and
- *Biosecurity Act 2015* (Biosecurity Act) (Cth).

The EPBC Act (Cth) (hereafter "EPBC Act") and EP Act (WA) (hereafter "EP Act") govern the environmental approval process. They aim to support environmentally sustainable development while protecting environmental values, including biodiversity. Projects referred under the EPBC Act are assessed by DAWE. Projects referred under the EP Act are assessed by the WA EPA. The EPA may undertake assessments on behalf of DAWE on Public Environmental Review (PER) and Assessment on Proponent Information - Category A (API-A) levels of assessment under a Bilateral agreement made under section 45 of the EPBC Act relating to environmental assessment.

The Department of Water and Environmental Regulation (DWER) will support the EPA in conducting environmental impact assessments and developing policies to protect the environment.

### 2.2.1. EPBC Act

Numerous fauna species trigger the EPBC Act during EIA. They are included as Matters of National Environmental Significance (MNES), by being:

- Listed threatened[1] species;
- Migratory species protected under international agreements'; and / or
- Cetaceans and other marine species associated with Commonwealth waters.

Significant impact criteria have been devised for each group (Department of the Environment 2013). Recovery Plans for threatened species and ecological communities are to be recognised during the EIA process as they stipulate research and management actions for species or communities' survival.

The EPBC Act is Australia's primary legislation for meeting international conservation commitments, including those related to International Union's Conservation of Nature (IUCN) Red List of Threatened Species, various conventions protecting migratory species and the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). Commonwealth waters from the three nautical mile state waters limit out to the boundary of the Exclusive Economic Zone (i.e., out to 200 nautical miles and further in some places) (Figure 1) have been designated as 'The Australian Whale Sanctuary'. Within the sanctuary, it is an offence to kill, injure or interfere with a cetacean.

[1] Threatened is the collective term for species that are listed as critically endangered, endangered or vulnerable.

### 2.2.2. EP Act

Governed by the EP Act, the EPA uses environmental principles, factors and associated objectives as the basis for assessing whether a proposal's impact on the environment is acceptable. These principles, factors and objectives therefore underpin the EIA process.

The object of the EP Act is to protect WA's environment and identifies five environmental principles. The third principle of the conservation of biological diversity and ecological integrity is directly relevant to marine fauna. Marine Fauna are defined as *"Animals that live in the ocean or rely on the ocean for all or part of their lives"* (EPA 2018)**.** The EPA's objective for Marine Fauna is: *'To protect marine fauna so that biological diversity and ecological integrity are maintained'*.

When assessing potential marine fauna impacts, the EPA also considers impacts to their habitats and surrounding environments. Special consideration is paid to critical habitat and key ecological windows – areas and times where actions should be avoided when practicable.

### 2.2.3. BC Act (WA)

The BC Act is administered by the Department of Biodiversity, Conservation and Attractions (DBCA). The Act sets out conservation listings and priorities for further research at the State level. Threatened species (both flora and fauna) that meet the categories listed within the Act are highly protected and require authorisation by the Ministerial to take or disturb.

### 2.2.4. CALM Act (WA)

The CALM Act (WA) is one of the WA's key pieces of conservation legislation, detailing how DBCA are to manage the State's conservation estate. In doing so, it facilitates the protection of some Marine Fauna habitat through the gazettal and management of marine protected areas.

### 2.2.5. FRM Act (WA)

The FRM Act[2] (WA) is the principal act that regulates the management, utilisation and conservation of fish (i.e., all aquatic organisms except reptiles, birds, mammals, amphibians) and their habitat in WA. This includes the management of biosecurity risks from the introduction and/or spread of invasive marine species (IMS). The Act is administered by the Department of Primary Industries and Regional Development (DPIRD). The department provides advice to the EPA and DAWE on the potential for proposed actions to have significant impact on fish or fish habitat in WA[3]. Published guidance is currently available for seismic activities, with plans for guidance on drilling activities, dredging programs, and oil spill impacts and monitoring to be published soon.

### 2.2.6. Biosecurity Act (Cth)

Under the Biosecurity Act (Cth), DAWE are responsible for managing biosecurity risks of IMS from ballast water and biofouling from vessels operating in Australian seas.

[2] The FRM Act (WA) will be replaced by the *Aquatic Resources Management Act 2016* (ARMA) (WA), which will regulate the management of fishing, aquaculture, pearling and aquatic resources in Western Australia.

[3] Projects likely to have a significant impact on fish or fish habitat in WA State waters must be assessed by the EPA; and by AWE in Commonwealth waters (between three and 200 nautical miles off the WA coast).

# 3. Methods

This marine fauna desktop study was undertaken in three main parts: an initial search of species likely to be in and around the Project area; identification of conservation significant fauna species likely to occur in the area; and further literature review on those key species.

Our scope of work focussed on 'in-water' marine fauna species, we excluded land-based species.

## 3.1. Marine Fauna Species Search

A search for marine fauna species in and around the Project area was undertaken using several databases and reports (Table 3). A search area polygon was drawn in QGIS, allowing a 10 km buffer area around project components (and to account for potential noise emissions and dredge plume), excluding land but including islands. All searches were undertaken in May 2021.

Conservation significant marine fauna species search results were combined, filtered, and organised to assist in the further identification of key species.

Birds were excluded from the search because the objectives of this study was to focus on species that could be affected by the dredging activity.

Fish species targeted by commercial and recreational fishers, and IMS, were tabulated and summarised.

*Table 3 Marine Fauna Species Search Resources*

| Target | Database / Report | Organisation | Citation |
|---|---|---|---|
| Conservation significant species[1] | Commonwealth Protected Matters Search (PMST)[3] | DAWE | DAWE 2021a |
| Conservation significant species[2] | DBCA threatened species database[4] | DBCA | DBCA 2021 |
| Commercially important fish species | State of Fisheries Report | DPIRD | DPIRD, 2020. |
| Recreationally important fish species | Statewide Recreational Fishing Survey | DPIRD | DPIRD, 2019 |
| Invasive marine species (IMS) | National Introduced Marine Pest Information System (NIMPIS) | DAWE | DAWE 2021b |

[1] Species listed as threatened, or other MNES under the EPBC Act (Cth)
[2] Species listed as threatened or priority under the BC Act (WA)
[3] Refer to Box 1
[4] Refer to Box 2

*Box 1 Protected Matters Search Tool (PMST)*

**Protected Matters Search Tool (PMST)**

The PMST is a platform provided by the Commonwealth Department of Agriculture, Water and the Environment (DAWE) advice to identify Matters of National Environmental Significance (MNES) within a given area of interest. Listed species and communities have a 'moderate potential to occur' as informed by broad species ranges, bioclimatic modelling and scientific expert advice.

Threatened species are reported with the following categories:

- CR: Critically Endangered
- EN: Endangered
- VU: Vulnerable

These categories for threatened species largely align with those of International Union for Conservation of Nature (IUCN) Red List of Threatened Species. However, listings for certain species may vary between AWE and IUCN, due to the level of information required by the assessment criteria. We have included IUCN categories in our tabulated search results to reflect the global significance of marine fauna species listed.

We have used the following categories for other MNES listed species:

- Mi: Migratory
- Ma: Marine (includes all cetaceans).

The type and probability of species presence, including a ranked order, is also provided by the 2021 Beta version.

*Box 2 DBCA Threatened Species Database*

**DBCA Threatened Species Database**

The Western Australian Department of Biodiversity, Conservation and Attractions (DBCA) provides a database search service for the identification of threatened and priority plants, animals or ecological communities at or near an area of interest.

Threatened species are reported with the following categories:

- CR: Critically Endangered
- EN: Endangered
- VU: Vulnerable

Specially protected species are reported with the following categories:

- MI: Migratory
- OS: Other Specially Protected

Priority species range from P1 – P4. They include possibly threatened species that do not meet survey criteria, or are otherwise data deficient, are added to the Priority Fauna or Priority Flora Lists under Priorities 1, 2 or 3. These three categories are ranked in order of priority for survey and evaluation of conservation status so that consideration can be given to their declaration as threatened fauna or flora. Priority 4 species are those in need of further monitoring – they are adequately known but are somewhat rare.

## 3.2. Identification of Key Species

Species were grouped into 'key', 'secondary' and 'other' levels for focus in Project EIA and EMP, based on their conservation significance and likelihood of occurrence within the Project Area. This approach facilitates the correct proportionality of information to be provided for given species, as it relates to the nature and risk of potentially significant impacts. Further, identified key species are effectively 'umbrella' species – when they are protected, others will be indirectly protected.

Conservation significance was based on species' EPBC Act and / or BC Act status (Table 2).

Marine fauna species were first sorted by the following occurrence rankings output by the PMST:

- Known to occur in the search area.
- Likely to occur in the search area.
- May occur in the search area.

Occurrence of these species at the Project site was then considered further, incorporating:

- Bioregional and local habitats (Box 3);
- Proximity to BIAs and known migration routes;
- Sighting records; and
- Scientific studies undertaken.

*Box 3 Bioregional Setting and Local Habitats Sumamry*

**Bioregional Setting**

The Project area is situated in the central west coast IMCRA mesco-scale bioregion. This is a 26,185 km$^2$ area with approximately 580 km of coastline from Kalbarri to Perth. It is characterised by a narrow continental shelf, moderate wave energy, temperate waters with intrusion from the warm southward flowing Leeuwin current, limestone islands and seagrass meadows (IMCRA 1998).

**Local Habitat**

The local environment of Champion Bay is representative of the broader central west coast. It is semi-enclosed, with relatively shallow (<10 m) waters extending approximately four kilometres from shore. An extensive limestone reef formation separates waters of the bay from the offshore oceanic waters. Seagrass meadows on sand, and algae and seagrass on sand veered limestone pavement and bare sand are the dominant benthic habitats.

'Key' species are those that have a high or medium conservation status and are known or have a high likelihood of occurrence in the Project area. 'Secondary' species are those with a low conservation status but known to existing within the Project area, medium status with high likelihood of occurrence or high status with moderate likelihood of occurrence. 'Other' species are those with a low conservation status and not known to occur within the Project area; those that have a medium conservation status with a moderate or low likelihood of occurrence; or those with a high conservation status but low likelihood of occurrence in the Project area.

## 3.3. Literature Review

A more detailed literature review was undertaken for key species to synthesise their ecological characteristics of these species including: distribution; abundance; habitat preference and identification of BIAs near the Project area; ecological windows; key threats and the existence of recovery plans.

Where possible, peer-reviewed published literature was sourced. However, as there is a paucity of published marine fauna science available for the area, grey literature was strongly relied upon.

*Table 4 Marine mammal species*

| Species | | BC Act | EPBC Act | | | | PMST rank | Use of the project site | Group |
|---|---|---|---|---|---|---|---|---|---|
| Common Name | Scientific Name | | Threatened Category | Migratory | Marine | Cetacean | | | |
| Humpback Whale | *Megaptera novaeangliae* | CD | VU | Yes | | Yes | Known | Some individuals may pass through during migration | Key |
| Indo_Pacific Bottlenose Dolphin | *Tursiops aduncus* | - | - | | | Yes | Likely | Likely to occur | Key |
| Blue Whale | *Balaenoptera musculus* | EN | EN | Yes | | Yes | Likely | | Secondary |
| Southern Right Whale | *Eubalaena australis* | VU | EN | Yes | | Yes | Likely | | Secondary |
| Australian Sea-lion | *Neophoca cinerea* | VU | EN | | Yes | | Likely | | Key |
| New Zealand Fur-seal | *Arctocephalus forsteri* | OPF | - | | Yes | Yes | May | | Other |
| Minke Whale | *Balaenoptera acutorostrata* | - | - | | | Yes | May | | Other |
| Bryde's Whale | *Balaenoptera edeni* | - | - | Yes | | Yes | May | | Other |
| Common Dophin, Short-beaked Common Dolphin | *Delphinus delphis* | - | - | | | Yes | May | | Other |
| Risso's Dolphin, Grampus | *Grampus griseus* | - | - | | | Yes | May | | Other |
| Killer Whale, Orca | *Orcinus orca* | - | - | Yes | | Yes | May | | Other |
| Pantropical Spotted Dolphin | *Stenella attenuata* | - | - | | | Yes | May | | Other |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Bottlenose Dolphin | *Tursiops truncatus s. str.* | - | - | | | Yes | May | | Other |

[1]Common names are aligned to those used by the Society for Marine Mammalogy.

*Table 5 Marine reptile species*

| Species | | BC Act | EPBC Act | | | | PMST rank | Use of the project site | Group |
|---|---|---|---|---|---|---|---|---|---|
| Common Name | Scientific Name | | Threatened Category | Migratory | Marine | Cetacean | | | |
| Loggerhead Turtle | *Caretta caretta* | EN | EN | Yes | Yes | | Known | Occur in the region, no site records | Secondary |
| Green Turtle | *Chelonia mydas* | VU | VU | Yes | Yes | | Known | Occur in the region, no site records | Secondary |
| Leatherback Turtle | *Dermochelys coriacea* | VU | EN | Yes | Yes | | Known | Occur in the region, no site records | Secondary |
| Flatback Turtle | *Natator depressus* | VU | VU | Yes | Yes | | Known | Occur in the region, no site records | Secondary |
| Shark Bay Seasnake | *Aipysurus pooleorum* | - | - | | Yes | | May | Occur in the region, no site records | Other |
| Spectacled Seasnake | *Disteira kingii* | - | - | | Yes | | May | Occur in the region, no site records | Other |
| Yellow-bellied Seasnake | *Pelamis platurus* | - | - | | Yes | | May | Occur in the region, no site records | Other |

*Table 6 Fish species*

| Species | | BC Act | EPBC Act | | | | PMST rank | Use of the project site | Group |
|---|---|---|---|---|---|---|---|---|---|
| Common Name | Scientific Name | | Threatened Category | Migratory | Marine | Cetacean | | | |
| White Shark | *Carcharodon carcharias* | VU | VU | Yes | | | Known | Pelagic, may move through nearshore waters occasionally. | Secondary |
| Reef Manta Ray | *Mobula alfredi* | - | - | Yes | | | Known | Pelagic, may move through nearshore waters occasionally. | Secondary |
| Grey Nurse Shark | *Carcharias taurus* | VU | VU | | | | Likely | No known habitats in the area. | Secondary |
| Scalloped Hammerhead | *Sphyrna lewini* | - | CD | | | | Likely | Pelagic, may move through nearshore waters occasionally. | Secondary |
| Southern Bluefin Tuna | *Thunnus maccoyii* | - | CD | | | | Likely | Pelagic, may move through nearshore waters occasionally. | Secondary |
| Southern Pygmy Pipehorse | *Acentronura australe* | - | - | | Yes | | May | Occur in the region, no site records | Other |
| Gale's Pipefish | *Campichthys galei* | - | - | | Yes | | May | Occur in the region, no site records | Other |

| Species | | BC Act | EPBC Act | | | | PMST rank | Use of the project site | Group |
|---|---|---|---|---|---|---|---|---|---|
| Oceanic Whitetip Shark | *Carcharhinus longimanus* | - | - | Yes | | | May | Occur in the region, no site records | Other |
| Pig-snouted Pipefish | *Choeroichthys suillus* | - | - | | Yes | | May | Occur in the region, no site records | Other |
| Brock's Pipefish | *Halicampus brocki* | - | - | | Yes | | May | Occur in the region, no site records | Other |
| Western Spiny Seahorse | *Hippocampus angustus* | - | - | | Yes | | May | Occur in the region, no site records | Other |
| Short-head Seahorse | *Hippocampus breviceps* | - | - | | Yes | | May | Occur in the region, no site records | Other |
| West Australian Seahorse | *Hippocampus subelongatus* | - | - | | Yes | | May | Occur in the region, no site records | Other |
| Porbeagle | *Lamna nasus* | - | - | Yes | | | May | Occur in the region, no site records | Other |
| Prophet's Pipefish | *Lissocampus fatiloquus* | - | - | | Yes | | May | Occur in the region, no site records | Other |
| Sawtooth Pipefish | *Maroubra perserrata* | - | - | | Yes | | May | Occur in the region, no site records | Other |
| Western Crested Pipefish | *Mitotichthys meraculus* | - | - | | Yes | | May | Occur in the region, no site records | Other |

| Species | | BC Act | EPBC Act | | | | PMST rank | Use of the project site | Group |
|---|---|---|---|---|---|---|---|---|---|
| Giant Manta Ray | *Mobula birostris* | - | - | Yes | | | May | Occur in the region, no site records | Other |
| Bonyhead Pipefish | *Nannocampus subosseus* | - | - | | Yes | | May | Occur in the region, no site records | Other |
| Leafy Seadragon | *Phycodurus eques* | - | - | | Yes | | May | Occur in the region, no site records | Other |
| Common Seadragon | *Phyllopteryx taeniolatus* | - | - | | Yes | | May | Occur in the region, no site records | Other |
| Pugnose Pipefish | *Pugnaso curtirostris* | - | - | | Yes | | May | Occur in the region, no site records | Other |
| Whale Shark | *Rhincodon typus* | OPF | VU | Yes | | | May | Occur in the region, no site records | Other |
| Gunther's Pipehorse | *Solegnathus lettiensis* | - | - | | Yes | | May | Occur in the region, no site records | Other |
| Spotted Pipefish | *Stigmatopora argus* | - | - | | Yes | | May | Occur in the region, no site records | Other |
| Widebody Pipefish | *Stigmatopora nigra* | - | - | | Yes | | May | Occur in the region, no site records | Other |
| Double-end Pipehorse | *Syngnathoides biaculeatus* | - | - | | Yes | | May | Occur in the region, no site records | Other |

| Species | | BC Act | EPBC Act | | | | PMST rank | Use of the project site | Group |
|---|---|---|---|---|---|---|---|---|---|
| Hairy Pipefish | *Urocampus carinirostris* | - | - | | Yes | | May | Occur in the region, no site records | Other |
| Mother-of-pearl Pipefish | *Vanacampus margaritifer* | - | - | | Yes | | May | Occur in the region, no site records | Other |

## 3.4. Mammals

Key species for the project include the humpback whale (*Megaptera novaeangliae*), Australian sea lion (*Neophoca cinerea*), and the Indian ocean bottlenose dolphin (*Tursiops aduncus*).

Other marine mammal species are species that may occur in the area though are not likely or known to occur and do not have an EPBC Act threatened listing. Other species include the New Zealand fur seal, minke whale, Bryde's whale, common dolphin, risso's dolphin, killer whale, spotted dolphin, and bottlenose dolphin.

### 3.4.1. Australian sea lion

#### Conservation Significance

The Australian sea lion is listed as Endangered under the EPBC Act and Vulnerable under the BC Act. The sea lion is native to Western Australia and is listed in Schedule 4 of the WA Wildlife Conservation (Specially Protected Fauna) Notice 1998. Their global (non-statutory) listing by the IUCN is Endangered. 'The Recovery Plan for the Australian sea lion has been in place since 2013.

#### Threats

Major threats to Australian sea lions are from commercial fishing including by-catch, entanglement and competition for resources. Their population numbers were decimated by historic sealing (AFMA 2010). As a result of their incredibly high site fidelity, re-population of previously inhabited islands has not occurred.

#### Life History

The Australian sea lion commonly reaches 8-9 years of age, and a maximum of 12+ years (Stirling 1972).
The birth interval in Australian sea lions is around 17–18 months. It is the only pinniped with a non-annual breeding cycle that is also temporally asynchronous across its range. In effect, over a 24 year period, breeding will have occurred across all calendar months.

#### Distribution and abundance

Sea lion breeding colonies extend across 3,500km of Australia's southwest coastline from Houtman Abrolhos Island in Western Australia to the Pages Islands near Kangaroo Island in South Australia. They are endemic to Australia with distribution restricted to South Australian and Western Australia. Breeding colonies occur in islands or remote parts of coastline.

Geraldton is home to a small, non-breeding (male) colony of Australian sea lions (*Neophoca cinerea*). Approximately 17 to 20 mainly sub-adult males and the occasional female are known to use the breakwaters of the Port as haul-out sites (URS 2001a). The Project site is at the northern end of a BIA for foraging.

Breeding sites for the species in Western Australia are Eastern Island in the Abrolhos Islands north-west of the Project area. Breeding sites have also been found across Jurien Bay (Goldsworthy *et al.*, 2021). They exhibit high site fidelity and there is little seen movement of females between colonies. The nearest breeding site to Geraldton is Beagle Island 100+ km south-west. There are also various haul-out sites south in Sandland Island, Essex Rocks, and Cervantes Island. Many Beagle Island juveniles make their way up to Geraldton (Campbell & Holley, 2006).

## Habitat Requirements

Australian sea lions use many habitats for rookeries and haul-out sites. Onshore habitats include exposed islands and reefs, sandy beaches, rocky terrain, vegetates fore dunes and swales, along with caves and cliff overhangs. Most colonies occur on islands though some small colonies occur on the mainland.

Australian sea lions prefer sheltered sides of islands and avoids exposed rocky headlands. Colony sites used for breeding have the feature of being shallow, protected pools. They breed on low-lying limestone reefs that are well protected in Western Australia. Adult females hide their pups in holes in rock or vegetation. Although this is preferred, the largest colonies occur with little available protection with pups born on open ground (DAWE, n.d.).

The environment the Australian sea lion lives in is shallow on-shelf water of low productivity, influenced by the Leeuwin current (DAWE, n.d.).

*Breeding*: The nearest sites to Geraldton are the Abrolhos Islands, some 60 km to the west (Goldsworthy et al., 2021)

Breeding cycle: The species has an asynchronous 17.5 month breeding cycle across its known range (Campbell 2003). The pupping season can extend for between five and seven months (Shaughnessy et al. 2006). Associated with the longer pupping interval present in this species is a longer period of embryonic diapause of four to five months, and a prolonged post-implantation period of up to 14 months (Gales et al. 1997). Adult females haul-out a day or two before giving birth and leave 10 days later to forage at sea (Higgins & Gass 1993). They have their first pups on an average of 4.5 years of age (Higgins 1990).

*Pups*: A strong bond is established between a female and her pup, sometimes lasting from a year (Strahan 1983) to 40 months (Higgins & Gass 1993). Both males and females are very territorial during the breeding season, often becoming aggressive. When this aggression is directed towards pups it can contribute significantly to their mortality (Strahan 1983).

*Foraging*: Australian Sea-lions feed on a wide variety of prey, including cephalopods, fish, sharks, rock lobsters and sea birds (Gales & Cheal 1992). There is little quantitative information on their diet as only a few hard parts are normally found in the faeces of this species (Gales & Cheal 1992), although the species is known to 'feed' at fishing boats on scraps or by taking fish off lines. Australian Sea-lions in western WA spend more time foraging compared to those in SA due to the less productive conditions of the Leeuwin Current (Lowther et al. 2013). Radio transmitter and time-depth recorder studies of Australian Sea-lions at Seal Bay found that nursing females were benthic feeders on the continental shelf approximately 20–30 km offshore, in depths less than 150 m (Costa et al. 1988, 1990). While at sea, females and juveniles dive almost continually through the day and night. Young sea lions (approximately 7–18 months old) have been recorded foraging in depths up to 60 m and range up to 10 km from their birth colony (Campbell 2005). Less is known about males' feeding behaviour, but they are recorded to dive deeper. The inshore breeding and foraging habitat of this species is responsible for interactions with fisheries and aquaculture (Gales 2008).

## Biologically Important Areas

The Project area and the broader Geraldton region is a biologically important area as it is considered a foraging site for the Australian sea lion. Figure 4 depicts the species presence in and around the Project area.

## Ecological Windows

Australian sea lions may be present in the Project area at any time through the year, with no ecological windows having been identified.

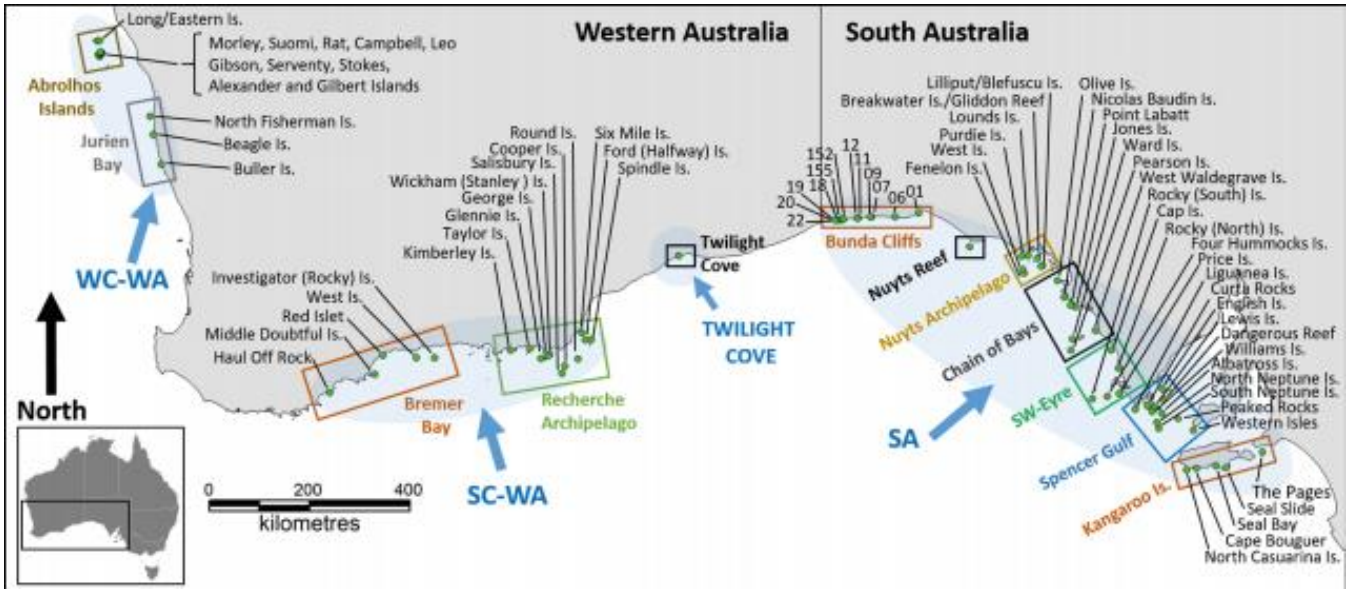


*Figure 3* *Australian sea lion breeding sites across Australia, noting that the nearest sites to Geraldton are the Abrolhos Islands, some 60 km to the west (Goldsworthy et al., 2021)*

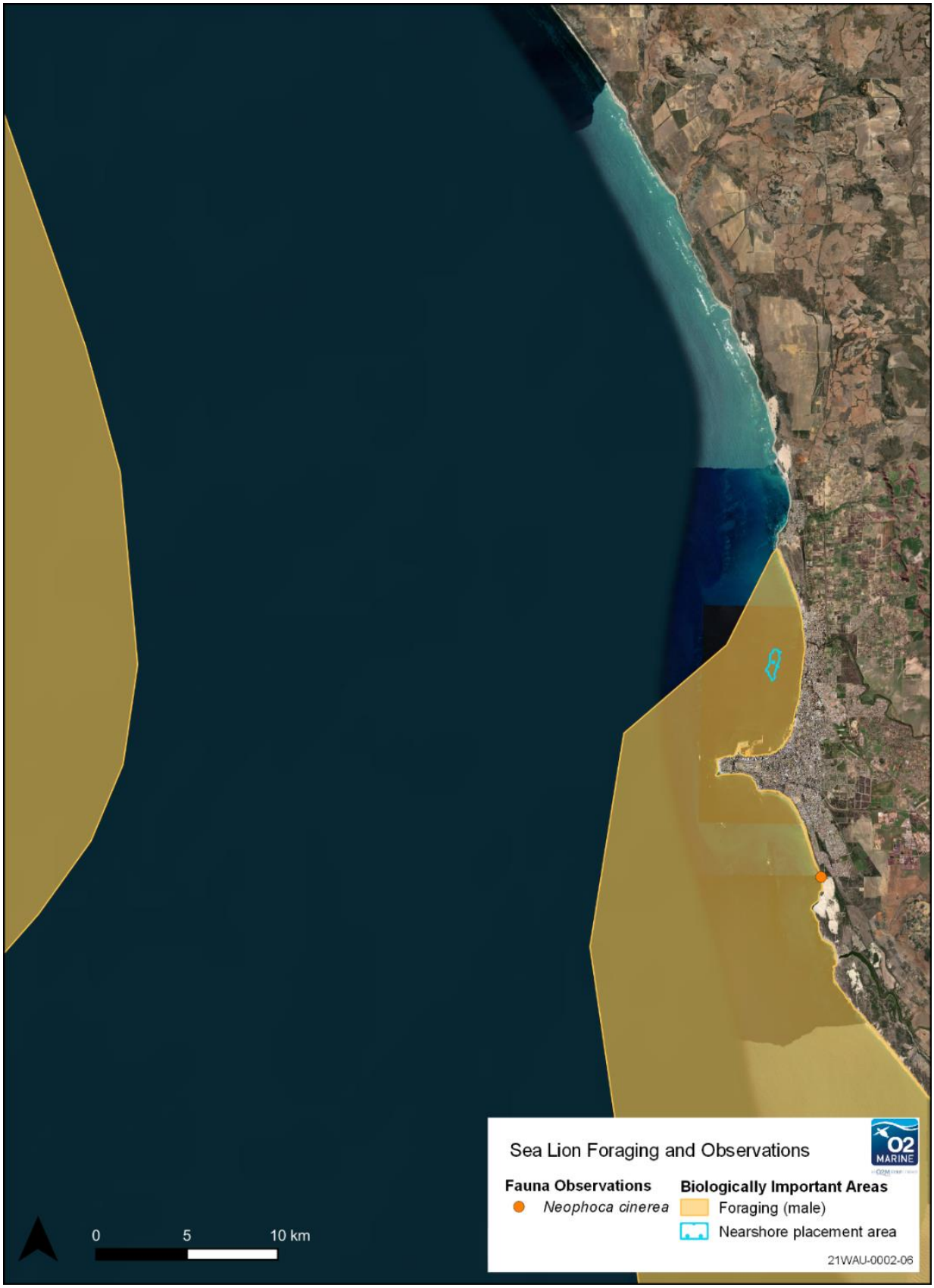


*Figure 4* *Australian sea lion species presence and biologically important areas*

### 3.4.2. Humpback whale

#### Conservation Significance

Humpback whales (*Megaptera novaeangliae*) are listed as Vulnerable, migratory, marine and cetacean under the EPBC Act and as Conservation Dependant fauna under the BC Act (WA). Humpback whales in WA waters represent Population IV, or Breeding Stock D, humpback whales that annually migrate from their feeding grounds in Antarctica to their breeding grounds in northern WA. This population is considered to be the fastest recovered since the cessation of whaling and in 2015 were delisted from their previous threatened species status.

#### Threats

The greatest threats to humpback whales in WA are from human-made underwater noise (resulting in hearing impairment, organ damage, communication interference, elevated stress levels and/or avoidance of important habitat), vessel strike and entanglement in lobster pot lines and marine debris. There is no adopted or made Recovery Plan for this species.

#### Distribution and abundance

Humpback whales are known to migrate annually from the southern Antarctic feeding grounds to the north entering the North-west Marine Region waters around June to breed and give birth to calves until later returning to the southern waters of the Antarctic around October (Comrie – Greig, 2014; DSEWPC, 2012d). Humpback whales are found in the Geraldton area between late-May to early-December with the peak of the southern migration occurring in September to November (DEH 2005). There are no resting or breeding sites within the Project area, they only migrate past.

Breeding Stock D is the largest population of humpback whales worldwide estimated at ~20,000–30,000 animals (Salgado Kent et al. 2012). At such high densities, it is possible that individuals could pass through the Project area during peak migration. Their migration pathway population is generally within 200 km from shore (Double et al. 2010). Important resting areas have been identified during the southern migration and include:

- Augusta;
- Geographe Bay;
- Shark Bay, Exmouth Gulf; and
- The southern Kimberley region.

Humpback whales travel to the Kimberly for breeding and calving in August to October. They migrate past the central west coast where the project is situated. During their northern migration, the whales tend to remain further off-shore (Jenner at al. 2001). Data collected from satellite tagged whales found that median distances from shore were less than 25 km and thus in shallow water (<40 m water depth). During their southern migration, humpback whale cow-calf pairs travel close to the shore in shallow water depths (<30), likely to avoid attacks by sharks, killer whales and threats from male humpback whales (Jenner et al, 2010; Thums et al. 2018).

### Habitat Requirements

Humpback whales migrate through the Geraldton region though the Geraldton coast is not important as a breeding area. Thums *et al* (2018) found the depth and day of year to be the top predictors of abundance, with modelling predicting numbers of humpback whales to increase up to mid-August and to peak in waters around 35m depth and decline in waters shallower than 25m. The humpback whales predominately occur further offshore (~70km) when traveling on their northward migration. The southern migration is the period when they are closest to shore at an average of ~40 km (RPS, 2009b and Thums *et al*, 2018).

### Biologically Important Areas

The project site sits within a broad BIA identified for humpback whale migration (Figure 4). The nearest humpback whale BIA for resting to the Project area is more than 500 km north-west in Exmouth Gulf.

### Ecological Windows

*Breeding*: Humpback nursing and calving behaviour has not been recorded within the Project Area or Study Area. The nearest known calving and nursing areas for humpback whales have been identified further north from the inshore waters of the Lacepede Islands to Camden Sound (Jenner et al, 2010; DSEWPC, 2012d).
Sighting rates of humpback whale pods with calves are higher in Septemer on their southern migration routes compared to August on their northward migration (Jenner *et al*, 2010). It is thought that females with young calves tend to stay close to shore in order to reduce the possibility of attacks by sharks, killer whales and threats from male humpback whales (Thums *et al, 2018*). Jenner *et al* (2010) revealed the relationship between this behaviour and the shallower depths at which female humpback whales and calves were sighted, usually in less than 30m of water. The distance at which they are sighted from the shore is within a few tens of kilometres, with some sightings approximately 15km offshore of Eighty Mile Beach further south of the Project Area. Given the depths and distance for which adult and calve humpback whales are most commonly sighted it would be unlikely the humpback whales would occur within the Project Area as the bathymetry of the Project Area and the distance of the project extending from shore it is too shallow for their preffered depth as well as too close to shore.

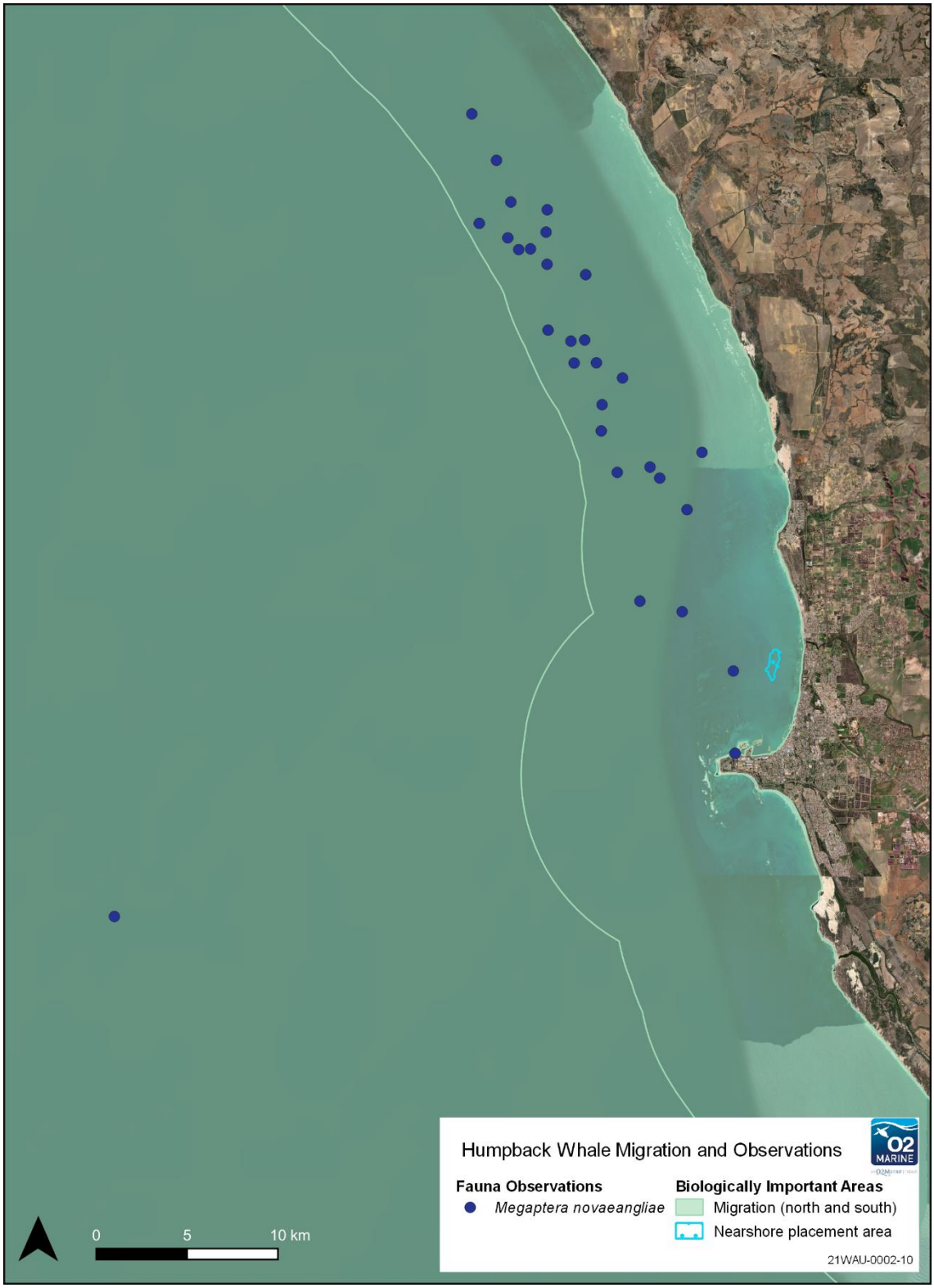


*Figure 5* *Humpback whale species presence and biologically important areas*

### 3.4.3. Indo-Pacific bottlenose dolphins

#### Conservation Significance

The Indo-Pacific bottlenose dolphin (*Tursiops aduncus*) is likely to occur in the area though is considered a key species. It has a low conservation status level and is not listed under the EPBC or BC Act. However, it is listed as near threatened according to the IUCN Red List.

#### Threats

The main threat to affect this species includes indirect catches in trawl, gillnet, purseseine, and trap fisheries entanglements., tourism, habitat degradation and destruction, and overfishing (Bedjer et al. 2006).

In Shark Bay in Western Australia. a recent study has suggested that the increase from one to two dolphin-watch tour operators near Monkey Mia has led to a decline in relative abundance of dolphins in the area (Bedjer et al. 2006)

#### Distribution and abundance

Indo-Pacific bottlenose are broadly distributed in coastal waters around Australia. They occur over a very wide region and are regularly seen within Champion Bay and surrounding waters. The population in Shark Bay are the second longest studied dolphins in the world, and is the nearest study site to the Project area. No abundance estimates are available for the Geraldton area.

#### Habitat Requirements

The Indo-Pacific bottlenose dolphin is restricted to inshore areas, including estuaries and bays, open coast environments, nearshore waters and shallow offshore waters such as coastal areas nearing oceanic islands. The Indo-Pacific bottlenose dolphins around Australia occur within depths of 50 and 100m and are offshore from 20m (Allen *et al.,* 2016). The Indo-Pacific bottlenose dolphin feeds on fish and cephalopods. They are an opportunistic-generalist feeders and highly adaptable, meaning that they forage in different ways in different habitats throughout their range.

#### Biologically important habitat

No biologically important areas have been identified for the Indian ocean bottlenose dolphin in the Project area or the broader region.

#### Ecological Windows

The Indo-Pacific bottlenose dolphin may be present in the Project area at any time through the year, with no ecological windows having been identified.

## 3.5. Reptiles

No key reptile species were identified. Flatback, green, loggerhead, and hawksbill turtles were identified as secondary species for the Project (Table 8) as although the PMST search says they're known to occur in the area, they are occasionally seen in the region and none have been observed during recent baseline investigations close to the project area.

Turtles have been infrequently recorded in the area. Core ranges for loggerhead, green and flatback turtles are further north, in the Kimberley, Pilbara and Gascoyne as far south as Shark Bay. There are no BIAs, foraging or nesting habitats identified near the Project area. It is expected that turtles further south may be vagrant individuals, travelling along in warm water currents. Leather back turtles may occur in the area infrequently, as vagrant individuals. Flatback turtles are the largest turtle species. They travel extensive distances at sea and are pelagic foragers. There are no known nesting areas in WA.

Three species of seasnakes may occur in the region, but not likely to be restricted to the Project site. These include the Shark Bay seasnake (*Aipysurus pooleorum*), spectacled seasnake *(Disteira kingii*), and the yellow-bellied seasnake (*Pelamis platurus*).

## 3.6. Fish

Many shark and ray species are globally threatened due to fisheries overexploitation coupled with their low fecundity, late age at maturity, and slow growth (Birkamanis 2020). Undertaking long-distance migrations, it is possible that species in Australian waters encounter additive pressures in other regions. As top order predators, their movements are likely to be driven by prey movements and habitat suitability (Birkmanis 2020). These pelagic species could enter the Project area from time to time, but their occurrence is expected to be rare. They are likely to spend time foraging in adjacent deeper water areas where key ecological features (narrow shelf, canyons and the Exmouth plateau) facilitate upwelling and enhance local productivity ( Wilson 2013). For instance, giant manta rays are rarely seen close to the coast due to their preference for offshore waters (Armstrong et al 2020).

Numerous sygnathid (pipefish and seahorse) species exist in the region, however little is known of their distribution and habitat preferences. The PMST results reported that sygnathid species 'may' occur in the search area. All species are listed as 'Marine' under the EPBC Act, affording them protection from wild capture for the aquarium trade.

Sygnathids are a diverse group exhibiting varying degrees of site fidelity. Seahorses tend to be patchily distributed at low densities with high site-fidelity and small home ranges (Lourie et al., 2004). They have particular microhabitat preferences due to their limited swimming ability. Most species generally display a preference for seagrass and macroalgal beds, coral reefs, mangroves and sponge gardens, although some species occur in open sandy or muddy bottoms and estuaries and lagoons (Lourie et al., 2004).

# 4. Fisheries

Recreational and commercial fishing have long been important cultural and economic activities for the town of Geraldton and surrounds. Both groups are motivated to catch high quality food species (Ryan et al 2017).

Recreational fishing has a distinct seasonal peak in winter with significant numbers of metropolitan and inter-state tourists travelling through the area. Fishing activities include beach-fishing, crabbing and angling in creek systems, rivers and the ocean, but most activity is line-based from boats.

Recreational boat-based fishing, west coast rock lobster fishery and the west coast demersal scalefish fishery occur in waters surrounding the Project area. Generally, recreational fishers target similar species to that of the PDSF which are high-value tropical finfish including emperors, snappers and cods (Ryan et al 2017).

## 4.1. Demersal Scalefish

The demersal scalefish fishery comprises of inshore demersal tropical finfish species. Demersal fish species are those that live near the sea floor. Deep water tropical fish are generally slow growing and long-lived, and as a result have low production potential and are vulnerable to over-harvesting. The highest catch rates are of baldchin groper, dhufish and pink snapper (Table 5). The fishery collectively uses a combination of vessels, effort allocations (time), gear limits, plus spatial zones (including extensive trawl closures) as management measures.

In the instance of this fishery, inshore waters are defined as being between 20 and 250 m from the mainland (Figure 6). It marks the boundary between coastal, relatively shallow, benthic habitats, and the deep benthic habitats. Fish may move through the Project area at some time, but are more likely to be in deeper waters offshore.

*Table 7 Demersal Scalefish Fishery Species (in order of tonnage as taken by the Demersal Scalefish Fishery)*

| Common name | Scientific name |
|---|---|
| Baldchin groper | *Choerodon rubescens* |
| Dhufish | *Glaucosoma hebraicum* |
| Pink snapper | *Chrysophrys auratus* |

## 4.2. Western Rock Lobster

The West Coast Rock Lobster Managed Fishery (WCRLMF) is lucrative, supporting 688 lobster vessels. It extends from Shark Bay to Cape Leeuwin and is a major source of income in the Mid-West region.
The commercial fishing season begins on January 15 each year, running for 12 months. The recreational fishing season extends from October 15 each year until June 30 the following year (DoF, 2011).

The western rock lobster (*Panulirus cygnus*) is a temperate species found only on the continental shelf off the coast of WA, with the highest density from Geraldton to Perth. Their lifecycle involves six stages: mating, spawning, larvae, pueruli, juveniles, and whites' migration (DoF, 2011). The western rock lobster has an extended larval phase of 9 to 11months from the period of spawning (November to February) to the period of settlement (August to January) in the shallow waters along the WA coast (Caputi, 2008). Juveniles are

observed closer along the shoreline and within the protection of bays, such as Champion Bay, and use seagrass area and shallow rocky reef areas for foraging and protection.

At Oakajee, around 16 miles north of the project area, the coastal fishery is mainly concentrated in the 0-20m depth zone with a band extending around 2km offshore. The high reef out to the 5m depth contour acts as a major habitat for juvenile and adult rock lobsters. Figure 6 depicts the extent of the West Coast Lobster Managed Fishery.

*Table 8 Western rock lobster state of the fisheries report (DPIRD, 2020).*

| Resource | Fishery | Assessment level | Breeding stock assessment | Catch (and effort) range | Catch, effort and cate rate for season 2019/20 | Catch (or effort or catch rate) level acceptable and explanation if needed |
|---|---|---|---|---|---|---|
| Western Rock Lobster | West Coast Rock Lobster Managed Fishery (MSC) | Annual: Level 5 | Sustainable: Adequate | Commercial: 6300t Recreational: 490t (TARC) | Commercial: 6,400t Recreational: 380-510t | Acceptable Commercial: Catch within TACC plus 1.5% water loss i.e. 6400 t Recreational: Catch within acceptable range. Review of estimation methods for recreational catch underway. |

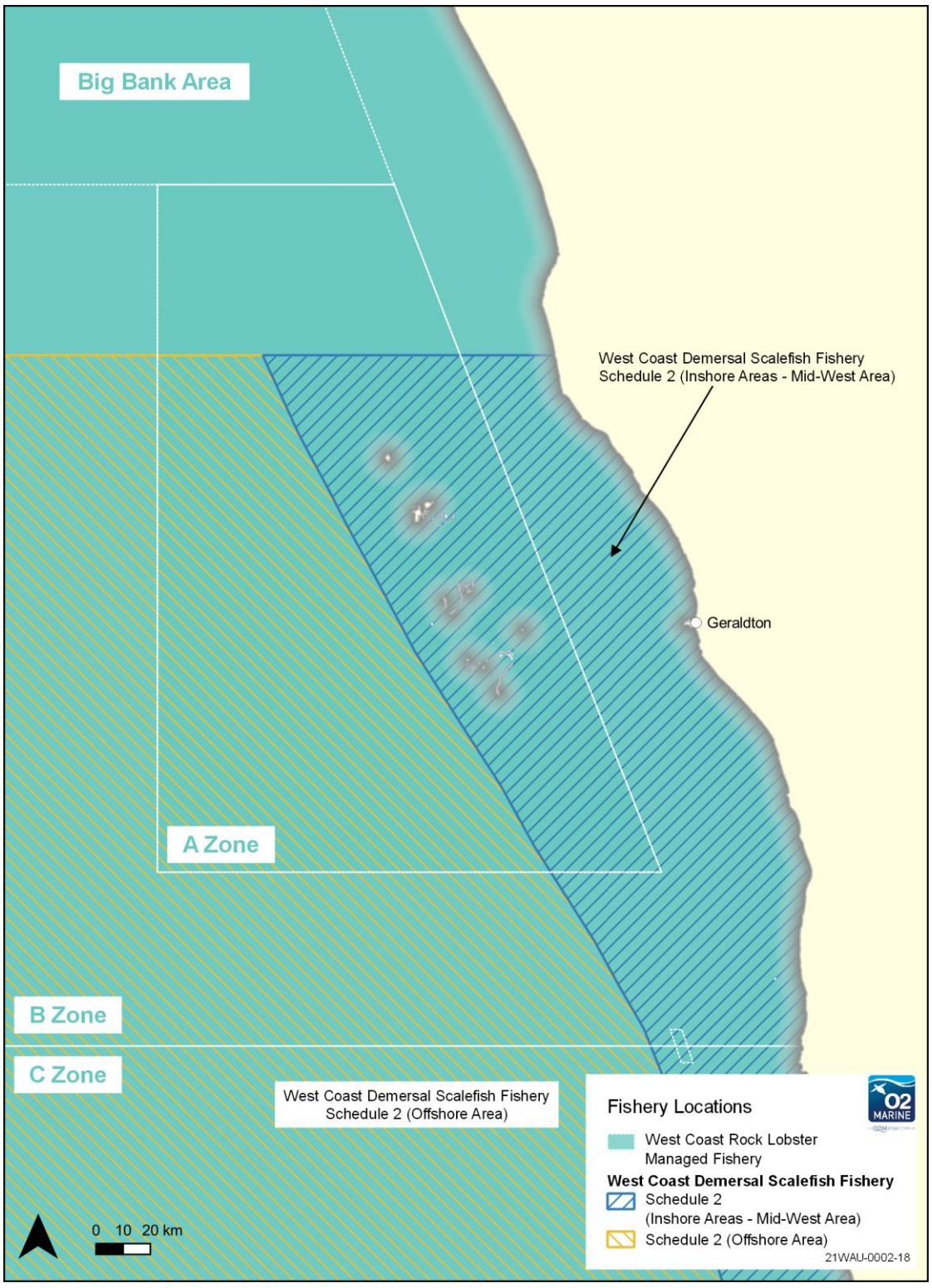


*Figure 6* *Fishery Locations for West Coast Rock Lobster Managed Fishery and the West Coast Demersal Scalefish Fishery*

# 5. Introduced marine pest species

The majority of marine pests are introduced through vessel movements ad shipping worldwide. Ballast water was the original primary vector for transporting marine pests though now it is due to biofouling, which can occur on any immersed surface.

NIMPIS has developed a target list of 55 species of concern to Australia of which nine are present in the Project area:

- *Amathia distans*
- *Botrylloides leachii*
- *Bugula neritina*
- *Ciona intestinalis*
- *Didemnum perlucidum*
- *Schizoporella unicornis*
- *Styela plicata*
- *Theora lubrica*
- *Watersipora arcuate*

# 6. Potential impacts

The South West Bioregional Plan highlights the vulnerabilities of species to various stressors in the marine environment. Those generated through development activities are summarised in Table 11 (as adapted from DSEWPaC 2011). Based on this information, the highest potential for impacts arising from project activities are:

- Vessel strike (humpback whales, bottlenose dolphins or sea lions);
- Underwater noise disturbance (humpback whales and bottlenose dolphins); and
- Habitat modification (sea lions).

These potential impacts are deemed to be low risk due to the relative small nature of project activities and lack of important habitat for these species. Standard management and mitigation measures may be implemented as a precautionary measure.

# 7. Key species

As a result of their conservation or economic value, and occurrence in the study are, key species identified for the Project are:

- Australian sea lion (*Neophoca cinerea*);
- Humpback whale (*Megaptera novaeangliae*);
- Indo-Pacific bottlenose dolphin (*Tursiops aduncus*); and
- Western rock lobster (*Panulirus cygnus*).

Habitat preferences, BIA presence and ecological windows for key species are presented below (Table 7 and Table 8).

*Table 9 Key Species habitats preference, seasonality and Recovery Plan*

| Species | Habitat preference | BIA | Seasonality | Recovery plan |
|---|---|---|---|---|
| Australian sea lion | Breeding and shore-based resting habitats include exposed islands and reefs, sandy beaches, rocky terrain and vegetated fore dunes and swales. | Present - Champion bay foraging site | Year round | Yes[1] |
| Humpback whale | Humpback whales in WA follow a migration pathway of 200km from shore. They remain further offshore during northern migration. | Present – migratory corridor | June to November | Nil |
| Indo-Pacific bottlenose dolphin | Restricted to inshore areas, nearshore waters, open coast environments, and shallow offshore waters. Bottlenose dolphins are opportunistic-generalist feeders with a high level of plasticity that enables them to use different habitat types within their range. | None present | Year round | Nil |
| Western Rock lobster | Temperate species found on the continental shelf, utlising limestone reefs and rocky outcrops. | NA | Year round | Nil |

[1]Recovery Plan for the Australian Sea Lion in Australia, Australian Government 2013

*Table 10 Key Species Ecological Windows*

| **Species presence** | **J** | **F** | **M** | **A** | **M** | **J** | **J** | **A** | **S** | **O** | **N** | **D** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Australian sea lion | | | | | | | | | | | | |
| Humpback whale | | | | | | | | | | | | |
| *- Northward migration* | | | | | | | | | | | | |
| *- Southward migration* | | | | | | | | | | | | |
| Indo-Pacific bottlenose dolphin | | | | | | | | | | | | |
| Western rock lobster | | | | | | | | | | | | |
| *- Spawning* | | | | | | | | | | | | |
| *- Settlement* | | | | | | | | | | | | |

*Table 11 Summary of key species vulnerability to development-related activities ( PC=Potential Concern, LC=Less Concern (Green), NC= Not of Concern (Grey) (adapted from DSEWPaC 2011; no activities were of 'Concern')*

| Species | Vessel Strike | Underwater Noise | Habitat Modification | Human Presence | Hydrology Change | Increased Turbidity[1] | Nutrient Pollution | Dredge Entrainment | Chemical Spills | Litter/ Debris | Light Pollution | Invasive Species |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Humpback whales | PC | PC | NC | NC | NC | NC | NC | NC | LC | LC | NC | NC |
| Indo-pacific bottlenose dolphin | PC | PC | LC | NC | NC | NC | NC | NC | LC | LC | NC | NC |
| Australian sea lion | PC | LC | PC | NC | NC | NC | NC | NC | LC | LC | NC | NC |
| Western rock lobster | PC | NC | LC | NC | LC | LC | LC | NC | LC | LC | NC | NC |

# 8. Conclusion and Recommendations

Marine fauna species to be considered in Project EIA and management planning are:

- Australian sea lion;
- Humpback whale;
- Indo-Pacific bottlenose dolphin; and
- Western rock lobster.

These are the species of highest value (i.e. highest conservation status or commercial worth) that are most likely to occur within the Project area. Other species have a lower potential for impact, based on a lesser conservation status or likelihood of occurrence. Although listed in the PMST results, a number of these (e.g. great white shark) are more likely to occur in deep waters offshore of the Project area, rather than within the Project area itself. Australian sea lions have been included in this list due to their high conservation status. However, the area does not represent important habitat. A key finding of this desktop study is that the Project area does not support restricted populations or habitats of conservation significant or commercially important fish species.

The EPA has highlighted that a paucity of biological data exists for many marine fauna species in north WA, largely due to the vast and remote nature of the location, in their Factor Guideline. However, there is sufficient information available to suggest that potential impacts may be easily mitigated through standard control measures (i.e. to prevent the spread of marine pests, avoid vessel strike and mitigate for underwater noise).

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