FLOTATION ENERGY

SEADRAGON OFFSHORE WIND FARM

PRELIMINARY MARINE ECOLOGY REPORT

01415A_3_V1

NOVEMBER 2021

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Seadragon Offshore Wind Farm

Preliminary Marine Ecology Report

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Abbreviations

Abbreviation	Definition
ALA	Atlas of Living Australia
AMSA	Australian Maritime Safety Authority
BIA	Biologically Important Area
CME	Commonwealth Marine Area
EARPL	Esso Australia Resources Pty Ltd
EE Act	Victorian *Environment Effects Act 1978*
EMF	Electromagnetic fields
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
FFG Act	*Flora and Fauna Guarantee Act 1988*
MNES	Matters of National Environmental Significance
MNP	Marine National Park
OSPs	Offshore Substation Platforms
PMST	*Environment Protection and Biodiversity Conservation Act 1999* Protected Matters Search Tool
SESSF	Southern and Eastern Scalefish and Shark Fishery
VBA	Victorian Biodiversity Atlas
VEAC	Victorian Environmental Assessment Council
WTGs	Wind Turbine Generators

1. Introduction

1.1 Project Overview

Flotation Energy is bringing its experience and expertise to Australia for the development of the Seadragon Offshore Wind Farm (the Project). The Project concept is a 1.5-gigawatt offshore wind development in the Bass Strait. The Project comprises an offshore wind farm (in the Bass Strait) along with an offshore and onshore electricity transmission network required to connect energy supply into the Victorian network. The key components of the project are:

- Offshore wind turbine generators and inter-array cables
  - Wind assets consisting of approximately 100 Wind Turbine Generators (WTGs) located offshore and a network of buried and/or mechanically protected subsea inter-array 66kv cables.
- Offshore substations
  - Four Offshore Substation Platforms (OSPs) installed on jacket structures and/or existing infrastructure.
- Offshore cables
  - 4-6 buried and/or mechanically protected 66 kilovolt subsea export cables connecting the OSPs to the shore crossing.
- Onshore cables
  - 4-6 buried and/or mechanically protected overhead cables connecting the shore crossing to an onshore substation connection. Six cable route corridors are currently under consideration.
- Onshore Substation Connection
  - A connection to an existing or modified onshore substation, currently anticipated to be Loy Yang.
- Shore Crossing
  - A shore crossing connecting the offshore export cables to the onshore cables.
- Ports and harbours
  - Potential modifications to existing ports and harbours to support project construction and operations.

The Project comprises offshore and onshore components located between Seaspray and Golden Beach, off Ninety Mile Beach on the Victorian coastline. The Project will optimise the wind farm layout across two offshore sites where the turbines will be installed:

- Central: centred at 38º 25’ S / 147º 26’ E, 10–30km off-shore with waters of 20-40m depth.

- Bream: centred at 38º 30' S / 147º 46' E encompassing an area around the Bream A and Bream B oil and gas platforms, 30-50km offshore where the waters are approximately 60m deep.

1.2 Study Purpose and Objectives

A preliminary marine ecology study was undertaken to support the preparation of the Project referrals under the Victorian *Environment Effects Act 1978* (EE Act) and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The preliminary marine ecology study was undertaken to provide an initial characterisation of the existing marine ecological values in the vicinity of the Project area and to identify potentially sensitive marine ecological features, habitats, species and existing and proposed marine uses relevant to this area. This information has been used to assess the likelihood and nature of potential impacts on these values.

1.3 Scope

This report addresses marine ecological values from below the high-water mark but does not include marine and migratory birds, coastal sensitivities above the high-water mark including wetlands, or fish that spend most of their time in freshwater and estuarine environments (e.g., Australian grayling and eastern dwarf galaxias). These are addressed in the preliminary terrestrial and aquatic ecology report (Biosis, 2021a).

While the focus of this report is on marine ecological values, this report also includes information on physical characteristics and commercial and recreational marine use.

2. Methods

2.1 Study Area

The referral area is shown in Figure 2.1. This area includes 193 km^2 within the Victorian State water limits and 1,360 km^2 within Commonwealth marine waters. This report focuses on a preliminary characterisation of the marine environment within both State and Commonwealth jurisdictions as well as more broadly in the east Gippsland region (the study area).

For the purposes of using the Protected Matters Search Tool (PMST) to screen for EPBC Act listed marine species, the referral area shown in Figure 2.1 was applied. This includes both of the potential offshore wind farm development areas as well as the potential cable route corridors. It is noted that while the referral area includes part of the Ninety Mile Beach Marine National Park, no Project activities are planned within this park and cable routes are not proposed to intersect the park.

For the purposes of data base searches of the Victorian Biodiversity Atlas (DELWP, 2021a) and the Atlas of Living Australia (CSIRO, 2021a), a search area broader than the referral area was applied to obtain records of marine species occurring in the region and to understand the proximity of records of sensitive species to the referral area. This search area was equal to the extent shown in Figure 2.1 and is referred to as the VBA/ALA search area throughout this report.

2.2 Information Sources

This preliminary marine ecology assessment has drawn upon information available from government databases and online decision support tools, public reports and scientific literature. The key sources of information used to develop the preliminary understanding of the marine values and sensitivities relevant to the referral are:

- Victorian Biodiversity Atlas (DELWP, 2021a).
- The Atlas of Living Australia (CSIRO, 2021a).
- Species Profile and Threats Database (DAWE, 2021a).
- National Conservation Value Atlas (DAWE, 2021b).
- Environment Protection and Biodiversity Conservation Act Protected Mattes Search Tool (DAWE, 2021c).
- CoastKit (DELWP, 2021b).
- South-east Marine Region Profile (DoE, 215).
- Reports prepared for other Projects in the region (e.g., CarbonNet and Golden Beach Gas Project)
- Scientific literature.

REFERRAL AREA AND STUDY CONTEXT

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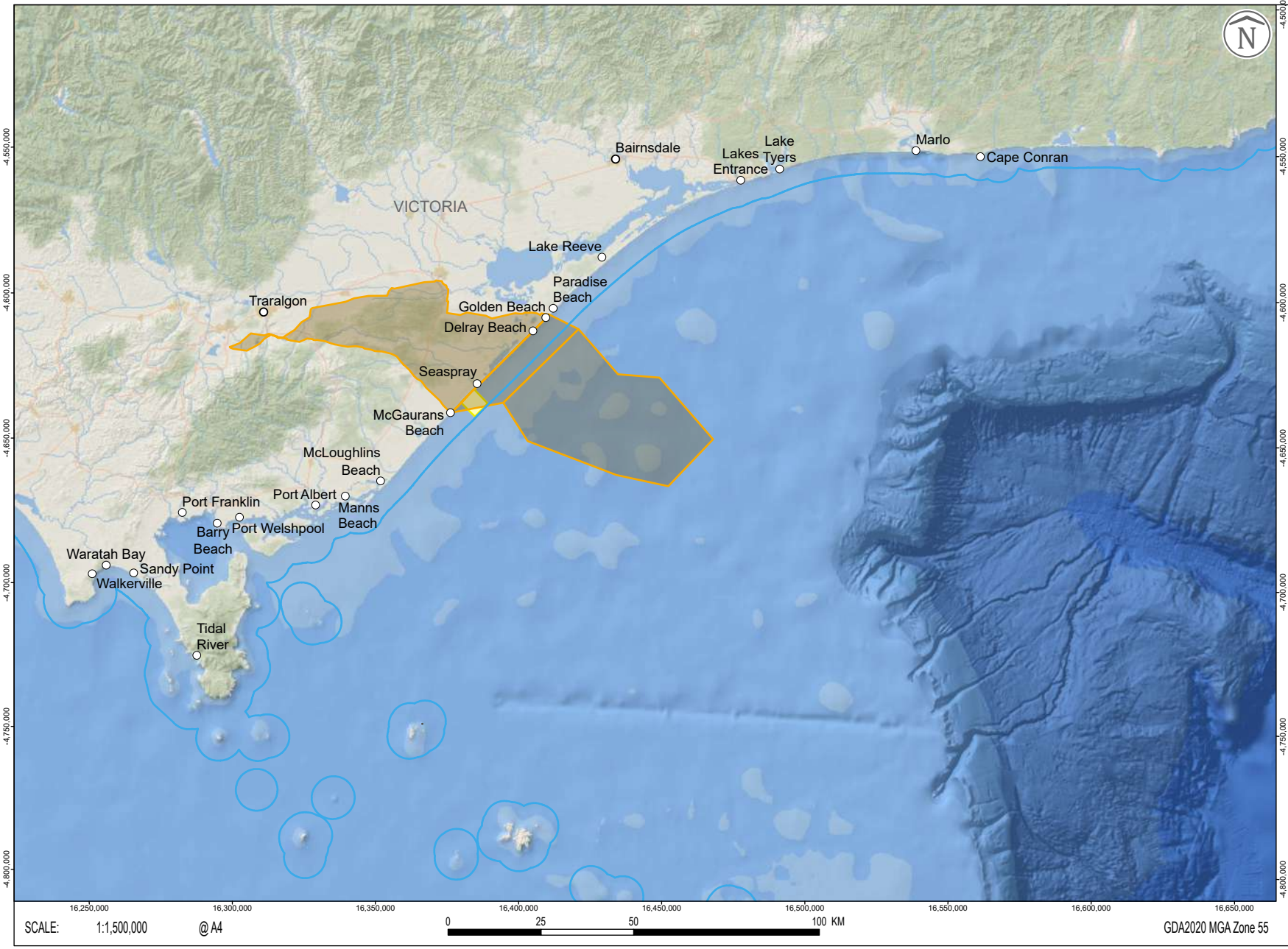
FIGURE 2.1



State coastal water (3nm)

Seadragon referral area

Ninety Mile Beach Marine National Park

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DATA SOURCES:
Project data from Flotation Energy, 2021.
Base data from DELWP and Geoscience Australia, 2021.
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While there is sufficient available information to inform the preliminary marine ecology assessment, knowledge gaps that will need to be addressed in the next stage of the marine ecology assessment (e.g., baseline studies) have been highlighted in Section 7.

3. Legislative Framework

Table 3.1 summarises the key legislative requirements applicable to the Project's proposed marine activities.

Table 3.1 – Key Marine Related Legislation

Legislation	Description
Commonwealth Legislation	
Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)	The EPBC Act provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places, which are defined in the EPBC Act and referred to as matters of national environmental significance (MNES). The EPBC Act also seeks to protect the environment in relation to Commonwealth actions and actions on (or impacting upon) Commonwealth land.
Biosecurity Act 2015	This Act replaced the *previous Quarantine Act 1908* and provides the framework for managing diseases and pests that may cause harm to human, animal or plant health or the environment. The Act includes requirements under the Ballast Water Convention and regulates the ballast water and sediment of certain vessels in accordance with the United Nations Convention on the Law of the Sea.
Protection of the Sea (Prevention of Pollution from Ships) Act 1988	This Act includes several enforcement measures for Australia to meet its requirements under the International Convention for the Prevention of Pollution from Ships (MARPOL) to prevent both accidental pollution and pollution from routine vessel operations including pollution by oil, noxious liquid substances, harmful substances, sewage, garbage and air emissions.
Navigation Act 2012	The Act enforces measures for maritime safety and the prevention of pollution of the marine environment by promoting safety of life at sea, safe navigation and providing measures to prevent pollution of the marine environment while ensuring that the Australian Maritime Safety Authority (AMSA) has the necessary powers.
Underwater Cultural Heritage Act 2018	The Act protects the heritage values of shipwrecks and relics of shipwrecks older than 75 years, sunken aircraft and other types of underwater cultural heritage.
Victorian Legislation	
Environment Effects Act 1978	Establishes a process for assessing the potential environmental effects of a proposed development and enables statutory decision-makers to determine whether a project with potentially significant environmental effects should proceed.
Flora and Fauna Guarantee Act 1988 (FFG Act)	The Act regulates the conservation of threatened species and communities and the management of potentially threatening processes. The act requires permits for activities that may harm listed species or communities.
Environment Protection Act 2018	The Act replaces the previous *Environment Protection Act 1970.* The Act includes a new approach to environmental issues, focusing on preventing waste and pollution impacts rather than managing impacts after they've occurred. The purpose of the legislation is to enhance protection of Victoria's environment and human health through a proportionate, risk-based environment protection framework.

Marine and Coastal Act 2018	The Victorian Government introduced a new Marine and Coastal Act in August 2018 replacing the previous *Coastal Management Act 1995*. The *Marine and Coastal Act 2018* improves management and oversight arrangements for the state's marine and coastal environment and provides a simpler, better integrated and coordinated approach to planning and managing the marine and coastal environment.
National Parks Act 1975	The *National Parks Act 1975* allows for the creation and management of national and state parks in Victoria for the preservation and protection of: • Natural environment including wilderness areas. • Indigenous flora and fauna and features of scenic or archaeological, ecological, geological, historic or other scientific interest.
Wildlife Act 1975	This is the primary legislation in Victoria providing for protection and management of wildlife, and it covers approvals for the handling or taking of wildlife, scientific surveys and/or habitat removal.

4. Existing Environment

4.1 Regional Context

The Victorian marine environment supports over 12,000 known species with most of these species only occurring in southern Australian waters. The referral area is located in the Twofold Shelf mesoscale bioregion which extends from east of Wilsons Promontory in Victoria north to Tathra, New South Wales and also includes the Kent Group of islands (IMCRA Technical Group, 1998). The Twofold Shelf bioregion is characterised by exposed coastline and long sandy beaches interspersed with rocky headlands and coastal lagoons (IMCRA Technical Group, 1998). Sea surface temperatures are influenced by warm water delivered to Bass Strait by the East Australian Current.

The Twofold Shelf bioregion contains three marine national parks (MNP), which includes the Ninety Mile Beach MNP located adjacent the referral area, Point Hicks MNP and Cape Howe MNP. The Beware Reef Marine Sanctuary is also located within the bioregion. The predominantly soft sediment habitat found throughout the bioregion and the water column support a diversity of marine flora and fauna.

The marine biodiversity of Bass Strait is diverse and highly endemic (GCCSI, 2016). Species diversity and biomass of infauna and fish is generally lower in nearshore waters (water depths up to 30 m) compared to further offshore and along the continental shelf (Parry et al. 1990).

Marine habitats in the referral area and the region include expansive sediment beds, subtidal low- and high-profile reefs and the water column.

4.2 Physical Characteristics

4.2.1 Bathymetry and Seabed Geology

Within the referral area, water depth increases rapidly from the high-water mark to 10 m within a few hundred metres of the coast before increasing more gradually out to a depth of around 65 m over a distance of approximately 55 km (Figure 4.1). Depth contours generally run parallel to the coast throughout the referral area.

The referral area average seabed sediment and grain size is illustrated in Figure 4.2. The nearshore environment features fine to very coarse sand, with finer sands found in the southern nearshore environment, grading to coarser sands to the north. Between the 30 and 50 m depth contours, the referral area is indicated to contain coarse sands, which become very coarse between the 50 and 70 m depth contour. The Ninety Mile Beach area features subtidal reefs which run generally parallel to the shoreline and are predominantly low profile but with some area of higher complexity and vertical reef.

REGIONAL BATHYMETRY

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FIGURE 4.1

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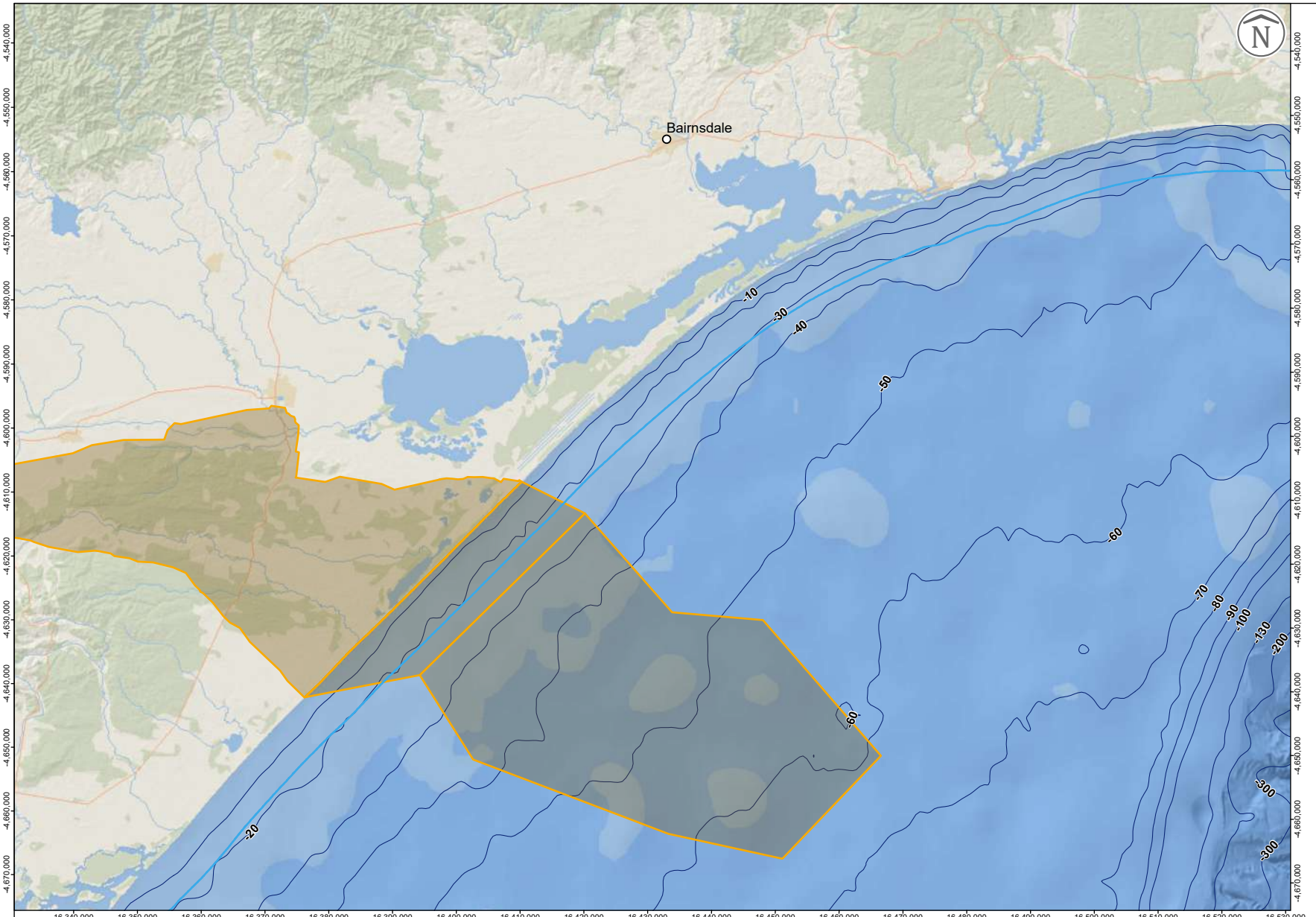

State coastal water (3nm)

Bathymetry

Seadragon referral area

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REGIONAL AVERAGE SEABED SEDIMENT AND GRAIN SIZE

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FIGURE 4.2

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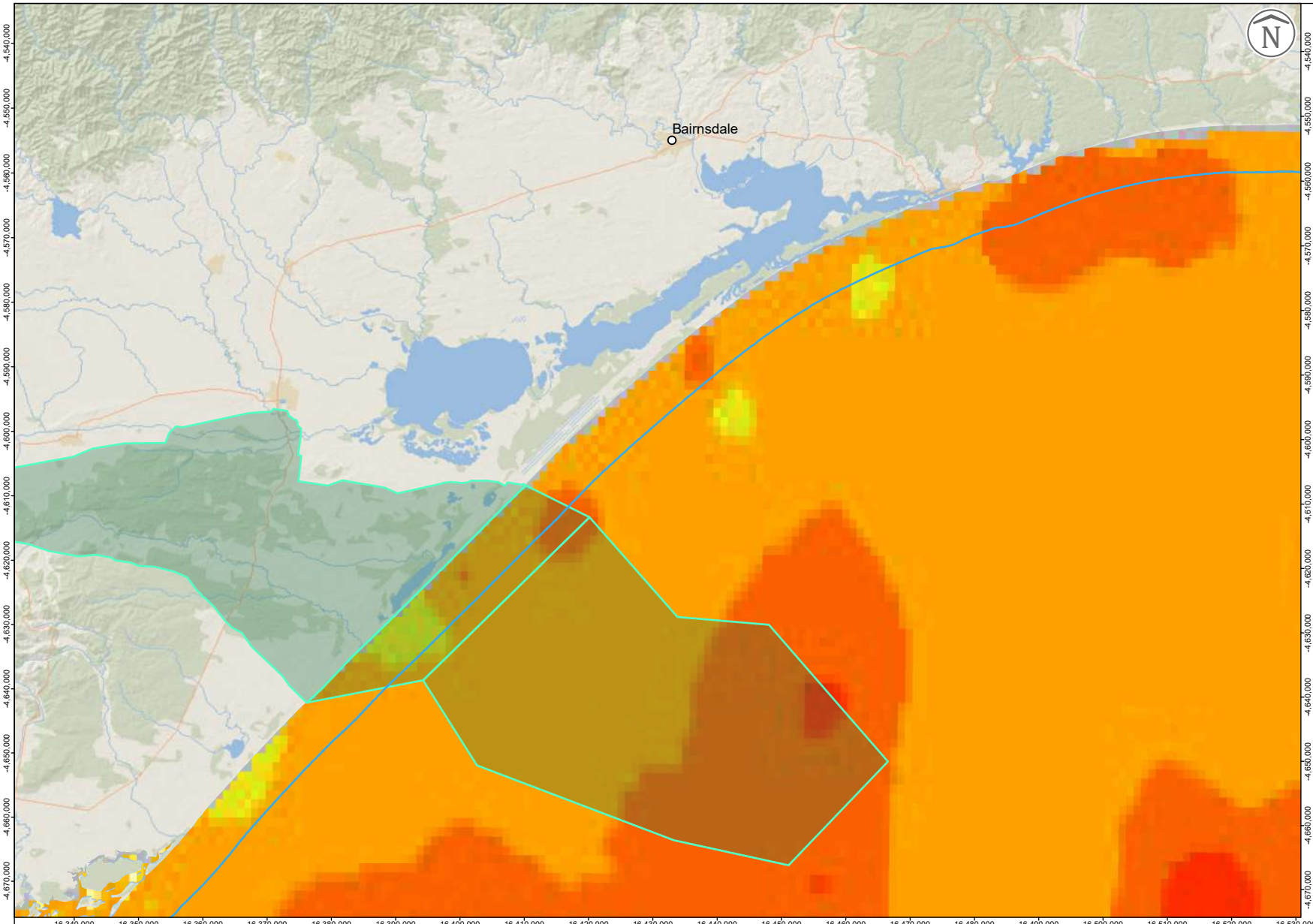

State coastal water (3nm)

Seadragon referral area

Mean Grain Size (mm)

- Fine-medium clay (0 - 0.002 mm)
- Coarse clay (0.0021 - 0.004 mm)
- Very fine silt (0.0041 - 0.008 mm)
- Fine silt (0.0081 - 0.016 mm)
- Medium silt (0.0161 - 0.031 mm)
- Coarse silt (0.0311 - 0.063 mm)
- Very fine sand (0.0631 - 0.125 mm)
- Fine sand (0.1251 - 0.250 mm)
- Medium sand (0.2501 - 0.500 mm)
- Coarse sand (0.5001 - 1.000 mm)
- Very coarse sand (1.0001 - 2.000 mm)
- Granules (2.0001 - 4.000 mm)
- Pebbles and larger (>4.0001 mm)

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Figure Number: 01415A_3_F04-2_GIS_v0-d_es

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4.2.2 Currents, Waves and Tides

Currents in Bass Strait are primarily wind driven and the movement of water is predominantly northeast to southwest and closely aligned with topographic contours, i.e., alongshore (GCCSI, 2016). Strong tidal currents are reported for the area, in the range of 2 to 2.5 knots (ECC, 2000).

Bass Strait is a high energy environment that is frequently exposed to storms and significant wave heights. High waves can occur under both easterly and westerly wind events, but the majority of high waves occur in association with low pressure systems moving across Bass Strait and the resulting strong west and southwest winds in particular (O'Grady and McInnes, 2010). Maximum wave heights are reported between 1.9 and 2.7 m (LLC, 1993). The high energy environment produces well-mixed coastal waters (ECC, 2000; GCCSI, 2016).

The Twofold Shelf bioregion experiences a moderate tidal range of about 2 m and variable wave energy (IMCRA Technical Group, 1998). Tidal variation for the region is 0.9 metres for spring tides and 0.6 metres for neap tides (Plummer et al. 2003).

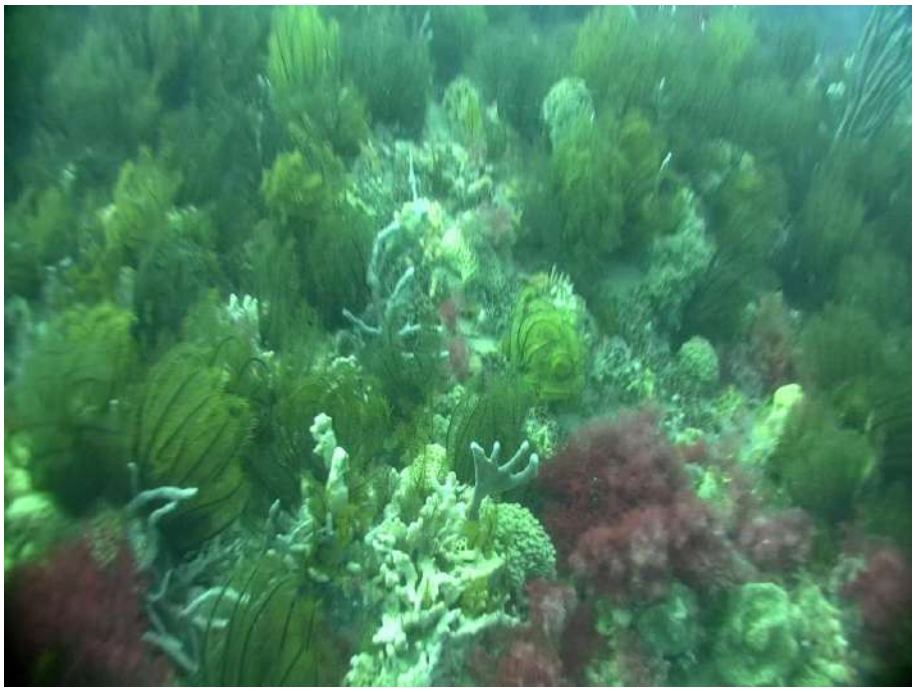
4.3 Marine Habitats

The referral area is located within the Twofold Shelf bioregion. Smaller scale biounits have been defined for Victoria's State waters, with the Victorian component of the referral area located in the Ninety Mile Beach biounit, which extends from east of Nooramunga to east of Marlo (Figure 4.3), covering an area of 953 km^2 (VEAC, 2019a). Based on broad level habitat mapping, the subtidal marine habitats of this biounit are dominated by expansive sediment beds, featuring rippled sands and emergent patch reefs (VEAC, 2019a). Other subtidal habitats found within this biounit include non-reef forming sediment epibiota and scallop beds (VEAC, 2019a).

The sandflats off Ninety Mile Beach are the most extensive area of such habitat in Victoria and supports a diverse benthic infauna assemblage. The Ninety Mile Beach biounit features infralittoral reefs which run generally parallel to the shoreline and are predominantly low profile but with some areas of higher complexity and vertical reef. The CoastKit biotope habitat distribution (DELWP, 2021b) indicates the location of infralittoral rock and other hard substrate based on predictive modelling and ground truthing field surveys (Figure 4.3). Such habitats occur within the referral area primarily along the 10 m depth contour offshore from Lake Reeve, with a notably large area offshore from Golden Beach in 5 to 10 m of water. This infralittoral reef features thallose red algae with abundant feather stars (Plate 4.1), grey mounded colonies of *Cryptopolyzoon bryozoan* and beds of *Ecklonia radiata* (Plate 4.2), interspersed with areas of rippled fine sand which at times contain colonies of polychaete tubes (Plate 4.3).

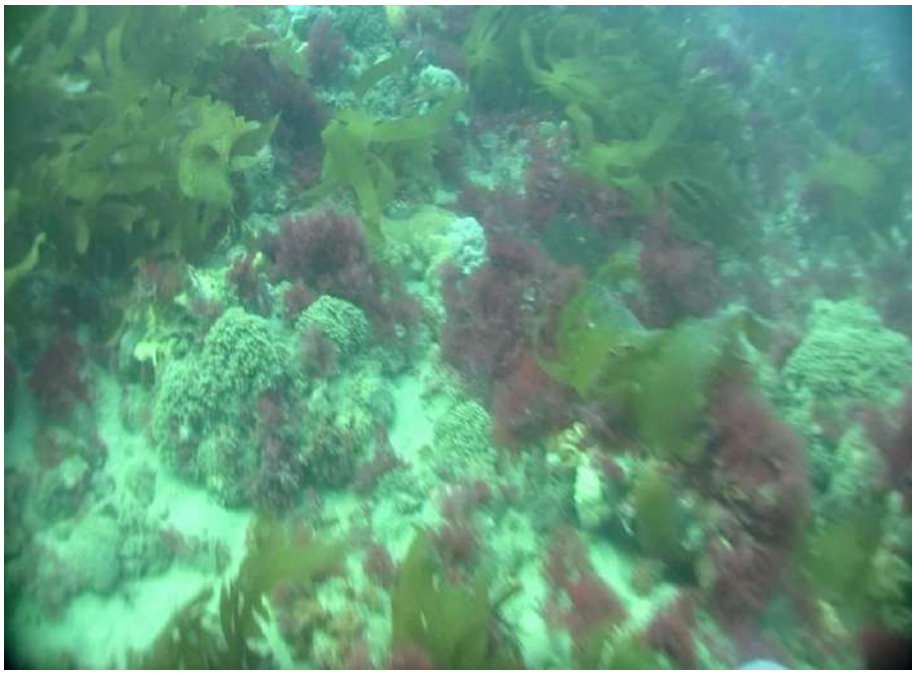
There are 447 biotope CoastKit records from primarily towed video surveys conducted within or adjacent the referral area (Figure 4.3). Sublittoral sand and muddy sand are the main habitat unit recorded (395 records), followed by non-reef sediment epibenthos (27 records) and high energy infralittoral rock (17 records).

Plate 4.1 – Thallose Red Algae and Abundant *Cenolia* Feather Stars



Source: DELWP (2021b).

Plate 4.2 – Grey Mounded Colonies and Beds of *Ecklonia radiata*



Source: DELWP (2021b).

Plate 4.3 – Rippled Fine Sand and Polychaete Tube Field

Source: DELWP (2021b).

Beyond the infralittoral zone, there are also circalittoral reef; however, little is known about the location of these reefs and they are often covered in a layer of sand, but where they do occur, they are characterised by tall branching sponges (Plate 4.4) and diverse sessile filter feeding communities (A. Flynn pers. comm., October 2021).

Plate 4.4 – Branching Sponge Community

Source: DELWP (2021b).

NINETY MILE BEACH BIOUNIT AND HABITAT FEATURES

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FIGURE 4.3

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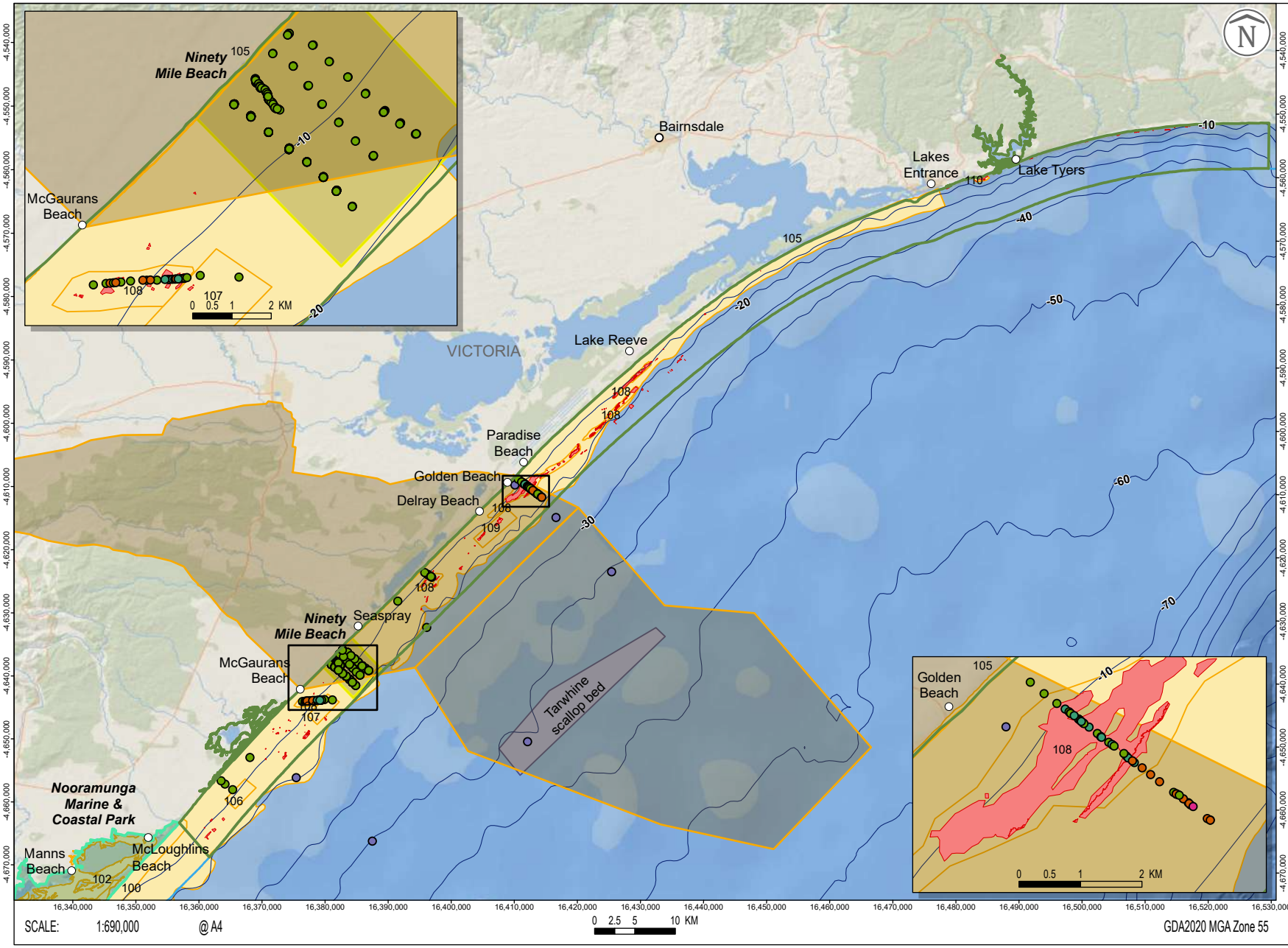

Biotope Units

- High energy infralittoral rock
- Non-reef sediment epibenthos
- Sublittoral coarse sediment
- Sublittoral mixed sediments
- Sublittoral sand and muddy sand
- Sublittoral seaweed on sediment
- Bathymetry
- State coastal water (3nm)
- Seadragon referral area
- Ninety Mile Beach biounit
- Infralittoral rock and other hard substrata
- Marine assests

Australian protected areas

- National Park
- Marine and Coastal Park

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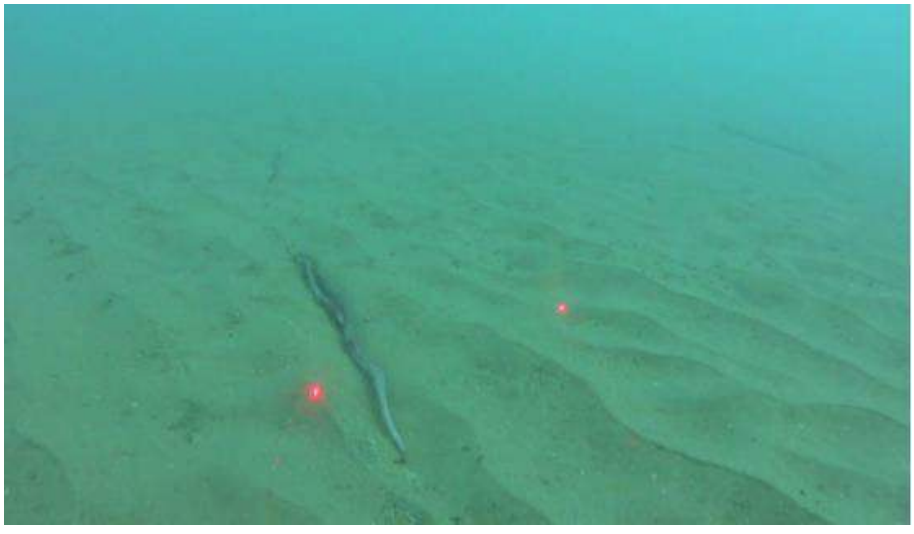
4.4 Victorian Marine Assets

In 2018 the Victorian Environmental Assessment Council (VEAC) completed an assessment of the values of Victoria's marine environment (VEAC, 2019a and 2019b), to support marine planning and decision making. The assessment identified 140 significant marine assets in Victorian State waters, being tangible biophysical elements that are valuable for their ecosystem service. Of the 140 significant marine assets in Victoria, 28 are the largest and most significant, with 8 located in the Gippsland Region. These eight assets are located around Wilsons Promontory, Corner Inlet and Nooramunga Marine and Coastal Park and at select locations (Walkerville, Venus Bay and Bunurong Marine National Park) between Wilsons Promontory and Cape Peterson. All of these assets are located a substantial distance from the referral area, with the closest being Nooramunga Marine and Coastal Park. This park extends from McLoughlins Beach southwest towards Port Welshpool, and is approximately 22 km southwest of the referral area at its closest boundary (Figure 4.4). This park is close to the Barry Beach Marine Terminal/Port Anthony, which is one of the ports that may be utilised by the Project. The values of the Nooramunga Marine and Coastal Park are described in Section 4.7.2.

Although none of the largest and most significant Victorian marine assets are located within the referral area, the Ninety Mile Beach biounit does include a number of smaller assets (See Figure 4.3). The largest of these is asset 105, which extends from Port Albert to Lakes Entrance and covers the majority of the State waters portion of the referral area. This asset features sandy plains with diverse benthic infauna communities. Patchy low profile reefs (e.g., Plates 4.1 and 4.2), sometimes covered by sand and dominated by sessile invertebrates are another marine asset found within the Ninety Mile Beach biounit and the referral area (See Figure 4.3). The other marine asset found in the referral area is asset 109, which is offshore of Delray beach along the 10 m depth contour and features the soft coral (*Pseudogorgia godeffroyi*, Plate 4.5), which is only found in Victoria between McGuarans Beach and Delray Beach.

Plate 4.5 – Soft Coral (*Pseudogorgia godeffroyi*) within the Ninety Mile Beach Biounit



Source: Advisian (2017).

KEY ECOLOGICAL FEATURES AND MARINE PROTECTED AREAS

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FIGURE 4.4

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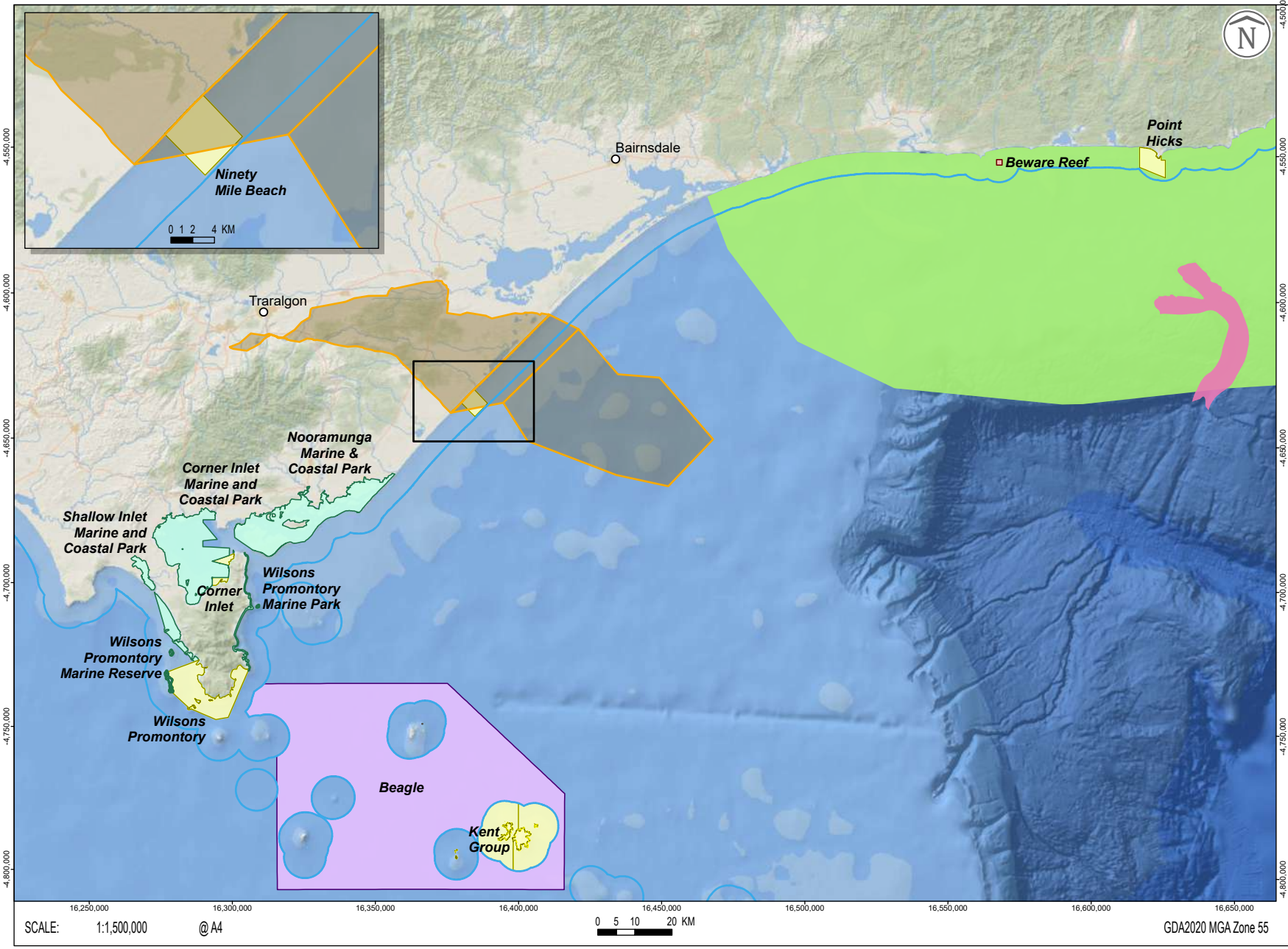

State coastal water (3nm)

Seadragon referral area

Australian protected areas

- Australian Marine Park
- Marine Sanctuary
- National Park
- Marine and Coastal Park

Key ecological features

- Big Horseshoe Canyon
- Upwelling East of Eden

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4.5 Marine Flora

Seagrasses are found within the Ninety Mile Beach biounit, including *Zostera* spp. and *Ruppia* spp. beds. Surveys conducted for the CarbonNet Project identified isolated and sparse seagrass beds offshore from Golden Beach, in water depths between 15 and 25 m (Plate 4.6) as well as large brown algae (*Ecklonia radiata* and *Sargassum*) growing on infralittoral reefs in less than 10 m of water offshore of Paradise Beach (DEDJTR, 2018). As noted in Section 4.3, thallose red algae (Plate 4.1) are also common to the infralittoral reefs of the Ninety Mile Beach biounit and Barton et al. (2012) report a sparse floral community consisting of small red algae along Ninety Mile Beach.

Plate 4.6 – Sparse Seagrass Beds Observed in the Referral Area

Source: Advisian (2017).

4.6 Marine Fauna

4.6.1 Benthic Fauna

The VBA search area has 3,517 records of marine benthic fauna; however, none of these are located within 50 km of the referral area. Beyond this distance, blacklipped abalone (*Haliotis rubra*) are the most recorded species (850 records), followed by the seastar (*Nectria macrobrachia*, 571 records) and the sea urchin (*Heliocidaris erythrogramma*, 446 records) which collectively account for 53% of all records. Several species of seastar and biscuit star account for the majority (1,205) of the remaining records. Surveys of infauna and epifauna were conducted in east Gippsland in the 1980's and 1990's, the results of these are described in the following sections.

4.6.1.1 Infauna

Benthic infauna samples were collected between 1983 and 1986 from 10 sites near McGaurans Beach and 10 near Woodside Beach (See Figure 2.1) both 2 m above and 2 m below the most recent high tide mark (LVWSB, 1987). The average abundance per site was generally low and varied annually from 8 to 153 individuals, with unidentified isopods making up the majority of

infauna. The number of species per site was low (less than five), but typical of exposed sandy beaches.

Infauna were sampled using a grab sampler at four sites off Lakes Entrance by Parry et al. (1990). A total of 353 species were recorded, which were predominantly made up of crustaceans (53%), polychaetes (32%) and amphipods (23%), which is a comparable composition to samples from Western Port and Werribee, but with a notably higher number of species regarded off Lakes Entrance (Parry et al. 1990). Species diversity was considered exceptionally high, particularly considering the limited sampling effort, but comparable to other locations in Bass Strait (Parry et al. 1990). Abundance of individual species was generally low with generally less than 10 individuals per species recorded per sample.

Surveys of benthic infauna in east Gippsland were conducted by Coleman et al. (1997) in water depths between 11 and 50 m, with sites located between Lake Tyers and Cape Conran. The sampling was conducted primarily to understand the effects of effluent discharges off Waygara and Cape Conran but provides an indication of benthic infaunal assemblages of the region. While the sites sampled are a considerable distance from the referral area (i.e., 75 to 115 km), the habitats and water depths within this part of the Ninety Mile Beach biounit are comparable to those within the referral area. The results considered taxonomic richness and abundance of crustaceans, polychaetes, molluscs, pycnogonids and echinoderms and excluded epifauna such sponges, hydroids, bryozoa and ascidians. A total of 803 species were recorded from 104 samples, covering an area of 10.4 m^2 (Coleman et al., 1997). The number of individuals per 0.1 m^2 ranged from 33 to 2,824 while the number of species ranged from 17 to 198 (Coleman et al., 1997). Polychaetes, molluscs and crustaceans accounted for 99% of total abundance and 98% of the species recorded (Coleman et al., 1997). The most abundant species was the polychaete (*Prionospio nirripa*) which accounted for 6% of total abundance. Surface deposit feeders and scavengers were found to dominate the infauna.

Subsequent studies of benthic infauna conducted by Coleman et al. (2007) in east Gippsland along the 10 m depth contour found between 43 and 430 individuals per sample and between 21 and 43 species. The most abundant species from the study, which included sites from Portland all the way to Mallacoota, generally occurred in high proportions across all bioregions and depths sampled, but the majority of the species encountered were uncommon throughout Victoria (Coleman, et al., 2007).

Based on these previous studies, the benthic environment of the referral area is expected to support a highly diverse and abundant infaunal assemblage.

4.6.1.2 Epifauna

Benthic epifauna were sampled using an epibenthic sled at 24 sites between Lakes Entrance and Bemm River (Parry et al. 1990). Within nearshore locations (less than 30 m water depth) with coarse sediment, epifauna was dominated by the bivavles *Tucetilla striatularis, glycymeris flammeus* and *Tucetona flabellatus* and the gastropod *Alcospira oblonga*. Locations with medium sand in 45 to 65 m water depth were the most sampled, and these habitats were characterised by an abundance of hermit crabs (*Trizopagurus stigimanus, Dardanus arrosor* and other unidentified species), crabs (*Phylxia intermedia*, *Liocarcinus corrugatus*, *Achaeopsis ramusculus*, *Pilumnus*

spp., *Chlorinoides spatulifer)*, four species of ascidians, the bivalve *Neotrigonia margaritacea*, *Allostichaster* seastars, a sea urchin (echinoid sp. A) and the hat urchin *Peronella peronii*.

The Ninety Mile Beach biounit features a high-density of *Cenolia* feather stars (Plate 4.1), which amass on reefs and indicate a high planktivorous nutrient input, likely a result of nearby upwelling.

The Brachyura crab (*Halicarcinus* sp. *MoV746*) is likely endemic to the Ninety Mile Beach area (Plumer et al., 2003), and the shallow waters (to 20 m water depth) off Delray and Woodside Beaches, which includes the referral area, are considered significant habitat for this species, as well as the FFG Act listed opistobranch *Platydoris galbana* (O'Hara and Barmby, 2000). While O'Hara and Barmby (2000) indicate that this species is restricted to the shallow waters off Delray and Woodside Beach, the only known records of this species in the ALA are from Phillip Island, and it may also occur in New South Wales (Rudman, 2003). While little is known about it's distribution it is likely that the range of this species is larger than that indicated by O'Hara and Barmby (2000).

ERIAS (2020) analysed epibenthic data collected for the GipNet Study which included sites within, and close to, the referral area in approximately 20 m water depth, in proximity to the Golden Beach Gas Project Area (see Figure 4.10, Section 4.14). Data was collected using a towed benthic sled and opportunistic samples were also collected during the study. One bivalve, the little wing pearl shell (*Electroma georgiana*) accounted for 75% (3,647 individuals) of all benthic fauna recorded (ERIAS, 2020). This species grows rapidly and can occur in large numbers, generally in sheltered areas, attached to seaweed and seagrass. After bivalves, polychaetes, arthropods and echinoderms were the next most abundant taxonomic groups in the survey area, accounting for around 9, 6 and 5% of benthic fauna recorded respectively (ERIAS, 2020). With respect to taxonomic richness, arthropods had the most number of taxa recorded (21 taxa) followed by gastropods with 16 taxa. These two groups accounted for 50% off all observed taxa. Overall there was a high degree of variability between the type and abundance of benthic taxa recorded at sites within the study area.

4.6.2 Fish

Over 500 species of fish are predicted to occur in the waters of Bass Strait (LCC, 1993) including recreational and commercial fishing species.

Seaspray beach is known for populations of Australian salmon (*Arripis* sp.), snapper (*Pagrus auratus*), tailor (*Pomatomus saltatrix*) and flathead (Plummer et al., 2003). The Ninety Mile Beach biounit may also represent important feeding areas for gummy shark pups (*Mustelus antarcticus*) (Plummer et al., 2003). Long-finned pike (*Dinolestes lewini*) and short-finned pike (*Sphyaena novaehollandiae*) are also known to the referral area (Plummer et al., 2003).

The VBA search area contains 3,034 recordings of 67 marine fish species (Appendix 1). Nine species account for 75% of the records, these are listed in Table 4.1. Most of these commonly recorded fish species are generally associated with rocky reef habitat; however, except for black bream (*Acanthopagrus butcheri*), none of these species have been recorded within 50 km of the referral area. Some of the other relatively common species recorded in closer proximity to the referral area, i.e., within 1 km, these have included yellow-eye mullet (*Aldrichetta forsteri*, 71 records) and sea mullet (*Mugil cephalus*, sea mullet).

Table 4.1 – Most Commonly Recorded Marine Fish Species in the Region

Common Name	Species Name	Number of Records in the Search Area	Distance (km) to Nearest Record from Referral Area (Year of Closest Record)
Blue throated wrasse	*Notolabrus tetricus*	502	68 (1989)
Barber perch	*Caesioperca rasor*	397	84 (1999)
Purple wrasse	*Notolabrus fucicola*	358	67 (1977)
Sea sweep	*Scorpis aequipinnis*	302	86 (1985)
Zebra fish	*Girella zebra*	155	86 (2001)
Scalyfin	*Parma victoriae*	153	86 (2006)
Black bream	*Acanthopagrus butcheri*	148	1 (1977)
Longfin pike	*Dinolestes lewini*	138	84 (1999)
Senator wrasse	*Pictilabrus laticlavius*	113	86 (1992)

Source: DELWP (2021a).

A weedy seadragon (*Phyllopteryx taeniolatus*) was observed (Plate 4.7) adjacent an infralittoral *Ecklonia* bed, located offshore from Golden Beach in the referral area, in approximately 5 to 10 m water depth (DEWLP, 2019b). The ALA search area also contains one record of this species, 15 km from the referral area. The weedy seadragon is not listed as threatened or migratory under the EPCB or FFG Act but is an EPBC listed marine species under Part 13 of the EPBC Act, which means it is an offence to kill, injure, take or trade this species from a Commonwealth area, unless an accredited management regime or permit is in place. All syngnathids (seahorses, seadragons and pipehorses) and solenostomids (ghost pipefish) are listed marine species under the EPBC Act, and this listing is to primarily prevent illegal harvesting of these species for the aquarium trade rather than their populations being threatened.

Plate 4.7 Weedy Seadragon (*Phyllopteryx taeniolatus*) Observed in the Referral Area Adjacent Reef with *Ecklonia Radiata*

Source: DELWP (2021b).

The southern shortfin eel (*Anguilla australis*) and longfin eel (*Anguilla reinhardtii*) have been recorded in the adjacent estuarine and freshwater environment. While excluded from the results for the purpose of this report, the southern shortfin eel (*Anguilla australis*) is the most recorded species in the VBA search area (739 records) with these records being from nearby estuarine environments. These eels spend up to 20 years in freshwater before migrating to the sea to breed in the Coral Sea (Gomon and Bray, 2018). As such, they are likely to occur temporarily in the referral area during this migration.

A total of 82 fish species were collected from 61 demersal fish trawls between Lakes Entrance and Point Hicks, which targeted water depths of 13, 25 and 45 m (Parry et al. 1990). The lowest diversity of fish occurred in nearshore waters (13 m water depth), where the species with highest biomass were the sparse spotted stingaree (*Urolophus paucimaculatus*), globefish (*Diodon nicthemerus*), angel shark (*Squatina squatina*), banded stingaree (*Urolophus cruciatus*) and school whiting (*Sillago* spp.). In 25 water depth, species with the highest biomass were sparse spotted stingaree, starry toadfish (*Arothron stellatus*) and globefish, while in 45 m water depth, highest biomass was accounted for by sparse spotted stingaree, white spotted skate (*Dentiraja cerva*), common stinkfish (*Foetorepus calauropomus*) and globefish.

The referral area includes a known great white shark (*Carcharodon carcharias)* nursery area (Section 4.8) and they are known to occur in the area. In addition, a number of threatened or migratory shark species have been recorded in the VBA/ALA search area including:

- Scalloped hammerhead (*Sphyrna lewini*), nearest record 7 km from referral area.
- Shortfin mako (*Isurus oxyrinchus*), nearest record 12 km from referral area.

- Grey nurse shark (*Carcharias taurus*), nearest record 80 km from referral area.
- Porbeagle shark (*Lamna nasus*), nearest record 221 km from referral area.

While some of these sharks have been recorded at some distance from the referral area, given the large distances travelled by these species they may also occur in the referral area. Sharks are also caught along Ninety Mile Beach by recreational fishers, including gummy, school, bronze whaler, seven-gilled and hammerhead sharks (Brew, 2014) and tiger sharks have also been caught off Golden Beach.

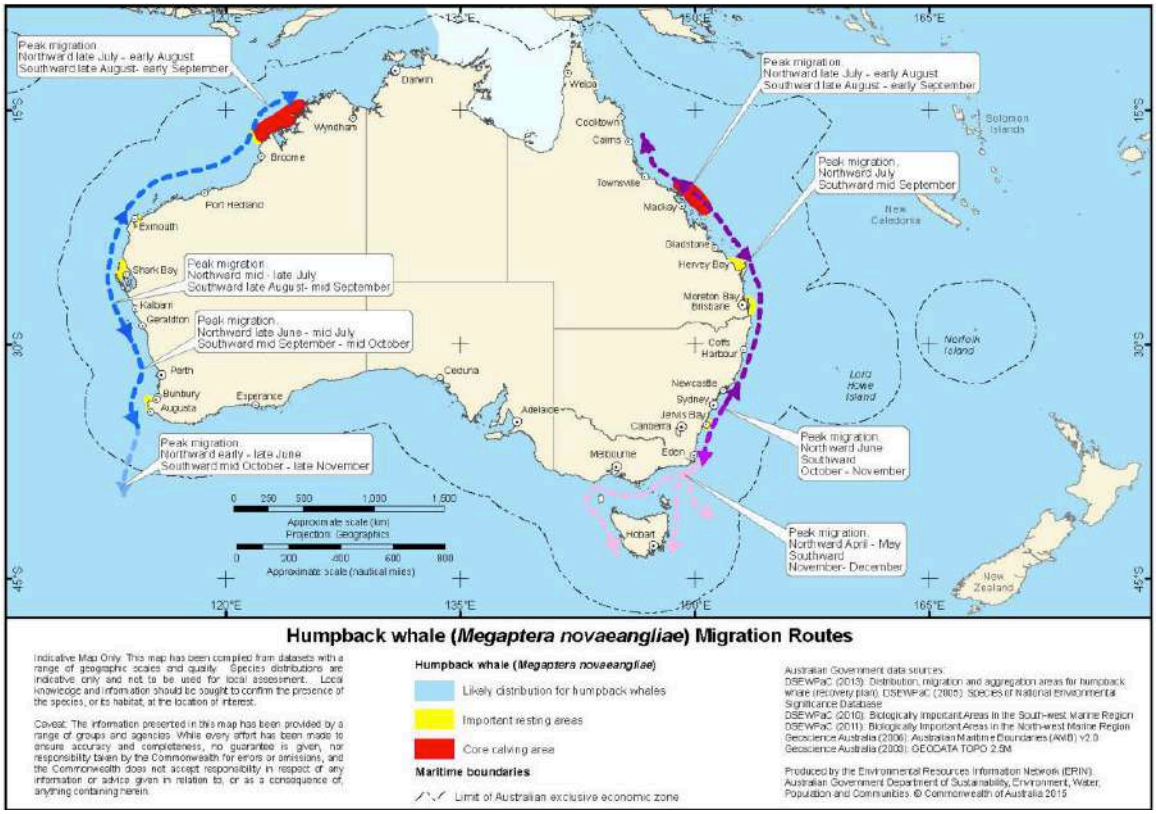
4.6.3 Cetaceans

The southern Victorian waters and east Gippsland provide potential and or known habitat for a number of cetacean species, some of which are either listed as threatened or migratory species under the EPBC Act and FFG Act. Cetacean species with potential to occur in the region are discussed in the following sections.

4.6.3.1 Humpback Whale (*Megaptera novaeangliae*)

Humpback whales are listed as Vulnerable under the EPBC Act, Threatened under the FFG Act and as migratory under the Bonn Convention. Humpback whales are present around the Australian coast in winter and spring and the referral area is within the known core range for the species. Humpbacks undertake an annual migration between the summer feeding grounds in Antarctica to their winter breeding and calving grounds in northern tropical waters (Figure 4.5). The northern migration on the south-east coast of Australia starts in April and May while the southern migration peaks around November and December (DEE, 2005a). A discrete population of humpback whales has been observed to migrate along the west coast of Tasmania and through Bass Strait. The exact timing of the migration period varies between years in accordance with variations in water temperature, sea-ice extent, prey abundance, and location of feeding grounds (DEE 2005a, DSEWPC 2012a). Feeding occurs where there is a high krill density, and during the migration this primarily occurs in Southern Ocean waters south of 55°S (DEE, 2005a). Opportunistic feeding may occur in response to the Upwelling East of Eden, (Section 4.7). The referral area is located further west of the Humpbacks' normal migration route so they are not expected to frequent the referral area but have been recorded in the referral area. There are 117 humpback whale records in the VBA/ALA search area and they have been recorded in the referral area.

Figure 4.5 – Humpback Whale (*Megaptera novaengliae*) Migration Routes



Source: TSCSC (2015).

4.6.3.1 Southern Right Whale (*Eubalaena australis*)

Southern right whales are listed as Endangered under the EPBC Act, Threatened under the FFG Act and as migratory under the Bonn Convention. Southern right whales are distributed in the southern hemisphere, typically between 20°S and 60°S. They are present around the Australian coast from May to October (DEE, 2005b). This species generally migrates to the warmer waters of southern Australia during winter and inhabits Sub-Antarctic waters in summer, where their main feeding grounds are generally between 40°S and 55°S (DEE, 2005b). During winter and spring southern right whales breed in shallow coastal waters, less than 5 m in depth (DEE 2005b, Payne, 1986). The referral area is within the current core coastal range and an area for migration and resting and migration (Section 4.8), but outside of calving and aggregation areas. There are 34 records of southern right whales in the VBA/ALA search area and they have been recorded within the referral area.

4.6.3.2 Pygmy Blue Whale (*Balaenoptera musculus brevicauda*)

There are two subspecies of the blue whale in the Southern Hemisphere. These are the Antarctic blue whale (*Balaenoptera musculus intermedia*) and the pygmy blue whale (*B. m. brevicauda*), with the latter occurring off the Victorian coast and discussed in this section. The pygmy blue whale is listed as Endangered under the EPBC Act, Threatened under the FFG Act and as migratory under the Bonn Convention. The southeast marine region, where the referral area is located, contains one of the most significant feeding aggregation areas for blue whales in

Australian waters, driven by the Bonney Upwelling which generally starts in the eastern Australian Bight in November or December and spreads eastwards to the Otway Basin around February. In response to the upwelling, pygmy blue whales occur off South Australia and western Victoria from November to May each year (DoE, 2015b). Bass Strait is an important migratory corridor for pygmy blue whales with the migratory period for the pygmy blue whale into Bass Strait generally commencing in November or December (Gill et al. 2011), and they are distributed throughout Bass Strait from January through April (Gill et al., 2011). While the migratory routes along western Victoria are well known, less is known about their migratory routes along the east of Victoria where the Project is located. The referral area is outside of known migration routes, aggregation areas and foraging areas. Surveys conducted in western Victoria over several years recorded the majority of pygmy blue whales between Cape Nelson and Cape Otway in water depths between 50 and 100 m water depth, with less than 10% of observations recorded in water depths less than 50 m (i.e., those comparable to the referral area) (Gill et al. 2011). There are three records of pygmy blue whales in the VBA/ALA search area, with the closest record being more than 50 km from the referral area.

4.6.3.3 Burrunan Dolphin (*Tursiops australis*)

The Burrunan dolphin is a recently described species and is listed as Threatened under FFG Act, but is not currently listed or categorised under the EPBC Act. Little is known about this species, but there are two known resident populations in Victoria occurring in Port Phillip Bay and the Gippsland Lakes, with an estimated 65 individuals in the Gippsland Lakes population (Puszka et al., 2021). There are 121 records of Burrunan dolphins in the VBA/ALA search area, with the closest being 19 km from the referral area in the Gippsland Lakes. They are not known to occur outside of the estuarine environment of the lakes and so are unlikely to occur in the referral area.

4.6.3.3 Killer Whale (*Orcinus orca*)

The killer whale is a listed migratory species under the Bonn convention. The killer whale is widely distributed from polar to equatorial regions and has been recorded in all Australian waters. Killer whales are generally more common in nearshore and higher-productivity areas and high latitudes (Reeves et al., 2017). In Australia, killer whales are reported in highest concentrations around Tasmania but are also frequently sighted in South Australia and Victoria (Ling, 1991). The breeding season is variable and the species moves seasonally to areas of food supply (Bannister et al. 1996, Morrice et al. 2004). Killer whales are habitat generalists, but Australian populations are most often seen along the continental shelf and particularly near seal populations. There are 34 records of *Orcinus orca* within the VBA/ALA search area, with the closest record being more than 50 km from the referral area.

4.6.3.3 Common Dolphin (*Delphinus delphis*)

Common dolphins are found in offshore waters around all Australian states and territories, although are less common in northern waters. The species shows seasonal shifts in distribution and abundance, indicative of migration patterns, however, no clear migration patterns have been mapped. Calving occurs throughout the year, but peaks in spring and autumn (DEE, 2019).

There are 53 records of common dolphins in the VBA/ALA search area, with the closest record being 6 km from the referral area.

4.6.3.4 Indian Ocean Bottlenose Dolphin (*Tursiops aduncus*)

Indian ocean bottlenose dolphins are found in estuaries, bays, nearshore and shallow offshore waters around Australia. The species shows variable movement patterns. Some populations show year-round residency, while others have long-range movement and migration. Calving peaks occur in spring, summer and autumn. There are five records of *Tursiops aduncus* within the VBA/ALA search area, with the closest record being more than 50 km from the referral area.

4.6.3.4 Bottlenose Dolphin (*Tursiops truncatus s. str.)*

Bottlenose dolphins are common in the offshore waters (typically deeper than 30 m) off Queensland, New South Wales, Tasmania, South Australia and Western Australia. Sightings also occur within coastal (inshore and nearshore) coastal areas, but these are less common. Similar to other dolphin species, calving peaks in spring, summer and autumn.

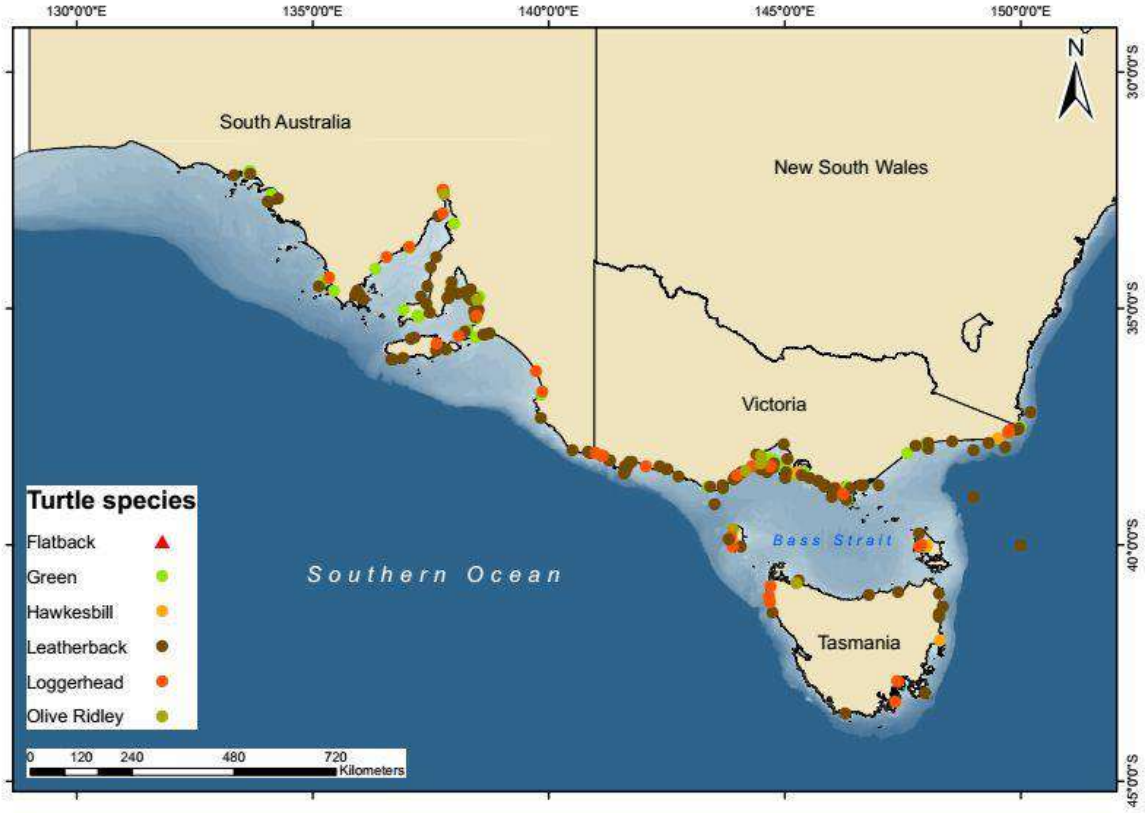
There are 26 records of *Tursiops truncatus s. str.* in the VBA/ALA search area, with the closest record being 21 km from the referral area.

4.6.4 Marine Reptiles

Plummer et al. (2003) list four sea turtles occurring in Victoria's waters: loggerhead turtle (*Caretta caretta*), green sea turtle (*Chelonia mydas*) olive ridley turtle (*Lepidochelys olivacea*) and leatherback turtle (*Dermochelys coriacea*), and one sea snake: yellow-bellied sea snake (*Pelamis platurus*). In addition, the flatback turtle (*Natator depressus*) is also known to forage off the continental shelf (DEE, 2016a) and CIE (2019) indicates sightings of hawksbill turtle (*Eretmochelys imbricata*) in the east of Victoria. CIE (2019) indicates turtle sightings in Southern Australia, shown in Figure 4.6. Based in this data, the leatherback turtle is the most frequently recorded in eastern Victoria; however, turtle sightings in Victoria are rare and relate to vagrant individuals only with no major nesting sites or biologically important areas for any marine turtle in Victoria.

There are no records of the olive ridley turtle, the flatback turtle or the hawksbill turtle in the VBA/ALA search area, and no records of the leartherback turtle within 50 km of the referral area (despite those shown in Figure 4.6). There are 11 records of loggerhead turtles in the search area, with the closest 38 km from the referral area, and 18 records of the yellow-bellied sea snake, with the closest 8 km from the referral area.

Figure 4.6 – Southern Australian Sea Turtle Sightings



Source: CIE (2019).

4.6.5 Pinnipeds

Australian fur seals (*Arctocephalus pusillus*) and New Zealand fur seals (*Arctocephalus forsteri*) are found in southern Australian waters and are known to Ninety Mile Beach MNP.

There are 10 established Australian fur seal breeding colonies which are limited to the islands in Bass Strait, with six of these found off the coast of Victoria and the remaining four off the coast of Tasmania. The closest of these breeding sites is Rag Island (75 km southwest), while the closest haul out site is located at Gabo Island (205 km northeast). There are 114 records of Australian fur seals within the VBA/ALA search area and they have been recorded in the referral area.

The New Zealand fur seal occurs in New Zealand and along the south coast of Australia, from southwest Western Australia to South Australia, with small populations in Victoria and Tasmania (Parks & Wildlife Service, 2015). The majority of breeding occurs at the Pages Islands and on Kangaroo Island in the Neptune Islands chain, located over 500 km to the northwest, but they are also found on Cape Leeuwin in Western Australia and the south coast of Tasmania. The breeding season occurs from mid-November to mid-January and pups are born a year later (Ingleby, 2018). There are 12 records of New Zealand fur seals in the VBA/ALA search area, with three records from within the referral area.

Although outside of their current core range, southern elephant seal (*Mirounga leonine*) have been recorded in Victorian waters, and indeed the VBA has a record from within the referral area,

but this is from 1977. Although they once bred on King Island, they were wiped out. There are limited recent sightings and only in Tasmania (DPIPWE, 2015).

4.6.6 Little Penguins (*Eudyptula minor*)

Little penguins (*Eudyptula minor*) are found along the southern coastline of Australia and New Zealand, with the largest breeding colony occurring at Phillip Island. Little penguins spend most of their lives at sea swimming and foraging, but nest on land. The closest little penguin colony is located at Wilsons Promontory and the surrounding islands (approximately 75 km west of the referral area). Little penguins forage within 5 to 25 km of the coast during the breeding season (August to October) but can forage up to 75 km from the coast at other times (SARDI, 2011). There are 34 records of little penguins in the VBA/ALA search area, with the closest record being more than 50 km from the referral area.

4.7 Key Ecological Features

Key ecological features are not matters of national environmental significance and have no legal status in their own right, but they are a component of the Commonwealth marine area considered to be of regional importance for regional biodiversity or its ecosystem function and integrity. There are no key ecological features within the referral area. The closest key ecological feature is the Upwelling East of Eden, which is located 35 km to the northeast of the referral area (See Figure 4.4). The Upwelling East of Eden covers an area of 23,016 km^2 and extends from just west of Lakes Entrance in Victoria, all the way around to Ulladulla in New South Wales.

The Upwelling East of Eden is subject to periodic nutrient enrichment and increased primary productivity driven by phytoplankton blooms, which subsequently support increased productivity in zooplankton, copepods, krill and small pelagic fish (DoE, 2015a). These blooms support fisheries and marine biodiversity including top order predators (e.g. tuna), marine mammals (dolphins and whales) and seabrids. The area is one of two known feeding areas for pygmy blue whales and humpback whales, which arrive when significant aggregations of krill occur (DoE, 2015a). The area is also important for seals, other cetaceans and sharks (DoE, 2015a).

4.8 Biologically Important Areas

Biologically important areas (BIAs) are those areas identified as being particularly important for the conservation of protected species, and where aggregations of individuals display biologically important behaviour such as breeding, foraging and resting on migration. The referral area includes biologically important areas for the following species:

- Great white shark (breeding and nursery area), Figure 4.7.
- Pygmy blue whale (possible foraging area and known distribution), Figure 4.8.
- Southern right whale (known core range and migration and resting on migration), Figure 4.9.

Juvenile great white sharks appear to aggregate seasonally between Corner Inlet and Ninety Mile Beach and this is considered a shark nursery area (DSEWPC, 2013). White sharks are a transient species and are only temporary residents in the areas they inhabit; however, given they return on seasonal or more regular basis this implies a degree of site fidelity (Bruce et al., 2005).

There is evidence to suggest that both males and females are philopatric and may return to their birthplace for breeding (Blower et al., 2012). As such, the nursery area intersected by part of the referral area may provide critical habitat for the survival of the species. The referral area occupies 17% of the nursery area shown in Figure 4.7.

The referral area intersects with a possible foraging area for the pygmy blue whale. Blue whales require more prey than any other known predator and consume up to two tonnes of krill per day (DoE, 2015b). As such, they feed where there is high primary productivity, often associated with upwelling and frontal systems (DoE, 2015b). The referral area is located outside of the primary foraging areas for the pygmy associated with the Bonney Upwelling which occurs off the western Victorian coast; however, upwelling and high primary productivity also occurs in the Upwelling East of Eden (See Figure 4.4) and there is anecdotal evidence of feeding areas offshore of Eden and Merimbula in New South Wale (DoE, 2015b). There are also records from the VBA/ALA of pygmy blue wales occurring in east Gippsland in comparable water depths to the referral area (Figure 4.8).

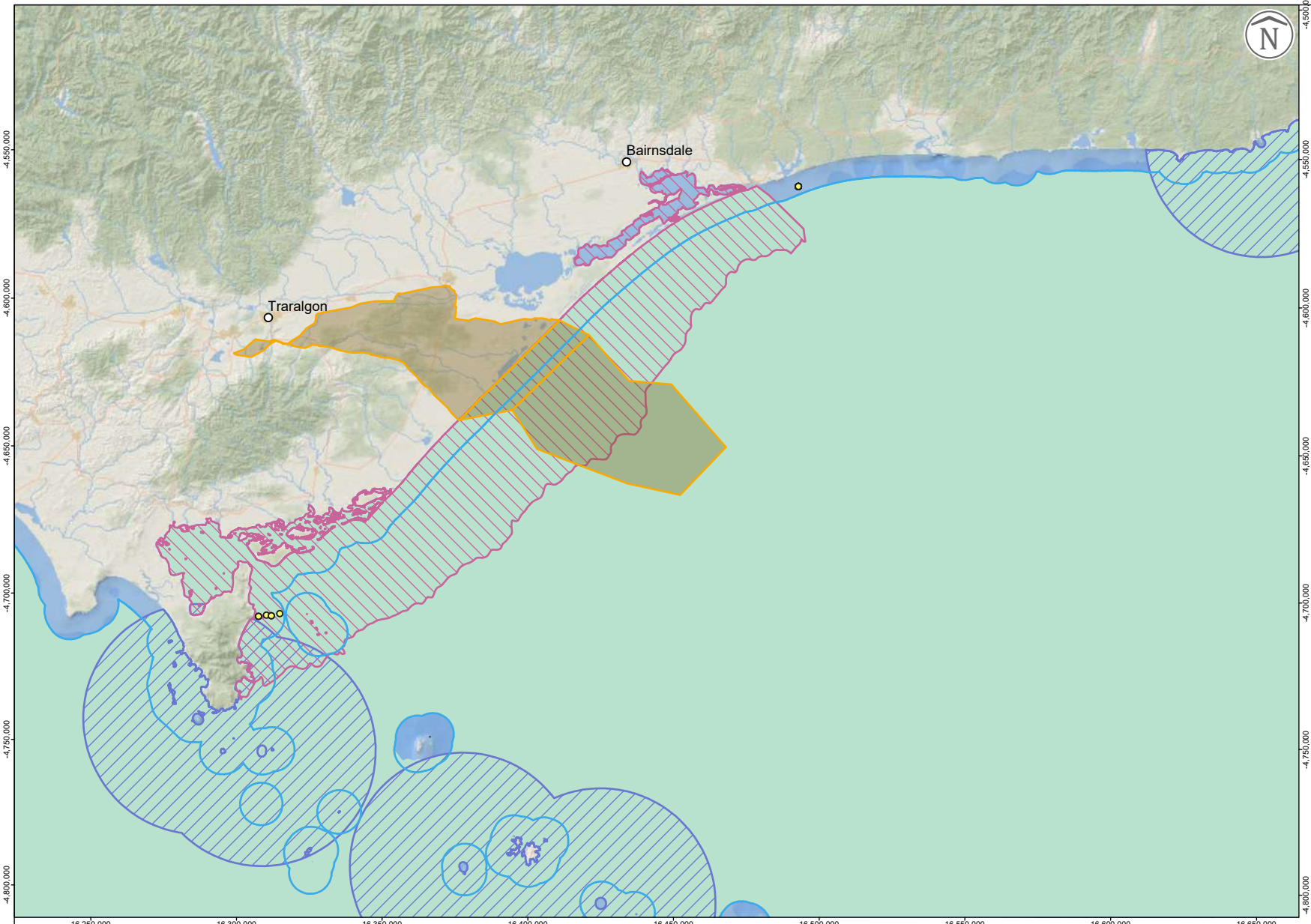
The referral area is within the known core range of the southern right whale and the nearshore component of the referral area intersects an area for migration and resting on migration. The referral area intersects approximately 2% of this resting on migration area. There are several records from the VBA/ALA within the referral area, and along the Ninety Mile Beach coast. Due to the long journeys made by southern right whales and their substantial coast-wide movement, connectivity of coastal habitat is important for the species (DoE, 2015a). They are thought to be solitary during migration or accompanied by a dependent calf or young offspring (DoE, 2015a).

BIOLOGICALLY IMPORTANT AREAS: GREAT WHITE SHARK

Seadragon Offshore Windfarm | Preliminary Marine Ecology Report

FIGURE 4.7

ERIAS



State coastal water (3nm)

Seadragon referral area

Great White Shark

Recorded sighting

Breeding (nursery area)

Foraging

Distribution

Issue Date: 2021.11.18

Map ID: 01415A_3_GIS002_v0

Figure Number: 01415A_3_F04-7_GIS_v0-e_es

ERIAS

ERIAS, 13-25 Church Street
Hawthorn VIC 3122, Australia

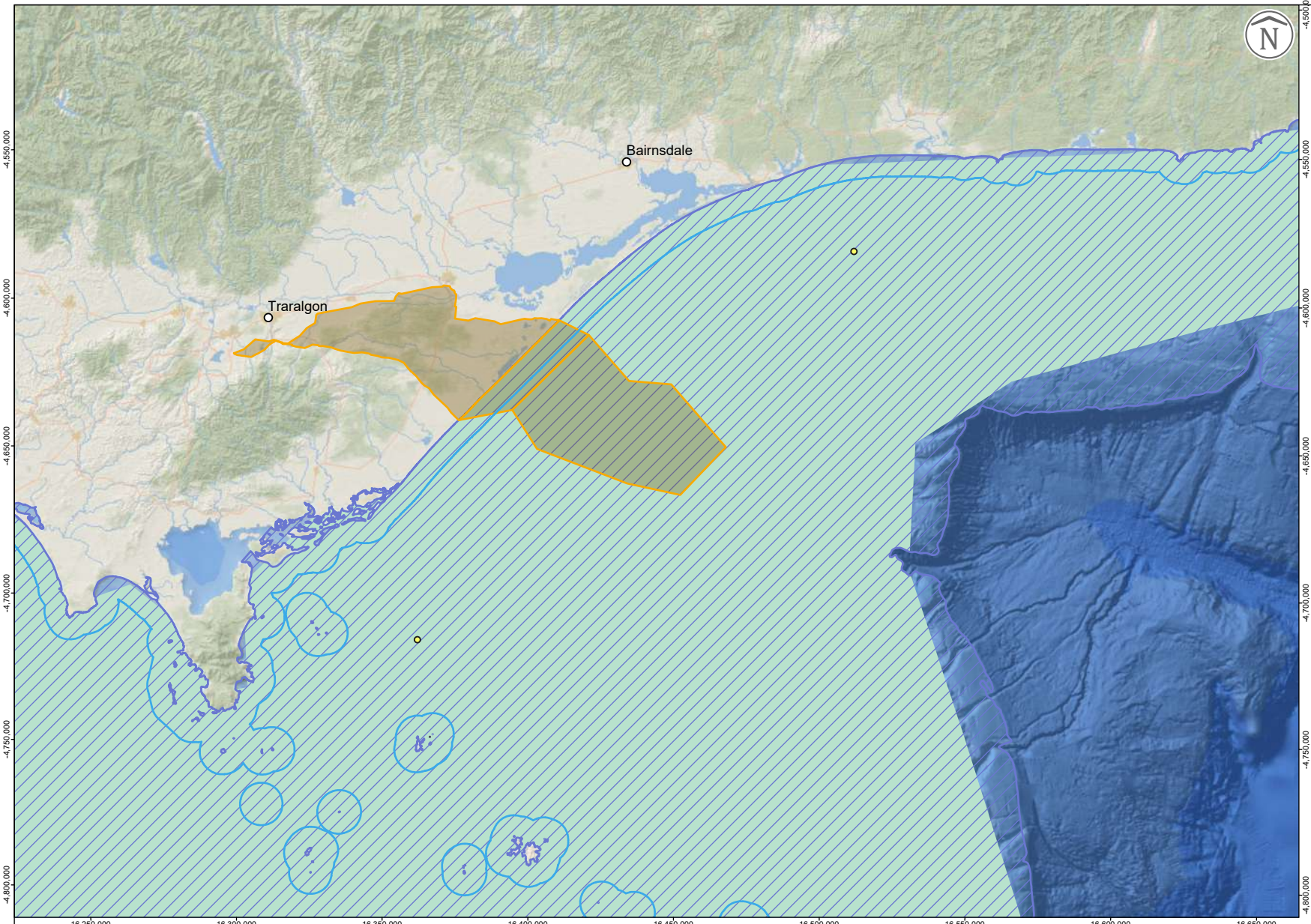
DATA SOURCES:
Project data from Flotation Energy, 2021.
Base data from DELWP and Geoscience Australia, 2021.
Imagery © ESRI, DigitalGlobe and Partners, 2021.

BIOLOGICALLY IMPORTANT AREAS: PYGMY BLUE WHALE

Seadragon Offshore Windfarm | Preliminary Marine Ecology Report

FIGURE 4.8

ERIAS



State coastal water (3nm)

Seadragon referral area

Pygmy Blue Whale

Recorded sighting

Foraging

Distribution

Issue Date: 2021.11.18

Map ID: 01415A_3_GIS003_v0

Figure Number: 01415A_3_F04-8_GIS_v0-e_es

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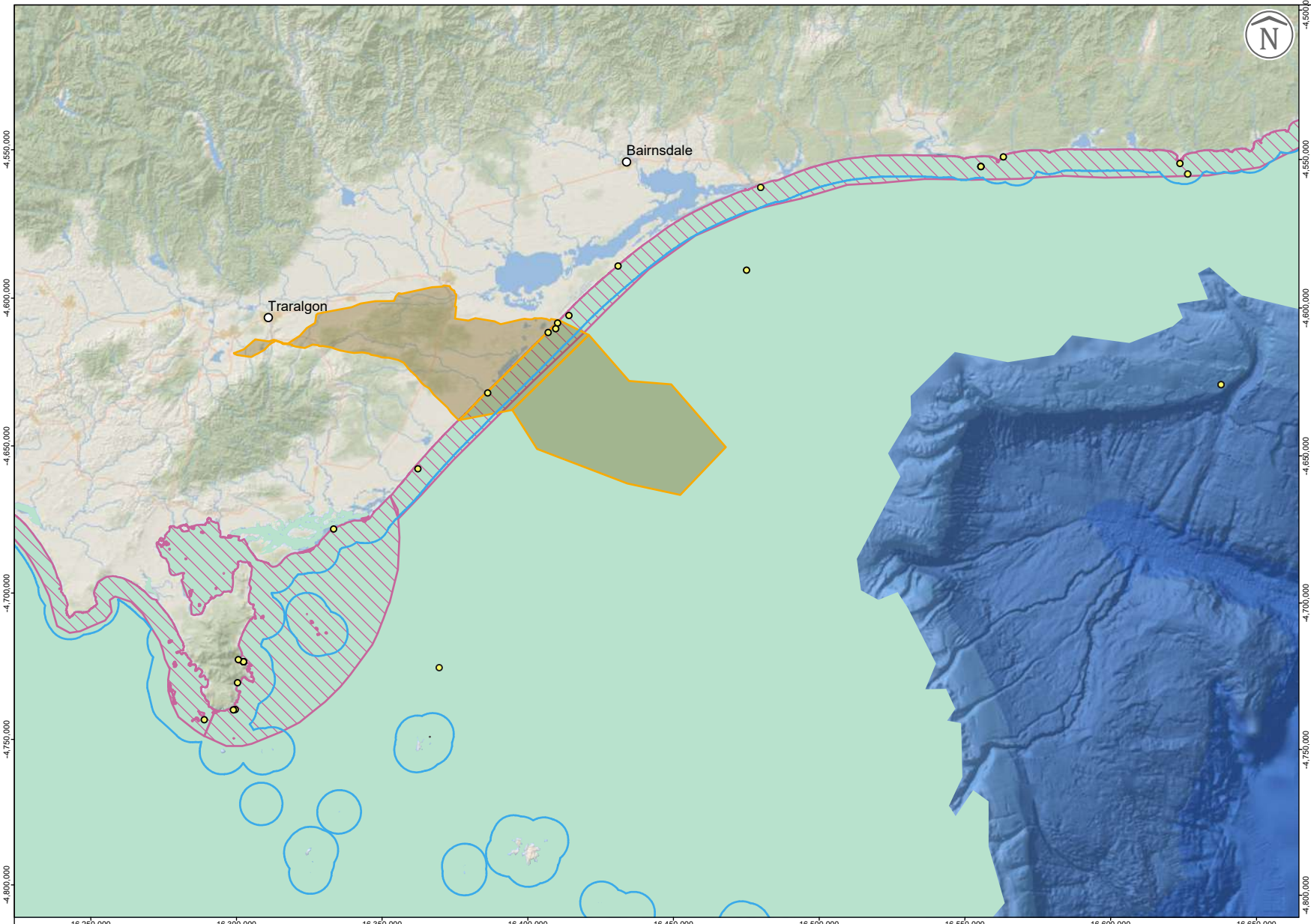
BIOLOGICALLY IMPORTANT AREAS: SOUTHERN RIGHT WHALE

Seadragon Offshore Windfarm | Preliminary Marine Ecology Report

FIGURE 4.9

ERIAS



State coastal water (3nm)

Seadragon referral area

Southern Right Whale

Recorded sighting

Migration and resting on migration

Known core range

Issue Date: 2021.11.18

Map ID: 01415A_3_GIS004_v0

Figure Number: 01415A_3_F04-9_GIS_v0-d_es

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DATA SOURCES:
Project data from Flotation Energy, 2021.
Base data from DELWP and Geoscience Australia, 2021.
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4.9 Threatened Ecological Communities

The PMST report did not identify any threatened marine ecological within the referral area nor are they expected to occur within the vicinity of the referral area. The preliminary terrestrial and aquatic ecology report (Biosis, 2021a) considers threatened coastal ecological communities identified in the PMST, including Subtropical and Temperate Coastal Saltmarsh, Natural Damp Grassland of the Victorian Coastal Plains.

4.10 Threatened and Migratory Species

Threatened and migratory marine species known to, or with potential to occur within, the referral area are provided in Table 4.3. Comment is provided regarding the likelihood of occurrence which was determined considering closest records available from the VBA and ALA and the availability of suitable habitat. The criteria used are provided in Table 4.2. All marine fauna listed in Table 4.3 are listed as under the FFG Act Threatened lists (August 2021) or are threatened or migratory species triggered by the EPBC Act Protected Matters Search Tool Report (Appendix 2). The closest recordings of these threatened and migratory species within the VBA/ALA search area are provided in Appendix 3.

Table 4.2 – Likelihood of Occurrence Assessment Criteria

Likelihood of Occurrence	Criteria
Known	• Species recorded in the referral area during surveys.
High	• Species recorded within 20 km of the referral area since 2000 and suitable habitat exists in the referral area, or; • Referral area is within species core range and suitable habitat is present in the referral area, or; • Referral area includes known biologically important area (e.g., breeding or calving/pupping areas).
Moderate	• Records of species within 20 km of the referral area although only limited habitat availability, or; • No records of species within 20 km of the referral area since 2000 although referral area potentially includes known biologically important areas (e.g., breeding or calving/pupping areas).
Low	• No records of species within 20 km of the referral area since 2000, or; • Referral area within species range although does not include preferred habitat or known biologically important areas (e.g., breeding or calving/pupping areas).
Negligible	• Referral area outside of species range, and no suitable habitat in the referral area.

Table 4.3 – Threatened and Migratory Species

Common Name	Scientific Name	FFG Act Status*	EPBC Act Status#	EPBC Migratory Species?	BIA within Project Area?	Likelihood of Occurrence in Referral Area
Fish (including sharks)						
Great white shark	*Carcharodon carcharias*	E	V	Yes	Project area overlaps with known distribution and breeding area	High
Grey nurse shark	*Carcharias taurus*	CE	CE	No	No BIAs overlap the Project area	Low
Porbeagle, mackerel shark	*Lamna nasus*	NL	NL	Yes	BIA not defined.	Low
Scalloped hammerhead	*Sphyrna lewini*	CD	CD	No	BIA not defined.	Moderate
Shortfin mako, mako Shark	*Isurus oxyrinchus*	NL	NL	Yes	BIA not defined.	Moderate
Southern bluefin tuna	*Thunnus maccoyii*	CD	CD	No	BIA not defined.	Moderate
Whale shark	*Rhincodon typus*	NL	V	Yes	No BIAs overlap the Project area	Low
Invertebrates						
Brittle star species	*Clarkcoma australis*	CE	NL	No	BIA not defined.	Low
Brittle star species	*Amphiura trisacantha*	E	NL	No	BIA not defined.	Low
Chiton 5254	*Bassethullia glypta*	CE	NL	No	BIA not defined.	Low
Ghost shrimp	*Pseudocalliax tooradin*	E	NL	No	BIA not defined.	Low
Marine opisthobranch	*Rhodope rousei*	CE	NL	No	BIA not defined.	Low
Sea cucumber 5251	*Apsolidium densum*	E	NL	No	BIA not defined.	Low
Sea cucumber	*Apsolidium falconerae*	CE	NL	No	BIA not defined.	Low
Sea cucumber 5052	*Apsolidium handrecki*	E	NL	No	BIA not defined.	Low

Common Name	Scientific Name	FFG Act Status*	EPBC Act Status#	EPBC Migratory Species?	BIA within Project Area?	Likelihood of Occurrence in Referral Area
Sea cucumber (species 5258)	*Pentocnus bursatus*	CE	NL	No	BIA not defined.	Low
Sea cucumber	*Rowedota shepherdi*	CE	NL	No	BIA not defined.	Low
Sea cucumber	*Thyone nigra*	E	NL	No	BIA not defined.	Low
Sea slug	*Platydoris galbana*	E	NL	No	BIA not defined.	High**
Mammals						
Blue whale	*Balaenoptera musculus*	E	E	Yes	Project area overlaps with possible feeding area.	High
Burrunan dolphin	*Tursiops australis*	CE	NL	No	BIA not defined.	Low
Dusky dolphin	*Lagenorhynchus obscurus*	NL	NL	Yes	BIA not defined.	Low
Fin whale	*Balaenoptera physalus*	NL	V	Yes	BIA not defined.	Low
Humpback whale	*Megaptera novaeangliae*	CE	V	Yes	No BIAs overlap the Project area	Known
Killer whale, orca	*Orcinus Orca*	NL	NL	Yes	BIA not defined.	Low
New Zealand fur seal, long-nosed fur seal	*Arctocephalus forsteri*†	V	NL	No	BIA not defined.	Known
Pygmy right whale	*Caperea marginata*	NL	NL	Yes	BIA not defined.	Low
Sei whale	*Balaenoptera borealis*	NL	V	Yes	BIA not defined.	Low
Southern right whale	*Eubalaena australis*	E	E	Yes	Project area overlaps with migration route	Known
Reptiles						
Green turtle	*Chelonia mydas*	NL	V	Yes	No BIAs overlap the Project area	Low

Common Name	Scientific Name	FFG Act Status*	EPBC Act Status#	EPBC Migratory Species?	BIA within Project Area?	Likelihood of Occurrence in Referral Area
Leatherback turtle, leathery turtle	*Dermochelys coriacea*	CE	E	X	No BIAs overlap the Project area	Low
Loggerhead turtle	*Caretta caretta*	NL	E	X	No BIAs overlap the Project area	Low

* FFG Act definitions: CD = Conservation Dependant, V = Vulnerable, E = Endangered, CE = Critically Endangered, NL = Not Listed
# EPBC Act definitions = CD = Conservation Dependant, V = Vulnerable, E = Endangered, CE = Critically Endangered, NL = Not Listed
† The FFG Act lists the long-nosed fur seal's binomial name as *Arctophoca australis forsteri*, the split into the genus A*rctophoca* is still under consideration and for the purposes of this assessment, the species has been grouped with *Arctocephalus forsteri*.
** Based on O'Hara and Barmby (2000)

4.11 Introduced and Invasive Species

At least 250 species of marine flora and fauna have been introduced to Australia's marine waters (Parks Victoria, 2018) with over 115 introduced species recorded in the southeast region of Australia (NOO, 2004). Not all of these introduced species are considered invasive pest species and native species can also become pest species. Eleven of the 115 species have been recognised as pest species (NOO, 2004). The most concerning marine pest species occurring in Victorian waters are listed in Table 4.4 along with details about their known distribution.

Table 4.4 – Key Marine Pest Species in Victoria

Common Name	Scientific Name	Known Distribution in Victoria
Northern pacific seastar	*Asterias amurensis*	Well established in Port Phillip only but recorded (and subsequently controlled) at San Remo (Inverloch) Tidal River (Wilsons Promontory) and Gippsland Lakes.
Wakame	*Undaria pinnatifida*	Well established in Port Phillip as well as Apollo Bay Harbour, but not present elsewhere in Victorian waters.
Pacific oyster	*Crassostrea gigas*	Known to Western Port. Also recorded in Port Phillip, Tidal River, Corner Inlet (Wilsons Promontory) but not considered a pest in these locations.
Green shore crab	*Carcinus meanus*	Widespread across Victoria and common in Port Phillip and Western Port.
European fan worm	*Sabella spallanzanii*	Well established in Port Phillip and other local ports in Victoria but not yet observed in Western Port or elsewhere.
New Zealand screw shell	*Maoricopus roseus*	Widespread in coastal areas of eastern Victoria including Cornet Inlet and has been found west of Wilsons Promontory in Waratah Bay and Shallow Inlet. Range expanding westward, not known to Port Phillip or Western Port.

Source: Parks Victoria, 2018.

Aquarium caulerpa (*Caulerpa taxifolia*) is considered a major threat to Victorian waters but despite being well established in New South Wales and South Australia is not yet established in Victoria. Other key marine pests known to Victoria, but not the Project area, include the red algae (*Grateloupia turuturu),* dead man's fingers (*Codium fragile* ssp. *fragile*) and the Asian date muscle (*Musculista senhousia*).

While native to Victorian waters, the purple urchin (*Heliocidaris erythogramma*) has become over-abundant in parts of Victoria's marine environment where they have caused substantial damage to seagrass and macroalgae causing barrens.

An outbreak of abalone viral *Ganglioneuritis* occurred in farmed populations of abalone in southwest Victoria in late 2005 and early 2006. While it was eradicated from these farms it entered the wild and has been detected in wild populations between Cape Otway and Discovery Bay Marine Park (DoA, 2014), but not within the eastern part of the central abalone zone, where the Project is located. The virus was also confirmed in Tasmania in 2008 and 2009 in both wild stocks and at processing facilities and outbreaks were again reported in Tasmania in 2010 from one farm and two processing facilities (DoA, 2014). The virus can be spread through direct contact, through the water column without contact and from contact of abalone with virus-contaminated mucus and seawater (DoA, 2014).

4.12 Victorian Marine Protected Areas

4.12.1 Ninety Mile Beach Marine National Park

Ninety Mile Beach MNP extends 5 km along the coastline and 5 km offshore and is located within the referral area (See Figure 4.4). The park is on Gunai/Kurnai country and contains important intertidal and subtidal soft sediment habitat for a range of species, including sessile invertebrates, algae, fish and migratory whales (Parks Victoria 2006).

The main habitats within the park are intertidal soft sediment, extensive subtidal soft sediment and the water column. Scattered low calcarenite reefs are reported to occur within the MNP (Parks Victoria, 2006), although more recent reporting suggests that subtidal reefs occur along Ninety Mile Beach, but have not been mapped within the MNP (Barton et al., 2012). Such reefs may be present within the MNP albeit covered by sand. Intertidal habitat at the park is limited to soft sediments, resulting from a steep, course-grained beach and extensive dune system. Subtidal soft sediment habitats support a diverse range of invertebrate species, dominated by crustaceans (Plummer et al., 2003). Recreational fishing data from the east of the MNP indicates the presence of Australian salmon (*Arripis sp.*), snapper (*Pagrus auratus*), tailor (*Pomatomus saltarix*) and flathead. Gummy shark (*Mustelus antarcticus*) pups potentially inhabit the nearshore sandy areas of the MNP (Plummer et al., 2003). The water column is the largest habitat in the MNP and supports both transient and resident species.

Species of conservation significance that occur in the MNP are generally transient marine mammals and reptiles. The southern right whale (*Eubalaena australis*) uses the park on its migration route (Barton et al., 2012). Reptiles of conservation significance not recorded but likely from time to time as vagrants include the leatherback turtle (*Dermochelys coriacea*), loggerhead turtle (*Dermochelys coriacea*), green turtle (*Chelonia mydas*), olive ridley (*Lepidochelys olivacea*) and the yellow-bellied sea snake (*Pelamis platurus*) (Barton et al., 2012). Aggregations of juvenile white sharks (*Carcharodon carcharias*) also occur within the MNP (Barton et al., 2012). The New Zealand fur seal (*Arctophoca forsteri*) and Australian fur seal (A*rctocephalus pusillus doriferus*) have also been recorded in the park.

The key threats to the conservation of the MNP are invasive marine pests from ballast water/hull fouling, benthic fishing adjacent to the MNP, introduced pathogens via fish bait and climate change (Carey et al, 2007).

4.12.2 Nooramunga Marine and Coastal Park

Nooramunga Marine and Coastal Park (Nooramunga) is located 22 km southwest of the referral area. Nooramunga covers approximately 302 km^2 and falls within the Corner Inlet Ramsar site. Nooramunga features mostly intertidal mud and sand flats which drain into Bass Strait (Monk et al., 2011).

The key values of Nooramunga are the extensive subtidal seagrass habitat, intertidal mudflats and large extents of white mangrove and saltmarsh. Globally important populations of migratory birds feed on the invertebrates that thrive in the mud flats, while the seagrass beds support diverse fish communities including Australian salmon (*Arripis sp*), flathead species, southern garfish (*Hyporhamphus melanochir*) and gummy sharks (*Mustelus antarcticus*) (DSEWPC, 2011).

Key threats to Nooramunga include (DSEWPC, 2011):

- Poor water quality (nutrients, sediment loads, suspended sediments and water-column turbidity).
- Invasive plants including spartina (*Spartina angelica* and *Spartina x townsendii*) and the green macroalga (*Codium fragile ssp tomentosoides*).
- Invasive animals including the northern Pacific seastar (*Asterias amurensis*), European shore crab (*Carcinus maenas*), and Mediterranean fanworm (*Sabella spallanzanii*).
- Oil spills.
- Land use and development.
- Flow modifications.
- Rising sea levels and increased frequency in storm surges.
- Changes in rainfall and runoff.

4.13 Commonwealth Marine Area

4.13.1 Overview

Part of the referral area (1,360 km^2) is located within the Commonwealth marine area, which stretches from the three nautical mile limit to the outer extent of the referral area. Both potential offshore wind farm development areas are located within the Commonwealth marine area and part of the cable route corridor will also be within Commonwealth waters.

Commonwealth marine areas are MNES under the EPBC Act. An action requires approval if it has, will have, or is likely to have a direct or indirect significant impact on the environment.

The referral area within Commonwealth waters features water depths between 20 and 65 m water depth (See Figure 4.1) and a primarily gently sloping sandy seabed, characterised by primarily medium to very coarse sand (See Figure 4.2). The majority of available data on benthic communities in the referral area is limited to the nearshore environment within Victorian coastal waters. As such, in comparison far less is known about the benthic habitat within the

Commonwealth marine area. EARPL (2019) report that ROV surveys of the seabed at the Snapper operational area, located northeast of the referral area and in comparable water depths, found polychaetes and crustaceans to the most abundant infaunal taxa. The location of reefs within the Commonwealth waters part of the referral area are not well known, but as for the nearshore reefs, they are likely to be patchy, predominantly low profile, calcarenite reefs that may be exposed or covered by a sediment veneer and support a diverse community of sessile and mobile biota. Parry et al. (1990) indicate a band of low-profile limestone reef occurring across the referral area in approximately 30 m water depth, which is close to the nearshore extent of the Commonwealth waters.

The Commonwealth waters of the referral area include BIAs for the great white shark, pygmy blue whale and southern right whale (Section 4.8) and Commonwealth commercial fisheries (Section 4.14.3).

4.13.2 Commonwealth Marine Reserves

There are no Commonwealth marine reserves located in the referral area. The closest Commonwealth marine reserves are:

- Beagle Marine Park (67 km southwest of the referral area, Figure 4.4).
- East Gippsland Marine Park (168 km northeast of the referral area).

Considering their distance from the referral area, no impact to Commonwealth marine reserves are expected from Project activities, although it is noted that vessels coming to and from Port of Hastings may intersect the Beagle Marine Park. The Beagle Marine Park is a shallow water (i.e., 50 to 70 m) marine park which includes several islands within Bass Strait. Marine habitats within the park feature diverse benthic communities and rocky reefs which support a variety of sponges (Parks Australia, 2021). The park also includes important foraging grounds for the pygmy blue whale and also supports top predators such as great white sharks and orcas which feed on the rich marine life of the area (Parks Australia, 2021).

4.14 Existing and Proposed Uses of the Marine Project Area

4.14.1 Petroleum Exploration and Production and Offshore Industrial Assets

The referral area is located within the Gippsland Basin, one of Australia's most prolific hydrocarbon provinces, which contains a number of offshore platforms and a network of pipelines that deliver produced hydrocarbons to onshore processing facilities near Longford (Figure 4.10).

The majority of the assets in the Gippsland Basin are operated by Esso Australia Resources Pty Ltd (EARPL) of the Gippsland Basin Joint Venture with BHP Billiton Petroleum (Bass Strait) Pty Ltd. EARPL produce oil and gas from Commonwealth water in the Gippsland Basin. There are 23 oil and gas platforms in Bass Strait operated by EARPL, which include staffed and unstaffed production platforms, monotowers and subsea completions. A marine exclusion zone exists around oil and gas assets, including subsea wellheads and pipelines. The referral area is in proximity to several of EARPL's offshore assets including:

- Dolphin (steel gravity based monotower), located within the referral area.

REGIONAL PETROLEUM AND INDUSTRIAL ASSETS AND 2019 TO 2020 COMMERCIAL SHIPPING TRAFFIC

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FIGURE 4.10

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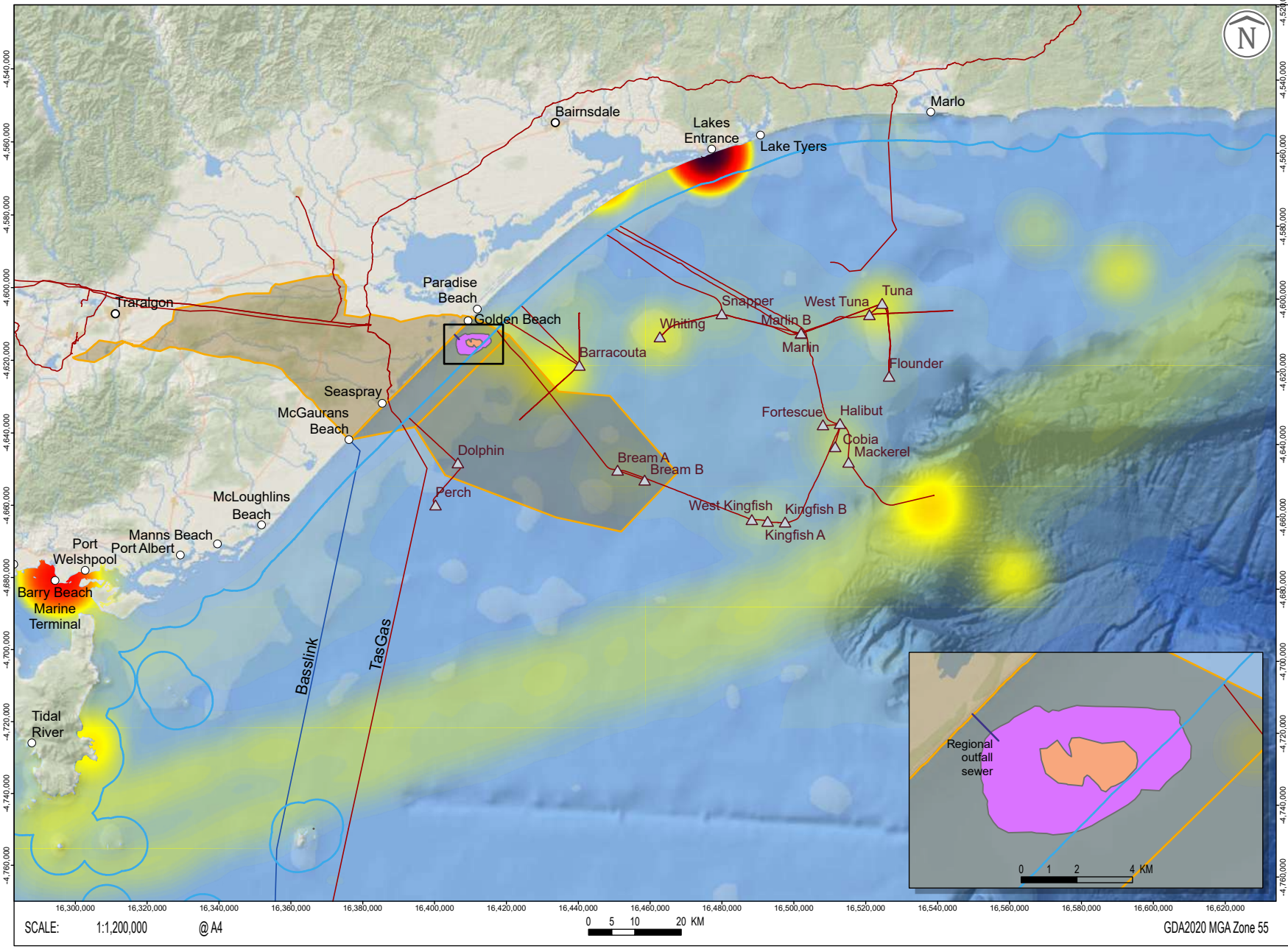

- Oil and gas platforms
- Oil and gas pipelines
- Basslink electricity interconnector
- State coastal water (3nm)
- Seadragon referral area
- Golden Beach Gas Project Area
- CarbonNet Pelican Site

Vessel traffic density

- Sparse
- Dense

Issue Date: 2021.11.18

Map ID: 01415A_3_GIS007_v0

Figure Number: 01415A_3_F04-10_GIS_v0-e_es

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- Tarwhine (subsea completion), located within the referral area.
- Bream A (steel jacket platform), located within the referral area.
- Barraccouta (steel jacket platform), 6 km from the referral area.
- Bream B (concrete gravity-based platform), located within the referral area.
- Perch (steel gravity based monotower), 7 km from the referral area.
- Offshore pipeline network including the Perch-Dolphin-Seaspray pipeline, Bream A to Seacombe pipeline, Tarwhine-Barracoutta pipeline and Barracoutta to Seacombe pipeline (Figure 4.10).

In addition to these EARPL assets, a number of other assets intersect, or are located close to, the referral area (Figure 4.10). These include:

- BassLink Interconnector 400kV DC electricity connector which runs between Bell Bay in Northern Tasmania and Loy Yang in Gippsland and crosses the shore at McGauran Beach in Seaspray. BassLink intersects the referral area.
- Tasmanian Gas Pipeline, which supplies natural gas to Tasmania from Longford, Victoria to Bell Bay in Tasmania. The pipeline crosses the shore at Seaspray and approximately 3.7 km of the nearshore section of the pipeline intersects the referral area.
- Gippsland Water regional outfall sewer, an ocean outfall outlet pipe, which discharges treated effluent approximately 1.3˚km offshore in approximately 15 m water depth and is located within the referral area (Figure 4.10).

The majority of the proposed CarbonNet Project Pelican site, an offshore carbon capture and storage network in Bass Strait, is also located within the referral area (Figure 4.10). To date, investigations to support this project have included a marine seismic survey in 2018 and drilling of an appraisal well in January 2020. Further work is being conducted to assess the suitability of the Pelican site for carbon dioxide storage.

The proposed Golden Beach Gas Project is also located within the nearshore northern part of the referral area (Figure 4.10). The offshore component of this project would involve subsea wellheads and a subsea pipeline.

4.14.2 Victorian Managed Fisheries

4.14.2.1 Central Abalone Fishery

The fishery targets blacklip abalone (*Haliotus rubra*) and greenlip abalone (*H. laevigata*) which are collected by hand using surface air supply from small fishing boats. Abalone are caught along the majority of the Victorian coastline from rocky reefs. The abalone fishery is one of the largest by value in Victoria.

The Victorian Wild Harvest Abalone Fishery Management Plan provides objectives and strategies and actions for managing the fishery. There are 34 licences in the Central Zone which extends from Warnambool around to Lakes Entrance and includes the referral area (Figure 4.11). Commercial harvesting of abalone is permitted all year round. The majority of the wild caught abalone are caught from the eastern part of the Central Zone, around the back beaches of the Mornington Peninsula and Phillip Island.

4.14.2.2 Rock Lobster and Giant Crab Fishery

The Victorian Rock Lobster Fishery is based primarily on one species, the southern rock lobster (*Jasus edwardsii*), which is found on coastal reefs from the southwest coast of Western Australia to the south coast of New South Wales, including Tasmania and New Zealand.

The Rock Lobster Fishery is Victoria's most valuable commercial fishery. Almost all of the catch is now exported to international markets, mostly in Asia, with the remainder sold on the domestic market. The Victorian Government has jurisdiction over the commercial rock lobster fishery in Commonwealth waters adjacent to Victoria through an Offshore Constitutional Settlement Agreement with the Commonwealth Government. The fishery is divided into two separately managed zones: the Eastern Zone and the Western Zone. The Eastern Zone extends west from the New South Wales border (150º20'E) to Apollo Bay (143º40'E) (Figure 4.12). The Western Zone extends from Apollo Bay west to the border with South Australia (140º57.9'E). The referral area falls within the Lakes Entrance region, Lakes Entrance being the main port used to service the region. Fishing effort within the referral is unknown; however DEDJTR (2018) reports that fishing catch data provided by the Victorian Fisheries Authority (VFA) indicating low rock lobster catch from the referral area.

While the giant crab (*Pseudocarcinus gigas*) fishery is linked to the rock lobster fishery and a by-product of this fishery. The fishery is however limited to the Western Zone of the rock lobster fishery which is outside of the referral area.

VICTORIAN ABALONE FISHERY

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FIGURE 4.11

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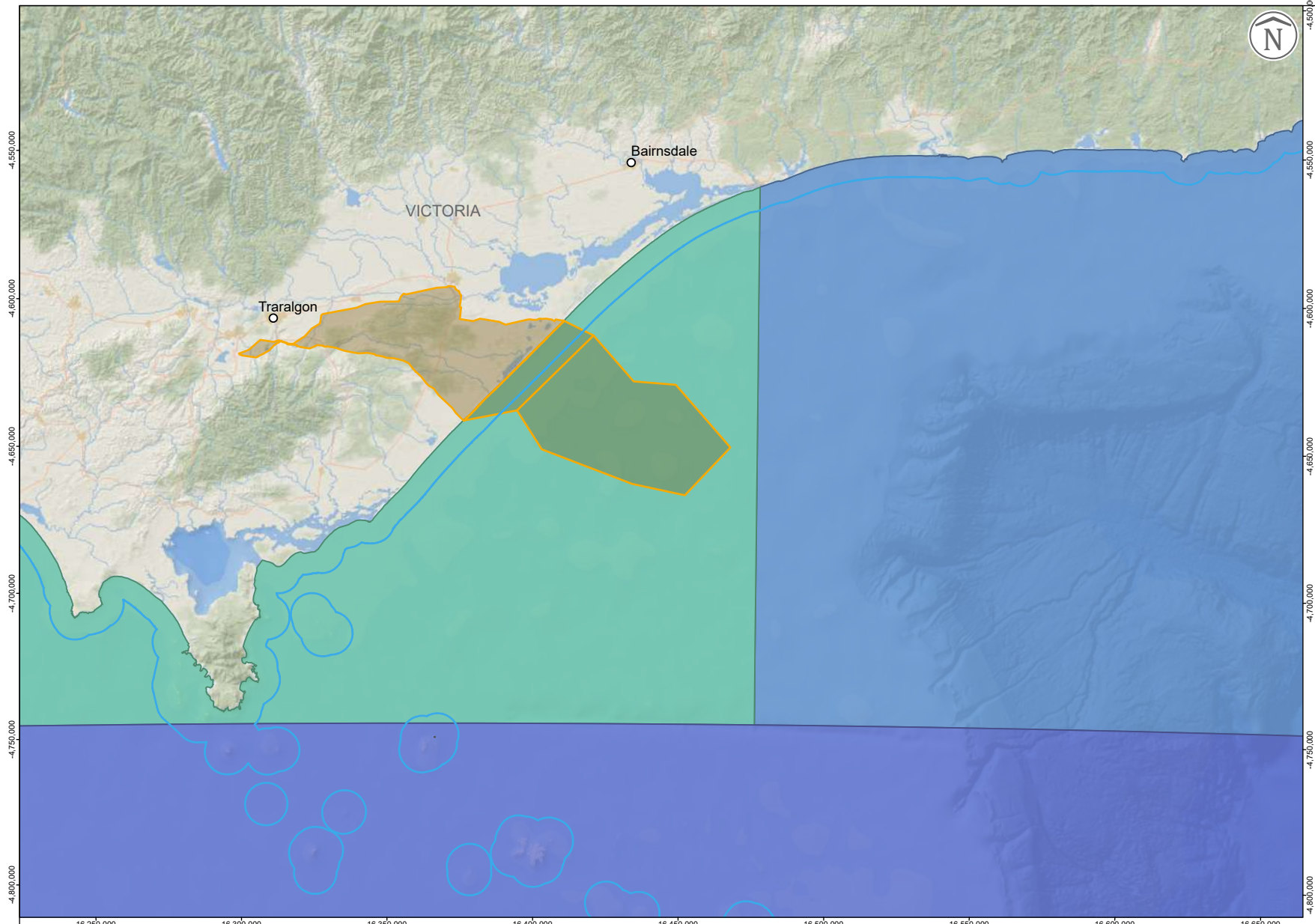

State coastal water (3nm)

Seadragon referral area

Victorian Abalone Fishery

Victorian Central Abalone Zone

Victorian Eastern Abalone Zone

Tasmanian Waters for Abalone

Issue Date: 2021.11.18

Map ID: 01415A_3_GIS010_v0

Figure Number: 01415A_3_F04-11_GIS_v0-c_es

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VICTORIAN ROCK LOBSTER AND GIANT CRAB FISHERY

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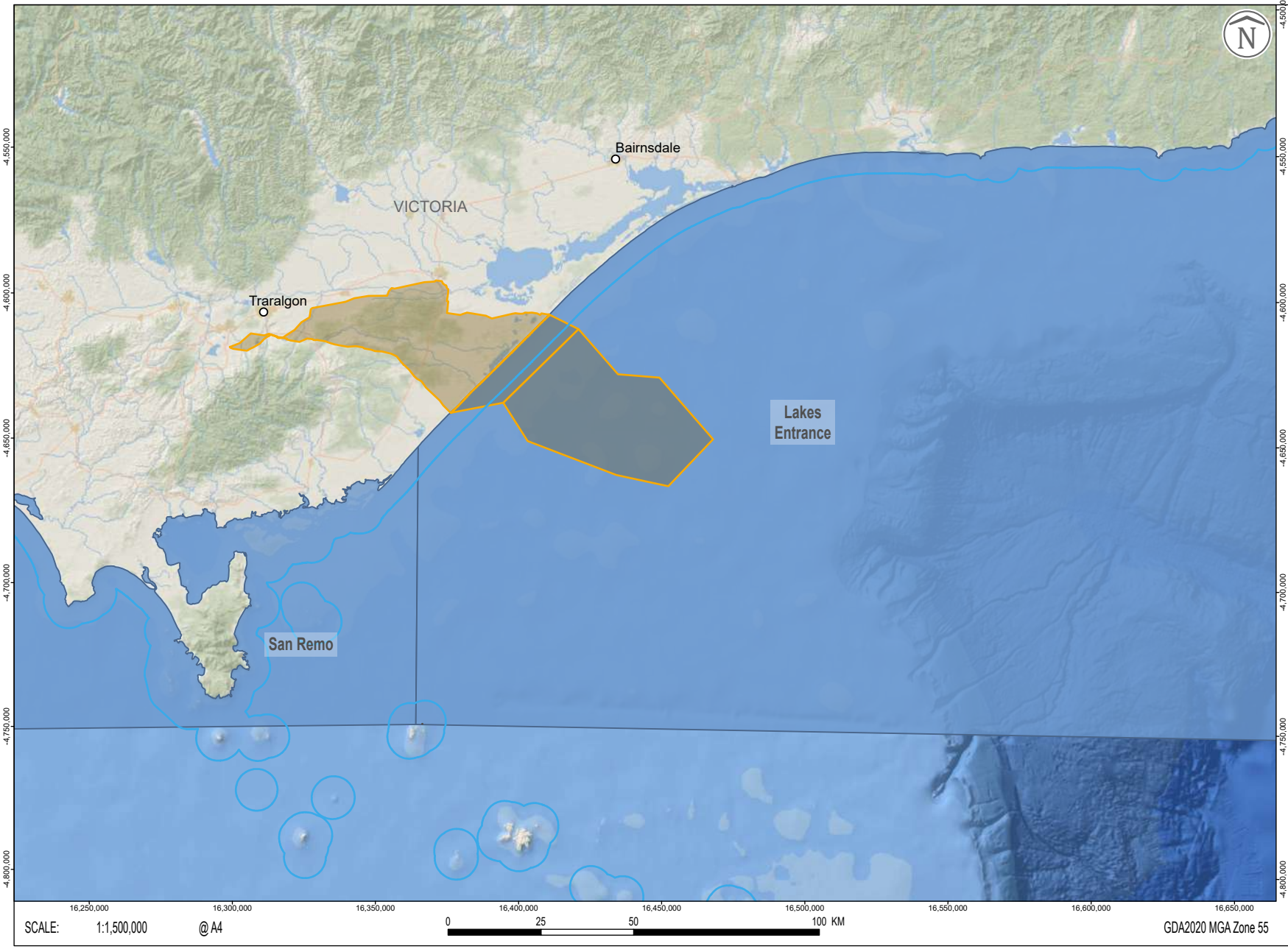
FIGURE 4.12



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State coastal water (3nm)

Seadragon referral area

Victorian Giant Crab and Southern Rock Lobster Fishery

Eastern

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Map ID: 01415A_3_GIS009_v0

Figure Number: 01415A_3_F04-12_GIS_v0-c_es

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4.14.2.3 Bass Strait Scallop Fishery

The Victorian Scallop Fishery is based on the species, *Pecten Fumatus*. Occasionally, incidental catches of doughboy scallops (*Chlamys asperrimus*) are taken as by-product, but they are generally not found in commercial quantities.

The Victorian Scallop Fishery is one of three scallop fishing zones in the Bass Strait and extends out from the coastline to 20 nautical miles. Most of the fishing activity in the Victorian zone has historically occurred in the eastern waters of the state where scallop beds are targeted, with vessels accessing the area from Lakes Entrance and Welshpool.

Commercial fishing for scallops is by dredging; vessels tow a single dredge that is dragged along the seabed. To participate in the Scallop Fishery, fishers must possess a Victorian Scallop (Ocean) Fishery Access Licence. The number of licences has been capped at 91, and approximately 10 to 15 boats operate in the fishery.

Surveys were recently conducted to investigate a scallop bed reported to the east of the Tarwhine oil field (Koopman et al., 2021). The surveyed sites were located within the referral area, with sites located in approximately 42 m water depth. The surveys identified a commercial scallop bed (See Figure 4.3) with an estimated 7,876 tonnes of legal-sized commercial scallops with a mean density of legal-sized scallops of 1.15 individuals/m^2, although the 95% confidence limit range is between 4,000 and 12,000 tonnes (Koopman et al., 2021). Commercial scallops were also recorded within the referral area within the CarbonNet Pelican Site (Figure 4.13), around the 30 m depth contour.

4.14.2.4 Wrasse Fishery

The Victorian Wrasse (Ocean) Fishery extends along the Victorian coastline out to the 20 nautical mile limit and is divided into three management zones (east, central and west) with the referral area located in the east zone (Figure 4.14). Bluethroat wrasse (*Notolabrus tetricus*) and purple wrasse/saddled wrasse (*N. fucicola*), comprise approximately 90 per cent of the commercial Victorian wrasse harvest. The majority (90%) of the catch is caught using hook and line with the remainder caught in rock lobster pots (by fishers holding rock lobster and wrasse fishing licences) in water depths less than 30 m. There are currently 22 issued licences for the fishery. DEDJTR (2018) report that in recent years, catches have been highest off the central coast which includes Port Phillip Heads, Western Port and Wilson's Promontory and off the west coast (Portland).

VICTORIAN BASS STRAIT SCALLOP FISHERY

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FIGURE 4.13

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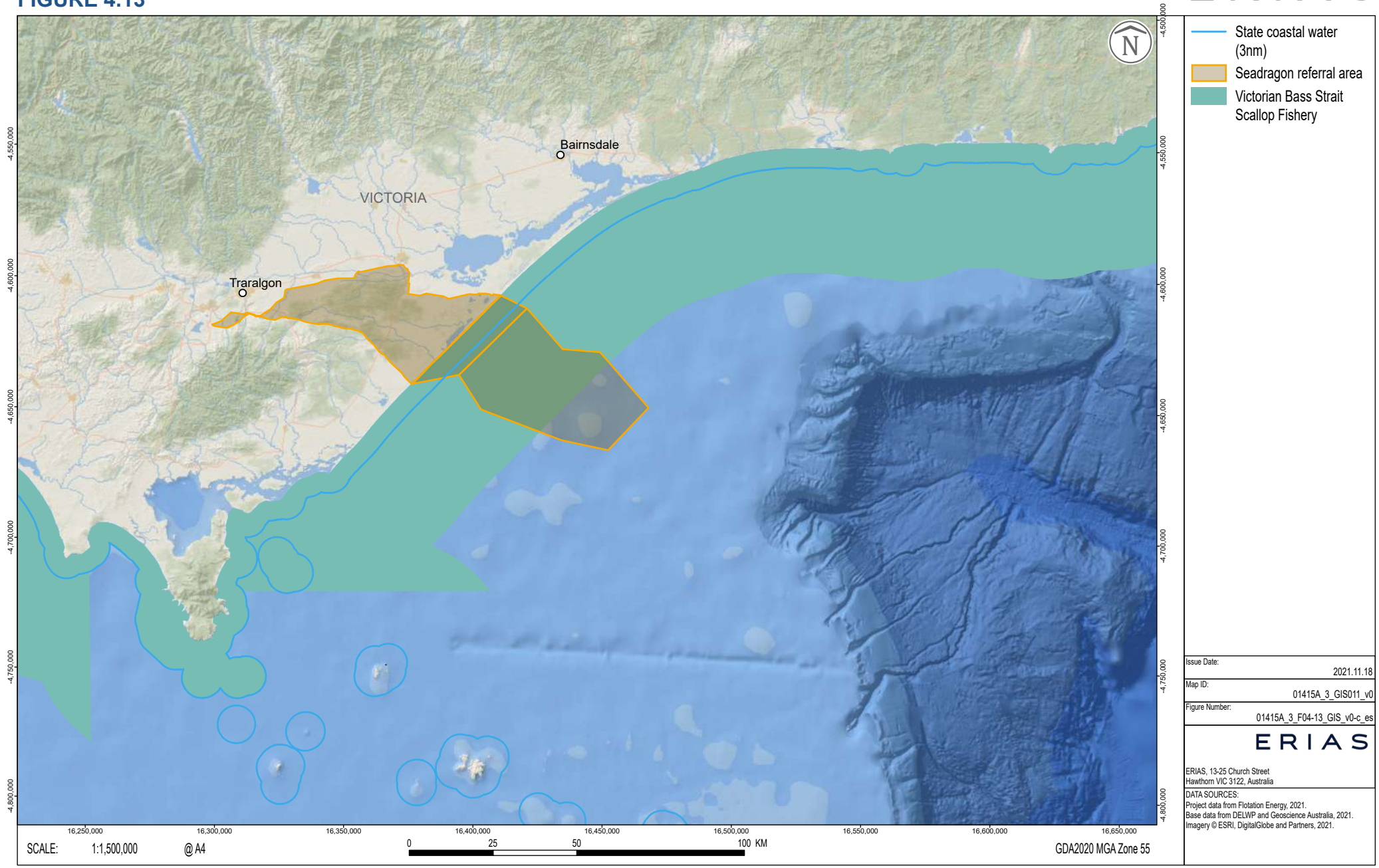

State coastal water (3nm)

Seadragon referral area

Victorian Bass Strait Scallop Fishery

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Figure Number: 01415A_3_F04-13_GIS_v0-c_es

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VICTORIAN WRASSE FISHERY

Seadragon Offshore Windfarm | Preliminary Marine Ecology Report

FIGURE 4.14

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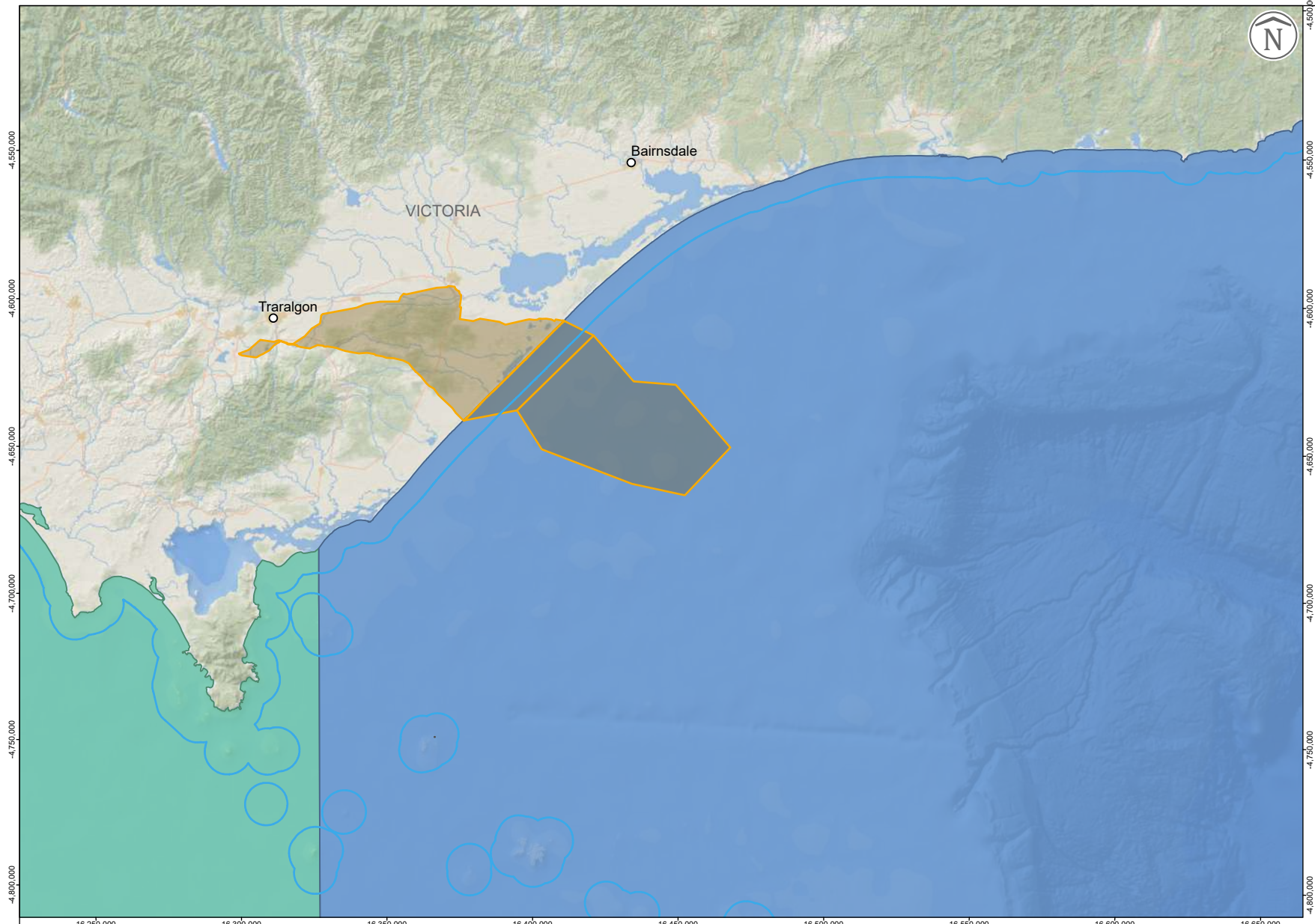

State coastal water (3nm)

Seadragon referral area

Victorian Wrasse Fishery

Central Assessment Zone

East Assessment Zone

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Map ID: 01415A_3_GIS008_v0

Figure Number: 01415A_3_F04-14_GIS_v0-c_es

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4.15.3 Commonwealth Managed Fisheries

4.15.3.1 Bass Strait Central Zone Scallop Fishery

This fishery operates in the Bass Strait above Tasmania and extends from the Victoria/New South Wales border, around southern Australia to the Victoria/South Australia border. The fishery is between the Victorian and Tasmanian scallop fisheries that lie within 20 nm of their respective coasts and intersects part of the referral area. The referral area is however located outside of the reported maximum area of waters fished, with high use zones focussed on islands in Bass Strait more than 100 km from the referral area (Figure 4.15).

4.15.3.2 The Eastern Tuna and Billfish Fishery

The Eastern Tuna and Billfish Fishery extends from Cape York in Queensland to the South Australian/Victorian border and includes the referral area; however, the referral area is outside of the reported maximum area of waters fished for 2020 to 2021, with fishing effort focussed along the New South Wales and Queensland coasts.

4.15.3.3 Southern and Eastern Scalefish and Shark Fishery.

The Southern and Eastern Scalefish and Shark Fishery (SESSF) stretches south from Fraser Island in southern Queensland, around Tasmania, to Cape Leeuwin in southern Western Australia. This fishery is managed under a quota system that limits the number of fish that boats can take in the fishery. Thirty four different species/species groups are managed under the quota system in this fishery and these are caught using a variety of methods which form sub-sectors. The referral area occurs within the Commonwealth South East Trawl Sector, the Commonwealth Scalefish Hook Sector and the Commonwealth Gillnet, Hook and Trap Sector.

Fishing area and intensity for 2020 to 2021 is shown for the following sectors and sub-sectors relevant to the referral area:

- Danish Seine Sub-sector (Trawl Sector), Figure 4.16. There was medium to low intensity fishing intensity within the referral area and high intensity fishing effort off the southeast corner of the referral area in 2020 to 2021.
- Trawl Sub Sector (Trawl Sector), Figure 4.17. The referral area is outside of the maximum fished area for 2020 to 2021 for the Trawl Sub-sector; however, there was low intensity fishing squid catch (less than 7 kg/km^2) within the referral area (Figure 4.18).
- Scalefish Hook Sector, Figure 4.19. The referral area is outside of the maximum fished area for 2020 to 2021.
- Shark Hook Sub-sector (Gillnet, Hook and Trap Sector), Figure 4.20. The referral area is within the maximum fished area for 2020 to 2021 but fishing effort was concentrated around Flinders Island and northeast Tasmania.
- Shark Net Sub-sector (Gillnet, Hook and Trap Sector), Figure 4.21. There was high and medium intensity fishing effort in 2020 to 2021 in the referral area.

BASS STRAIT CENTRAL ZONE SCALLOP FISHERY

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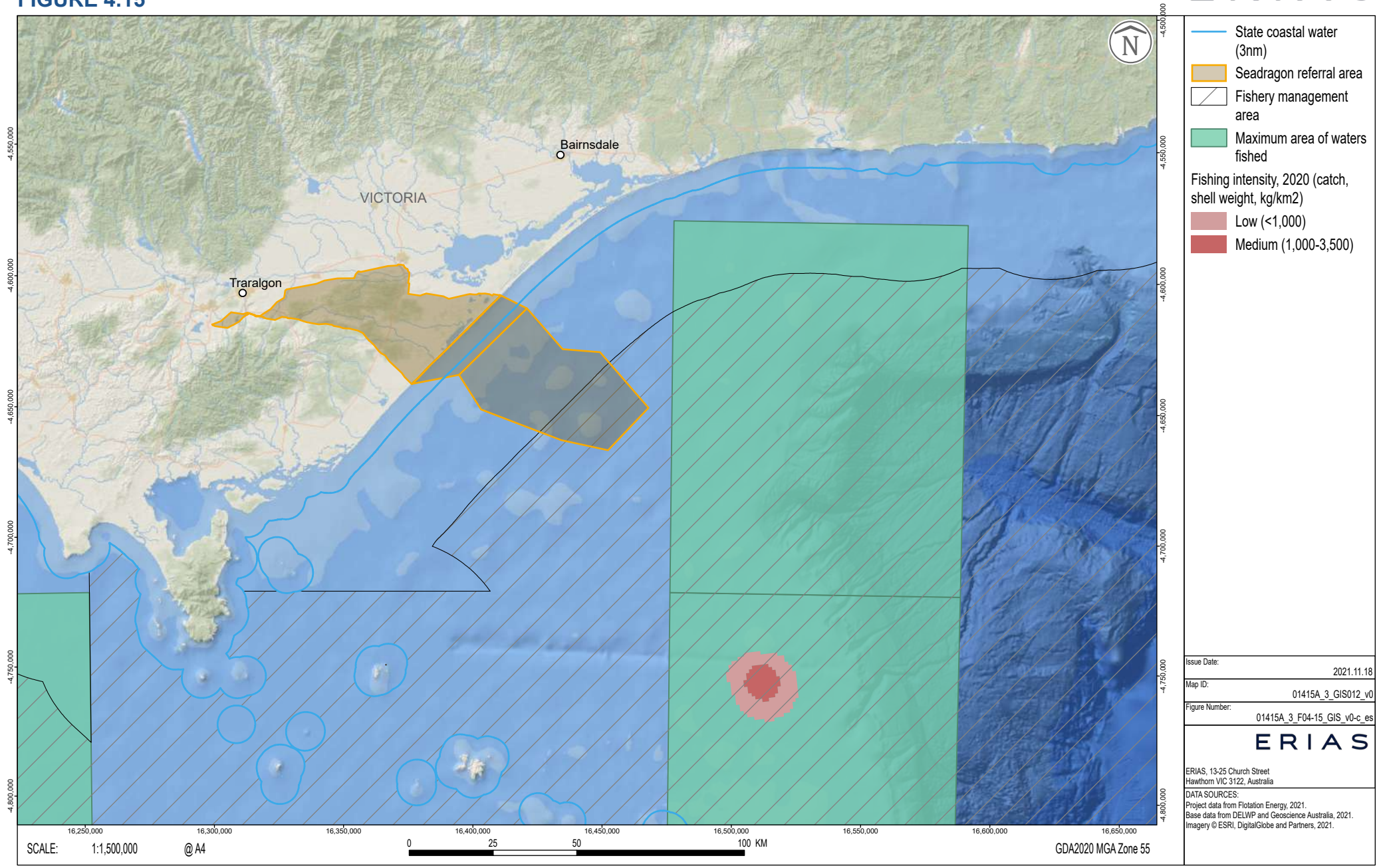
FIGURE 4.15

ERIAS



State coastal water (3nm)

Seadragon referral area

Fishery management area

Maximum area of waters fished

Fishing intensity, 2020 (catch, shell weight, kg/km2)

Low (<1,000)

Medium (1,000-3,500)

Issue Date: 2021.11.18

Map ID: 01415A_3_GIS012_v0

Figure Number: 01415A_3_F04-15_GIS_v0-c_es

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SESSF TRAWL SECTOR, DANISH SEINE SUB-SECTOR FISHING EFFORT 2020 TO 2021

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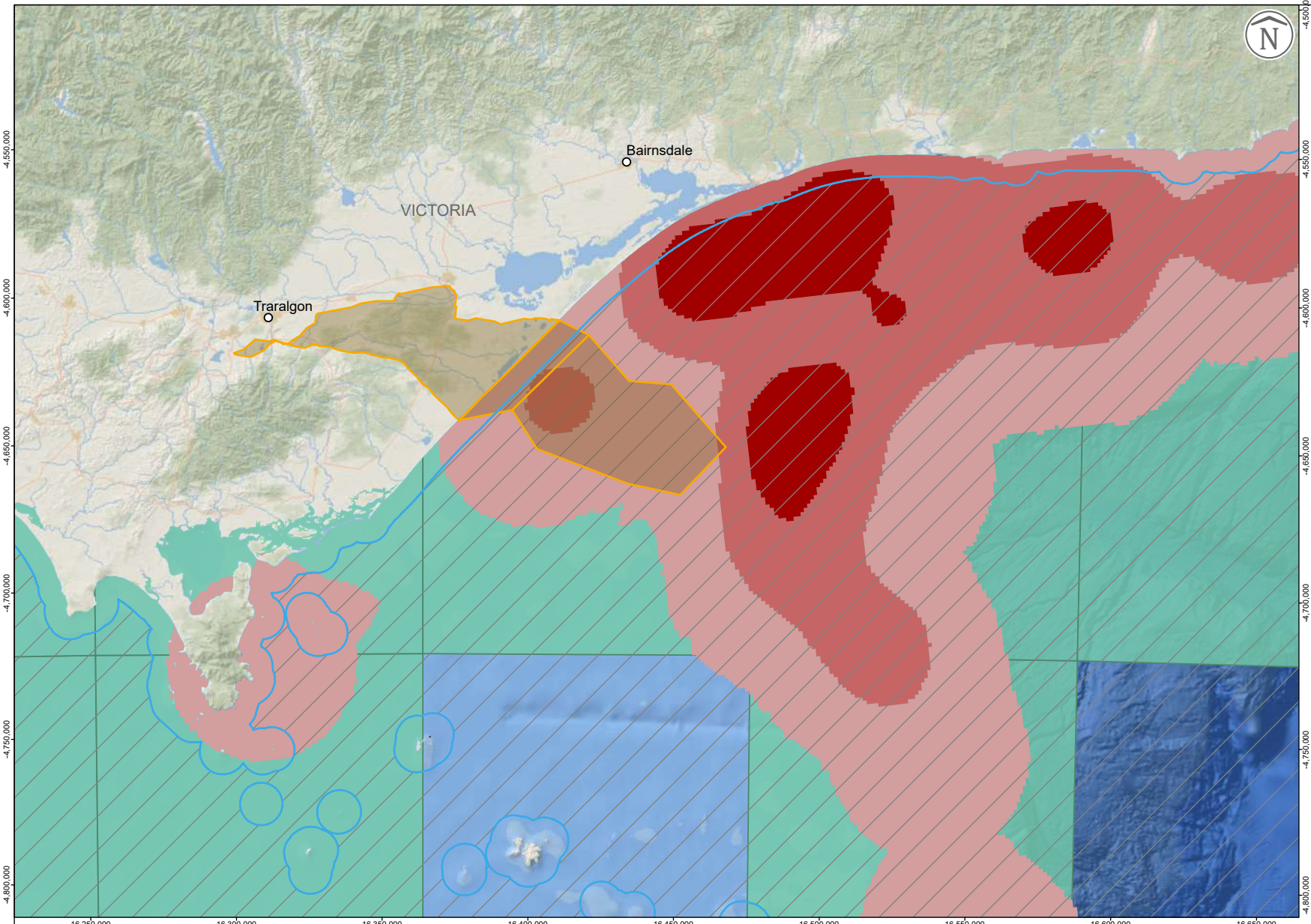
FIGURE 4.16

ERIAS



State coastal water (3nm)

Seadragon referral area

Fishery management area

Maximum area of waters fished

Fishing intensity, 2020-21 (effort, shots/km2)

Low (<0.25)

Medium (0.25-0.75)

High (0.75-1.3)

Issue Date: 2021.11.18

Map ID: 01415A_3_GIS013_v0

Figure Number: 01415A_3_F04-16_GIS_v0-c_es

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SESSF TRAWL SECTOR, TRAWL SUB-SECTOR FISHING EFFORT 2020 TO 2021

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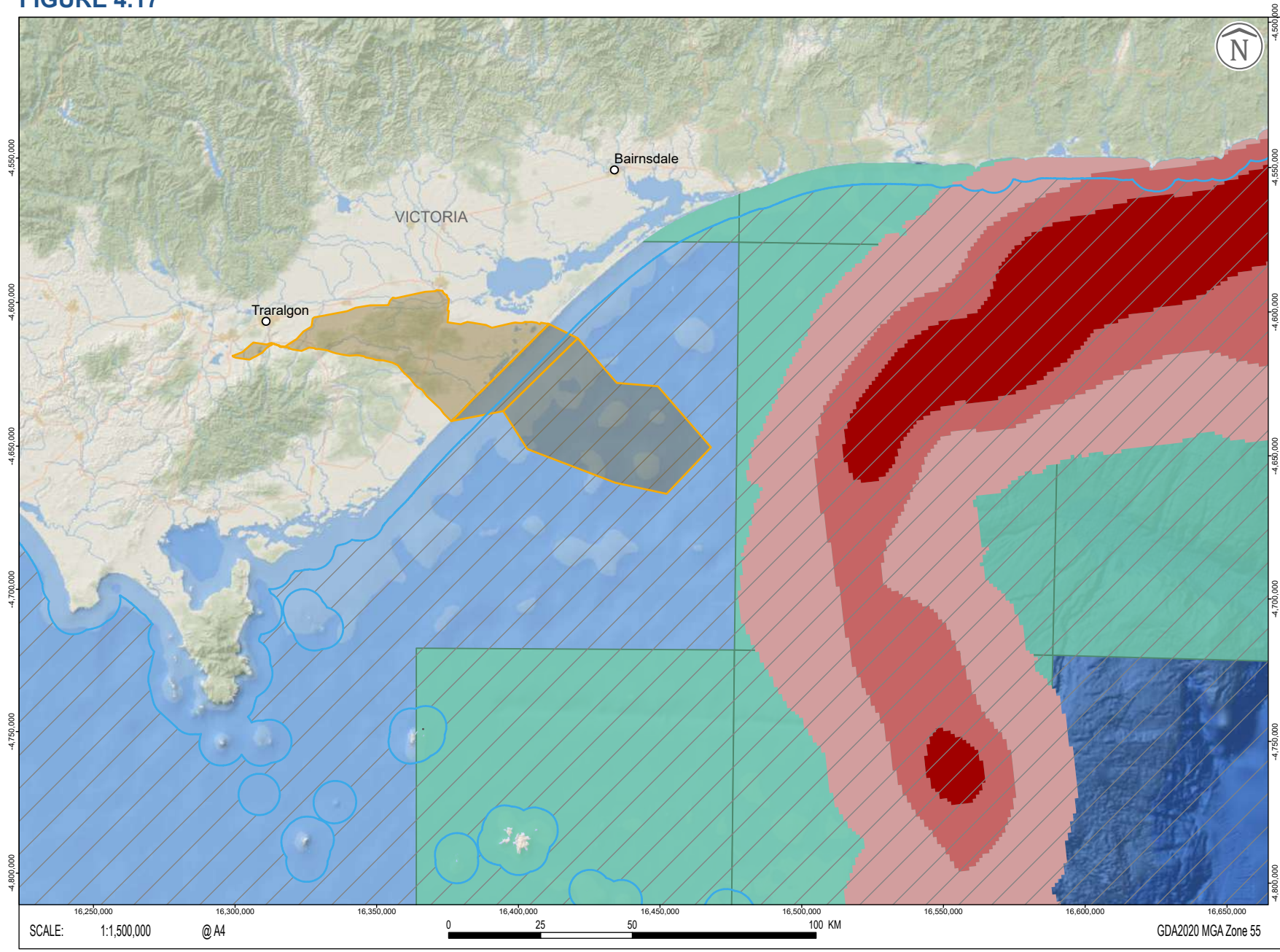
FIGURE 4.17

ERIAS



State coastal water (3nm)

Seadragon referral area

Fishery management area

Maximum area of waters fished

Fishing intensity, 202-21 (efforts, hours/km2)

Low (<0.5)

Medium (0.5-1.0)

High (1.0-1.7)

Issue Date: 2021.11.18

Map ID: 01415A_3_GIS014_v0

Figure Number: 01415A_3_F04-17_GIS_v0-c_es

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SESSF TRAWL SECTOR, SQUID CATCH 2020

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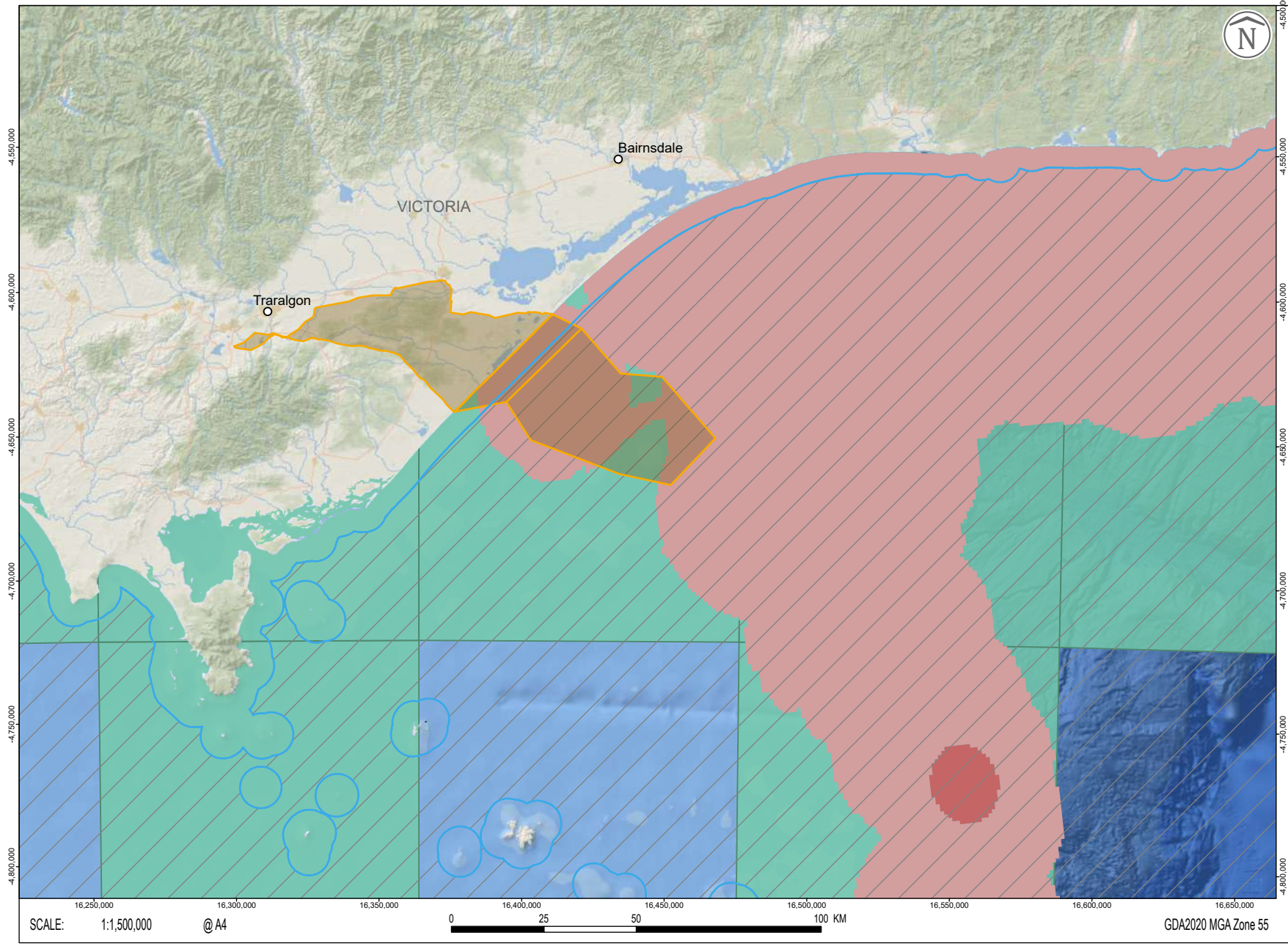
FIGURE 4.18

ERIAS



State coastal water (3nm)

Seadragon referral area

Fishery management area

Maximum area of waters fished

Fishing intensity, 2020 (catch, kg/ km2)

Low (<7)

Medium (7-25)

Issue Date: 2021.11.18

Map ID: 01415A_3_GIS019_v0

Figure Number: 01415A_3_F04-18_GIS_v0-b_es

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SESSF SCALEFISH HOOK SECTOR FISHING EXTENT 2020 TO 2021

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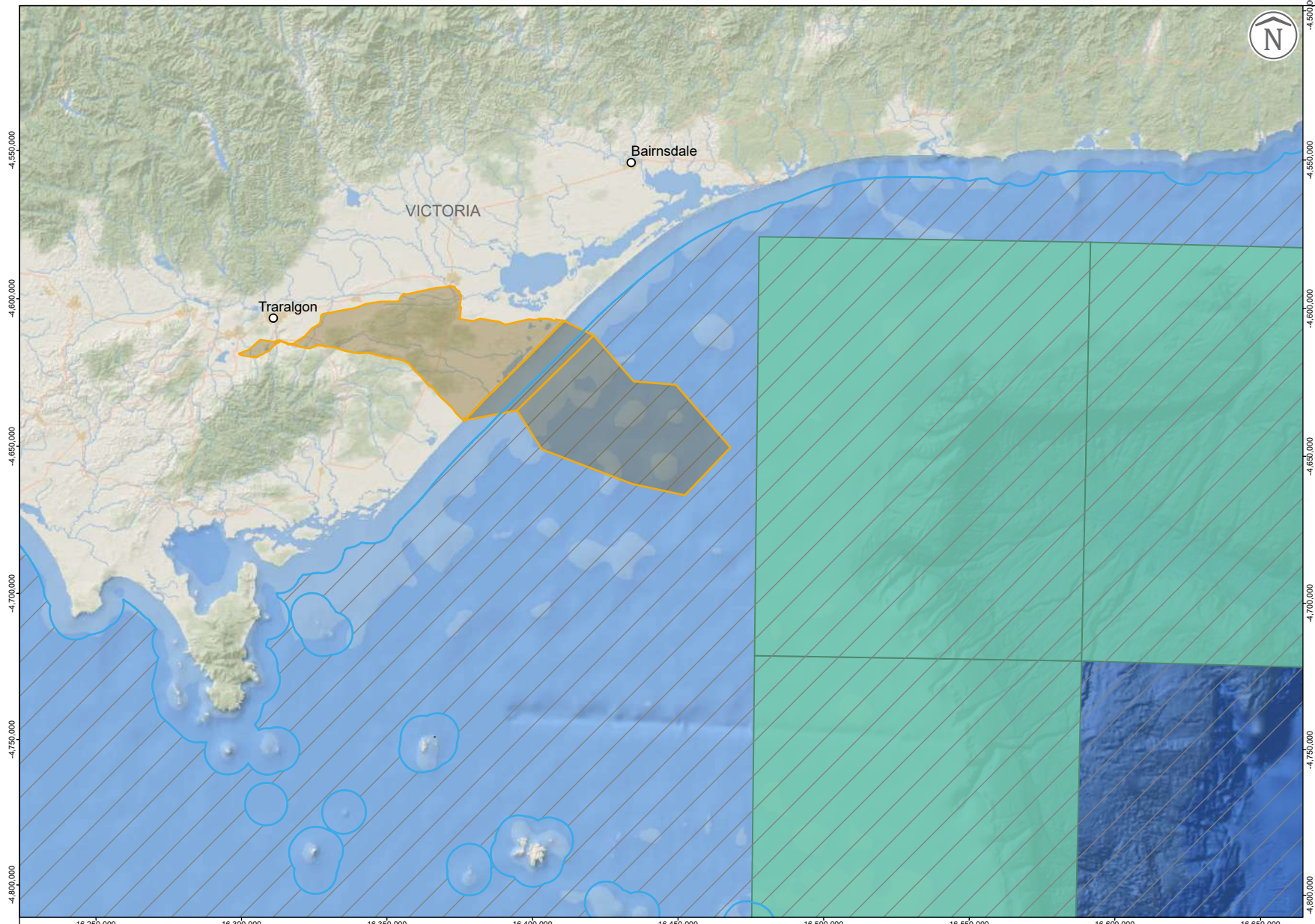
FIGURE 4.19

ERIAS



State coastal water (3nm)

Seadragon referral area

Fishery management area

Maximum area of waters fished

Issue Date: 2021.11.18

Map ID: 01415A_3_GIS015_v0

Figure Number: 01415A_3_F04-19_GIS_v0-c_es

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SESSF GILLNET, HOOK AND TRAP SECTOR, SHARK HOOK SUB-SECTOR

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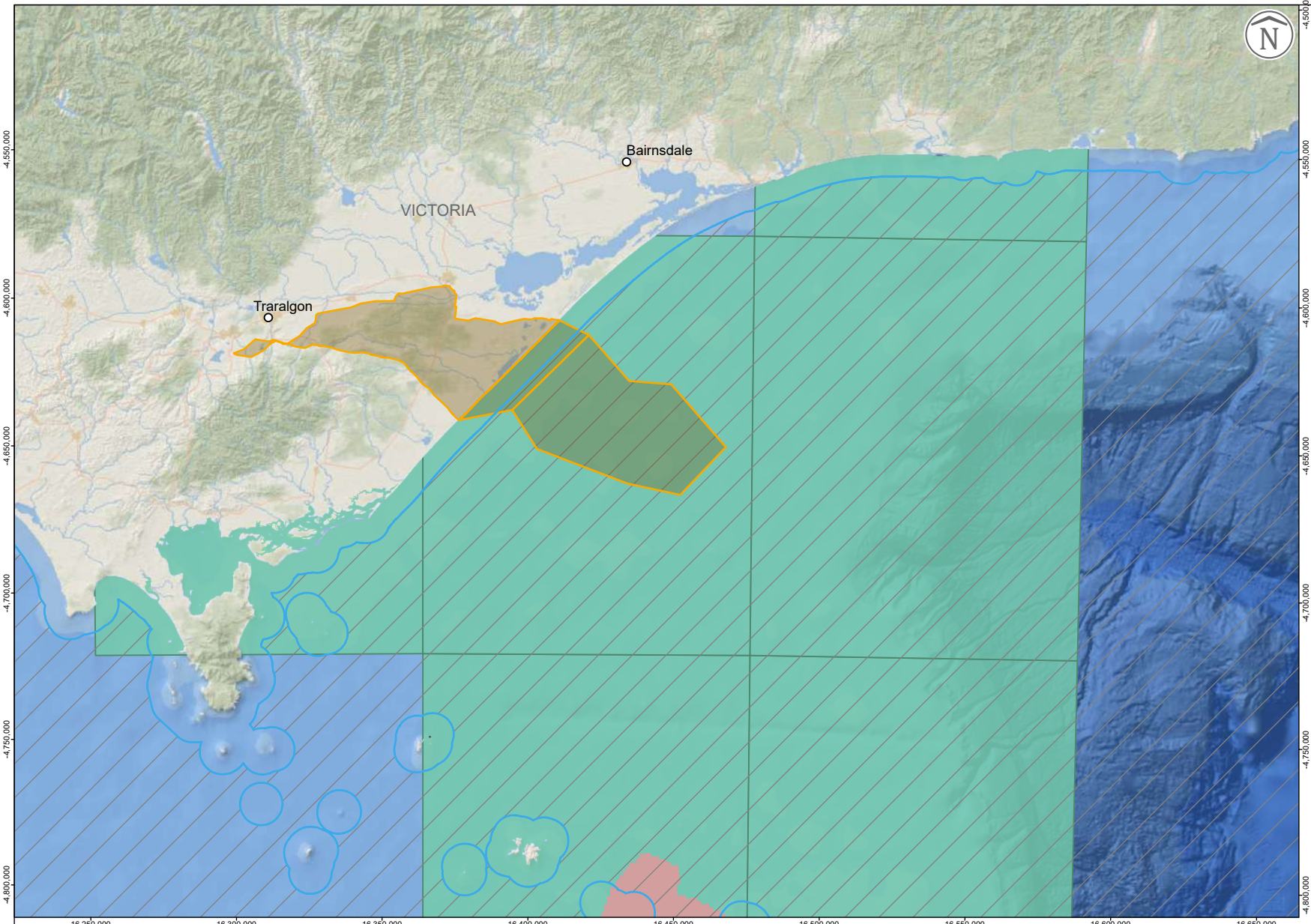
FIGURE 4.20

ERIAS



State coastal water (3nm)

Seadragon referral area

Fishery management area

Maximum area of waters fished

Fishing intensity, 2020-21 (effort, hooks/km2)

Low (<20)

Issue Date: 2021.11.18

Map ID: 01415A_3_GIS016_v0

Figure Number: 01415A_3_F04-20_GIS_v0-c_es

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SESSF GILLNET, HOOK AND TRAP SECTOR, SHARK NET SUB-SECTOR FISHING EFFORT 2020 TO 2021

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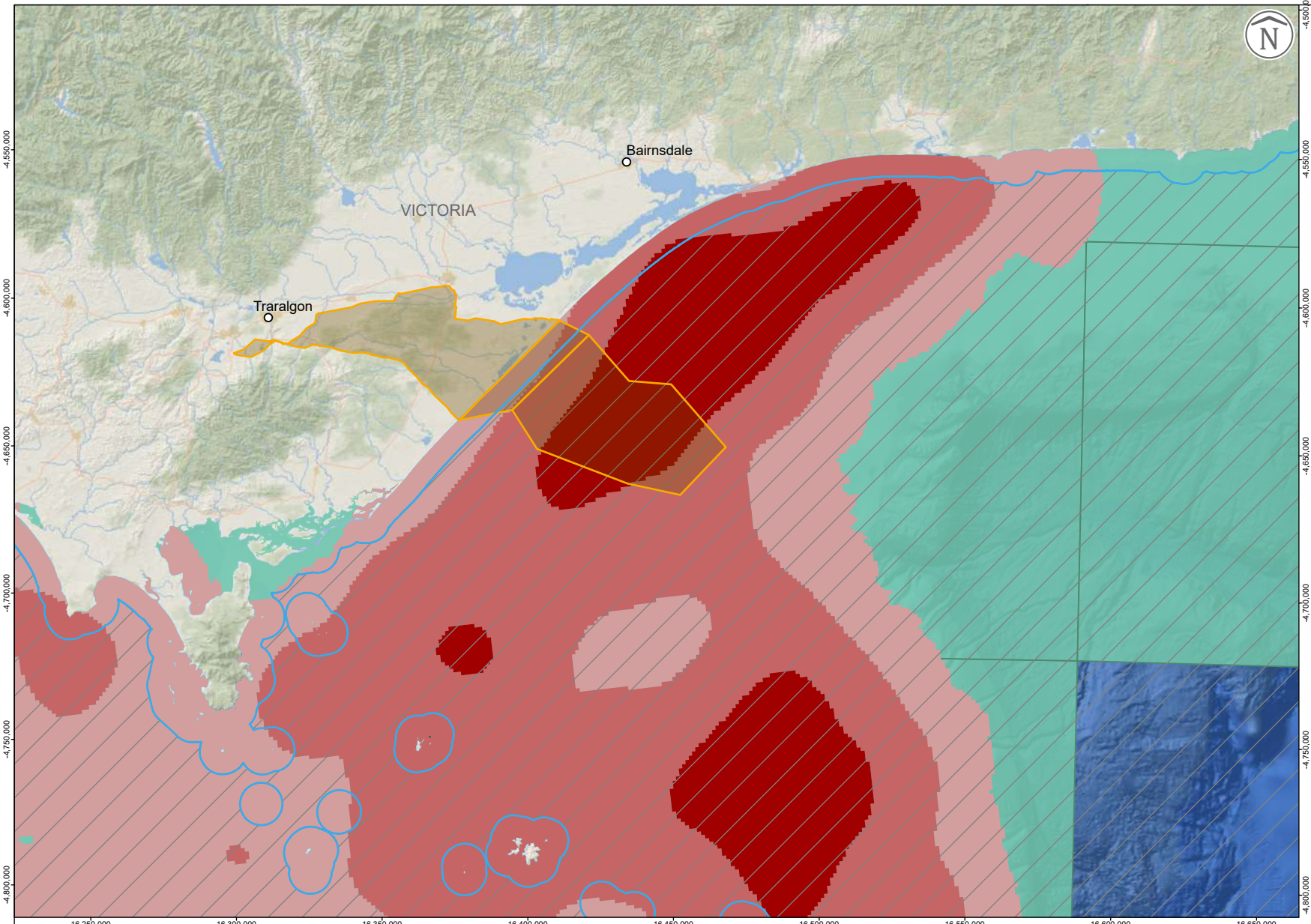
FIGURE 4.21

ERIAS



State coastal water (3nm)

Seadragon referral area

Fishery management area

Maximum area of waters fished

Fishing intensity, 2020-21 (effort, net length m km/2)

Low (<150)

Medium (150-450)

High (450-900)

Issue Date: 2021.11.18

Map ID: 01415A_3_GIS017_v0

Figure Number: 01415A_3_F04-21_GIS_v0-c_es

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4.15.3.3 Southern Squid Jig Fishery

The Southern Squid Jig Fishery is located off New South Wales, Victoria, Tasmania and South Australia and in a small area of oceanic water off southern Queensland. The fishery is a low impact, single method, single species fishery that covers almost half of the Australian Fishing Zone. The referral area is outside of the maximum fished area for 2020 to 2021, with most of the fishing effort concentrated around Portland, Victoria.

4.15.3.3 Southern Bluefin Tuna

The Southern Bluefin Tuna Fishery covers the entire sea area around Australia, out to 200 nm from the coast. This fishery is managed under a quota system that limits the amount of fish that boats can take. Southern bluefin tuna is also managed internationally. This means the current stock status is for the global catch of this species. Operators in the Southern Bluefin Tuna Fishery only catch a part of the total international catch. The referral area is outside of the maximum fished area for 2020 to 2021, with most of the fishing effort concentrated off New South Wales and South Australia.

4.15.4 Commercial Shipping

The southeast region is one of Australia's busiest shipping hubs. Shipping traffic includes cargo ships, passenger ships and cargo and vehicular ferry services (DoE, 2015) in addition to shipping traffic related to offshore petroleum exploration and production and commercial fishing activities. Bass Strait is one of Australia's busiest shipping routes along with east to west and west to east international trading routes. In the east of Victoria, Western Port is the major port, with minor ports including Port Anthony and Lakes Entrance.

The 2019 to 2020 commercial shipping traffic data for the region is shown in Figure 4.10. As indicated, there is a key shipping route that runs parallel to the coast, located approximately 10 to 20 km south of the referral area. In addition, commercial shipping movements are focussed around the various offshore petroleum assets, including EARPL's Barracouta platform, located to the east of the referral area. Lakes Entrance and Port Anthony/Barry Beach Marine Terminal are the key local ports servicing the petroleum activities.

4.15.5 Recreational Fishing and Boating

Recreational fishing along the east Gippsland coast primarily targets snapper, whiting, flathead, bream, sharks, tuna and salmon (DEDJTR, 2018). Ninety Mile Beach, Woodside Beach, Seaspray and Golden Beach are popular nighttime fishing spots during winter. The Gippsland Lakes are a popular recreational fishing location, but the sandy beaches along Ninety Mile Beach and the low profile reefs that occur parallel to the shore also serve as important recreational fishing spots (Edmunds et al., 2010). DEDJTR (2018) report that small boats are likely to target nearshore reefs while larger game fishing is undertaken further out to sea.

The Golden Beach Surf Fishing Competition is held over a weekend around Australia day and again over Easter each year between Seaspray and Loch Sport, on Ninety Mile Beach. These competition weekends can see the arrival of up to 1,000 people in the region (DEDJTR, 2018).

4.15.6 Tourism

The southeast region offers a variety of marine-based tourism opportunities including diving, charter boat cruises, whale and wildlife watching, sailing, snorkelling, surfing and kayaking. The Ninety Mile Beach area is however not one of the major tourist destination areas in the region. The Gippsland Lakes are the closest key tourist destination and the closest hub for marine-based tourism activities.

5. Potential Impacts

5.1 Overview of Potential Impacts

An overview of key potential marine impacts associated with the referral are described in Table 5.1. Both planned (e.g., seabed disturbance associated with subsea infrastructure construction) and unplanned (e.g., vessel fauna strike) impacts have been included. Potential preliminary mitigation strategies have been provided based on legislative requirements and recognised best practice. More detailed and specific mitigation and management measures would be required to be developed as part of the subsequent Project approvals process (Section 6.1).

Table 5.1 – Potential Project Impacts and Mitigation

Aspect/Activity	Potential Impact	Potential Mitigation Strategy/Approach
Construction of subsea cables, shore crossing activities, installation of platform foundations.	• Re-suspension of sediment in the water column creating turbid plumes causing decline in water quality, reduced light availability and smothering of benthic fauna. • Scour and changes to seabed and sediment transport and deposition processes resulting in habitat alterations.	• Investigation of scour protection measures. • Adherence to relevant water quality guidelines.
Underwater noise from piling, drilling, cable laying or other construction activities or vessel noise.	• Noise from construction or operation of equipment/vessels causing avoidance behaviour (by predator and prey species) or physical injury or death, masking of communications or behavioural responses. • Interruption to biologically important activities (e.g., great white shark and southern right whale).	• Compliance with EPBC interactions with cetaceans' policy. • Soft start procedures. • Marine faunal observers on vessels for high-risk activities.
Planned vessel discharges.	• Routine discharges from vessels (e.g., sewage) causing decline in water quality.	• Compliance with maritime legislation for discharges (e.g., MARPOL).
Physical presence of subsea infrastructure.	• Reduction in subsea habitat availability causing displacement of species. • Direct mortality of benthic fauna during installation. • Subsea infrastructure provides substrate for sessile invertebrates and new habitat features for other invertebrates or fish species altering existing habitat.	• Habitat mapping to identify sensitive habitat features. • Cable route selection to avoid key habitat features where practicable. • Micro-siting of infrastructure to avoid sensitive features where practicable.
Vessel movements.	• Introduction or spread of invasive marine species from contaminated hulls or ballast water discharges causing competition, predation or displacement of native fauna and flora.	• Use of local vessels, where practicable • Standard ballast water management measures.

Aspect/Activity	Potential Impact	Potential Mitigation Strategy/Approach
		• Adherence to legislative requirements for biofouling.
Unplanned spills of hazardous materials	• Fuel or chemical spills from refuelling incidents, vessel collisions, incorrect storage or transport of hazardous materials deteriorating water and sediment quality.	• Compliance with maritime legislation for discharges (e.g., MARPOL). • Standard hazardous material management measures in accordance with maritime legislation and best practice. • Consultation with other mariners to reduce risk of collisions. • Use of vessel exclusion zone around operations. • Develop spill response plans.
Dropped objects or unplanned waste disposal overboard.	• Entanglement of species in dropped objects causing injury or death. • Ingestion of dropped objects by species leading to illness or death. • Smothering of sessile invertebrates.	• Contractor practices to prevent dropped objects. • Waste and equipment storage and handling procedures. • Recovery of dropped objects/wastes if practicable.
Electromagnetic fields (EMF)	• Subsea cables emitting EMF causing avoidance behaviours or disrupting communication or navigational signals of fish or invertebrates.	• Burial or mechanical protection of subsea cables.
Vessel strike	• Presence or movement of vessels causes collision with marine fauna.	• Compliance with EPBC interactions with cetaceans policy. • Marine fauna observers on vessels during high risk periods/activities.
Artificial lighting	• Lighting from vessels, construction and operation infrastructure disrupting navigational cues of turtles, or causing aggregations of invertebrates.	• Minimise lighting to that required for safe operations.
Marine use	• Disruption of other marine users (Section 4.14) due to Project activities. • Reduced access to commercial fishing areas or decline in abundance of fisheries species, leading to loss of livelihoods	• Stakeholder consultation with potentially affected marine users.

5.2 Threatened Ecological Communities

There are no threatened marine ecological communities with potential to occur in the referral area.

5.3 Listed Threatened Species

Likely impacts to threatened species are discussed in Table 5.2.

Table 5.2 – Potential Impacts to Threatened Species

Threatened Species/Groups	Potential Impact
EPBC Listed Species	
Great white shark (*Carcharodon carcharias*).	The referral area overlaps with nursery areas (Figure 4.7) assigned as critical habitat under the great white shark recovery plan (DSEWPC, 2013). The referral area occupies 17% of the nursery area located between Wilsons Promontory and Lakes Entrance. The installation of subsea cables and underwater noise from pile driving or vessels has potential to displace white sharks from this critical habitat. Great white sharks may also be vulnerable to impacts from EMF. Turbid plumes generated by subsea construction as well as accidental spills or planned discharges could cause avoidance behaviour of white sharks reducing the area of occupancy. Similarly, indirect impacts could also occur from white shark prey species avoiding areas of construction or vessel movement. Potential for impacts to occur to the great white shark are most likely during construction and decommissioning when there is increased vessel movement and subsea activities. White sharks exhibit philopatry (i.e., returning to their place of birth for breeding) (DSEWPC, 2013), suggesting that displacement from nursery areas may have intergenerational effects. Consequently, the potential for significant impacts to the great white shark cannot be discounted.
Grey nurse shark (*Carcharias taurus*).	The grey nurse shark was expected to have a low probability of occurrence, with the nearest recording approximately 80 km from the referral area. The east coast population generally does not extend south of the NSW-VIC border. The referral area does not overlap with any critical habitat of the grey nurse shark (DoE, 2014). If present, grey nurse sharks have potential to be displaced from the area either directly due to underwater noise or changes to water quality, or indirectly from changes to prey species abundance and distribution. The referral area is not expected to support significant populations of the grey nurse shark as no critical habitat is present and the referral area is outside of the species core range. Consequently, significant impacts to the grey nurse shark are not expected.
Pygmy blue whale (Balaenoptera musculus intermedia).	The referral area overlaps with the known distribution and foraging areas of the pygmy blue whale (Figure 4.8). Critical habitat of the pygmy blue whale is not currently defined, due to limited knowledge of their abundance and distribution (DoE, 2015b). If present, blue whales are more likely to inhabit the deeper waters of the referral area. Key threats identified in DoE (2015b) relevant to the Project include noise interference and vessel collisions/disturbance. Underwater noise from pile driving or vessel noise has potential to mask communication systems that pygmy blue whales use for targeting prey and finding mates. Severe noise exposure also has potential to cause injury or death to individuals (2015b). Vessel strikes have potential to kill or injure pygmy blue whales. Collisions with calves are more likely as they typically spend more time at the surface, are slower or haven't yet learned to avoid vessels (DoE, 2015b). Indirect impacts could also occur from changes in prey species abundance and distributions due to Project activities. The presence of physical infrastructure may also displace pygmy blue whales from areas previously considered habitable. Offshore renewable energy facilities have been identified as a potential future threat to the species (DoE, 2015b). Pygmy blue whales are unlikely to use the Project area for foraging, but rather in transit to higher quality foraging areas (e.g., the Upwelling of East Eden and the Bonney Upwelling). Consequently, the referral area is unlikely to be critical habitat for the species, and significant impacts are not expected.

Threatened Species/Groups	Potential Impact
Southern right whale (*Eubalaena australis*).	The referral area overlaps with biologically important areas for migration and resting on migration for the southern right whale, and individuals have been recorded within the referral area (Figure 4.9). Similar to pygmy blue whales, key threats for the southern right whale include vessel strike and noise interference (DSWPC, 2012b). Due to southern right whales generally occurring in shallower waters closer to the coastline than pygmy blue whales, entanglement in, or ingestion of, marine debris is also identified as a key threat in the conservation management plan for the species (DSWPC, 2012). Marine debris applicable to the Project may include plastic waste used in construction or rope/long lines. As there is overlap with the biologically important areas of the species, and the high occurrence of the species within the referral area, there is potential for significant impacts to the southern right whale.
Other whale species: • Sei whale (*Balaenoptera borealis*). • Fin whale (*Balaenoptera physalus*). • Humpback whale (*Megaptera novaeangliae*).	The referral area does not overlap with important areas for the sei and fin whales (DEH, 2011). Similarly, the referral area does not overlap with any biologically important areas of the humpback whale, although the species has been recorded within the referral area. Key impacts to these whale species include: • Underwater noise masking communication or causing injury to hearing organs. • Vessel strikes causing injury/mortality. • Displacement from potential habitat due to the presence of Project infrastructure or underwater noise. • Indirect impacts from disruptions to prey species abundance and distribution. If encountered, impacts are expected to be managed by compliance with EPBC regulations for interactions with cetaceans. As no biologically important areas for these species overlap the referral area, they are only expected to occur transiently. The referral area is unlikely to support significant populations. Consequently, significant impacts to the sei, fin and humpback whale are not expected.
Marine reptiles: • Green turtle (*Chelonia mydas*). • Leatherback turtle (*Dermochelys coriacea*). • Loggerhead turtle (*Caretta caretta*).	Threatened marine reptiles were assessed to have a low likelihood of occurrence in the referral area; however, these species are expected to occur in the Ninety Mile Beach Marine National Park (Barton et al., 2012) at times as vagrant individuals. The closest recording of a listed turtle species is the loggerhead turtle approximately 38 km from the referral area. The referral area does not provide habitat critical to the survival of any of the identified species (DOEE, 2017). Potential impacts relevant to marine reptiles include: • Toxicity (lethal or sub-lethal) effects from planned discharges or accidental spills, or indirectly through consumption of exposed prey species. • Entanglement in, or ingestion of, marine debris. Floating non-degradable debris (e.g., plastics) are often mistaken by turtles for prey species (e.g., jellyfish or large ascidians in the water column) and ingested (DOEE, 2017). Ingestion of debris can cause starvation or create internal blockages which may decrease diving efficiency. Entanglement in debris most often relates to derelict fishing gear, but can also include marine wastes or construction materials and can restrict or inhibit mobility with subsequent starvation or amputation of entangled limbs. • Vessel strike from species feeding or breathing at the surface causing injury or mortality. • Underwater noise causing injury or avoidance behaviour of individuals or prey species. • Presence of subsea infrastructure may create new habitat for prey species. • Suspended sediment during construction causing reduced foraging efficiency, or changes in prey species abundance or distribution.

Threatened Species/Groups	Potential Impact
	• Artificial lighting may disrupt orientation cues, although noting that this is chiefly associated with nesting females and hatchlings, none of which are expected to be in the referral area. As no critical habitat for marine turtles has been identified in the referral area, the area is unlikely to support significant populations of marine turtles. Consequently, significant impacts are not expected.
Southern bluefin tuna (*Thunnus maccoyii*)	No southern bluefin tuna have been recorded in the referral area, although it has been recorded within 20 km. The species forms a single, widely distributed population spawning in the Indian Ocean. The key threats to the species relate to ongoing fishing pressure from commercial fisheries (TSSC, 2010). Potential impacts relevant to this species include: • Toxicity (lethal or sub-lethal) effects from planned discharges or accidental spills, or indirectly through consumption of exposed prey species. • Underwater noise causing injury or avoidance behaviour of individuals or prey species. Tuna are fast moving, so may be able to escape sources of underwater noise more easily than other species. • Entanglement in, or ingestion of, marine debris. If present, the species is expected to occur transiently through the referral area rather than being a permanent resident. Additionally, given that tuna are highly mobile, they are not overly susceptible to the preliminary identified potential Project impacts. Consequently, no significant impacts are expected.
FFG Listed Species	
Marine invertebrates (See Table 4.3 for individual species)	There is little information on the abundance, distribution or ecology of the listed invertebrate species. Consequently, they have been assessed as a group. No threatened marine invertebrates have been recorded (in VBA/ALA databases) within 20 km of the referral area. However, suitable habitat does occur and the referral area is thought to provide important habitat for the threatened *Platydoris galbana*, which is believed to have a highly restricted range. Invertebrates (particularly sessile) have high susceptibility to Project impacts. Potential impacts to marine invertebrates include: • Direct mortality or injury from installation of subsea infrastructure. • Toxicity effects from planned discharges and accidental spills. • Smothering of fauna from accidental solid waste disposal or dropped objects overboard. • Direct habitat loss from construction of turbines or subsea cables. • Habitat alteration from scour and changed sediment processes. • Smothering from turbid plumes generated during construction of turbines or subsea cable laying. The construction of offshore windfarms may also provide new habitat features (e.g., hard substrate) for marine invertebrates or prevent harmful trawling activities previously allowed in the area (Bray et al., 2016). Impacts to invertebrates will be most prevalent during construction. During operations, there is potential for potential benefits to occur for marine invertebrates.
Burrunan dolphin (*Tursiops australis*)	There are only two known resident populations of Burrunan dolphin, Port Phillip Bay (approximately 120 individuals) and in the Gippsland Lakes (approximately 63 individuals) (Puszka et al., 2021). The two populations of the Burrunan Dolphin are restricted to Port Phillip Bay and the Gippsland Lakes (Puszka et al., 2021), so are not expected to occur in the referral area. Consequently, impacts to this species are expected to be indirect only. Vessel noise can mask acoustic communication signals and interfere with echolocation for hunting outside of the immediate vicinity of the vessel (Puszka et al., 2021). Similarly, pile driving can cause auditory injury at 100 m, and behavioural changes up to 50 km away

Threatened Species/Groups	Potential Impact
	(Bailey et al., 2010). Consequently, key potential impacts to the Burrunan dolphin include: • Toxicity (lethal or sub-lethal) effects from planned discharges or accidental spills, or indirectly through consumption of exposed prey species mobilised to Port Phillip Bay or Gippsland Lakes. • Entanglement in, or ingestion of, marine debris mobilised to Port Phillip Bay or Gippsland Lakes. • Underwater noise causing avoidance behaviour of individuals or prey species. As the species is restricted to two isolated populations not within the referral area, significant impacts are not expected.
Scalloped hammerhead (*Sphyrna lewini*)	Scalloped hammerheads have been recorded in Ninety Mile Beach Marine Park and therefore may occur in the referral area. Potential impacts to hammerheads include: • Toxicity effects from planned discharges or accidental spills, or indirectly through consumption of exposed prey species. • Entanglement in, or ingestion of, marine debris. • Suspended sediment during construction causing reduced foraging efficiency, or changes in prey species abundance or distribution. • EMF interference with predator-prey dynamics. Adult hammerheads occupy depths up to 275 m (DPI, 2021). The presence of the Project will restrict access to commercial fishing practices (e.g., trawling), which are a key threat to the species (DPI, 2021). Consequently, significant impacts to the scalloped hammerhead are not expected.
New Zealand fur seal, long-nosed fur seal (*Arctocephalus forsteri*)	The New Zealand fur seal has been recorded within the referral area. However, no significant haul out sites occur within 50 km, and the majority of breeding habitat occurs at the Pages Islands and on Kangaroo Island in the Neptune Islands chain, located over 500 km to the northwest. Consequently, the referral area does not support a resident population of seals. Impacts are likely to be restricted to individuals, rather than whole population level effects. Potential impacts to the New Zealand Fur seal include: • Underwater noise causing injury to hearing organs or behavioural responses. • Indirect impacts from disruptions to prey species abundance and distribution. • Toxicity (lethal or sub-lethal) effects from planned discharges or accidental spills, or indirectly through consumption of exposed prey species. • Entanglement in, or ingestion of, marine debris. Given that seals in the referral area are unlikely to be a resident population, significant impacts are not expected.

5.4 Migratory Species

Likely impacts to migratory species are provided in Table 5.3. Some migratory species are also threatened species and have already been addressed in Table 5.2.

Table 5.3 – Potential Impacts to Migratory Species

Migratory Species/Groups	Potential Impact
Dusky dolphin (*Lagenorhynchus obscurus*)	Dusky dolphins and orcas have a low likelihood of occurrence in the referral area, and the habitat of the referral area is unlikely to be of high value to these species. The dusky dolphin has not been recorded in the search area and the

Migratory Species/Groups	Potential Impact
Orca, killer whale (*Orcinus Orca*)	closest orca recording is over 50 km from the referral area. Both species can be susceptible to certain types of underwater noise, although, soft start procedures will likely give individuals adequate time to disperse before any potential injury as the species is highly mobile. Similarly, high mobility reduces the risk of vessel collisions. It is unlikely that the species forage in the referral area. Consequently, significant impacts to these species are not expected.
Porbeagle, mackerel shark (*Lamna nasus*)	Preferred habitats and migration patterns of the porbeagle are not well documented but they have been recorded migrating up to 1,800 km along continental shelves (Francis et al., 2002). Given the large range of the species, their area of occupancy is unlikely to be affected by the Project. Porbeagles are fast swimming, and hence able to avoid impacts from vessel strike and underwater noise with relative ease. Given no records within the search area, and the extent of the species range, significant impacts to the Porbeagle are not expected.
Pygmy right whale (*Caperea marginate*)	Pygmy right whales have been recorded 98 km from the referral area. While minimal records of the abundance and distribution occur (Cooke and Zerbin, 2008), the species is generally associated with upwellings (e.g., Bonney Upwelling) to the west of the referral area. If present, the species is only expected to occur transiently. Potential impacts are expected to be minimal, but may include: • Entanglement in, or ingestion of, marine debris. • Underwater noise causing injury or avoidance behaviour of individuals or prey species. • Suspended sediment during construction causing reduced foraging efficiency, or changes in prey species abundance or distribution. Given the low likelihood of occurrence, impacts are expected to be easily mitigated and significant impacts are not expected.
Shortfin mako, mako shark (*Isurus oxyrinchus*)	No resident populations of the shortfin mako are expected to occur in the referral area. There are recordings of the species within 12 km of the referral area but records are assumed to be of transient individuals. Indeed, individuals tagged in western Victoria have been tracked residing in the Great Australian Bight and Bass Strait in summer and migrating north to the Coral Sea for winter (Rogers and Bailleul, 2015). Consequently, significant impacts are not expected as the species is only expected to pass through the referral aera in transit. If present, potential impacts may include: • Underwater noise causing avoidance behaviour of individuals or prey species. • Entanglement in, or ingestion of, marine debris.
Whale shark (*Rhincodon typus*)	Whale sharks are generally found in warmer waters off the coast of the Northern Territory, Queensland and northern Western Australia. However, immature sharks have been recorded on the western fringe of the Great Australian Bight, albeit not recently (Last & Stevens, 1994). No critical habitats have been identified in Victoria (DEH, 2005). Significant impacts to this species are not expected given their low likelihood of occurrence and highly mobile nature. Potential impacts that may occur if the species is present include: • Entanglement in, or ingestion of, marine debris. • Underwater noise causing injury or avoidance behaviour of individuals or prey species. • Vessel strikes causing injury/mortality

5.5 Commonwealth Marine Environment

5.5.1 Direct and Indirect Impacts Commonwealth Marine Area

Several of the impacts listed in Table 5.1 have the potential to impact the Commonwealth Marine Environment (CME). Potential direct impacts on the CME include:

- Routine discharges from vessels (e.g., sewage) causing decline in water quality.
- Reduction in subsea habitat availability causing displacement of species or direct mortality of benthic fauna from installation of infrastructure.
- Re-suspension of sediment in the water column creating turbid plumes causing decline in water quality, reduced light availability and smothering of benthic fauna.
- Scour and changes to seabed and sediment transport and deposition processes resulting in habitat alterations.
- Introduction or spread of invasive marine species from contaminated hulls or ballast water discharges causing competition, predation or displacement of native fauna and flora.
- Fuel or chemical spills from refuelling incidents, vessel collisions, incorrect storage or transport of hazardous materials deteriorating water and sediment quality.
- Presence or movement of vessels causing collision with protected marine fauna.

Potential indirect (or secondary) impacts include:

- Decline in native species abundance, resulting from a decline in water or sediment quality from Project activities, or reduction in available habitat.
- Cumulative impacts caused by the cumulative effect of multiple offshore windfarms and developments in the region.

5.5.2 Potential Benefits to the Commonwealth Marine Area

The Project may also contribute potential benefits to the CME. Offshore wind farms have the potential to act as both artificial reefs and fish aggregation devices by providing hard substrate for settlement of sessile invertebrates and shelter for mobile species (Inger et al., 2009).

5.6 Victorian Marine Protected Areas

Ninety Mile Beach Marine National Park (See Section 4.12.1) is located within the referral area. While there will not be any direct disturbance within the park, the following indirect impacts may occur:

- Increased turbidity and sedimentation from sediment plumes mobilising to the park leading to reduced light and primary productivity and potential smothering of benthic fauna.
- Changes to sedimentation processes in the park from settlement of turbid plumes.

- Mobilisation of potentially harmful substances (e.g., solid waste incorrectly disposed overboard, spills of hazardous materials to the park, with subsequent effects sediment and water quality.
- Potential introduction or spread of invasive marine species.
- Increased underwater noise from adjacent Project activities.

5.7 Assessment of Potentially Significant Impacts

Further assessment of the potential for significant impacts on Victorian (EE Act) and Commonwealth (i.e., EPBC Act) protected matters was undertaken for species identified in Tables 5.2 and 5.3 that could be significantly impacted by the Project. This additional assessment involved considering the specific criteria from the EE Act and EPBC Act relevant to these species. The criteria are taken from the EE Act triggers for requiring an Environment Effects Statement and the Matters of National Environmental Significance Significant Impact Guidelines (DoE, 2013). This assessment has considered the likely impacts from the Project based on the current Project concept and the preliminary understanding of the marine ecological environment. This screening assessment has not considered potential cumulative impacts. Given there are a number of other projects proposed in the nearby area, including the CarbonNet Project, the Golden Beach Gas Project and Star of the South, potential cumulative impacts will need to be considered as part of the subsequent environmental approvals process (i.e., the environmental impact assessment).

Based on the initial screening of potential impacts provided in Tables 5.2 and 5.3, the matters considered in this further assessment are:

- The great white shark (*Carcharodon carcharias*) (Tables 5.4, 5.5).
- The southern right whale (*Eubalaena australis*) (Tables 5.6, 5.7).
- The sea slug (*Platydoris galbana*) (Table 5.8).
- The Commonwealth and Victorian marine environment (Table 5.9)

Table 5.4 – Assessment of Potential for Regional or State Significant Impacts to Great White Shark (FFG Act Endangered)

Relevant EES Criteria for Determining if a Referral is Warranted	Assessment and Justification
Potential long-term loss of a significant proportion (e.g., 1 to 5 percent depending on the conservation status of the species) of known remaining habitat or population of a threatened species within Victoria	The great white shark has a widespread distribution around Australia and more broadly in the Pacific. In Australia there is evidence of two populations, an eastern population and a southern-western population (CSIRO, 2021b). The eastern population has a widespread distribution along the entire eastern seaboard, which includes the referral area. There is evidence that in Australia, great white sharks from the eastern population undergo a seasonal movement northward along the east of Australia over autumn and winter and southwards over spring and early summer (Bruce et al., 2006). There is evidence to suggest that both males and females are philopatric and may

Relevant EES Criteria for Determining if a Referral is Warranted	Assessment and Justification
	return to their birthplace for breeding (Blower et al., 2012). While they may exhibit some degree of site fidelity, given the widespread distribution of the eastern population and their primarily transient nature, the Project will not result in the long-term loss of a significant proportion of the remaining habitat for the great white shark. The referral area occupies 17% of a known nursery area occurring between Corner Inlet and Lakes Entrance (which includes Commonwealth and State waters). This nursery area may provide critical habitat for the survival of the species. While the referral area occupies a substantial portion of this nursery area, this is due to the multiple cable routes and development areas under consideration. The actual Project footprint will be much smaller. Within Victorian State waters the direct footprint of the Project will be limited to the cable route(s). Considering the planned activities of the Project, great white sharks are likely most vulnerable to impacts from underwater noise, EMF and artificial light. While the sources of these may be outside of State waters, they could impact great white shark habitat within State waters. Great white sharks are unlikely to be significantly impacted by short term, localised turbid plumes associated with seabed disturbance or changes in water quality from routine discharges and they are unlikely to be struck by vessels. Adhering to standard discharge management and invasive pest management protocols will minimise potential impacts from other activities. Underwater noise from construction activities could result in localised and or short-term displacement of sharks, behavioural changes and changes to predator-prey dynamics. Given they are less susceptible to impacts from underwater noise compared to other marine fauna (e.g., cetaceans and bony fish with swim bladders) injury or mortality is unlikely to occur. Artificial light can alter predator-prey dynamics, but this is unlikely to negatively impact top order predators like the great white shark. During operations, sharks may also be susceptible to impacts from EMF. While underwater noise, artificial light and EMF could elicit behavioural responses and could alter predator-prey dynamics, impacts are likely to be primarily localised and short term (with the exception of potential EMF impacts) and are unlikely to result in changes to the eastern population by interfering with the survival of juveniles which use the nearby area, or to breeding success. The great white shark is primarily threatened due to historic and current commercial fishing activities, beach protection, historic game fishing and illegal hunting. The Project will not exacerbate these threatening processes.
A Combination of Two or More of the Following Types of Potential Effects on the Environment (Matters listed under the Flora and Fauna Guarantee Act 1988)	
Potential loss of a genetically important population of an endangered or threatened species (listed or nominated for listing), including as a result of loss or fragmentation of habitats	The great white shark has a widespread distribution around Australia and more broadly in the Pacific. In Australia there is evidence of two populations, an eastern population and a southern-western population (CSIRO, 2021b). The eastern population has a widespread distribution along the entire eastern seaboard, which includes the referral area. The Project may result in the localised displacement of individuals and behavioural responses to underwater noise, artificial light and

Relevant EES Criteria for Determining if a Referral is Warranted	Assessment and Justification
	EMF and could change predator-prey dynamics, however this is highly unlikely to result in the loss of the eastern population. Considering the habitat of the great white shark is the water column, there will be some loss of this habitat due to the physical presence of the Project infrastructure and there could be temporary displacement or fragmentation of the sharks from the nursery area; however, the Project is not expected to impact on the survival of pups in the area or the breeding success of the eastern population.
Potential loss of critical habitat	The referral area (which includes Commonwealth and State waters) occupies 17% of a known nursery area occurring between Corner Inlet and Lakes Entrance. This area nursery area may provide critical habitat for the survival of the species. While the referral area occupies a substantial portion of this nursery area, this is due to the multiple cable routes and development areas under consideration. The actual Project footprint will be much smaller. The Project footprint within State waters will be limited to the cable route(s). Considering the great white shark occupies the water column, there will be no permanent loss of critical habitat within State waters due to the physical presence of the Project infrastructure. Individuals may however be temporarily displaced from critical habitat (i.e., the nursery area) during construction activities e.g., due to underwater noise or the presence of cable laying and support vessels. In accordance with the criteria, loss of critical habitat is only considered to result in a regional or State significant impact if this occurs in combination with the previous criteria, which is highly unlikely.

Table 5.5 – Assessment of Potential for Significant Impacts to Great White Shark (EPBC Act Vulnerable and Migratory)

EPBC Significant Impact Criteria*	Assessment and Justification
Criteria for Vulnerable Species	
Lead to a long-term decrease in the size of an important population of a species	The great white shark has a widespread distribution around Australia and more broadly in the Pacific. In Australia there is evidence of two populations, an eastern population and a southern-western population (CSIRO, 2021b). The eastern population has a widespread distribution along the entire eastern seaboard, which includes the referral area. Given the widespread distribution of the eastern population and their primarily transient nature, the Project will not result in the long-term loss of a significant proportion of the remaining habitat for the great white shark. The great white shark is primarily threatened due to historic and current commercial fishing activities, beach protection, historic game fishing and illegal hunting. The Project will not exacerbate these threatening processes. Considering the planned activities of the Project, great white sharks are likely most vulnerable to impacts from underwater noise, EMF and artificial light. Great white sharks are unlikely to be significantly impacted by short term, localised turbid plumes associated with seabed disturbance or changes in water quality from routine discharges and they are unlikely to be struck by

EPBC Significant Impact Criteria*	Assessment and Justification
	vessels. Adhering to standard discharge management and invasive pest management protocols will minimise potential impacts from other activities. While underwater noise, artificial light and EMF could elicit behavioural responses and could alter predator-prey dynamics, impacts are likely to be primarily localised and short term (with the exception of potential EMF impacts) and are unlikely to result in changes to the eastern population by interfering with the survival of juveniles which use the nearby area, or to breeding success.
Reduce the area of occupancy of an important population	The great white shark has a widespread distribution around Australia and more broadly in the Pacific. The eastern population has a widespread distribution along the entire eastern seaboard, which includes the referral area. Given the widespread distribution of the eastern population and their primarily transient nature, the Project is unlikely to result in a notable reduction in area of occupancy for the eastern population. Notwithstanding, there could be localised and or short-term reduction in occupancy of the nursery area as a result of Project activities, particularly during construction.
Fragment an existing important population into two or more populations	Given the widespread distribution of the eastern population and the highly mobile nature of the great white shark, the Project will not result in the fragmentation of this population.
Adversely affect habitat critical to the survival of a species	The Project activities could impact the great white shark nursery area between Corner Inlet and Lakes Entrance which is considered critical habitat. While these impacts are expected to be primarily localised and short term this will need to be further assessed during the environmental assessment process.
Disrupt the breeding cycle of an important population	Little is known about the breeding cycle of great white sharks. There are no identified breeding grounds for the species in Australian waters. The referral area does however intersect with a known nursery area. It is not known whether breeding also takes place in this area. Given the gestational period is approximately 12 months, breeding could take place elsewhere. There is currently insufficient information about great white shark breeding to conclude whether the Project could disrupt the breeding cycle of the eastern population.
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The great white shark has a widespread distribution around Australia and more broadly in the Pacific. In Australia there is evidence of two populations, an eastern population and a southern-western population (CSIRO, 2021b). The eastern population has a widespread distribution along the entire eastern seaboard, which includes the referral area. There is evidence that in Australia, great white sharks from the eastern population undergo a seasonal movement northward along the east of Australia over autumn and winter and southwards over spring and early summer (Bruce et al., 2006). There is evidence to suggest that both males and females are philopatric and may return to their birthplace for breeding (Blower et al., 2012). While they may exhibit some degree of site fidelity, given the widespread distribution of the eastern population and their primarily transient nature, the Project will not result in the long-term loss of a significant proportion of the remaining habitat for the great white shark. The referral area (which includes Commonwealth and State waters) occupies 17% of a known nursery area occurring between Corner Inlet and Lakes Entrance. This area nursery

EPBC Significant Impact Criteria*	Assessment and Justification
	area may provide critical habitat for the survival of the species. While the referral area occupies a substantial portion of this nursery area, this is due to the multiple cable routes and development areas under consideration. The actual Project footprint will be much smaller. Considering the habitat of the great white shark is the water column, there will be some loss of this habitat due to the physical presence of the Project infrastructure and there could be temporary displacement or fragmentation of the sharks from the nursery area due to Project activities; however, the Project is not expected to impact on the survival of pups in the area or the breeding success of the eastern population. A population decline is therefore not expected.
Result in invasive species that are harmful to a vulnerable species Becoming established in the vulnerable species' habitat	The Project will require vessels and equipment to be brought from outside of the referral area and seabed disturbance and as such there will be the potential for the introduction or spread of invasive marine species. With adherence to best practice ballast water and antifouling management and biosecurity controls, the introduction of invasive species is unlikely to occur.
Introduce disease that may cause the species to decline, or	As per above response, with adherence to best practice ballast water and antifouling management and biosecurity controls, the introduction of diseases that may affect the great white shark are unlikely to occur.
Interfere substantially with the recovery of the species.	The great white shark is primarily threatened due to historic and current commercial fishing activities, beach protection, historic game fishing and illegal hunting. The Project will not exacerbate these threatening processes. As per responses to other criteria, the nature of the likely impacts from the Project are not expected to affect the survival of pups using the nursery area or to result in population decline; however, little is known about the breeding cycle for great white sharks and the location of breeding grounds is unknown.
Criteria for Migratory Species	
Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species	The referral area occupies 17% of a known nursery area occurring between Corner Inlet and Lakes Entrance. This area nursery area may provide critical habitat for the survival of the species. While the referral area occupies a substantial portion of this nursery area, this is due to the multiple cable routes and development areas under consideration. The actual Project footprint will be much smaller. Considering the habitat of the great white shark is the water column, there will be some loss of this habitat due to the physical presence of the Project infrastructure. The Project may result in localised and or short-term impacts to the nursery area due to underwater noise, artificial noise, EMF, seabed disturbance and routine discharges but these are unlikely to result in long term substantial changes to this critical habitat.
Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species, or	The Project will require vessels and equipment to be brought from outside of the referral area and seabed disturbance and as such there will be the potential for the introduction or spread of invasive marine species. With adherence to best practice ballast water and antifouling management and biosecurity controls, the introduction of invasive species is unlikely to occur.
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically	Little is known about the breeding cycle of great white sharks. The eastern population occupies a widespread habitat and they are thought to undertake annual migrations along the east coast

EPBC Significant Impact Criteria*	Assessment and Justification
significant proportion of the population of a migratory species.	of Australia. The Project is not expected to interfere with this migration or to seriously disrupt feeding for this highly mobile species. The referral area occupies 17% of a known nursery area occurring between Corner Inlet and Lakes Entrance. This area nursery area may provide critical habitat for the survival of the species. While the referral area occupies a substantial portion of this nursery area, this is due to the multiple cable routes and development areas under consideration. The actual Project footprint will be much smaller. The Project may result in localised and or short-term impacts to the nursery area due to underwater noise, artificial noise, EMF, seabed disturbance and routine discharges but these are unlikely to result in long term substantial changes to this critical habitat or the lifecycle of the eastern population.

* An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that these consequences could occur.

Table 5.6 – Assessment of Potential for Regional or State Significant Impacts to Southern Right Whale (FFG Act Endangered)

Relevant EES Criteria for Determining if a Referral is Warranted	Assessment and Justification
Potential long-term loss of a significant proportion (e.g., 1 to 5 percent depending on the conservation status of the species) of known remaining habitat or population of a threatened species within Victoria	In Australian waters, southern right whales have two distinct populations (based on mtDNA haplotypes) in the southeast and southwest waters of Australia (DSEWPC, 2012b). The south-western population is much larger (approximately 3,191 individuals; Smith et al., 2019) compared to the south-eastern population (approximately 268 individuals; Stamation et al., 2020), both populations have been increasing steadily since 1996 (Stamation et al., 2020). Individuals occurring in the referral area would be considered part of the south-eastern population. As mentioned in Table 5.2, the key threats to southern right whales in Australia relate to vessel interactions, from vessel strike and underwater noise. Potential impacts from underwater noise and vessel strike are most likely to occur during the construction and decommissioning phase but are also possible during operations. The referral area includes an area for migration and resting on migration, which extends along the east coast of Victoria (See Figure 4.9). The referral area overlaps only 2% of the total migration and resting and migration area, with the known core range of the species extending much further (DSEWPC, 2012b). Consequently, given the current population trends of the species and assuming effective implementation of mitigation measures, a long-term loss of habitat or population is not expected within Victorian waters.
A Combination of Two or More of the Following Types of Potential Effects on the Environment (Matters listed under the Flora and Fauna Guarantee Act 1988)	
Potential loss of a genetically important population of an endangered or threatened species (listed or nominated for listing), including as a result of loss or fragmentation of habitats	Southern right whales may be displaced from the referral area during construction, primarily due to underwater noise and increased vessel movements; however, this is unlikely to result in injury or mortality of individuals with standard mitigation and management measures in place. The Project infrastructure within State waters will be limited to the subsea cables, which

Relevant EES Criteria for Determining if a Referral is Warranted	Assessment and Justification
	will not act as a barrier to the species movement or result in habitat fragmentation.
Potential loss of critical habitat	The referral area does overlap with biologically important areas; however, this habitat is unlikely to be critical to the survival of the species. No mother-calf pairs have been recorded on the east coast of Victoria (Stamation et al., 2020), with sightings most often occurring west of Port Campbell, in south-eastern Tasmania, Flinders Island and around Eden. Similarly, foraging behaviour is expected at higher quality foraging areas (e.g., the Upwelling of East Eden and the Bonney Upwelling) outside of the referral area (DSEWPC, 2012b), although no dedicated foraging areas have been mapped for the southern right whale. This suggests that while the referral area is likely to be used by transient individuals, the referral area does not include critical habitat. In accordance with the criteria, loss of critical habitat is only considered to result in a regional or State significant impact if this occurs in combination with the previous criteria, which is highly unlikely.

Table 5.7 – Assessment of Potential for Significant Impacts to Southern Right Whale (EPBC Act Endangered and Migratory)

EPBC Significant Impact Criteria*	Assessment and Justification
Criteria for Endangered Species	
Lead to a long-term decrease in the size of a population	In Australian waters, southern right whales have two distinct populations (based on mtDNA haplotypes), the southeast and southwest (DSEWPC, 2012b). The south-western population is much larger (approximately 3,191 individuals; Smith et al., 2019) compared to the south-eastern population (approximately 268 individuals; Stamation et al., 2020), both populations have been increasing steadily since 1996 (Stamation et al., 2020). Individuals occurring in the referral area would be considered part of the south-eastern population. As mentioned in Table 5.2, the key threats to southern right whales in Australia relate to vessel interactions, from vessel strike an underwater noise. Whales may be temporarily displaced from the referral area during construction due to underwater noise and and increased vessel movements; however, impacts are expected to be limited to temporary behavioural responses (e.g., avoidance, increased diving, masking of communication) and are not expected to result in injury or mortality or be long-term.
Reduce the area of occupancy of the species	The southern right whale has a widespread distribution and they are a migratory species that travel long distances. While the Project activities could result in temporary displacement from the nearby area which is used for migration and resting on migration; however, this habitat is widely available and temporary displacement from this localised area is not considered a reduction in the overall area of occupancy. The total habitat of the species extends much further than the migration and resting area (DSEWPC, 2012b). Notwithstanding, there could be localised and or short-term reduction in occupancy of the

	migration and resting on migration area as a result of Project activities, particularly during construction.
Fragment an existing population into two or more populations	The southern right whale has a widespread distribution and they are a migratory species that travel long distances. Southern right whales may be displaced from the referral area during construction, primarily due to underwater noise and increased vessel movements; however, this is unlikely to fragment the migratory movements of the south-eastern population. The physical presence of the subsea infrastructure is also unlikely to create a barrier to movement and result in fragmentation.
Adversely affect habitat critical to the survival of a species	The referral area does overlap with biologically important areas; however, this habitat is unlikely to be critical to the survival of the species. No mother-calf pairs have been recorded on the east coast of Victoria (Stamation et al., 2020), with sightings most often occurring in west of Port Campbell, in south-eastern Tasmania, Flinders Island an around Eden. Similarly, foraging behaviour is expected at higher quality foraging areas (e.g., the Upwelling of East Eden and the Bonney Upwelling) outside of the referral area (DSEWPC, 2012b), although no dedicated foraging areas have been mapped for the southern right whale. This suggests that while the referral area is likely to be used by transient migratory individuals, the referral area does not include critical habitat.
Disrupt the breeding cycle of a population	No mother-calf pairs have been recorded on the east coast of Victoria (Stamation et al., 2020), with sightings most often occurring west of Port Campbell, in south-eastern Tasmania, Flinders Island an around Eden. Consequently, the referral area is unlikely to be used for the breeding cycle of the southern right whale.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	Considering the habitat of the southern right whale is the water column, there will be some loss of this habitat due to the physical presence of the Project infrastructure and there could be temporary displacement or fragmentation of whales from the referral due to Project activities during construction; however, as the habitat is not considered critical to the species, a population decline is not expected.
Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat	No invasive species are identified as key threats to the southern right whale (DSEWPC, 2012b). The Project will require vessels and equipment to be brought from outside of the referral area and seabed disturbance and as such there will be the potential for the introduction or spread of invasive marine species. With adherence to best practice ballast water and antifouling management and biosecurity controls, the introduction of invasive species is unlikely to occur.
Introduce disease that may cause the species to decline	As per above response, with adherence to best practice ballast water and antifouling management and biosecurity controls, the introduction of diseases that may affect the southern right whale are unlikely to occur.
Interfere with the recovery of the species.	Key historical threats to the southern right whale include whaling, as well as vessel interactions and entanglement in oceanic waste (DSEWPC, 2012b). Vessel interactions may interfere with individuals within referral area; however, as described in Section 4.15.4, the east coast of Victoria is part of one of the busiest shipping routes in Australia. The increase in vessel interactions is not expected to be significantly greater than current shipping traffic. Additionally, as the referral area is unlikely to be critical habitat, an impact on the recovery of the entire species is not expected.

Criteria for Migratory Species	
Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species	The referral area does overlap with biologically important areas, however this habitat is unlikely to be critical to the survival of the species. No mother-calf pairs have been recorded on the east coast of Victoria (Stamation et al., 2020), with sightings most often occurring in west of Port Campbell, in south-eastern Tasmania, Flinders Island an around Eden. Similarly, foraging behaviour is expected at higher quality foraging areas (e.g., the Upwelling of East Eden and the Bonney Upwelling) outside of the referral area (DSEWPC, 2012b), although no dedicated foraging areas have been mapped for the southern right whale.
Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species, or	No invasive species are identified as key threats to the southern right whale (DSEWPC, 2012b). The Project will require vessels and equipment to be brought from outside of the referral area and seabed disturbance and as such there will be the potential for the introduction or spread of invasive marine species. With adherence to best practice ballast water and antifouling management and biosecurity controls, the introduction of invasive species is unlikely to occur.
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.	No mother-calf pairs have been recorded on the east coast of Victoria (Stamation et al., 2020), with sightings most often occurring in west of Port Campbell, in south-eastern Tasmania, Flinders Island an around Eden. The referral area is unlikely to play a role in the breeding cycle of the southern right whale. Similarly, foraging behaviour is expected at higher quality foraging areas (e.g., the Upwelling of East Eden and the Bonney Upwelling) outside of the referral area (DSEWPC, 2012b), although no dedicated foraging areas have been mapped for the southern right whale. Project activities could result in temporary displacement from the nearby area which is used for migration and resting on migration; however, this habitat is widely available and temporary displacement from this localised area is not likely to disrupt the lifecycle of the south-eastern population. The total habitat of the species extends much further than the migration and resting area (DSEWPC, 2012b). While the referral area is likely to be used by transient migratory individuals, the referral area does not include critical habitat.

* An action is likely to have a significant impact on a threatened species if there is a real chance or possibility that these consequences could occur.

Table 5.8 – Assessment of Potential for Regional or State Significant Impacts to sea slug (*Platydoris galbana*) (FFG Act Endangered)

Relevant EES Criteria for Determining if a Referral is Warranted	Assessment and Justification
Potential long-term loss of a significant proportion (e.g., 1 to 5 percent depending on the conservation status of the species) of known remaining habitat or population of a threatened species within Victoria	The referral area may provide significant habitat FFG Act listed opisthobranch *Platydoris galbana*. O'Hara and Barmby (2000) indicate that this species is restricted to the shallow waters off Delray and Woodside Beach, however, the only known records of this species in the ALA are from Phillip Island, and it may also occur in New South Wales (Rudman, 2003). While little is known about it's distribution it is likely that the range of this species is larger than that indicated by O'Hara and Barmby (2000). Direct habitat loss of the species is likely to occur during construction of the subsea cables. However, these impacts would be localised to the immediate footprint of the cables.

Relevant EES Criteria for Determining if a Referral is Warranted	Assessment and Justification
	Further habitat modification may occur from suspended sediment smothering changing sedimentation processes. These impacts would be confined to construction. While the referral area does represent a significant proportion of known habitat, long-term effects are unlikely.
A Combination of Two or More of the Following Types of Potential Effects on the Environment (Matters listed under the Flora and Fauna Guarantee Act 1988)	
Potential loss of a genetically important population of an endangered or threatened species (listed or nominated for listing), including as a result of loss or fragmentation of habitats	As mentioned above, the referral area may provide significant habitat for the species and is likely a genetically important population. The Project infrastructure within State waters will be limited to the subsea cables, which may act as a barrier during construction, although impacts would be unlikely to extend beyond this phase of the Project and long-term effects to the population are not expected.
Potential loss of critical habitat	Direct habitat loss of the species is likely to occur during construction of the subsea cables. However, these impacts would be localised to the immediate footprint of the cables. Further habitat modification may occur from suspended sediment smothering changing sedimentation processes. These impacts would be confined to construction. Permanent habitat loss is not expected.

Table 5.9 – Assessment of significant impacts to the Marine Environment

Criteria	Assessment and justification
Commonwealth Marine Environment (EPBC Criteria)	
An action is likely to have a significant impact on the environment in a Commonwealth marine area if there is a real chance or possibility that the action will: • Result in a known or potential pest species becoming established in the Commonwealth marine area	There are many identified pest species currently present in Victorian waters (See Table 4.4). However, none have been recorded in the referral area and the presence of these species in Commonwealth waters is even less well understood. Potential pest species could be introduced through ballast water and hull fouling. The risk of introduction or spread of these is expected to be minimal, assuming the implementation of the following mitigation measures: • Use of local vessels, where practicable. • Standard ballast water management measures. • Adherence to legislative requirements for biofouling.
Modify, destroy, fragment, isolate or disturb an important or substantial area of habitat such that an adverse impact on marine ecosystem functioning or integrity in a Commonwealth marine area results	There will be habitat modification and the loss of small areas of seafloor habitat associated with subsea cable laying during construction and the presence of subsea infrastructure during operations. Further habitat modification may occur from potential introductions of invasive species or accidental spills of hazardous materials, with consequences on native species abundance and distributions. However, these impacts are not expected to occur as a result of planned activities. The provision of hard substrate by subsea infrastructure may alter the existing benthic ecology by providing a hard substrate for settlement of sessile invertebrates and shelter for mobile species (Inger et al., 2009); however, this is considered a localised positive impact and could improve ecosystem function.
Have a substantial adverse effect on a population of a marine species or	Over 500 species of fish are predicted to occur in the waters of Bass Strait (LCC, 1993) including recreational and commercial

Criteria	Assessment and justification
cetacean including its life cycle (for example, breeding, feeding, migration behaviour, life expectancy) and spatial distribution,	fishing species. The referral area is also known to house various cetacean species, sharks, marine mammals and pinnipeds and may also be home to transient marine reptiles (See Section 4.6). While these species may occur, substantial adverse effects are not expected. Specific species with potentially significant impacts have been assessed in Tables 5.4 to 5.8.
Result in a substantial change in air quality or water quality (including temperature) which may adversely impact on biodiversity, ecological integrity; social amenity or human health	Air emissions (e.g., from vessels, operation of infrastructure) in the Commonwealth marine area would be minimal and mostly limited to construction. These emissions are unlikely to adversely impact on biodiversity, ecological integrity, social amenity or human health. Potential changes to water quality may occur due to suspension of sediment during construction and installation of subsea infrastructure thereby increasing turbidity. Accidental spills (e.g., fuels or chemicals) or planned discharges (e.g., sewage from vessels) may also cause short-term localised decline in water quality. The extent of these impacts is expected to be localised and minor, with effective implementation of mitigation measures. Large-scale spill incidents can occur but are highly unlikely, with the most recent major oil spill in Victoria occurring in 1990 at cape Otway. Embedded design controls and standard operating procedures have evolved over several decades to reduce the occurrences and severity of such events.
Result in persistent organic chemicals, heavy metals, or other potentially harmful chemicals accumulating in the marine environment such that biodiversity, ecological integrity, social amenity or human health may be adversely affected, or	While potentially harmful chemicals (e.g., fuels) may be used by the Project, there will be no planned discharges of these materials. A large-scale spill of hydrocarbons (e.g., from a major vessel accident) has the potential to adversely impact biodiversity, ecological integrity, social amenity or human health. While these events can occur, they are highly unlikely, with no such events ever reported on the east coast of Australia and the most recent in Victoria being from 1990. Embedded design controls and standard operating procedures have evolved over several decades to reduce the occurrences and severity of such events. The Project will also comply with legislative requirements relating to preparation of oil spill response and prevention plans.
Have a substantial adverse impact on heritage values of the Commonwealth marine area, including damage or destruction of an historic shipwreck.	Impacts to heritage values are outside of the scope of this report and will be assessed under the Project's Historic Heritage Assessment Report (Biosis, 2021b).
Victorian Marine Environment (EES Criteria)	
Potential extensive or major effects on the health or biodiversity of aquatic, estuarine or marine ecosystems, over the long term.	Impacts to aquatic and estuarine ecosystems are out of scope of this report and are assessed in Biosis (2021a). Potential impacts to the Victorian marine environment will be primarily related to shore crossing activities and the laying of subsea cables during construction and impacts from the presence of vessels (e.g., accidental spills or planned discharges, underwater noise, potential translocation of invasive marine species). Assuming effective implementation of mitigation measures, it is unlikely to have extensive or major effects on the health or biodiversity of aquatic, estuarine or marine ecosystems and no major long-term effects are expected in Victorian waters.

6. Mitigation Measures

6.1 Approach to Mitigation Measures

Preliminary mitigation measures are provided in Table 5.1. These mitigations are considered minimum controls and are standard best practice. Targeted (i.e., receptor specific) mitigations would be developed as part of the subsequent environmental approvals process (i.e., the environmental impact assessment) when a more detailed understanding of the existing environment and Project activities will be known. As the Project progresses through concept and design, development of mitigations will occur as an iterative process, feeding back into the design of the Project. Mitigations will be developed using the mitigation hierarchy of avoid, minimise, rehabilitate, offset.

Prior to construction, the Project will implement a series of environmental management plans for construction and operations (including decommissioning), which will include specific measures to mitigate potential impacts along with monitoring requirements and criteria for measuring environmental performance.

6.2 Proposed Objectives/Outcomes

The overarching objective of the Project is to ensure that all environmental impacts are as low as reasonably practicable. The key environmental outcomes for the Project are:

- To adhere to all legislative requirements applicable to managing environmental impacts.
- Apply industry and international best practice standards to marine operations.

With respect to some of the sensitivities of the marine environment, some of the key objectives are to:

- Avoid impacts to the Ninety Mile Beach Marine National Park.
- Minimise impacts to great white sharks and southern right whales which are known to use the referral area for biologically important activities.
- Minimise impacts to low- and high-profile reefs and non-reef epibenthos communities.
- Avoid impacts to endemic species (e.g., Brachyura crab and the opistobranch *Platydoris galbana* and the soft coral *Pseudogorgia godeffroyi*) which the referral area may provide important habitat for.
- Minimise disruption to other marine users (e.g., commercial fishers and petroleum industry).

7. Conclusion

7.1 Victorian Matters

The referral area includes State waters which extend from the high tide mark to approximately 20 m water depth. The sandflats off Ninety Mile Beach are the most extensive area of such habitat in Victoria and support a diverse benthic infauna assemblage. The Ninety Mile Beach biounit features infralittoral reefs which run generally parallel to the shoreline and are predominantly low profile but with some area of higher complexity and vertical reef. Infralittoral rocky reefs occur within the referral area primarily along the 10 m depth contour offshore from Lake Reeve, with a notably large area offshore from Golden Beach in 5 to 10 m of water. These reefs support a diverse benthic assemblage.

The preliminary marine ecology study has identified the following key sensitivities related to the referral area within the Victorian marine environment:

- Ninety Mile Beach MNP is located within the referral area. While there will be no direct physical disturbance in the park, indirect impacts could occur due to the potential close proximity to Project activities.
- Low- and high-profile reefs and non-reef associated epibenthos communities supporting diverse benthic assemblages.
- Migration and resting on migration area for the southern right whale.
- Foraging area for the pygmy blue whale.
- Breeding (nursery area) for the great white shark.
- Important habitat for endemic species (Brachyura crab, the opistobranch *Platydoris galbana* and the soft coral *Pseudogorgia godeffroyi*). Unlike other sensitive species that may occur in the referral area, these species are less mobile or sessile and have highly limited distribution ranges and may be more susceptible to impacts from the Project.

A number of threatened FFG Act listed species have a moderate or higher likelihood to occur in the referral area:

- Southern right whale.
- Pygmy blue whale.
- Humpback whale.
- Great white shark.
- Grey nurse shark.
- Scalloped hammerhead.

- Shortfin mako shark.
- Southern bluefin tuna.
- New Zealand fur seal.
- *Platydoris galbana.*

The identified sensitive habitat features and species may be impacted by the planned or unplanned activities associated with the development of the Project. There is currently insufficient knowledge to assess whether significant impacts to the Ninety Mile Beach MNP, southern right whale, great white shark or endemic/restricted range species are likely to occur because of the Project. These uncertainties should be addressed in future baseline studies, impact assessment and mitigation and management.

7.2 Commonwealth Matters

The referral area extends into the Commonwealth marine environment which is characterised by water depths from approximately 20 to 65 m, with seafloor habitat expected to be primarily expansive sand flats interspersed with low to high profile reefs and non-reef epibenthos communities. The referral area does not intersect any Commonwealth marine reserves or key ecological features.

The preliminary marine ecology study has identified the following key sensitivities related to the referral area within the Commonwealth marine environment:

- Southern right whale biologically important area (migration and resting on migration)
- Pygmy blue whale biologically important area (foraging).
- Great white shark biologically important area (breeding (nursery area)).
- Expected presence of low- and high-profile reefs supporting diverse benthic assemblages.
- Tarwhine commercial scallop bed.
- Medium to high use fishing intensity for a number of sectors of the SESSF.

A number of EPBC listed threatened and migratory species have a moderate or higher likelihood to occur in the referral area including:

- Southern right whale.
- Pygmy blue whale.
- Humpback whale.
- Great white shark.
- Shortfin mako shark.

- Southern bluefin tuna.
- New Zealand fur seal.

The identified sensitive habitat features and species may be impacted by the planned or unplanned activities associated with the development of the Project. There is currently insufficient knowledge to assess whether significant impacts to the southern right whale or great white shark are likely to occur because of the Project. These uncertainties should be addressed in future baseline studies, impact assessment and mitigation and management.

The referral area intersects with a number of Commonwealth managed commercial fishery management areas, and in particular the referral area occurs within the Commonwealth South East Trawl Sector, the Commonwealth Scalefish Hook Sector and the Commonwealth Gillnet, Hook and Trap Sector. The most recent available data indicates commercial fishing activities occur within the referral area which includes low to medium intensity fishing effort for the trawl sector, low intensity squid catch and medium to high intensity shark netting fishing.

The referral area is also located within EARPL's petroleum precinct, with a number of assets located within and in close proximity to the referral area. The referral area also includes a number of other proposed projects including the CarbonNet Project and the Golden Beach Gas Project.

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Appendix 1
Victorian Biodiversity Atlas Records.

Common Name	Scientific Name (or Closest Taxon)	No of Recordings	Proximity to Referral Area of Closest Record (km)	Year of Closest Record	Longitude	Latitude
Anemone cone	*Conus anemone*	1	99	2002	146.382	-39.13
Australian Anchovy	*Engraulis australis*	16	18	2015	147.23592	-38.11884
Australian Burrfish	*Allomycterus pilatus*	2	102	1980	148.52329	-37.79638
Australian Fur Seal	*Arctocephalus pusillus doriferus*	21	0	2018	147.20355	-38.36786
Australian Herring	*Arripis georgianus*	4	68	1977	148.09236	-37.84172
Australian Sardine	*Sardinops sagax*	1	153	2004	149.12379	-37.74653
Banded Morwong	*Cheilodactylus spectabilis*	71	84	1999	146.447	-38.9972
Banded Seaperch	*Hypoplectrodes nigroruber*	4	86	1981	146.47	-39.0361
Banded Stingaree	*Urolophus cruciatus*	2	131	2004	148.883	-37.7942
Barber Perch	*Caesioperca rasor*	397	84	1999	146.447	-38.9972
Barracouta	*Thyrsites atun*	1	153	2002	149.12379	-37.74653
Barracuda	*Sphyraena waitii*	1	44	2004	147.7714	-37.90645
Barred Toadfish	*Contusus richei*	2	44	1978	147.7714	-37.90645
Basket Clams	*supf. Corbiculoidea fam. Corbiculidae*	11	63	2018	146.51729	-38.12688
Bastard Trumpeter	*Latridopsis forsteri*	52	86	1978	146.47	-39.0361
Bearded Rock Cod	*Pseudophycis barbata*	3	84	2002	146.447	-38.9972
Bight Redfish	*Centroberyx gerrardi*	1	52	1976	147.87574	-37.87958
Biscuit Star	*Tosia australis*	160	84	1980	146.447	-38.9972
Biscuit Star	*Tosia magnifica*	17	86	1999	146.47	-39.0361

Common Name	Scientific Name (or Closest Taxon)	No of Recordings	Proximity to Referral Area of Closest Record (km)	Year of Closest Record	Longitude	Latitude
Bivalves	*phy. Mollusca cla. Bivalvia*	1	63	2000	146.51729	-38.12688
Black Bream	*Acanthopagrus butcheri*	148	1	1977	147.18333	-38.37389
Black Reef Leatherjacket	*Eubalichthys bucephalus*	2	87	2004	146.475	-39.0521
Black Sea Urchin	*Centrostephanus rodgersii*	18	131	2004	148.883	-37.7942
Black Stingray	*Dasyatis thetidis*	1	153	1985	149.12379	-37.74653
Black-lip Abalone	*Haliotis rubra*	850	86	2004	146.47	-39.0361
Blue Throated Wrasse	*Notolabrus tetricus*	502	68	1989	148.09236	-37.84172
Blue Weed Whiting	*Haletta semifasciata*	2	96	2001	146.305	-39.0396
Brittle Star species	*Amphiura (Amphiura) trisacantha*	1	54	1986	146.61071	-38.7289
Brittle Star species	*Ophiocomina australis*	1	54	2002	146.61071	-38.7289
Burrunan Dolphin	*Tursiops australis*	97	20	2007	147.52462	-38.04685
Clarks Threefin	*Trinorfolkia clarkei*	16	84	1999	146.447	-38.9972
Cleft-fronted Shore Crab	*Guinusia chabrus*	201	84	1999	146.447	-38.9972
Common Hermit Crab	*Paguristes frontalis*	2	96	2014	146.305	-39.0396
Common Mud Oyster	*Ostrea angasi*	1	87	1993	146.475	-39.0521
Cuvier's Beaked Whale	*Ziphius cavirostris*	1	86	2004	146.44047	-39.01928
Draughtboard Shark	*Cephaloscyllium laticeps*	18	86	1999	146.47	-39.0361
Dusky Flathead	*Platycephalus fuscus*	14	44	1981	147.7714	-37.90645
Dusky Morwong	*Dactylophora nigricans*	25	86	2002	146.47	-39.0361

Common Name	Scientific Name (or Closest Taxon)	No of Recordings	Proximity to Referral Area of Closest Record (km)	Year of Closest Record	Longitude	Latitude
Eared Seals	*Otariidae spp.*	13	0	2000	147.34522	-38.2568
Eared Seals	*subo. Caniformia fam. Otariidae*	3	0	2004	147.19603	-38.37361
Eastern Australian Salmon	*Arripis trutta*	13	41	1993	146.72089	-38.65217
Eastern Blue Groper	*Achoerodus viridis*	8	162	2004	149.266	-37.8003
Eastern Rock Lobster	*Sagmariasus verreauxi*	10	162	1989	149.266	-37.8003
Eight-armed Cushion Star	*Meridiastra calcar*	31	162	2004	149.266	-37.8003
Eleven-armed Seastar	*Coscinasterias muricata*	21	84	1999	146.447	-38.9972
Five-armed Seastar	*Uniophora granifera*	14	87	1999	146.478	-39.0457
Giant Cuttlefish	*Sepia apama*	1	87	2002	146.475	-39.0521
Goldspot Mullet	*Liza argentea*	11	44	2017	147.7714	-37.90645
gorgonian coral	*Erythropodium hicksoni*	3	87	2005	146.478	-39.0457
Green-lip Abalone	*Haliotis laevigata*	8	86	2000	146.47	-39.0361
Greenback Flounder	*Rhombosolea tapirina*	12	6	1999	147.14548	-38.3424
Gunn's Leatherjacket	*Eubalichthys gunnii*	33	87	2000	146.478	-39.0457
Hairy Pipefish	*Urocampus carinirostris*	1	44	1978	147.7714	-37.90645
Halfbanded Seaperch	*Hypoplectrodes maccullochi*	4	86	1999	146.47	-39.0361
Hermit crab	*Paguroidea spp.*	1	95	2000	146.43	-39.1131
Hermit Crabs	*fam. Paguridae gen. Pagurid*	8	86	2001	146.47	-39.0361
Horse-shoe leatherjacket	*Meuschenia hippocrepis*	12	86	1977	146.47	-39.0361

Common Name	Scientific Name (or Closest Taxon)	No of Recordings	Proximity to Referral Area of Closest Record (km)	Year of Closest Record	Longitude	Latitude
Hydrozoans	*ord. Anthoathecata fam. Hydridae*	3	68	2006	146.3271	-38.48376
Kelp Shell	*Phasianotrochus eximius*	7	87	1999	146.475	-39.0521
Killer Whale	*Orcinus orca*	2	86	2003	146.4336	-39.01114
King George Whiting	*Sillaginodes punctatus*	6	22	2004	147.58253	-38.04453
Long-nosed Fur Seal	*Arctocephalus forsteri*	4	0	2014	147.22737	-38.3497
Longfin Pike	*Dinolestes lewini*	138	84	1999	146.447	-38.9972
Longray Weed Whiting	*Siphonognathus radiatus*	7	87	1999	146.475	-39.0521
Longsnouted Flounder	*Ammotretis rostratus*	18	25	1993	146.90712	-38.60741
Luculent Wrasse	*Pseudolabrus luculentus*	4	163	1999	149.266	-37.7958
Nudibranchs	*subc. Opisthobranchia ord. Nudibranc*	8	87	1978	146.478	-39.0457
Pipefish	*fam. Syngnathidae gen. Stigmatopora*	1	44	1978	147.7714	-37.90645
Pipefishes, Seahorses, Sea D	*ord. Syngnathiformes fam. Syngnathid*	2	67	1993	148.088	-37.85438
Port Jackson Glassfish	*Ambassis jacksoniensis*	11	18	2015	147.23592	-38.11884
Port Jackson Shark	*Heterodontus portusjacksoni*	16	87	2000	146.478	-39.0457
Prickly Toadfish	*Contusus brevicaudus*	5	95	1993	146.3162	-39.02989
Purple Wrasse	*Notolabrus fucicola*	358	67	1977	148.088	-37.85438
Pygmy Sperm Whale	*Kogia breviceps*	1	95	2001	146.32051	-39.0366
Red Gurnard	*Chelidonichthys kumu*	5	44	1978	147.7714	-37.90645
Red Rock Lobster	*Jasus edwardsii*	48	84	2017	146.447	-38.9972

Common Name	Scientific Name (or Closest Taxon)	No of Recordings	Proximity to Referral Area of Closest Record (km)	Year of Closest Record	Longitude	Latitude
Reef Ocean Perch	*Helicolenus percoides*	3	87	2001	146.475	-39.0521
Rosy Wrasse	*Pseudolabrus mortonii*	23	86	2006	146.47	-39.0361
Rough Rock Crab	*Nectocarcinus tuberculosus*	20	87	1999	146.475	-39.0521
Rusty Catshark	*Parascyllium ferrugineum*	1	164	2000	149.288	-37.796
Salmon	*fam. Arripidae gen. Arripis*	1	50	1978	147.77985	-37.8442
Sand Mullet	*Myxus elongatus*	46	44	2000	147.7714	-37.90645
Sand Whiting	*Sillago ciliata*	2	153	1981	149.12379	-37.74653
Scallop	*Notochlamys hexactes*	1	92	1993	146.441	-39.0877
Scalyfin	*Parma victoriae*	153	86	2006	146.47	-39.0361
Sea Mullet	*Mugil cephalus*	57	1	1999	147.18333	-38.37389
Sea slug	*Ceratosoma brevicaudatum*	1	99	2002	146.382	-39.13
Sea Slug	*Chromodoris tasmaniensis*	3	87	2004	146.478	-39.0457
Sea slug	*Digidentis perplexa*	1	96	2001	146.284	-39.0233
Sea slug	*Hypselodoris bennetti*	7	87	1999	146.478	-39.0457
Sea slug	*Neodoris chrysoderma*	6	86	2000	146.47	-39.0361
Sea slug	*Tambja verconis*	1	96	2006	146.305	-39.0396
Sea Sweep	*Scorpis aequipinnis*	302	86	1985	146.47	-39.0361
Sea urchin	*Heliocidaris erythrogramma*	446	84	1999	146.447	-38.9972
Sea urchin	*Heliocidaris tuberculata*		96	1999	146.305	-39.0396

Common Name	Scientific Name (or Closest Taxon)	No of Recordings	Proximity to Referral Area of Closest Record (km)	Year of Closest Record	Longitude	Latitude
Sea urchin	*Holopneustes porossimus*	11	87	2000	146.475	-39.0521
Sea urchin	*Holopneustes purpurascens*		87	2005	146.48	-39.0558
Sea Urchins	*fam. Temnopleuridae gen. Amblypneu*	15	86	2001	146.47	-39.0361
Sea-cucumber species	*Rowedota shepherdi*	1	54	1976	146.61071	-38.7289
sea-spider	*Meridionale ambigua*	1	87	1999	146.475	-39.0521
Seagrass Sea Urchin	*Holopneustes inflatus*	7	89	2000	146.469	-39.0642
Seastar	*Echinaster arcystatus*	55	87	2001	146.478	-39.0457
Seastar	*Fromia polypora*	95	86	1999	146.47	-39.0361
Seastar	*Meridiastra gunnii*	208	86	2002	146.47	-39.0361
Seastar	*Nectria macrobrachia*	571	84	2002	146.447	-38.9972
Seastar	*Nectria multispina*		86	1999	146.47	-39.0361
Seastar	*Nectria ocellata*		84	2002	146.447	-38.9972
Seastar	*Nectria wilsoni*		89	2002	146.469	-39.0642
Seastar	*Plectaster decanus*	210	84	1978	146.447	-38.9972
Seastar	*Pseudonepanthia troughtoni*	140	86	1999	146.47	-39.0361
Senator Wrasse	*Pictilabrus laticlavius*	113	86	1992	146.47	-39.0361
Sharpnose Weed Whiting	*Siphonognathus caninis*	4	86	1985	146.47	-39.0361
Short-beaked Common Dolph	*Delphinus delphis*	7	24	1995	147.63439	-38.04741
Snakeskin Wrasse	*Eupetrichthys angustipes*	3	87	2001	146.475	-39.0521

Common Name	Scientific Name (or Closest Taxon)	No of Recordings	Proximity to Referral Area of Closest Record (km)	Year of Closest Record	Longitude	Latitude
Snapper	*Chrysophrys auratus*	3	44	1978	147.7714	-37.90645
Soft Sea Cucumber	*Australostichopus mollis*	3	87	2000	146.475	-39.0521
Southern Eagle Ray	*Myliobatis australis*	3	98	1978	146.324	-39.0764
Southern Elephant Seal	*Mirounga leonina*	5	0	1977	147.30489	-38.29206
Southern Hulafish	*Trachinops caudimaculatus*	44	87	2005	146.475	-39.0521
Southern Humpback Whale	*Megaptera novaeangliae australis*	23	66	2006	146.4895	-38.78701
Southern Maori Wrasse	*Ophthalmolepis lineolatus*	20	87	1994	146.475	-39.0521
Southern Right Whale	*Eubalaena australis*	25	0	1991	147.40736	-38.21064
Southern Sand Flathead	*Platycephalus bassensis*	8	22	1999	147.58253	-38.04453
Southern Sea Garfish	*Hyporhamphus melanochir*	7	22	2000	147.58253	-38.04453
Sperm Whale	*Physeter macrocephalus*	2	96	2006	146.29261	-39.01938
Spider Crabs, Sea Spiders	*supf. Majoidea fam. Hymenosomatidae*	1	104	2005	148.50716	-37.74008
Subantarctic Fur Seal	*Arctophoca tropicalis*	1	104	2015	148.54696	-37.7974
Trevally	*fam. Carangidae gen. Pseudocaranx*	1	25	2006	147.08674	-38.1467
Velvet Leatherjacket	*Meuschenia scaber*	2	68	1978	148.09236	-37.84172
Velvet Seastar	*Petricia vernicina*	128	84	1977	146.447	-38.9972
Vermillion Seastar	*Pentagonaster duebeni*	157	84	2004	146.447	-38.9972
Weeping Toadfish	*Torquigener pleurogramma*	2	102	1985	148.52329	-37.79638
Whelk	*Penion maximus*	1	164	2002	149.288	-37.796

Common Name	Scientific Name (or Closest Taxon)	No of Recordings	Proximity to Referral Area of Closest Record (km)	Year of Closest Record	Longitude	Latitude
Whiting	*fam. Sillaginidae gen. Sillaginodes*	1	25	1993	146.90712	-38.60741
Yellow-eye Mullet	*Aldrichetta forsteri*	71	1	1977	147.18333	-38.37389
Yellow-fin Bream	*Acanthopagrus australis*	19	102	1993	148.52334	-37.79908
Yellow-finned Leatherjacket	*Meuschenia trachylepis*	1	44	1992	147.7714	-37.90645
Yellowstriped Leatherjacket	*Meuschenia flavolineata*	39	87	2001	146.478	-39.0457
Zebra fish	*Girella zebra*	155	86	2001	146.47	-39.0361

Appendix 2
EPBC Protected Matters Search Tool 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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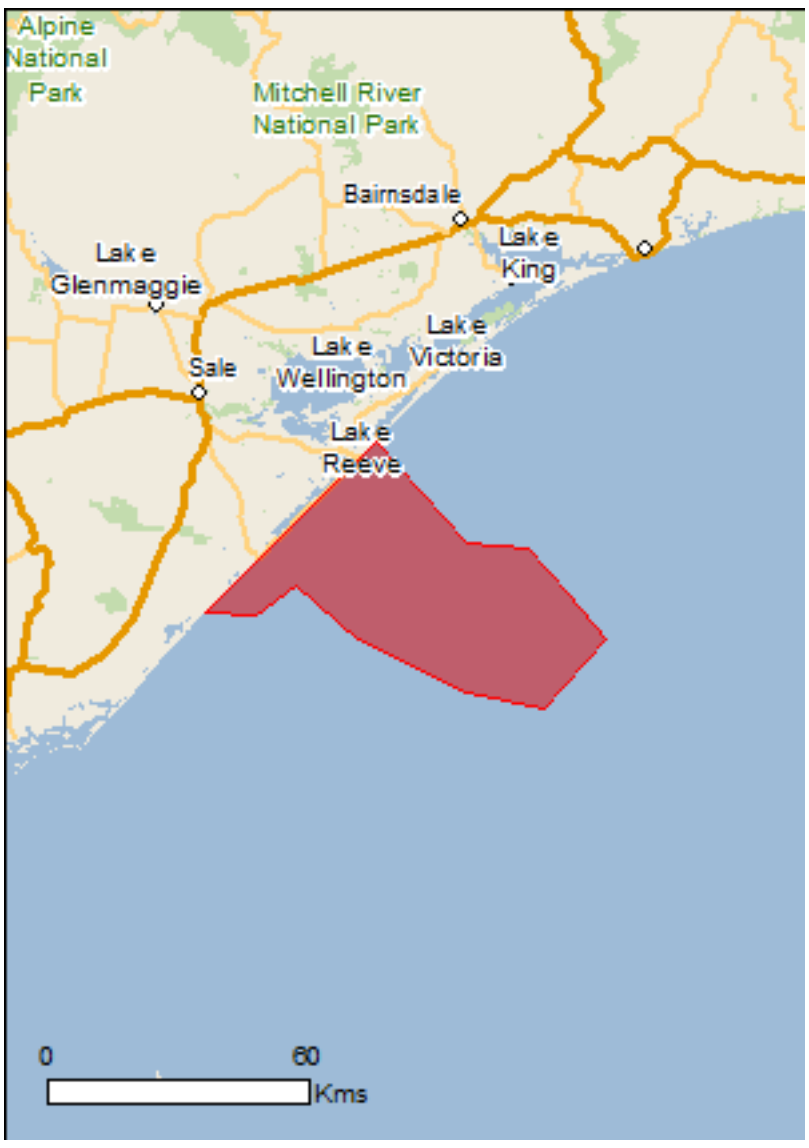

Coordinates

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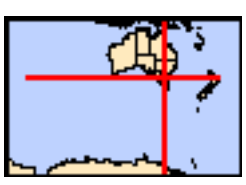

Summary

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:	None
National Heritage Places:	None
Wetlands of International Importance:	1
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	1
Listed Threatened Ecological Communities:	2
Listed Threatened Species:	64
Listed Migratory Species:	52

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:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	83
Whales and Other Cetaceans:	14
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

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

State and Territory Reserves:	2
Regional Forest Agreements:	1
Invasive Species:	33
Nationally Important Wetlands:	1
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Wetlands of International Importance (Ramsar) [Resource Information]

Name	Proximity
Gippsland lakes	Within Ramsar site

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

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
South-east

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
Natural Damp Grassland of the Victorian Coastal Plains	Critically Endangered	Community may occur within area
Subtropical and Temperate Coastal Saltmarsh	Vulnerable	Community likely to occur within area

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
Birds		
Anthochaera phrygia Regent Honeyeater [82338]	Critically Endangered	Species or species habitat likely 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
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea antipodensis gibsoni Gibson's Albatross [82270]	Vulnerable	Foraging, feeding or related behaviour likely

Name	Status	Type of Presence
		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
[Falco hypoleucos](#) Grey Falcon [929]	Vulnerable	Species or species habitat likely to occur within area
[Fregetta grallaria grallaria](#) White-bellied Storm-Petrel (Tasman Sea), White-bellied Storm-Petrel (Australasian) [64438]	Vulnerable	Species or species habitat likely to occur within area
[Grantiella picta](#) Painted Honeyeater [470]	Vulnerable	Species or species habitat likely to occur within area
[Halobaena caerulea](#) Blue Petrel [1059]	Vulnerable	Species or species habitat may occur within area
[Hirundapus caudacutus](#) White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area
[Lathamus discolor](#) Swift Parrot [744]	Critically Endangered	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
[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
[Neophema chrysogaster](#) Orange-bellied Parrot [747]	Critically Endangered	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
[Phoebetria fusca](#) Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area
[Pterodroma leucoptera leucoptera](#) Gould's Petrel, Australian Gould's Petrel [26033]	Endangered	Species or species habitat may occur within area
[Rostratula australis](#) Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area

Name	Status	Type of Presence
Sternula nereis nereis Australian Fairy Tern [82950]	Vulnerable	Species or species habitat known to occur within area
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area
Thalassarche bulleri platei Northern Buller's Albatross, Pacific Albatross [82273]	Vulnerable	Species or species habitat may occur within area
Thalassarche cauta Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Thalassarche chrysostoma Grey-headed Albatross [66491]	Endangered	Species or species habitat may occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thinornis cucullatus cucullatus Eastern Hooded Plover, Eastern Hooded Plover [90381]	Vulnerable	Species or species habitat known to occur within area
Fish		
Galaxiella pusilla Eastern Dwarf Galaxias, Dwarf Galaxias [56790]	Vulnerable	Species or species habitat likely to occur within area
Prototroctes maraena Australian Grayling [26179]	Vulnerable	Species or species habitat known to occur within area
Frogs		
Litoria aurea Green and Golden Bell Frog [1870]	Vulnerable	Species or species habitat likely to occur within area
Litoria raniformis Growling Grass Frog, Southern Bell Frog, Green and Golden Frog, Warty Swamp Frog, Golden Bell Frog [1828]	Vulnerable	Species or species habitat likely to occur within area
Mammals		
Antechinus minimus maritimus Swamp Antechinus (mainland) [83086]	Vulnerable	Species or species habitat may occur within area
Balaenoptera borealis Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Foraging, feeding or

Name	Status	Type of Presence
		related behaviour likely to occur within area
Dasyurus maculatus maculatus (SE mainland population)		
Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) [75184]	Endangered	Species or species habitat may occur within area
Eubalaena australis		
Southern Right Whale [40]	Endangered	Species or species habitat known to occur within area
Megaptera novaeangliae		
Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
Pseudomys novaehollandiae		
New Holland Mouse, Pookila [96]	Vulnerable	Species or species habitat known to occur within area
Pteropus poliocephalus		
Grey-headed Flying-fox [186]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Plants		
Amphibromus fluitans		
River Swamp Wallaby-grass, Floating Swamp Wallaby-grass [19215]	Vulnerable	Species or species habitat likely to occur within area
Caladenia tessellata		
Thick-lipped Spider-orchid, Daddy Long-legs [2119]	Vulnerable	Species or species habitat likely to occur within area
Commersonia prostrata		
Dwarf Kerrawang [87152]	Endangered	Species or species habitat likely to occur within area
Dianella amoena		
Matted Flax-lily [64886]	Endangered	Species or species habitat may occur within area
Dodonaea procumbens		
Trailing Hop-bush [12149]	Vulnerable	Species or species habitat likely to occur within area
Glycine latrobeana		
Clover Glycine, Purple Clover [13910]	Vulnerable	Species or species habitat may occur within area
Lepidium hyssopifolium		
Basalt Pepper-cress, Peppercress, Rubble Pepper-cress, Pepperweed [16542]	Endangered	Species or species habitat likely to occur within area
Prasophyllum frenchii		
Maroon Leek-orchid, Slaty Leek-orchid, Stout Leek-orchid, French's Leek-orchid, Swamp Leek-orchid [9704]	Endangered	Species or species habitat known to occur within area
Pterostylis chlorogramma		
Green-striped Greenhood [56510]	Vulnerable	Species or species habitat may occur within area
Senecio psilocarpus		
Swamp Fireweed, Smooth-fruited Groundsel [64976]	Vulnerable	Species or species habitat likely to occur within area
Thelymitra epipactoides		
Metallic Sun-orchid [11896]	Endangered	Species or species habitat likely to occur within area
Xerochrysum palustre		
Swamp Everlasting, Swamp Paper Daisy [76215]	Vulnerable	Species or species habitat likely to occur within area
Reptiles		

Name	Status	Type of Presence
[Caretta caretta](#) Loggerhead Turtle [1763]	Endangered	Breeding likely to occur within area
[Chelonia mydas](#) Green Turtle [1765]	Vulnerable	Species or species habitat may occur within area
[Dermochelys coriacea](#) Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat known to occur within area
Sharks		
[Carcharodon carcharias](#) White Shark, Great White Shark [64470]	Vulnerable	Breeding known to occur within area
[Rhincodon typus](#) Whale Shark [66680]	Vulnerable	Species or species habitat may 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		
[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 grisea](#) Sooty Shearwater [82651]		Species or species habitat may occur within area
[Diomedea antipodensis](#) Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour 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
[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
[Phoebetria fusca](#) Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area
[Sternula albifrons](#) Little Tern [82849]		Species or species habitat may occur within area
[Thalassarche bulleri](#) Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area

Name	Threatened	Type of Presence
Thalassarche cauta		
Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Thalassarche chrysostoma		
Grey-headed Albatross [66491]	Endangered	Species or species habitat may occur within area
Thalassarche impavida		
Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche melanophris		
Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche salvini		
Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche steadi		
White-capped Albatross [64462]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Migratory Marine Species		
Balaena glacialis australis		
Southern Right Whale [75529]	Endangered*	Species or species habitat known to occur within area
Balaenoptera borealis		
Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Balaenoptera musculus		
Blue Whale [36]	Endangered	Species or species habitat likely 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 may occur within area
Carcharodon carcharias		
White Shark, Great White Shark [64470]	Vulnerable	Breeding known to occur within area
Caretta caretta		
Loggerhead Turtle [1763]	Endangered	Breeding likely to occur within area
Chelonia mydas		
Green Turtle [1765]	Vulnerable	Species or species habitat may occur within area
Dermochelys coriacea		
Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat known to occur within area
Isurus oxyrinchus		
Shortfin Mako, Mako Shark [79073]		Species or species habitat likely to occur within area
Lagenorhynchus obscurus		
Dusky Dolphin [43]		Species or species habitat may occur within area
Lamna nasus		
Porbeagle, Mackerel Shark [83288]		Species or species habitat likely to occur within area
Megaptera novaeangliae		
Humpback Whale [38]	Vulnerable	Species or species

Name	Threatened	Type of Presence
		habitat known to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat likely to occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area
Migratory Terrestrial Species		
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat may occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat likely to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat likely to occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		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
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat likely 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
Limosa lapponica Bar-tailed Godwit [844]		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

Name	Threatened	Type of Presence
Numenius minutus		
Little Curlew, Little Whimbrel [848]		Roosting likely to occur within area
Pandion haliaetus		
Osprey [952]		Species or species habitat likely to occur within area
Tringa nebularia		
Common Greenshank, Greenshank [832]		Species or species habitat known to occur within area

Other Matters Protected by the EPBC Act

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		
Actitis hypoleucos		
Common Sandpiper [59309]		Species or species habitat known to 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
Calidris acuminata		
Sharp-tailed Sandpiper [874]		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
Catharacta skua		
Great Skua [59472]		Species or species habitat may occur within area
Charadrius ruficapillus		
Red-capped Plover [881]		Roosting known to occur within area
Diomedea antipodensis		
Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area

Name	Threatened	Type of Presence
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 gibsoni Gibson's Albatross [64466]	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
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat likely 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
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
Himantopus himantopus Pied Stilt, Black-winged Stilt [870]		Roosting known to occur within area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat likely to occur within area
Limosa lapponica Bar-tailed Godwit [844]		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
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat may occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat likely to occur within area

Name	Threatened	Type of Presence
Neophema chrysogaster Orange-bellied Parrot [747]	Critically Endangered	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
Numenius minutus Little Curlew, Little Whimbrel [848]		Roosting likely to occur within area
Pachyptila turtur Fairy Prion [1066]		Species or species habitat known to occur within area
Pandion haliaetus Osprey [952]		Species or species habitat likely to occur within area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area
Puffinus carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [1043]		Foraging, feeding or related behaviour likely to occur within area
Puffinus griseus Sooty Shearwater [1024]		Species or species habitat may 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 likely to occur within area
Sterna albifrons Little Tern [813]		Species or species habitat may occur within area
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area
Thalassarche cauta Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Thalassarche chrysostoma Grey-headed Albatross [66491]	Endangered	Species or species habitat may occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche sp. nov. Pacific Albatross [66511]	Vulnerable*	Species or species habitat may occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable	Foraging, feeding or

Name	Threatened	Type of Presence
		related behaviour likely to occur within area
Thinornis rubricollis Hooded Plover [59510]		Species or species habitat likely to occur within area
Thinornis rubricollis rubricollis Hooded Plover (eastern) [66726]	Vulnerable*	Species or species habitat known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat known to occur within area
Fish		
Heraldia nocturna Upside-down Pipefish, Eastern Upside-down Pipefish, Eastern Upside-down Pipefish [66227]		Species or species habitat may occur within area
Hippocampus abdominalis Big-belly Seahorse, Eastern Potbelly Seahorse, New Zealand Potbelly Seahorse [66233]		Species or species habitat may occur within area
Hippocampus breviceps Short-head Seahorse, Short-snouted Seahorse [66235]		Species or species habitat may occur within area
Hippocampus minotaur Bullneck Seahorse [66705]		Species or species habitat may occur within area
Histiogamphelus briggsii Crested Pipefish, Briggs' Crested Pipefish, Briggs' Pipefish [66242]		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
Hypselognathus rostratus Knifesnout Pipefish, Knife-snouted Pipefish [66245]		Species or species habitat may occur within area
Kaupus costatus Deepbody Pipefish, Deep-bodied Pipefish [66246]		Species or species habitat may occur within area
Kimblaeus bassensis Trawl Pipefish, Bass Strait Pipefish [66247]		Species or species habitat may occur within area
Leptoichthys fistularius Brushtail Pipefish [66248]		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
Mitotichthys semistriatus Halfbanded Pipefish [66261]		Species or species habitat may occur within area
Mitotichthys tuckeri Tucker's Pipefish [66262]		Species or species habitat may occur within area
Notiocampus ruber Red Pipefish [66265]		Species or species

Name	Threatened	Type of Presence
		habitat may occur within area
Phyllopteryx taeniolatus Common Seadragon, Weedy Seadragon [66268]		Species or species habitat may occur within area
Solegnathus robustus Robust Pipehorse, Robust Spiny Pipehorse [66274]		Species or species habitat may occur within area
Solegnathus spinosissimus Spiny Pipehorse, Australian Spiny Pipehorse [66275]		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
Stipecampus cristatus Ringback Pipefish, Ring-backed Pipefish [66278]		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
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
Arctocephalus pusillus Australian Fur-seal, Australo-African Fur-seal [21]		Species or species habitat may occur within area
Reptiles		
Caretta caretta Loggerhead Turtle [1763]	Endangered	Breeding likely to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat may occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat known to occur within area

Whales and other Cetaceans		[Resource Information]
Name	Status	Type of Presence
Mammals		

Name	Status	Type of Presence
Balaenoptera acutorostrata Minke Whale [33]		Species or species habitat may occur within area
Balaenoptera borealis Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat likely 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 may 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	Species or species habitat known to occur within area
Grampus griseus Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
Lagenorhynchus obscurus Dusky Dolphin [43]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat likely to occur within area
Pseudorca crassidens False Killer Whale [48]		Species or species habitat likely to occur within area
Tursiops aduncus Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area
Tursiops truncatus s. str. Bottlenose Dolphin [68417]		Species or species habitat may occur within area

Extra Information

State and Territory Reserves [Resource Information]

Name	State
Gippsland Lakes Coastal Park	VIC
Jack Smith Lake W.R	VIC

Regional Forest Agreements [Resource Information]

Note that all areas with completed RFAs have been included.

Name	State
Gippsland RFA	Victoria

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
Alauda arvensis Skylark [656]		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
Carduelis chloris European Greenfinch [404]		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
Streptopelia chinensis Spotted Turtle-Dove [780]		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
Mammals		
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Capra hircus Goat [2]		Species or species

Name	Status	Type of Presence
		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
Lepus capensis Brown Hare [127]		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 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 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		
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Carrichtera annua Ward's Weed [9511]		Species or species habitat may 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
Genista sp. X Genista monspessulana Broom [67538]		Species or species habitat may occur within area
Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area
Nassella trichotoma Serrated Tussock, Yass River Tussock, Yass Tussock, Nassella Tussock (NZ) [18884]		Species or species habitat likely to occur within area
Olea europaea Olive, Common Olive [9160]		Species or species habitat may occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species

Name	Status	Type of Presence
		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
Ulex europaeus		
Gorse, Furze [7693]		Species or species habitat likely to occur within area

Nationally Important Wetlands [Resource Information]

Name	State
Jack Smith Lake State Game Reserve	VIC

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

-38.50417 147.39444,-38.59222 147.62222,-38.61861 147.78222,-38.50361 147.91056,-38.35528 147.75194,-38.3475 147.62444,-38.18167 147.43806,-38.4625 147.08167,-38.46694 147.18722,-38.41833 147.27083,-38.50417 147.39444

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-Department of Environment and Primary Industries, Victoria
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-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

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

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Appendix 3
Atlas of Living Australia and Victorian Biodiversity Atlas Recordings of Threatened and Migratory Species.

Common Name	Scientific Name	No of Recordings	Year of Closest Record	Proximity to Referral Area of Closest Record (km)	Latitude	Longitude
Blue Whale	*Balaenoptera musculus*	3	1991	60	-38.96667	146.9833
Brittle Star species	*Amphiura trisacantha*	6	1983	66	-38.73	146.62
Brittle Star species	*Clarkcoma australis*	2	2001	85	-38.772	146.411
Burrunan Dolphin	*Tursiops australis*	121	2006	18	-38.08	147.43
Great White Shark	*Carcharodon carcharias*	24	2004	62	-37.88	148.13
Green Turtle	*Chelonia mydas*	2	n.d	92	-38.77	146.32
Grey Nurse Shark	*Carcharias taurus*	2	2002	80	-39.25	147.25
Humpback Whale	*Megaptera novaeangliae*	117	2016	0	-38.21316	147.4041
Leatherback Turtle, Leathery Turtle	*Dermochelys coriacea*	8	1993	107	-38.9582	146.255
Loggerhead Turtle	*Caretta caretta*	11	2014	38	-37.93	147.7
New Zealand Fur Seal, Long-nosed Fur Seal	*Arctocephalus forsteri*	12	2014	0	-38.3497	147.2274
Orca, Killer Whale	*Orcinus orca*	27	2013	52	-38.6	148.5
Porbeagle, Mackerel Shark	*Lamna nasus*	1	2000	221	-37.75	150.25
Pygmy Right Whale	*Caperea marginata*	23	1995	98	-39.02	146.43
Scalloped Hammerhead	*Sphyrna lewini*	10	2001	7	-38.25	147.25
Sea-cucumber species	*Rowedota shepherdi*	3	1989	67	-38.7289	146.6107
Sei Whale	*Balaenoptera borealis*	2	1983	72	-38.3	148.7
Shortfin Mako, Mako Shark	*Isurus oxyrinchus*	39	2001	12	-38.25	147.75
Southern Right Whale	*Eubalaena australis*	34	1988	0	-38.22418	147.4017

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