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# Marine Parks

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## Environmental, Economic and Social Values of the Encounter Marine Park

### PART 1



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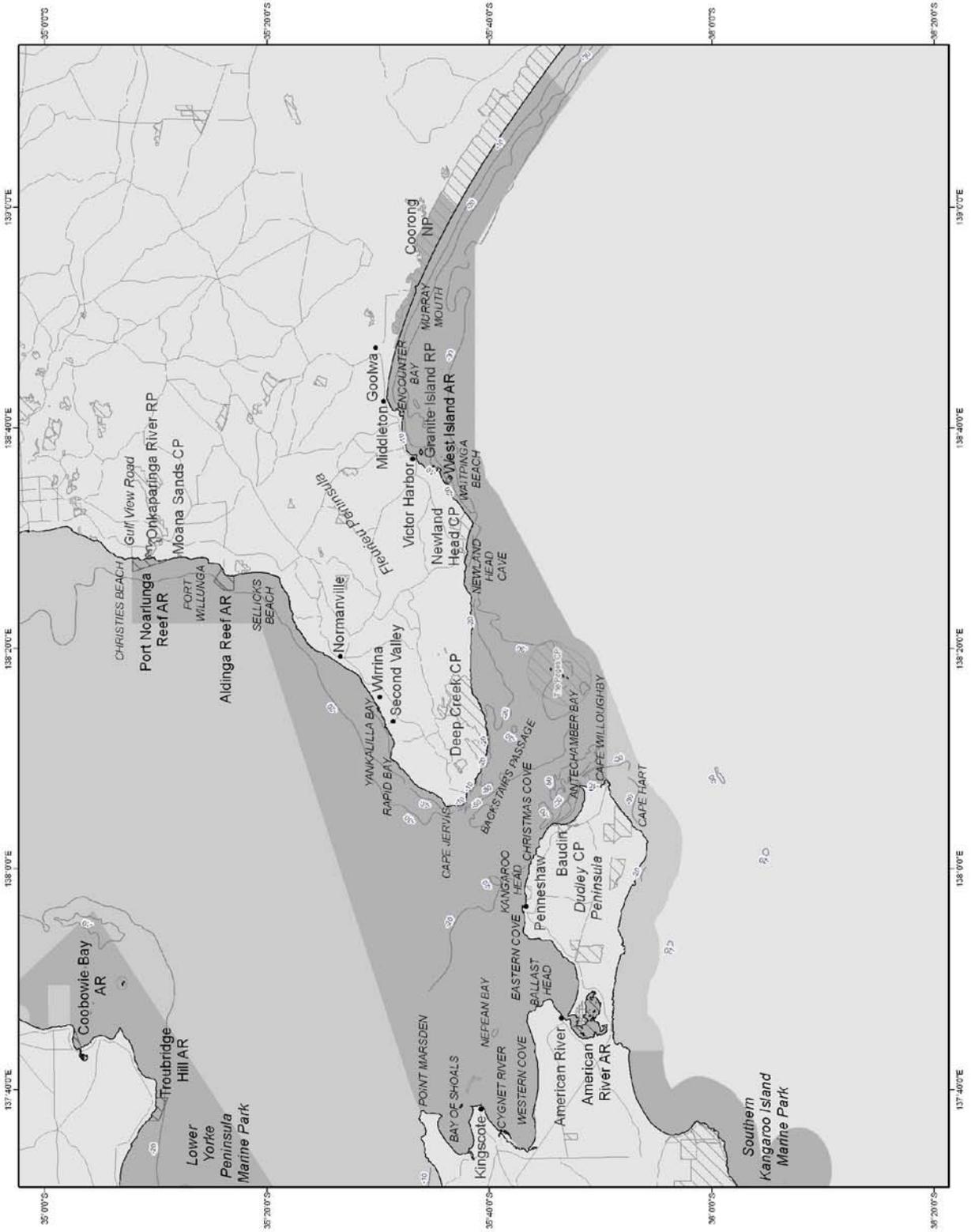
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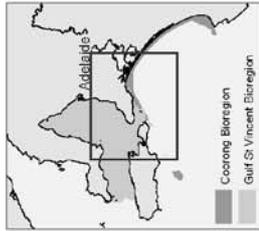
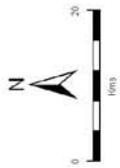
### PART 2 AN ATLAS OF MAPS

An atlas of maps containing environmental, economic and social/cultural information for this marine park has been produced as Part 2 of the Values Statement. The maps provide details specific to this park in a user-friendly visual format and may be viewed and downloaded from <http://www.marineparks.sa.gov.au>.

# Encounter Marine Park



- Marine Park
- State Waters Jurisdiction
- Parks and Reserves
- Aquatic Reserves
- Bathymetry Contours
- Roads
- Coastline (median high water)



Produced by  
Coast and Marine Conservation  
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Data Source  
Marine Park, NPWS  
Aquatic Reserves - PRSA  
Marine Reserves - SARDI  
State Waters Jurisdiction - Geoscience Australia  
Bathymetry  
Geographic Datum of Australia, 1994

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## ENCOUNTER MARINE PARK

Covering approximately 3,119 km<sup>2</sup>, the Encounter Marine Park straddles the transition between the Gulf St Vincent and Coorong Bioregions. It encompasses waters off southern metropolitan Adelaide and the Fleurieu Peninsula, extending past the Murray Mouth to the Coorong coast. At its western boundary, the marine park includes all waters of Backstairs Passage and the eastern shores of Kangaroo Island. This marine park partially or completely overlays a number of other protected areas, including the Coorong National Park; Beatrice Islet, Busby Islet, Cape Willoughby, Deep Creek, Baudin, Lashmar, Newland Head, Pelican Lagoon, Pullen Island, West Island and the Pages Islands Conservation Parks; and Granite Island Recreation Park. The marine park also borders Nepean Bay Conservation Park, Moana Sands Conservation Park and Onkaparinga River Recreation Park. The Aldinga Reef and Port Noarlunga Aquatic Reserves are overlaid by the marine park.

# 1 ENVIRONMENTAL VALUES

## 1.1 Ecosystem services

Ecosystems provide many critically important services that people benefit from, often at no direct cost to us. Examples of ecosystem services provided by coastal and marine habitats are shown in the following table. It is important to ensure that ecosystem health and integrity are maintained so that ecosystems continue to provide these services to us all.

Table adapted from McLeod, K and Leslie, H (2009).

|   | Life supporting services |                       |              |                  | Resources and products |                         |  |                                  | Maintain earth's living space |                  |                        |                        |                 |               | Recreational and cultural services |                      |                        |            |                                 |                        |
|---|--------------------------|-----------------------|--------------|------------------|------------------------|-------------------------|--|----------------------------------|-------------------------------|------------------|------------------------|------------------------|-----------------|---------------|------------------------------------|----------------------|------------------------|------------|---------------------------------|------------------------|
|   | Biogeochemical processes | Biophysical processes | Biodiversity | Nutrient cycling | Food                   | Fibre, fuel, shells etc | Non-biological materials (eg minerals) | Pharmaceuticals & nutraceuticals | Climate regulation            | Waste processing | Flood/storm protection | Water flow/circulation | Erosion control | Water quality | Sediment quality                   | Cultural and amenity | Recreation and tourism | Aesthetics | Spiritual, religious, lifestyle | Education and research |
| Coastal, estuarine and marine habitat types                         |                          |                       |              |                  |                        |                         |  |                                  |                               |                  |                        |                        |                 |               |                                    |                      |                        |            |                                 |                        |
| Bare sand   | x                        | x                     | x            | x                | x                      | x                       | x                                      |                                  |                               | x                |                        | x                      |                 | x             | x                                  | x                    | x                      | x          | x                               | x                      |
| Seagrass  | x                        | x                     | x            | x                | x                      | x                       |  | x                                | x                             | x                |                        | x                      | x               | x             | x                                  | x                    | x                      | x          | x                               | x                      |
| Reef (granite, limestone, calcarenite or low profile platform reef) | x                        | x                     | x            | x                | x                      | x                       | x                                      | x                                | x                             | x                |                        | x                      | x               | x             |                                    | x                    | x                      | x          | x                               | x                      |
| Water column  | x                        | x                     | x            | x                | x                      | x                       | x                                      | x                                | x                             | x                | x                      | x                      |                 | x             | x                                  | x                    | x                      | x          | x                               | x                      |
| Bedrock platform  | x                        | x                     | x            | x                | x                      | x                       | x                                      | x                                | x                             | x                |                        |                        | x               |               |                                    | x                    | x                      | x          | x                               | x                      |
| Cliffs  | x                        | x                     | x            | x                | x                      | x                       | x                                      |                                  |                               |                  | x                      |                        |                 |               |                                    | x                    | x                      | x          | x                               | x                      |
| Sandy beaches (dunes, coarse sand, fine sand)                       | x                        | x                     | x            | x                | x                      | x                       | x                                      |                                  |                               | x                |                        | x                      |                 |               | x                                  | x                    | x                      | x          | x                               | x                      |
| Other beaches (boulder, pebble/cobble, mixed)                       | x                        | x                     | x            | x                | x                      | x                       | x                                      |                                  |                               | x                |                        | x                      | x               |               | x                                  | x                    | x                      | x          | x                               | x                      |
| Mudflats and sandflats  | x                        | x                     | x            | x                | x                      | x                       | x                                      |                                  |                               | x                |                        | x                      |                 |               | x                                  | x                    | x                      | x          | x                               | x                      |
| Saltmarsh   | x                        | x                     | x            | x                | x                      | x                       | x                                      | x                                | x                             | x                | x                      | x                      | x               | x             | x                                  | x                    | x                      | x          | x                               | x                      |
| Intertidal seagrass   | x                        | x                     | x            | x                | x                      | x                       |  | x                                | x                             | x                |                        | x                      | x               | x             | x                                  | x                    | x                      | x          | x                               | x                      |

The Encounter Marine Park will be designed to conserve examples of habitats and species found in the Gulf St Vincent and Coorong Bioregions. Habitats, species and natural processes found here are summarised below.

## 1.2 Physical influences

Physical influences shape the type of habitats and species found in an area. Physical influences typical of this region include:

- fresh water inputs and associated sediments and nutrients from the River Murray, Onkaparinga River, Cygnet River and others;
- seasonal surface water temperatures varying from 11°C in winter to 26°C in summer;
- salinities ranging from 35 to 42 ppt;
- great variations in water depths and exposure to wind and wave energies;
- very strong tidal currents which pass through Backstairs Passage and connect Gulf St Vincent to the open ocean;
- strong currents forming eddies adjacent to the lower Fleurieu Peninsula; and
- some influence of the nutrient rich Bonney Upwelling in the southern reaches of the park.

## 1.3 Habitat variety

**Table 1** Benthic (subtidal) habitats found in the Encounter Marine Park

| Benthic Habitat**         | Area (km <sup>2</sup> )* | % of park |
|---------------------------|--------------------------|-----------|
| Bare sand                 | 537                      | 18%       |
| Dense seagrass            | 210                      | 7%        |
| Dense seagrass patches    | 8                        | <1%       |
| Medium seagrass           | 75                       | 2%        |
| Sparse seagrass           | 16                       | 1%        |
| Granite reef              | 4                        | <1%       |
| Heavy limestone reef      | 22                       | 1%        |
| Low profile platform reef | 74                       | 2%        |
| Unmapped                  | 2124                     | 69%       |

\* habitat areas have been rounded to the nearest whole number

\*\*not a definitive list the habitats included are those found from mapping at a resolution of 1:100,000

**Table 2** Shoreline (intertidal) habitats found in the Encounter Marine Park

| Shoreline Habitat      | Length in park (km)* | % of park length |
|------------------------|----------------------|------------------|
| Boulder beach          | 12                   | 3%               |
| Bedrock platform       | 33                   | 9%               |
| Cliffs                 | 86                   | 23%              |
| Coarse sandy beach     | 65                   | 17%              |
| Fine sandy beach       | 119                  | 31%              |
| Mudflats and sandflats | 7                    | 2%               |
| Mixed beach            | 14                   | 4%               |
| Pebble/Cobble beach    | 3                    | 1%               |
| Intertidal seagrass    | 32                   | 8%               |
| Saltmarsh              | 8                    | 2%               |

\* habitat lengths have been rounded to the nearest whole number

The Encounter Marine Park is made up of a range of distinctive habitats.

### 1.3.1 Port Noarlunga to Cape Jervis

The gulf-facing coast of the southern Fleurieu Peninsula is characterised by sheltered, generally shallow waters, with many small estuaries formed by rivers and creeks running off the Mt Lofty Ranges.

The Onkaparinga River creates the largest estuary along this stretch of coast and has a major influence on the ecology of the area. It is a Wetland of National Importance. The samphire

within the estuary is the only example of this community south of Adelaide. The estuary is comprised of 3 main habitat types: 1) The upper tidal reaches; 2) the lagoon/floodplain habitat in the lower reaches; and 3) the remnant sand dunes near the mouth. Habitats of the lower Fleurieu Peninsula include cliffs and rocky headlands interspersed by pocket beaches, intertidal and shallow near-shore reefs, seagrass meadows and sandy plains.

Larger, more open beach systems extend north from Sellicks Beach, backed either by soft sediment cliffs such as at Maslin Beach or dunes as at, Moana, Aldinga and Port Noarlunga. Further south, Normanville beach is also backed by dunes.

Limestone reefs such as those found at Aldinga and Port Noarlunga support different communities of plants and animals compared to the granite reefs of Victor Harbor. Significant intertidal and subtidal platform reefs are located off Carrickalinga Head.

### *1.3.2 Cape Jervis to the Coorong*

From Cape Jervis to the beginning of Tunkalilla Beach are a number of small headlands interspersed with bays and coves. Moving east the coastline extends into the impressive cliffs of Newland Head which are exposed to the full force of the Southern Ocean. The habitats comprise extensive stretches of sandy seafloor which border the basement rock and boulder reefs associated with cliff lines and headlands. The steeply sloping reef systems are home to a diversity of flora including both red and brown algae species. Deeper water habitats include reefs supporting animals such as sponges, soft corals and gorgonian corals. The sandy surf beaches at Tunkalilla and Waitpinga present significant expanses of shoreline exposed to the Southern Ocean.

The Encounter Bay region is diverse, with sheltered and exposed beaches, intertidal platform reef, offshore platform and granitic boulder reefs and extensive sandy seafloor habitats. The seagrasses of Encounter Bay are the only significant areas of seagrass between Cape Jervis and Lacepede Bay in the upper South East (Edyvane, 1999). Further offshore, an extensive platform reef system is known to run along the Coorong. The Hindmarsh and Inman Rivers create significant estuaries in this section of coastline.

### *1.3.3 The Coorong*

The Coorong coast contains the largest high energy dissipative beaches in the southern hemisphere, backed by vast sand dunes and the Coorong Lakes. This area is part of one of Australia's longest continual sandy beaches running approximately 194km from the Murray Mouth to Cape Jaffa.

The Murray Mouth and the associated sand peninsulas are a major biological and physical influence in this marine park, with the flow of the Murray Mouth integral to the functioning of the ecosystem of the Coorong region and the adjacent coastal and marine area.

The Coorong Lagoon complex encompasses one of Australia's most significant coastal wetlands as well as being of international importance under the RAMSAR convention (an international treaty to maintain the ecological character of wetlands and plan for sustainable use). The lagoonal waters and surrounding land support a diverse range of aquatic and terrestrial plants and animals.

The open coast is a deepwater environment sculpted by high wave energy, predominately comprising bare sand habitats but interspersed with patches of limestone reefs.

### *1.3.4 Backstairs Passage*

Backstairs Passage includes a range of habitats, in some cases unique to the region. The cliffs and headlands of Dudley Peninsula are cut by wave action to form shore platforms and fringing reefs at their bases, which continue to drop steeply into a deep submarine trench up to 80 metres deep. The trench floors and walls are lined with large sponges (up to one metre in diameter) and gorgonian corals. Amongst these sponge beds, the most richly diverse community of brachiopods within South Australian waters are known to exist. In waters between

20-40 metres deep are extensive mega-ripples (sand-waves) created by the strong currents in the area. Extensive and diverse red algal beds have been identified in waters 30-40m, with many uncommon species such as *Claudea* spp. recorded.

#### 1.3.5 *The Islands*

The Pages consist of two islands, the North and South Pages, and a reef system to the south that is tidally exposed. The island group is a granitic outcrop surrounded by fringing reef which is dominated by a canopy of brown algae in shallow water and is the only example of an offshore island archipelago in this marine park.

Other islands in this marine park include Granite Island, Wright Island, West Island, Seal Island and Pullen Island, each surrounded by medium to high profile reef, with sand and, in some cases, seagrass meadows found adjacent to the reef. The reef is typically dominated by the large brown kelp *Ecklonia radiata* along with a host of other large brown algae.

#### 1.3.6 *Eastern Kangaroo Island*

Antechamber Bay contains extensive and dense seagrass meadows, while Nepean Bay, including the protected waters of Eastern Cove, Western Cove and Bay of Shoals, contains large areas of seagrass, sandy seafloor habitat and shallow reefs. Seagrass species recorded here include *Posidonia australis*, *Zostera capricorni* and *Heterozostera nigricoulis*. *Amphibolis Antarctica* is found in a patchy distribution associated with reef and rubble bottom and in some cases in shallow areas such as Red Banks. Rare sponge gardens are located in the area near Strawbridge Point.

A distinguishing feature of Western Cove is the Cygnet River estuary and associated saltmarsh – the most significant in the area. Pelican Lagoon is the only semi-enclosed marine lagoon on Kangaroo Island and supports a range of reef, seagrass, sponge and sandy seafloor communities. The intertidal and supratidal mudflats and small islands in the lagoon provide important shorebird habitats.

Lashmar Lagoon and the Chapman River estuary have been identified as wetlands of national importance (see ANCA 1996). The site consists of Lashmar Lagoon, a shallow, freshwater (slightly brackish) lake and the lower reaches of the Chapman River to the river mouth, where it enters the sea at Antechamber Bay. The site is an important feeding and breeding refuge for waterbirds and migratory wader species, and provides a winter refuge for the Hooded Plover, *Thinornis rubricollis* (Nv, Sv).

### 1.4 *Marine species*

The many habitats located within the Encounter Marine Park support a variety of marine and coastal species, many of which have been identified as ecologically important. Refer to Appendix 1 for a more detailed list of species.

#### 1.4.1 *Plants and algae*

The area is recognised for its high diversity of large algae. There are two dominant groups of algae that form canopies including kelp (*Ecklonia radiata*) and fucoids, which are large brown algae that are usually branched or complex. Varieties of red, green and brown algae can be found in the understory. An unusually diverse range of red algal species can be found on the offshore islands of Encounter Bay and the north east coast of Kangaroo Island.

The seagrass beds are dominated by *Posidonia* species. *Amphibolis* and *Heterozostera* are also found in sections along the coast. Between Silver sands and Sellicks Beach the not so common seagrass known as *Posidonia coriacea* is present in clumps. *Halophila* sp. is also present in some areas.

#### 1.4.2 *Bony fish, sharks and rays*

Over 80 species of fish have been recorded off the coast of the Fleurieu Peninsula, between Lady Bay and Cape Jervis, with 59 species identified near the Murray Mouth and Coorong lagoons. Pelican Lagoon, Bay of Shoals, Western Cove and the estuaries of the Fleurieu

Peninsula and the Coorong provide nursery and feeding areas for the juvenile stages of a multitude of commercially and recreationally important fish species.

Fish species of conservation concern such as the harlequin fish, western blue devil and the western blue groper can be found at a variety of reefs throughout the marine park. In particular, harlequin fish are found in numbers at Aldinga Reef and also at locations around the Dudley Peninsula. These fish have been identified as long-living, site-attached species which are particularly vulnerable to fishing pressure. Blue morwongs, another reef dweller, have also been recorded on many reefs in the marine park and have been identified as a species of conservation concern.

Dusky whalers, which have been nominated for listing under the *Environment Protection and Biodiversity Conservation Act 1999* (the EPBC Act), and school sharks (conservation dependent) have been sighted in the coastal waters along the Coorong and Murray Mouth, while the transient hammerhead shark, a species of conservation concern, is known to frequent sites along the southern Fleurieu coastline. Smooth hammerhead sharks are also known to gather seasonally at the ocean beach adjacent to the Murray Mouth. The protected white shark is also known to visit sites along the coast within the park, and particularly frequents the Pages Islands. The shortfin mako is known to visit locations throughout the park and was recently listed for protection under the EPBC Act. The area from Port Noarlunga to Christies Beach and Second Valley contain very high numbers of Port Jackson shark egg cases.

Sheltered coastal seagrass habitats such as those around Rapid Bay, Second Valley and Pelican Lagoon provide habitat for many *Sygnathidae* species such as the leafy and weedy seadragon and several pipefish species. These species are of conservation concern but are not officially listed by the International Union for Conservation of Nature (IUCN).

Rapid Bay jetty provides habitat for an abundance of fish species, including many uncommon deeper water species rarely seen inshore such as the silverbelly and black-spotted wrasse. The black-spotted wrasse is a cleaner fish which is known to remove parasites from other fish species. The coastal stingaree is also found at sites around Rapid Bay and has been nominated for listing under the *Environment Protection and Biodiversity Conservation Act 1999* (the EPBC Act).

#### 1.4.3 *Marine mammals*

The Pages Islands host the world's largest breeding colony of the nationally and state listed *vulnerable* Australian sea lion and is also the most important site for pup production. During the early 2000s, approximately 2,100 Australian sea lions populated the islands. The Pages Islands are also a known haul out site for the New Zealand fur seal.

Each year during May to October the Middleton coast provides an important aggregation area for the nationally *endangered* and state *vulnerable* southern right whale for breeding and calving. In some years, up to 40 individuals have been recorded in Encounter Bay in one season. The whales regularly move between Encounter Bay and Kangaroo Island. Encounter Bay is the second most significant area in South Australia for migrant southern right whales after the Great Australian Bight.

The American River/Pelican Lagoon wetland system and Eastern Cove provide habitat for a local pod of bottlenose dolphins, including nursery and feeding areas. Pygmy right whales also visit this area occasionally and American River is one of the few locations in southern Australia where they can be found inshore.

#### 1.4.4 *Seabirds and local and migratory shorebirds*

Located throughout the marine park are many important sites for local and migratory shorebirds, as well as seabirds. These sites provide important habitats for both breeding and feeding for many of the local and migratory shore birds and seabirds. Of particular importance is the Coorong, which has been identified as being of international importance for many species of local and migratory shorebirds protected under international treaties. The Murray Mouth provides habitat for a large population of state *endangered* breeding fairy terns, while the state

*vulnerable* hooded plover is known to nest on the beach near the mouth and at other beaches throughout the park.

The sheltered north-eastern coast of Kangaroo Island provides feeding, roosting and breeding habitat for resident species of shorebirds, and feeding and roosting habitat for many migratory bird species. The Bay of Shoals and Kingscote spit, which includes the Busby and Beatrice Islets, are ecologically important habitat, particularly the tidal flats which provide important roosting and feeding refuges for seabirds and migratory and local shorebirds. Bird species that are known to visit this area include the state *vulnerable* eastern curlew, the fairy tern and hooded plover, as well as the eastern reef egret.

Pelican Lagoon and the Cygnet River estuary also provide habitat for many bird species that are *rare* to the State including the eastern reef egret, Australasian shoveler and Cape Barren goose. The state *endangered* osprey can be found in the area and the hooded plover is known to breed in the American River system.

Granite and West Islands provide important feeding and breeding sites for colonies of little penguins, as well as black-faced cormorants and crested terns. The pages Islands also are home to a small breeding colony of little penguins as well as the Australian gannet, fluttering shearwater, short-tailed shearwater, crested tern and pied cormorant. Colonies of little penguins are also found at Penneshaw and Kingscote.

Protected bird species such as the royal spoonbill have been recorded at sites along the Inman River. On the cliffs bordering Deep Creek Conservation Park, as well as around eastern Kangaroo Island, the state *endangered* white-bellied sea eagle and osprey have been recorded. These birds nest on the cliffs and feed in the surrounding waters.

#### 1.4.5 Marine invertebrates

The sandy ocean beaches of the Coorong are well known for Goolwa cockles. This regional population may be one of the largest in Australia. Blooms of the surf diatom are common in the area and are thought to be the principle source of food for the Goolwa cockle. The Murray Mouth is also important habitat for amphipods, which are used as a food source by many fish and bird species.

Seagrass beds located within Antechamber Bay are known to support large populations of sea slugs such as *Aplysia* spp., not known from any other location in South Australia.

Many of the protected bays with their large seagrass meadows and shallow reefs provide important nursery habitats for invertebrates such as sand crabs, western king prawns, scallops and various octopus species. For example, juvenile western king prawns are known to settle in the shallow sheltered bays of Eastern and Western Coves and Bay of Shoals. Seagrass beds are also an important habitat for many pipefish.

Reefs around the southern Fleurieu Peninsula, Encounter Bay and islands, as well as north-eastern Kangaroo Island are important to the southern calamari. These areas contain the seagrass *Amphibolis* sp. which is a favoured habitat for the calamari to lay their eggs.

Sponge/bryozoan assemblages are dominant in the deep (>50m) tidal race of Backstairs Passage. This community is characterised by massive sponges (more than 1 metre high and across) and large erect bryozoans (such as *Adeona grisea*); epizoic crinoids and ophiuroids are especially abundant on them.

In Investigator Strait fauna is limited to the 'button bryozoan' *Lunulites* and the brachiopod, *Magadena cumingi*, both of which lie on the surface of the sand, and species such the seapen, *Sarcophyllum grande*, stalked fan bryozoan, *Parmularia*, and the stalked ascidians, *Pyura australis* and *P. spinifera*, which can secure anchorage on the unstable bottom. Towards the Kangaroo Island side of Investigator Strait, on rocky reefs, massive erect, orange sponges occur everywhere, together with large populations of its predator, the black and white psolid holothurian, *Ceto cuvieri*.

For further environmental and social information refer to <http://www.marineparks.sa.gov.au>

## 2 ECONOMIC VALUES

The marine environment is an important source of wealth for South Australia and its coastal communities. Marine parks will be designed to accommodate existing economic activities wherever possible. The main economic activities in the Encounter Marine Park are summarised below. Information in the Aquaculture, Commercial fishing, and Mineral and energy resources sections have been provided by PIRSA.

### 2.1 Aquaculture

The South Australian aquaculture industry had a direct output value of \$324 million in 2008/2009 (EconSearch, 2010a). Marine species grown and harvested in South Australia include (but are not limited to) Pacific oysters and mussels (bivalve molluscs), southern bluefin tuna (prescribed wild caught tuna), abalone, yellow-tail kingfish and other species of finfish (aquatic animals – other than prescribed wild caught tuna.- which require regular feeding).

**Table 3** The statewide economic value of aquaculture industries in South Australia, 2008/09 (excludes freshwater aquaculture)

|   | Gross value of on-farm production (\$m) | Value to downstream* sectors (\$m) | On-farm number of employees (FTE) | Number of employees in downstream* sectors (FTE) |
|---|---|------------------------------------|-----------------------------------|--|
| Southern bluefin tuna (prescribed wild caught tuna) | \$157.8                                 | \$16.0                             | 348                               | 58   |
| Bivalve molluscs (oysters)                          | \$32.6                                  | \$42.6                             | 529                               | 252  |
| Finfish (other than prescribed wild caught tuna)    | \$29.2                                  | \$15.4                             | 108                               | 84   |
| Bivalve molluscs (mussels)                          | \$2.5                                   | \$2.8                              | 114                               | 16   |
| Abalone   | \$8.1                                   | \$0                                | 64                                | 0  |
| Other   | \$10.9                                  | \$0                                | 44                                | 0  |

EconSearch, 2010a

\* Downstream activities include processing, transport, retail and food service.

Existing aquaculture within this marine park includes the farming of Pacific oysters in Nepean Bay. A map showing current active sites and applications can be accessed online through the Aquaculture Public Register at: [http://www.pir.sa.gov.au/aquaculture/public\\_register](http://www.pir.sa.gov.au/aquaculture/public_register)

### 2.2 Commercial fishing

The commercial fisheries that operate in the Encounter Marine Park are:

- Gulf St. Vincent Prawn Fishery;
- Central Zone Abalone Fishery;
- Northern Zone Rock Lobster Fishery;
- Marine Scalefish Fishery (Gulf St Vincent/Kangaroo Island); and
- Lakes and Coorong Fishery.

The value of each of these fisheries, including the direct and flow-on values, as well as the number of employees and export values, where available, are listed below. Note that the values provided below are for the entire area of the fishery and may not be specific to the Encounter Marine Park.

**Table 4** The 2008/09 economic value of fisheries operating in the marine park for relevant fishery areas (figures are not specific to the park area and include catches from outside the marine park boundary).

|  | Catch value(\$m) | Value of flow-on to other sectors (\$m) | Fishing (FTE) employment | Flow-on (FTE) employment |
|--|------------------|---|--------------------------|--------------------------|
| <b>Prawn (Gulf St Vincent)</b>                             | 3.5              | 10.1                                    | 28                       | 49                       |
| <b>Abalone (State)</b>                                     | 30               | 45.2                                    | 90                       | 225                      |
| <b>Abalone(Central)</b>                                    | 5.7              |   |                          |                          |
| <b>Northern Zone Rock Lobster</b>                          | 19.3             | 34.2                                    | 155                      | 169                      |
| <b>Marine Scalefish (Gulf St Vincent/ Kangaroo Island)</b> | 7.2              | 6.0                                     | 192                      | 34                       |
| <b>Lakes and Coorong Fishery</b>                           | 8.4              | 19.1                                    | 62                       | 92                       |
| <b>Pipi (Goolwa cockle)</b>                                | 4.2              |   |                          |                          |

EconSearch 2010 b, c, d, e and f.

These fisheries are important to regional economies of the area both directly, through employment in each fishery, and indirectly, through a range of additional services such as processing, local transport, marketing, local retail and food services. Each of these activities generates flow-on effects to other sectors, through purchases of inputs and employment of labour.

The Gulf St Vincent Prawn Fishery contributes about 10% of South Australia's total king prawn production.

The abalone fishery targets greenlip and blacklip abalone. The park lies within the Central Zone Abalone Fishery, which produced 18% of the State's total abalone harvest in 2008/09.

The park is part of the Northern Zone Rock Lobster Fishery, which operates from November to May. The northern zone contributes around 20% of the \$105m state-wide catch of southern rock lobster. The River Murray mouth divides the northern zone with the Southern Zone Rock Lobster Fishery.

The Marine Scalefish Fishery is a diverse multi-species, multi-gear fishery that operates across State waters, targeting four key species: snapper, King George whiting, southern garfish and southern calamari.

The Lakes and Coorong Fishery (including the pipi – Goolwa cockle – fishery) has 36 licence holders who fish with a variety of nets and with cockle rakes. Total value of the Lakes and Coorong Fishery was estimated at \$4.16 million over the 2008/09 period.

Fishing charters also operate from a number of locations throughout this region.

For further information or to view maps of the fishing regions visit:

[http://www.sardi.sa.gov.au/\\_data/assets/pdf\\_file/0010/99739/No\\_305\\_South\\_Australian\\_Wild\\_Fisheries\\_Information\\_and\\_Stats\\_report\\_200708\\_published.pdf](http://www.sardi.sa.gov.au/_data/assets/pdf_file/0010/99739/No_305_South_Australian_Wild_Fisheries_Information_and_Stats_report_200708_published.pdf)

### **2.3 Mineral and energy resources**

Gulf St Vincent has potential for offshore petroleum discoveries and two deep offshore exploration wells were drilled unsuccessfully in the 1990s. Access for seismic surveys may be needed.

The potential for offshore geothermal energy resources has not yet been addressed, however potential exists to utilise geothermal energy in adjacent coastal or inland water settings for a variety of purposes, including power for desalination plants.

Seafloor dredging for Adelaide beach replenishment sand has already taken place. Interstate, offshore mining for construction materials, especially sand, has taken place in high demand areas such as Sydney. Gulf St Vincent may be of interest for offshore construction materials.

Copper, silver and other metallic mineral deposits have been mined on Fleurieu Peninsula and Kangaroo Island in the past and reflect a prospectivity for similar deposits in the Kanmantoo Arc geological province, which underlies Backstairs Passage.

There is a Petroleum Exploration Licence (PEL 423) partially overlapping this marine park, extending offshore north of Christies Beach, across to Kangaroo Island and into parts of Gulf St Vincent. There are five private Mines adjacent to the park for sand and limestone near Aldinga and Rapid Bay.

## **2.4 Transport and infrastructure**

Transport and infrastructure provide an important economic contribution to the region, providing for maritime activities such as: shipping ports for import and export of goods; boat ramps for launching of recreation or commercial vessels; jetties for fishing; and breakwaters and groynes for coastal management. Some of the infrastructure in the marine park includes marinas, wastewater treatment plants and desalination plants. Marine parks will be zoned to provide for existing and planned infrastructure development.

## **2.5 Local tourism**

The coastal and marine environment is integral to the tourism experience throughout this region. Visitors are drawn to the beautiful, open beaches of southern Adelaide, while the Fleurieu Peninsula and Victor Harbor are major destinations for both Adelaide residents and interstate visitors. Other tourism drawcards include charter boat fishing, diving and eco-tours, such as whale and seal watching, or other nature-based experiences such as visiting coastal national parks.

### *2.5.1 Fleurieu Peninsula*

Activities enjoyed by tourists in this region include water sports, whale and penguin watching, fishing, sampling the produce of the region and visiting coastal conservation parks. In 2009 the Fleurieu Peninsula tourism region attracted an estimated 519,000 overnight visitors, who stayed more than 1.3 million nights in the area, and over 2.2 million day visitors, spending an estimated \$303 million. In 2009 51% of overnight visitors to the region visited the beach, and 9% went fishing. From June to October visitors may catch sight of a southern right whale or, occasionally, a humpback whale. In 2008, an estimated 160,000 land-based whale watchers visited the Fleurieu Peninsula. Popular viewing spots include Goolwa Beach, Middleton Beach, Port Elliot and Waitpinga Beach.

### *2.5.2 Kangaroo Island*

Kangaroo Island is a premier tourism drawcard with an abundance of nature-based tourism opportunities on offer including swimming, fishing, boating, surfing, walking, and wildlife viewing and diving. In 2008-09 Kangaroo Island attracted over 180,000 visitors who spent over 670,000 nights in the region, spending an estimated \$107m.

Principal visitor activities on Kangaroo Island in 2008/09 included 77% who observed and interacted with native animals and wildlife. Going to the beach has increased in popularity over the last three years from 41% in 06/07 to 49% in 08/09. Visitors also participated in other marine activities such as boating/fishing (15%) and scuba diving/snorkelling (6%). Popular coastal destinations within the park include Cape Willoughby, Antechamber Bay, Penneshaw, Island Beach and Kingscote.

Tourism provides an important employment opportunity for Kangaroo Islanders. As a result the proportion of the Kangaroo Island population employed in tourism is significantly higher than for other regions in the state. In June 2007 there were more than 200 tourism related businesses in the region.

## 3 SOCIAL VALUES

The marine environment is an important recreational asset for coastal communities. Marine parks will be designed to accommodate existing recreational activities wherever possible. This section highlights the social values of the Encounter Marine Park and is separated into four parts:

- Aboriginal and European cultural heritage;
- scenic values;
- recreational activities and popular locations; and
- interpretive and educational facilities.

### 3.1 *Aboriginal heritage*

Aboriginal people have interacted with the marine environment for thousands of years and their relationships with the sea remain strong through customs, laws and traditions. Traditional usage, Aboriginal cultural heritage, Indigenous Protected Areas (IPAs), Indigenous Land Use Agreements (ILUAs) and Native Title considerations will be taken into account in developing the management plan for the Encounter Marine Park.

#### 3.1.1 *Language Groups*

The Kurna and Ngarrindjeri Aboriginal people have traditional associations with areas of the marine park including estuarine and coastal environments, which provide food and resources for local Aboriginal people and still hold strong cultural significance today.

#### 3.1.2 *Agreements and Claims*

Both the Kurna (2000) and Ngarrindjeri (1998) people have lodged native title claims that include parts of the Encounter Marine Park.

#### 3.1.3 *Sites and Stories*

Both Kurna and Ngarrindjeri people have distinctive languages, customs and creation stories which are depicted in well known creation stories such as Tjilbruke (Kurna) and Ngurunderi (Ngarrindjeri).

Kangaroo Island is believed to contain many cultural heritage sites from the period when the island was connected to the main land, as well as more recently from the early 19<sup>th</sup> century when many Aboriginal women were taken to Kangaroo Island from Kurna, Ngarrindjeri and Tasmanian Aboriginal groups by sealers and whalers.

The Government is aware that there may be confidential Aboriginal heritage sites in South Australia's coastal areas. Where possible, these sites will be considered in the planning process. Future management plans will ensure these heritage sites are appropriately respected.

### 3.2 *European heritage*

Where possible, the management plan for the Encounter Marine Park will recognise and complement sites of cultural and maritime heritage.

The Encounter Marine Park is associated with some of the most significant sites of European contact and settlement in South Australia, reflecting the rich early history of exploration, whaling, colonisation and shipping. A large number of these sites are recognised and listed as State Heritage Places.

Travelling eastwards from Kangaroo Island in 1802, Matthew Flinders named Investigator Strait, Backstairs Passage and Cape Willoughby and named Encounter Bay to mark his chance meeting with the French explorer Nicolas Baudin in the waters off the Murray Mouth.

Whaling and sealing were significant industries, both before and during the early years of settlement. Whalers and sealers worked the waters of Backstairs Passage and Encounter Bay and established whaling stations on the mainland and Kangaroo Island.

The site of the first official settlement in South Australia is located at Reeves Point, just north of Kingscote, where the first settlers landed in July 1836 and planted a mulberry tree which still survives.

The maritime heritage of the area reflects all aspects of its history. Backstairs Passage was from the early days of settlement the connecting seaway between Adelaide and the eastern colonies. Its eastern entrance is marked by South Australia's oldest lighthouse at Cape Willoughby (built in 1852) and the first automated light at Cape St Albans. Jetties, breakwaters and wharves were built in many locations to accommodate the shipping trade, including the causeway, breakwater and jetty on Granite Island and at Port Elliot, the first sea port for the River Murray trade following the construction of a rail link from Goolwa 1854.

Over 80 shipwrecks are located within the Park, the majority of them over 75 years old and formally protected, although a large number have not been located. Some of the oldest wrecks, like the *Solway* (1837) and the *Harry* (1856) are testament to the hazardous waters around Granite Island and Horseshoe Bay. Other wrecks are scattered through the waters of Backstairs Passage while more accessible wrecks such as the *Nashwauk* and *Star of Greece* are located in the shallow waters off Moana and Port Willunga. The ex-HMAS *Hobart*, recently scuttled off Wirrina, is also protected.

Some of the state's most significant geological sites are located on the boundaries of the marine park and recognised both as Geological Monuments and in the State Heritage Register. The coastal cliffs between Maslins Bay and Aldinga and Christmas Cove are evidence of significant glacial activity, while the more dramatic cliffs at Myponga Beach and Cape Jervis tell the story of the folding and faulting that created the Mount Lofty Ranges. The Normanville Sand Dunes are one of the largest remaining coastal dune systems in the region and are also included in the Register of the National Estate (RNE).

### **3.3 Scenic values**

The scenic quality of South Australia's coast is a significant social, economic and environmental resource. The coastline has high amenity value and includes high quality landscapes, also known as viewsapes. The significance or quality of viewsapes is derived from a combination of landform (relative relief, variety and complexity of landscapes), land cover (nature, scale and variety of vegetation), land use (impact of human activity), water, diversity, naturalism and colour.

In general, the coastline of the Encounter Marine Park has moderate-high scenic values (Lothian 2005).

The high steep cliffs, headlands, bays and gullies of southern Fleurieu Peninsula and eastern Kangaroo Island, which flank Backstairs Passage, are among the highest ranked areas of coastal scenic quality in the State. Other sections of the coastline where prominent landforms contribute to scenic quality are Rosetta Head (the Bluff), the cliffs and bays from Cape Jervis to Sellicks Beach and the spurs and cliffs south of Kingscote and between American River and Point Morrison on Kangaroo Island.

In contrast to the rocky coasts are the less visually appealing and moderately rated beaches and dunes. The Encounter Marine Park includes the northern section of the Coorong coastline, a long surf beach backed by dunes, which continues past the Murray Mouth to Goolwa Beach, Middleton and Port Elliot. Smaller beaches include Tunkalilla and Parsons, with longer stretches of beach from Lady Bay to Carrickalinga and at Sellicks, Aldinga and Maslins further north. On Kangaroo Island, stretches of beach at American River, Nepean Bay and Bay of Shoals are also considered to be of moderate scenic value.

Low scenic values have been attributed to the samphire and mangrove communities in Pelican Lagoon and between Western Cove and Brownlow on Kangaroo Island.

Scenic values of coastline in the Encounter Marine Park (Lothian 2005).

| Rating      | Coastal landform type  | Ranking         |
|-------------|------------------------|-----------------|
| 7.25 – 8.0  | High cliffs            | High            |
| 5.75 – 8.0  | Headlands and Bays     | Moderate - High |
| 6.0 – 7.0   | Low Cliffs             | Moderate        |
| 5.75 – 7.25 | Dunes and Beaches      | Moderate        |
| 4.5 – 5.5   | Samphire and Mangroves | Low             |

For further information on coastal scenic values and viewsapes refer to <http://www.environment.sa.gov.au/coasts/management/coastal-viewsapes.html>

### **3.4 Recreational activities in the marine park**

Due to its proximity to Adelaide, the coastal and marine environments of the Encounter Marine Park are very popular with recreational fishers, boat users, snorkellers, scuba divers, beach-goers, swimmers, surfers and sightseers. Examples of these activities are provided below.

#### *3.4.1 Recreational beach, rock and boat fishing locations*

Recreational fishing is a popular past time in South Australia. Recreational fishers collectively harvest significant proportions of the total catch for a number of key species. The total number of recreational fishers for the Fleurieu Peninsula and Kangaroo Island (region 19, 20, 22 and 33) during 07/08 was 61,148 which amounted to 171,974 days of fishing. (Note figures relate to regions used for reporting fishing activities and include catches from outside the marine park boundary). Regionally Gulf St Vincent and Kangaroo Island represented the highest fishing effort for the 07/08 period, with effort diminishing with greater distance from the Adelaide metropolitan area. Blue swimmer crab was the most abundantly caught species followed by King George whiting, southern garfish, southern calamari and snapper for the Gulf St Vincent and Kangaroo Island region.

Recreational beach, rock and jetty fishing is popular at a number of sites within the park, including: the Murray Mouth; Waitpinga and Parsons Beaches and at sites near Cape Jervis; Wirrina; Rapid Bay; Carrickalinga, Normanville, Myponga and Port Willunga. Jetties include: Second Valley; Rapid Bay; The Bluff; The causeway; Screwpile jetty; Horseshoe Bay; Penneshaw and Kingscote. Beach fishing on eastern Kangaroo Island occurs at Antechamber Bay, American River/Island Beach and Western Cove township. These of course are only a selection of popular fishing spots, there are more but are too many to mention.

Recreational fishing from a boat occurs at many sites throughout the region, particularly within a few kilometres radius of the many boat ramps located throughout the park. Smaller boats are also launched off beaches such as Aldindga and Sellicks.

#### *3.4.2 Popular surfing and swimming beaches*

Southport, Waitpinga, Parsons, Middleton and Goolwa beaches are some of the beaches regularly visited by surfers. The beaches at Port Noarlunga, Moana, Aldinga, Normanville, Carrickalinga, Antechamber Bay, Penneshaw and near American River are some of the areas enjoyed for swimming.

#### *3.4.3 Popular diving locations*

Many iconic diving locations exist within the marine park including Port Noarlunga Reef, Aldinga Reef, Second Valley, Rapid Bay, the *Hobart*, the Bluff, shipwrecks around Kangaroo Island; Seal Island, Kangaroo Head, Hog Point; Snapper Point and many of the headlands and reefs around Kangaroo Island.

#### *3.4.4 Other recreational activities in the park*

Both Penneshaw and Kingscote have penguin centres which offer guided penguin tours. The centre at Kingscote also offers tours of their saltwater aquariums in which tourists can learn more about the marine life found in and around Kangaroo Island. Guided penguin tours are also available on Granite Island with the option to visit the Penguin centre and learn more about the islands most popular inhabitants.

Tunkalilla cliff is a known location for hang gliding enthusiasts.

There are a few places popular for kite surfing including: Moana, South Port, Victor Harbour (Kent Reserve), Normanville, Goolwa and Kingscote.

#### ***3.5 Interpretive and educational facilities within the marine park***

Interpretive underwater and on-water trails within the region include Adelaide's Underwater Heritage Trail and Port Noarlunga Reef Underwater Trail, amongst others.

Granite Island Recreation Park, as well as Conservation Parks such as Deep Creek and Newland Head, which are adjacent to the marine park, are popular tourist destinations with a range of interpretive infrastructure.

The educational and interpretive needs of whale watchers is supported by the SA Whale Centre at Victor Harbor which provides an excellent range of educational and interpretive displays relating not only to whales but to the local marine environment generally.

An aquatics program is located at Port Noarlunga for school children that utilises the reef and estuary for its activities, while marine and environmental education programs are the focus of many schools in the marine park, particularly Kingscote Area School.

## APPENDIX 1 SPECIES LIST

This list of some of the species identified in the Encounter Marine Park indicates the diversity of species found there.

### **Plants and algae**

large brown kelp

*Ecklonia radiata*

### **Bony fish, sharks and rays**

black ray

*Dasyatis thetidis*

black-spotted wrasse

*Austrolabrus maculatus*

blue morwong

*Nemadactylus valenciennesi*

coastal stingaree

*Urolophus orarius*

crested pipefish

*Histiogamphelus cristatus*

dusky whaler

*Carcharhinus obscurus*

hammerhead shark

*Sphyrna zygaena*

harlequin fish

*Othos dentex*

King George whiting

*Sillaginodes punctata*

leafy seadragon

*Phycodurus equus*

pipefish

Signathidae

school shark

*Galeorhinus galeus*

shortfin mako

*Isurus oxyrinchus*

silverbelly

*Parequula melbournensis*

smooth hammerhead

*Sphyrna zygaena*

snapper

*Pagrus auratus*

southern bluefin tuna

*Thunnus maccoyi*

southern garfish

*Hyporhamphus melanochir*

weedy seadragon

*Phyllopteryx taeniolatus*

western blue devil

*Paraplesiops meleagris*

western blue groper

*Achoerodus gouldii*

white shark

*Carcharodon carcharias*

wrasse

Labridae

yellow-tail kingfish

*Seriola lalandi*

### **Marine mammals**

Australian sea lion

*Neophoca cinerea*

bottlenose dolphin

*Tursiops truncatus*

humpback whale

*Megaptera novaeangliae*

New Zealand fur seal

*Arctocephalus forsteri*

pygmy right whale

*Caperea marginata*

southern right whale

*Eubalaena australis*

### **Seabirds and local and migratory shorebirds**

Australasian shoveler

*Anas rhynchotis*

Australian gannet

*Morus serrator*

black-faced cormorant

*Phalacrocorax fuscescens*

Cape Barren goose

*Cereopsis novaehollandiae*

crested tern

*Sterna bergii*

eastern curlew

*Numenius madagascariensis*

eastern reef egret

*Egretta sacra*

fairy tern

*Sterna nereis*

fluttering shearwater

*Puffinis gavia*

hooded plover

*Thinornis rubricollis*

little penguin

*Eudyptula minor*

osprey

*Pandion haliaetus*

piebald cormorant

*Phalacrocorax varius*

royal spoonbill

*Platalea regia*

white-bellied sea eagle

*Fregetta grallaria grallaria*

***Marine invertebrates***

amphipod  
blacklip abalone  
brachiopod  
calamari  
fucoids  
Goolwa cockle  
gorgonian  
greenlip abalone  
king prawn  
King scallop  
mussel  
Pacific oysters  
pipi  
sand crab  
scallop  
sea slug  
soft coral  
southern calamari  
southern rock lobster  
sponge  
surf diatom  
western king prawn

Amphipoda  
*Haliotis rubra*  
Brachiopoda  
*Sepioteuthis australis*  
Fucales  
*Donax deltoides*  
Alcyonacea  
*Haliotis laevigata*  
*Melicertus latisulcatus*  
*Pecten fumatus*  
Mytilidae  
*Crassostrea gigas*  
*Donax deltoides*  
*Ovalipes australiensis*  
Pectinidae  
Opisthobranchia  
Alcyonacea  
*Sepioteuthis australis*  
*Jasus edwardsii*  
Porifera  
Bacillariophyta  
*Melicertus latisulcatus*

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