

15.2 Rock Islands



Figure 15.2.1: Some of the ecologically significant islands in the NY NRM Region. A: Althorpe Island, part of the Althorpe Islands group (photo by Fairv8 at Wikimedia Commons); B: Haystack Island; C: Wardang Island (image copyright Google Earth).

| Asset | Rocky Islands |
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| <i>Description</i> | Islands composed of rocks of various forms, and types (igneous, metamorphic and sedimentary), which provide species-rich intertidal and subtidal reef habitats at exposed island edges, and also mixed habitats (including seagrasses and sand), in more sheltered bays around some islands. Islands in NY NRM also provide feeding and nesting habitats for sea birds, and breeding and haul-out sites for sea lions and fur seals. |
| <i>Main Features</i> | <p>Althorpe Group</p> <ul style="list-style-type: none"> • high diversity and abundance of red, brown and green seaweeds as habitat • species-rich in fishes (particularly reef fishes), due to the variety of habitats and micro-habitats; • fishes of conservation concern (Western Blue Groper, Harlequin Fish; Southern Blue Devil; Boarfish species; Leafy Seadragons); • habitat for uncommonly recorded species such as Red Velvetfish and Green Moray • haul-out sites for threatened Australian Sea Lion • colonies of New Zealand Fur Seals • significant breeding and feeding areas for sea birds • habitat for threatened bird species (Fairy Tern, White-bellied Sea Eagle, Little Penguin, Rock Parrot). <p>Wardang Island, Goose Islands, and surrounds:</p> <ul style="list-style-type: none"> • nursery area for reef fishes • haul-out sites for threatened Australian Sea Lion • significant habitats for King George Whiting, Pink Snapper, Snook & many other fishes • geological monuments • variety of habitat types around Wardang (from exposed, plant-dominated reefs to seagrass beds and sheltered tidal flats) <p>Bird Islands</p> <ul style="list-style-type: none"> • Habitat for coastal and birds listed under South Australian threatened species legislation • Habitat for migratory waders listed under international agreements |

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| <i>Main Locations</i> | Althorpe Islands (Althorpe I., Haystack I., Seal I. and 5 small islets) Wardang Island and Goose Islands |
| <i>Other Locations</i> | Chinamans Hat Island South-west Rock, Brook Shoal, Emmes Reef North Islet / Roysten Island, Middle Islet, South Islet Bird Islands |

There are groups of rocky islands in the NY NRM region, particularly the south-western side, off the “toes” of Yorke Peninsula. One of the most ecologically significant is the Althorpe Island group (**Figure 15.2.1**), which is in an oceanographic transition zone, i.e. the boundary of seasonal sea surface temperature fronts. In this area, warmer gulf waters and cooler deeper waters from western SA meet, causing strong benthic temperature and salinity differentials (Bruce and Short 1992; Petrusevics 1993, cited by Baker 2004).

The Althorpe Islands consist of 3 main islands (Althorpe, Haystack and Seal), and 5 small islets. Althorpe Island is the southernmost and largest (96 ha, and 93m high). To the north-east, and closer to the coast, are Seal Island, and Haystack Island (43m high). The five small islets (the Western Islets or Little Althorpe) are off the western side of Althorpe.

Island Descriptions

The **Althorpe Islands** are located off the “toes” of Yorke Peninsula, in western Investigator Strait, at the boundary of seasonal sea surface temperature fronts, in which warmer gulf waters and cooler deeper waters from western SA meet. The wave exposure around the islands varied from high on the exposed sides of islands, to low in some of the sheltered bays. The islands are subject to the strong prevailing south-westerly swells of south-western Yorke Peninsula. Islands in the Althorpe group contain sub-tidal granite basement reefs, and calcarenite is present in the nearshore area some places, where it has eroded from the island “capping” above. On Althorpe Island, jointing in the massive granite humps has resulted in gaping, many-branched crevasses and chasms along the coastline, that alternate with long fingers of rock, in turn dissected into segmented chains of islets. There is a large sandy bay, bounded by cliffs, on the north-eastern side of Althorpe Island (Robinson et al. 1996).

A smaller island in the Althorpe group, **Seal Island**, is composed of granitic gneiss, intruded by other metamorphic rocks. The lines of weakness in the gneiss have been exaggerated into deep grooves, that eventually “slough off” large slabs of rock. The broadest joints and dykes have been worn to deep indentations, or completely penetrated, to form the segmented islets off the western tip of Seal Island (Robinson et al. 1996). Haystack Island is also granitic, but has a larger capping of calcareous rock than the other islands in the group. It rises as a narrow wall of sheer calcarenite cliffs, undermined and indented by rock falls from active erosion. The granite ridge of the island is mainly below sea level (Robinson et al. 1996).

The small islets formed from erosion of a granite rise along a series of joints or dykes, forming deep crevasses that segmented the outcrop into the five islets (Robinson et al. 1996). Within a few kilometres of the islands there are numerous granite shoals (e.g. SW Rock, Brook Shoal, Emmes Reef) (S. Shepherd, pers. comm.)

Closer to the southern Yorke Peninsula coast, **Chinaman’s Hat Island** is a small calcarenite islet west of Stenhouse Bay, around 350m offshore. The coastal perimeter rises abruptly as a rim of broken cliffs to a broad platform, and an arc of submerged reef connects the islet to a nearby headland to the west, and extends east of the islet (Robinson et al. 1996). Westward from Chinaman’s Hat Island, there is deeply dissected calcarenite reef of high relief (around 3m), and rocky outcrops near the western point.

Around the “toes” of Yorke Peninsula, out from the centre of Pondalowie Bay is **Middle Islet**, separated from the mainland by a channel reef. The islet is composed of granite, with a calcarenite capping and dunes, and there is also a small semi-submerged reef around 740m west (Robinson et al. 1996). There is also a small islet at the southern end of Pondalowie Bay, called **South Islet**, which is connected to the mainland by a “neck” of semi-submerged reef and sand.

South Islet has a granite base, capped with eroded and undercut calcarenite, which has formed sheer cliffs on the exposed western and northern coasts (Robinson et al. 1996). **North Islet** (or Royston Island close to Royston Head, the northernmost extremity of Pondalowie Bay, and a shallow, partially drying reef connects the two (Robinson et al. 1996). The island is composed of granite, with an eroded calcarenite capping. Waves and surge have scoured much of the slope area, to form smooth, deeply incised ramps. There are dislocated boulders in the fringe area, beyond the reach of normal swells, and rounded granitic detritus is mixed with the jagged fragments of calcarenite (Robinson et al. 1996).

In mid eastern Spencer Gulf, the largest island on the western side of Yorke Peninsula is **Wardang Island**, an island of 8.4km long and 2.4km wide, which lies about 9km off Port Victoria. This island is exposed to a variety of oceanographic conditions. It is shallow and largely sheltered from waves and swell on the north-eastern side, facing Point Pearce, and exposed to moderately high wave energy, surge and swells on the western side.

Around the south and west of **Wardang Island**, low cliffs, rock platforms, outcrops and small sandy and rocky beaches dominate the nearshore area. There are numerous dissected reef areas (made of Precambrian volcanic rock) in the subtidal, to at least 12m, around Wardang Island, interspersed with seagrass, bare sand patches, and cobble bottom. Wardang Island is a geologically significant area. The South Australian Division of the Geological Society of Australia with partner groups (e.g. Australian Heritage Commission, South Australian Museum, and other organisations) classified Cliff Point on the eastern side of Wardang Island as a geological monument. The island is also listed on the Register of the National Estate in recognition of the well preserved exposure of a wide variety of geologic and geomorphological features, including a variety of rock types of various ages. Examples include Precambrian (i.e. older than 540 million years) volcanic rocks, Permian (250-300 million year old) sedimentary rocks with numerous erratic rocks transported by glaciers, and Pliocene (2.5-5 million year old) limestone with rich fossil fauna in ten distinct horizons. A Permian / Pliocene time unconformity surface is also preserved. The island’s south-western coastline contains good evidence of Permian ice age sediments (glacial till – clay, sand, gravel and boulders deposited by moving ice), erratic boulders and glacial scour marks (Robinson et al. 1996). Wardang was also recognised in *the Register of the National Estate* for the Recent stranded beach ridges, wave cut platforms and calcrete horizons, and salt marshes and barrier dunes. On the western and southern sides of Wardang Island, the Precambrian metamorphosed volcanic basement rock outcrops as exposed intertidal reefs, headlands and platforms (Robinson et al. 1996).

The intertidal area of the south-eastern coast contains glacially deposited sediments from the Permian (clay, sand, gravel and boulders), and the boulders (called “erratics”) deposited by ice during the Permian, also occur on beaches on the east coast of the island. Overlying the basement rock is a layer of fossil-rich, Tertiary sandstone, visible as a prominent layer around 4m thick, in the cliffs at the southern end of the island (Robinson et al. 1996). Younger sedimentary rocks (Pleistocene calcarenite and calcrete) also occurs in the coastal area.

North of Wardang Island is **Goose Island**, a rocky island of about 2 hectares area. Nearby, **Rocky Island**, around 1.4km south of Point Pearce, rises above a shallow bank of reefs and sandbars between the Point and Wardang Island. Rocky Island has been eroded into a pile of fragmented boulders, and the southern rock spit is subject to tide and wave inundation. There are small sandy beaches in some parts of the island group (e.g. at **Goose Island** and **Green Island**), and a seagrass-covered sand spit joining **Green Island** to the mainland (Robinson et al. 1996).

Close to the coast, **Bird Islands** are the remnant of a low land prominence that was submerged around 6000 years ago. The amount of land exposed varies greatly with the tide. The island group consists mainly of two vegetated islands and a bare reef that dries on low tide. The reef marks the outer limit of the shallows, around 2.5km from the mainland (Robinson et al. 1996). Only the outer reef of the core Precambrian volcanic rock is exposed (Robinson et al. 1996). DEH’s supratidal and intertidal mapping program (DTUP 2003) mapped “bare” reef platform on the western and southern sides of **West Bird Island**. Tidal deposits of sand and fine silt fringe the shallows of the inner islets, blanketing the reef outcrops with low sand dunes and mudflats, the latter of which are regularly inundated by tides. The chapters on **Mangroves**, and **Saltmarsh with Samphire** provide more information about the soft sediment habitat in this area, which occur in sheltered locations around the islands.

Habitat descriptions, including main cover

Overall, the three main islands and smaller islets in the **Althorpe Islands** group support a variety of habitat types (Robinson et al. 1996; Edyvane and Baker 1998 and SARDI S.A. Benthic Survey data 1993, unpublished; J. Baker, pers. obs.). In rocky areas, the granitic basement reefs have a diversity of forms, including platforms, ledges, boulders and other reef outcrops, caves / caverns, chasms and crevasses, ledges and overhangs, "gutters" between reefs and vertical reef (rock "walls"). There are also isolated reef outcrops and near-shore fringing reef patches of broken calcarenite blocks and rubble. In some areas, such as the north-east coast of Althorpe Island, there are small sandy beaches. Around some of the islands, such as Haystack, are shallow seagrass beds. There are also mixed habitats in the Althorpe group, comprising sand / granite reef / calcarenite block and rubble reef habitats. Subtidal sand habitats in the area also have ecological roles (see chapter of this report on **Subtidal Sand and Rubble** habitat).

At the **Althorpe Islands**, surveys in 1993 and 2004 showed that cover and species composition of the canopy seaweeds was similar over the two periods, particularly at sites where few species dominated the canopy. A similar (and high) number of smaller species under the canopy (i.e. the understory) was recorded between the two survey periods, but the species composition differed, other than the dominance of the green seaweed *Caulerpa flexilis* during both 1993 and 2004. The islands are species-rich, with 267 species of seaweed within 151 genera so far recorded to 27m depth (Baker et al. 2005). During the 1993 survey, at least 180 species of seaweed were recorded in 29 quadrat samples, many of these from Haystack Island (Baker et al. 2005). The species richness of seaweeds at **Althorpe** and **Haystack** islands is amongst the highest in SA, comparable with islands in the eastern GAB, and coastal waters of the South East.

According to a benthic survey in 1993 (Edyvane and Baker 1998; Baker et al. 2005), reefs at the **Althorpe Island** are dominated by seaweed species that are characteristic of relatively high wave energy conditions. Some of the main canopy species include common kelp (*Ecklonia radiata*), *Acrocarpia paniculata*, *Cystophora* species (e.g. *C. moniliformis*), *Seirococcus axillaris* and *Sargassum* species. Under the main canopy species, on reefs below 5m there is an abundance of red seaweeds, such as species of *Plocamium*, *Phacelocarpus*, *Pterocladia*, and *Ballia*, and the broad flat *Sonderopelta coriacea*; also calcareous (coralline) red seaweed (e.g. *Metagoniolithon* sp., *Haliptilon roseum*), and green algae (e.g. species of *Caulerpa* and *Codium*).

At the time of benthic survey in 1993, reefs around **Haystack Island** were dominated by mixed species of the brown *Sargassum* (e.g. 6 species recorded) and *Cystophora* in the shallower areas (5m) and *Seirococcus axillaris* on the deeper reefs (e.g. 15m), with less cover of kelp *Ecklonia* (Baker et al. 2005). The understory composition on reefs at Haystack Island is both very diverse and abundant in red seaweeds, including some species that are considered to be uncommon at a State-wide scale. Green macroalgae (*Caulerpa* and *Codium* species) are also abundant on these reefs. There is a sandy bay along the north-eastern side of Althorpe Island, and small sheltered coves on the south-eastern side.

On sandy bottoms off **Althorpe** and **Haystack Islands**, seagrass communities comprise mixed beds of up to five seagrass species, within four genera (Baker et al. 2005). For example, at 10m deep on the eastern side of Althorpe I., strapweed (*Posidonia* species) was dominant, but also present were paddleweed *Halophila australis*, eelgrass *Heterozostera*, and wireweed *Amphibolis antarctica*. Epiphytic red and brown seaweeds are naturally abundant on some of the seagrasses at **Althorpe Island** and **Haystack Island**, and sponges are common in the understory. During the 1993 survey, on the south-eastern side of Althorpe Island, the community in a sheltered cove at a depth of 5m was dominated by a high density of green seaweeds (*Caulerpa flexilis* and *Caulerpa obscura*) in the benthic cover. Also present were the kelp *Ecklonia*, and other brown seaweeds (*Cystophora moniliformis* and *C. monilifera*, and mixed red macroalgae (e.g. species of *Gigartina*, amongst others) (Edyvane and Baker 1998; Baker et al. 2005).

At **Chinamans Hat Island**, dominant reef cover recorded between 3m and 7m includes *Ecklonia* kelp, with lesser amounts of *Acrocarpia*, and various *Cystophora* species (*C. moniliformis*, *C. monilifera* etc). In the channel area between the island and the coast, dissected calcarenite reef in the shallows is dominated by *Cystophora* species such as *C. moniliformis* and *C. siliquosa*, with *Amphibolis* seagrass patches on the sand near the shore. There is also high relief calcarenite reef on the seaward side of Chinaman's Hat Island, dominated by *Ecklonia*, with lesser cover of *Cystophora* species (e.g. at 6m – 9m). East of the island (towards the wreck of the *Marion*), *Ecklonia* is sparser on the high relief calcarenite reef, and dominant reef cover recorded between 2m and 7m includes *C. retorta*, other *Cystophora* species, and species of *Sargassum* (Shepherd and Brook 2002).

Baker, J. L. (2015) *Marine Assets of Yorke Peninsula*. Volume 2 of report for Natural Resources - Northern and Yorke, South Australia

Two basement “highs” (knolls) occur approx. 20-25km south-west of Althorpe Islands (Rankin et al. 1991). Such topographic features of the sea floor are generally considered to be ecologically significant, due to their differences in structure and depth, compared with the adjacent waters.

At **Wardang Island**, in eastern Spencer Gulf, calcareous reef has been recorded in the waters of western and south-western sides, as well as sparse seagrass patches. The patch reef is dominated by mixed species of brown and red seaweeds, and invertebrates. At the time of a 1995 survey, calcareous reef at 10m on the western side, was dominated by mixed species of *Cystophora*, with lesser cover of *Sargassum* species; the large, leathery red seaweed *Osmundaria prolifera*, and the turfing brown *Lobophora variegata* was common in the understory, with various invertebrates (e.g. ascidians / sea squirts). Bare calcareous rock was also recorded in some areas at 10m. On the south-western side of the island is a small bay, with patchy reef offshore. Towards the south and east, on shallower reef (5m), dominant plants recorded in 1995 included the canopy forming species *Sargassum heteromorphum*, *S. linearifolium* and *Cystophora expansa*, with *Scaberia agardhii* (“corkweed”) and the large red *Osmundaria prolifera* in patches. Few understory species were recorded, other than crustose corallines on the reef, and the succulent red *Cladurus elatus*, with minor cover of the turfing brown *Cladostephus spongiosus* (Edyvane and Baker 1996 and SARDI data, unpublished).

In contrast to the exposed western and southern sides of **Wardang Island**, nearshore habitats on the eastern side of Wardang include areas of fringing saltmarsh, sandy beaches, and intertidal sandbars. *Posidonia* seagrass beds occur on the eastern side of the island. In slightly deeper waters (e.g. 10m-15m), in the north-eastern sector of **Wardang**, a survey in 2000 recorded mainly reef habitat, with invertebrates (e.g. *Polycarpa* and *Pyura* ascidians, sponges, bryozoa), sparse seaweeds (e.g. species of the browns *Sargassum* and *Encyothalia*, with *Osmundaria* and other red macroalgae), and patches of *Amphibolis* and *Posidonia* seagrass on sand, amongst the rock / broken reef, rubble and invertebrates (SARDI data, 2002).

Tidal flats occur around Rocky Island, and the eastern side of **Wardang Island**. Saltmarshes are present along the eastern side of Wardang Island (PIRSA, SARDI and DEH map, in Bryars 2003).

In the Island Point area, south-westwards to **Goose Island** and **Green Island**, and the northern and eastern sides of Wardang Island, there are dense and medium density beds of *Posidonia* seagrass with filamentous seaweed (e.g. to around 5m) (SARDI data, 2002). Interspersed with the seagrass in some areas are patch reefs with brown seaweeds such as *Scaberia*, and *Caulocysis* and *Sargassum* species, in the shallows (; J. Baker, pers. obs. 2008, 2013). In the **Goose Island** area, the waters surrounding the island to the south, east and north support beds of seagrass (species of *Posidonia* and *Amphibolis*). A previous survey reported that reef areas to the west and north-west of Goose Island are dominated by brown seaweeds, such as species of *Cystophora* and *Sargassum* (Ivanovici 1984; Johnson 1988a).

Fishes

During the early and mid 2000s, when surveys of reef fish counts were undertaken at 19 reef sites across southern Yorke Peninsula, numbers of easily visible (i.e. not cryptic) reef fishes were highest at **Haystack Island**, in the Althorpe group, and up to double the number recorded at coastal reef locations along southern Yorke Peninsula (S. Shepherd, unpublished data).

During a reef fish census in 2002, when populations were surveyed by visual census from 2 - 20 m depth at a range of sites at the **Althorpe Islands**, **Haystack Island**, and nearby mainland reference sites, 45 fish species were recorded at **Althorpe Island**, 28 at Haystack I. and less at the mainland sites (Shepherd et al. 2005). Three of the most common species recorded were Blue-throated Wrasse, Herring Cale and Magpie Perch.

Biogeographically, the reef fish fauna of the island group is comprised of widely ranging southern Australian temperate species, but included six species with SW Australian affinities, and three species with SE Australian affinities (Shepherd et al. 2005). In addition to results from occasional survey data, there is anecdotal evidence for high species richness and diversity of fishes (particularly reef fishes), according to divers’ reports, tourism promotion materials, and popular articles, for south-western Yorke Peninsula in general, including **Althorpe Islands**, **Haystack Island**, and **Seal Island**.

The geographical position (influenced by the oceanography of both south-eastern and western Australia), and variety of habitats in the numerous bays and headland areas (e.g. seagrass, sand, calcareous reef platforms, and granite reef boulders, ledges etc), promotes the fish species diversity in the area.

The suite of reef fishes observed around **Althorpe Islands** and **Chinamans Hat Island** includes all of the species listed in **Table 15.2.1**, plus numerous cryptic species in caves and under ledges, and between and under marine plants. Leatherjacket species are numerous at these islands, with at least 8 species recorded so far (Shepherd et al. 2005; Shepherd and Baker 2008; Shepherd, unpublished data; Baker 2013). Some of the less commonly seen reef fishes at **Althorpe Islands** include Green Moray, Red Velvetfish, Western Sea Carp, and Stars-and-Stripes Leatherjacket (Baker 2012 and references therein; SA Museum data, in ALA 2014). Large pelagic fishes such as Yellowtail Kingfish, Samson Fish, Bight Redfish, Swallowtail and Southern Blue Morwong are also recorded around the islands (Baker 2004, and charter boat fishing records). Within the **Althorpe Islands**, there are also fish species of conservation concern, such as Leafy and Weedy seadragons, Harlequin Fish, Southern Blue Devil, Western Blue Groper (including large individuals of around 25kg), Blue-Throated Wrasse and other wrasse species (Baker 2004, 2005; Bryars 2003; Shepherd and Baker 2008). Leafy Seadragons also occur around **Wardang Island**, along with many of the other fishes shown in **Table 15.2.1**.

Table 15.2.1: Examples of fishes associated with rock islands in the NY NRM region.







| Latin Name and Common Name | Representative Image | Latin Name and Common Name | Representative Image |
|--|---|---|--|
| Samson Fish <i>Seriola hippos</i> and Yellowtail Kingfish <i>S. lalandi</i> |  © R. Stuart-Smith, Reef Life Survey | Bight Redfish <i>Centroberyx gerrardi</i> and Swallowtail <i>C. lineatus</i> |  © CSIRO Australian National Fish Collection |
| Harlequin Fish <i>Othos dentex</i> |  © J. Brook, CC Licence | Southern Blue Morwong <i>Nemadactylus valenciennesi</i> |  © R. Kuitert, Aquatic Photographics |
| Western Blue Groper <i>Achoerodus gouldii</i> |  © A. Brown | Blue-throated Wrasse <i>Notolabrus tetricus</i> |  © H. Crawford |

Table 15.2.1: (continued)



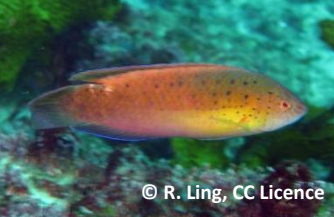








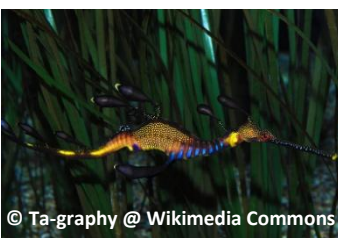
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|--|--|--|--|
| <p>Senator Wrasse <i>Pictilabrus laticlavus</i></p> |  <p>© J. Baker</p> | <p>Castelnaus Wrasse <i>Dotalabrus aurantiacus</i></p> |  <p>© R. Stuart-Smith, RLS</p> |
| <p>Black-spotted Wrasse <i>Austrolabrus maculatus</i></p> |  <p>© R. Ling, CC Licence</p> | <p>Magpie Perch <i>Cheilodactylus nigripes</i></p> |  <p>© J. Lewis</p> |
| <p>Victorian Scalyfin <i>Parma victoriae</i></p> |  <p>© J. Finn, Museum VIC</p> | <p>Southern Blue Devil <i>Paraplesiops meleagris</i></p> |  <p>© D. Kinasz</p> |
| <p>Spiny-tailed Leatherjacket <i>Acanthaluteres brownii</i></p> |  <p>© R. Stuart-Smith, Reef Life Survey</p> | <p>Horseshoe Leatherjacket <i>Meuschenia hippocrepis</i></p> |  <p>© A. Brown</p> |
| <p>Yellow-striped Leatherjacket <i>Meuschenia flavolineata</i></p> |  <p>© M. Norman, Museum VIC</p> | <p>Blue-lined Leatherjacket <i>Meuschenia galii</i></p> |  <p>© G. Edgar, Reef Life Survey</p> |
| <p>Leafy Seadragon <i>Phycodurus eques</i></p> |  <p>© H. Crawford</p> | <p>Weedy Seadragon <i>Phyllopteryx taeniolatus</i></p> |  <p>© Ta-graphy @ Wikimedia Commons</p> |

Table 15.2.1: (continued)














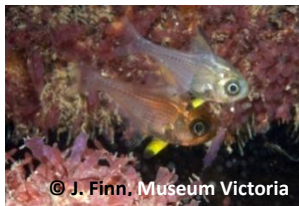


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|---|---|--|--|
| <p><i>Dactylophora nigricans</i> Dusky Morwong</p> |  <p>© J. Lewis</p> | <p><i>Kyphosus sydneyanus</i> Silver Drummer</p> |  <p>© R. Ling, Flickr, CC Licence</p> |
| <p>Ornate Cowfish <i>Aracana ornata</i></p> |  <p>© R. Stuart-Smith, RLS</p> | <p>Long-snouted Boarfish <i>Pentaceropsis recurvirostris</i></p> |  <p>© R. Stuart-Smith, Reef Life Survey</p> |
| <p>Western Talma <i>Chelmonops curiosus</i></p> |  <p>© R. Stuart-Smith, RLS</p> | <p>Zebra Fish <i>Girella zebra</i></p> |  <p>© Reef Life Survey</p> |
| <p>Sea Sweep <i>Scorpis aequipinnis</i></p> |  <p>© R. Stuart-Smith, RLS</p> | <p>Banded Sweep <i>Scorpis georgiana</i></p> |  <p>© D. Muirhead</p> |
| <p>Old Wife <i>Enoplosus armatus</i></p> |  <p>© J. Lewis</p> | <p>Six-banded Coral Fish <i>Tilodon sexfasciatus</i></p> |  <p>© J. Finn, Museum Victoria</p> |
| <p>Western Sea Carp <i>Aplodactylus westralis</i></p> |  <p>© R. Kuiter, Aquatic Photographics</p> | <p>Herring Cale <i>Odax cyanomelas</i></p> |  <p>© R. Stuart-Smith, RLS</p> |

Table 15.2.1: (continued)

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|---|--|--|---|
| <p>Blue-spotted Goatfish / Red "Mullet" <i>Upeneichthys vlamingii</i></p> |  <p>© J. Finn, Museum Victoria</p> | <p><i>Pempheris multiradiata</i> Bigscale Bullseye, and other bullseye species</p> |  <p>© J. Finn, Museum Victoria</p> |
| <p>Bearded Rock Cod <i>Pseudophycis barbata</i></p> |  <p>© R. Kuitert, Aquatic Photographics</p> | <p>Spiny Gurnard <i>Lepidotrigla papilio</i></p> |  <p>© S. Speight, CC Licence</p> |

Around islands in mid Spencer Gulf (e.g. N, S and S sides of **Wardang Island**, and parts of the **Goose Islands**), fishes such as Pink Snapper, King George Whiting, Snook, Silver Drummer, Sea Sweep, Yelloweye Mullet, Southern Sea Garfish, West Australian Salmon, Australian Herring, Red "Mullet" (Blue-spotted Goatfish), trevally, leatherjacket species, wrasse species and flathead species occur, and most of these are common around the dissected bottom reefs and ledges. There is a spawning aggregation area for King George Whiting, west of **Wardang Island** (Fowler and McGarvey, 1997, 1999). Schools of Pink Snapper, Old Wife, Silver Drummer, Sea Sweep, Bullseyes, and leatherjackets are attracted to the "maze" of dissected reefs in the area, and also occur around wrecks in the Port Victoria area. These species are also found around the **Goose Islands** (an Aquatic Reserve), along with Australian Salmon and Trevally. The shallows on the lee sides of the **Wardang Island** group, towards **Island Point**, provide a sheltered "nursery area" reef for small reef fishes, such as Zebra Fish, Magpie Perch, Sweep, Silver Drummer, and Six-banded Coralfish as well as seagrass-dwelling fishes. Examples of the latter include juvenile King George Whiting, Southern Sea Garfish, Pink Snapper, West Australian Salmon, Tommy Ruff, Trevally, Red "Mullet", flathead species, and leatherjacket species. A high abundance of small fishes has been observed in this nursery area Bellcambers 1998; (Baker, pers. obs. 2005). In more sheltered areas, tidal flats around **Bird Island** are reported to provide habitat for spawning Yellowfin Whiting, and nursery areas for juvenile King George Whiting and/or Southern School Whiting, West Australian Salmon, Australian Herring, Southern Sea Garfish, Yelloweye Mullet, and species of flathead and flounder (Bryars, 2003).

Sharks and Rays

NY NRM region support a rich fauna of sharks and rays, including south-eastern Australian and western Australian species, as well as wide-ranging, globally distributed pelagic species. Wobbegong sharks are often recorded around the **Althorpe Islands** group. Bronze Whaler sharks and White Sharks occur around the islands of mid-eastern Spencer Gulf (Ivanovici 1984; Capel 1994; Baker 2004), where there are food supplies such as Pink Snapper and other large fishes. Port Jackson Sharks and Gummy Sharks are also common around **Wardang Island** and the wrecks in the vicinity. Some of the sharks and rays which are found around rock islands of NY NRM region are shown in **Table 15.2.2**.

Marine Invertebrates

There have been few surveys of the marine invertebrate fauna of the Althorpe Islands, Chinaman's Hat Island and other rocky islands in the southern part of the NY NRM region, but divers and dive associations have noted over the years the abundance of gorgonian corals (especially at Haystack Island), and sponges, soft corals in shaded areas, ascidians (sea squirts), crinoids and other echinoderms, reef shells, and bryozoa ("lace corals") at island reef locations (e.g. Christopher 1988; DIASA, undated, and SCUBA diver records, unpublished). Rock lobster and abalone are common on reefs around the Althorpe group. Readers are referred to the chapters of this report on **Plant-covered Reefs, Seagrasses and Mixed Reef - Seagrass - Sand Habitats** for illustrations of some common invertebrate species which occur around rock islands in the NY NRM Region.

In 2004, a survey of the intertidal molluscs and echinoderms at **Althorpe Island** showed that the species composition of these groups at the island differed from mainland sites in Innes National Park (Benkendorff 2005). Also in 2004, a collecting expedition to record the pycnogonid (sea spider) fauna of the Althorpe islands, produced two new species described in 2005, one of these recorded to date only from the Althorpe Islands to date, and the other also known from Victoria (Staples 2005).

Islands in mid-Spencer Gulf area (e.g. parts of **Goose Island**, and the N, W and S sides of **Wardang Island**) provide habitat for Southern Calamari (including spawning areas), Giant Cuttlefish, Greenlip Abalone, and Purple Sea Urchin (Bryars 2003). The shallows of the Wardang area are also nursery areas for Western King Prawns (Carrick 2003). On the lee side of **Wardang Island**, the shallow, sheltered waters of the bay provide a productive area for sediment-dwelling invertebrates, which in turn provide important food sources for larval and juvenile fish and crustaceans. In the seagrass beds and subtidal sand around the mid-eastern Spencer Gulf islands, there are feeding, spawning and nursery areas for Blue Swimmer Crabs and Razorfish; egg-deposition areas for Southern Calamari, and habitat for post-larval and juvenile King and Queen Scallops (Bryars 2003). Juvenile Sand Crabs and Western King Prawns also utilise the unvegetated sand habitats (Bryars 2003). Mangrove forest in the **Bird Islands** area provides habitat for juvenile Blue Swimmer Crabs and Western King Prawns (Bryars 2003).

Table 15.2.2: Examples of sharks and rays associated with rock islands in the NY NRM region.











| Latin Name and Common Name | Representative Image | Latin Name and Common Name | Representative Image |
|--|--|---|--|
| White Shark |  © L. Baade | Bronze Whaler <i>Carcharhinus brachyurus</i> |  © CSIRO Australian National Fish Collection |
| <i>Alopias vulpinus</i> Thresher Shark |  © W. Helm, NOAA | Wobbegongs <i>Orectolobus maculatus</i> and <i>O. halei</i> , and <i>Sutorectus tentaculatus</i> |  © R. Ling, Flickr. CC Licence |
| Port Jackson Shark <i>Heterodontus portusjacksoni</i> |  © M. Norman, Museum Victoria | Gulf Catshark <i>Aymbolus vincenti</i> |  © J. Lewis |

Table 15.2.2 (continued):

| | | | |
|---|--|---|---|
| <p>Varied Carpetshark <i>Parascyllium variolatum</i>, and Rusty Carpetshark <i>P. ferrugineum</i></p> |  <p>© CSIRO Australian National Fish Collection</p> | <p>Smooth Stingray <i>Dasyatis brevicaudata</i> and Black Stingray <i>D. thetidis</i></p> |  <p>© S. Speight, Flickr. CC Licence</p> |
| <p>Southern Eagle Ray <i>Myliobatis australis</i></p> |  <p>© J. Bennett, CC Licence</p> | <p>Southern Fiddler Ray <i>Trygonorrhina dumerilii</i></p> |  <p>© J. Finn, Museum Victoria. CC Licence</p> |

Marine Mammals

There are colonies of New Zealand Fur Seals *Arctocephalus forsteri* at Althorpe, Little Althorpe South, and Seal Island (Shaughnessy et al., 1994). Haul-out sites for the Australian Sea Lion occur at Althorpe Island, Little Althorpe North and South islands, Seal Island, Haystack Island, and the Western Islets (Robinson and Dennis 1988; Gales et al. 1994). Australian Sea Lions may also be breeding at the Western Isles (DEH 2009).

Australian Sea Lions *Neophoca cinerea* also haul-out at Goose Island and White Rocks in mid-eastern Spencer Gulf, and swim around the wrecks off Wardang Island. Colony numbers of sea lions at Goose Islands have varied over time: for example, around 35 animals in 1978 (Robinson and Dennis 1988); around 24 animals in 1990 (Gales 1990); and less than 10 during the 2000s (DEH data).

Due to relatively narrow geographic range, low population number and ongoing threats, Australian Sea Lion is listed under the Commonwealth’s EPBC Act as a *Vulnerable* species. It is also classified as *Vulnerable* under the *National Parks and Wildlife Act* in South Australia, and listed globally and *Endangered*, under the IUCN Red List of Threatened Species.



Figure 15.2.2: New Zealand fur Seal (A) and Australian Sea Lion (B). Both species occur at islands in the NY NRM Region. Photos: (c) M. Lehmann (M. Switzerland) (A) and DiverDave (B), both at Wikimedia Commons .

Sea Birds and Wading Birds

A number of regionally and/or locally significant breeding and feeding areas for various sea bird species occur in Althorpe Island group. Examples include Short-tailed Shearwaters - a survey reported by Robinson et al. (1996) recorded a population of approximately 22,428 shearwaters. A tracking study at Althorpe Island in 2005 showed that shearwaters forage in waters about 35 - 70m south-west, between the Althorpe Island group and the north-western edge of Kangaroo Island (Einoder and Goldsworthy 2005).

Althorpe Island and **Western Islets** also contain breeding populations of Crested Tern, and there is also a large colony on **Daly Head Islet**. **Haystack Island** has, according to a previous survey reported by Robinson et al. (1996), a population of approximately 650 White-faced Storm Petrels, although in terms of petrel numbers, Haystack Island is not one of the major breeding areas in South Australia. **Althorpe Islands (Haystack, Seal, Western Islets)** also provide habitat for White-faced Heron; Ruddy Turnstone; Sooty Oystercatcher; Masked Plover; Pacific Gull (including feeding areas on **Haystack Island**, where middens are present, indicating generations of Pacific Gulls use the area for cracking open molluscs taken from intertidal pools, with molluscs being a primary food source); Black-faced Cormorant; Pied Cormorant (N.B. breeding, roosting and/or feeding areas for several cormorant species have been recorded on **Seal Island**), and Crested Tern (breeding recorded on **Althorpe Island**) (Copley 1995, 1996; Robinson et al. 1996). Althorpe Islands Conservation Park (made up of **Althorpe, Haystack, Seal Islands** and **Western Islets**) is listed on the *Register of the National Estate*, primarily to preserve breeding habitat for seabirds that is considered to be in good condition, due to the absence of predators and competitors.

As importantly, the **Althorpe Island group** provides habitat for potentially threatened species such as Fairy Tern (breeding colonies on **Seal Island**), White-bellied Sea Eagle (nesting areas), and Rock Parrot (breeding on Seal Island, and also found on all other islands in the group) (Robinson et al., 1996). Collectively, the south-western Yorke Peninsula islands are important habitat for Little Penguin, with breeding colonies reported from **Royston Islet, Middle Islet, Chinaman's Hat Island, Seal Island** and **Althorpe Island** (Robinson et al. 1996). Breeding success has reduced markedly in some other areas of South Australia over the past decade (Wiebkin 2011, hence the comparative importance of Yorke Peninsula as a habitat is increasing for this species. Rock Parrots (classified as *Rare* in SA), which have a coastal association, use **Middle Islet**, and have been recorded nesting on **Royston Island** (Robinson et al. 1996). White-bellied Sea Eagle (classified *Vulnerable* in SA) and Osprey (classified *Rare* in SA) also occur in Innes National Park (Robinson et al. 1996; NPWSA 2002). A White-bellied Sea Eagle nest was recorded at **Daly Head Islet** during the 1930s and 1940s (Dennis and Lashmar 1996), and may potential use other islands around southern Yorke Peninsula at times. Ospreys previously nested on **South Islet**; however Robinson et al. (1996) reported that increased interference over the years has resulted in unsuccessful nesting. There are also unconfirmed past reports of Osprey at **Daly Head Islet**, and this species may periodically use islands in the area.

Pied Oystercatcher and Sooty Oystercatcher, are also found in the area, at **Royston Island, Middle Islet**, and **Chinaman's Hat Island** (Robinson et al. 1996). Both of these species are considered uncommon on Yorke Peninsula and have been classified as Rare in South Australia under the *National Parks and wildlife Act 1972*.

In addition to the bird species that are listed as rare or vulnerable, the islands of the southern NY NRM region provide habitat for Banded Stilt (which is an Australian endemic, and listed under South Australian legislation as *Vulnerable*) and Pied Stilt, Grey Plover, Red-capped Plover (**Daly Head Islet**), Banded Plover, Hooded Plover, Red-necked Stint, Pacific Gull (e.g. **Middle Islet, South Islet**), Silver Gull (breeding areas on **Daly Head Island** and **Haystack Island** - see section on **Impacts and Threatening Processes**), Caspian Tern (e.g. **Middle Islet**), White-faced Heron (e.g. **Royston Island**), and Black-faced Cormorant (e.g. **Middle Islet**) amongst others (Copley 1996; Robinson et al., 1996; NPWSA 2002). Some of these species are seasonal migrants from various locations in the Northern Hemisphere.

Further north, in eastern Spencer Gulf, a number of islands provide significant habitat for sea birds (**Table Table 15.2.3**). There are breeding areas for Crested Terns, migratory Caspian terns, Little Penguin, several cormorant species, amongst others (**Table 15.2.3**). Goose Islands and Wardang Island provide habitat for at least five species of migratory coastal birds that are listed under international migratory bird treaties JAMBA and/or CAMBA. Species include Sharp-tailed Sandpiper, Ruddy Turnstone, Red-Necked Stint, Great Knot and Caspian Tern (Robinson et al. 1996; Environment Australia 2000).

Table 15.2.3: Some of the coastal and sea bird species and migratory wading birds which occur around rock islands in the NY NRM region. Some of the species which have been recorded as breeding on the islands are listed in bold font.

| Island or Island Group | Species Breeding and/or Nesting on Island | References and other Notes |
|------------------------|---|---|
| Althorpe Islands | White-faced Storm Petrel Short-tailed Shearwater Australasian Gannet Sooty Oystercatcher Ruddy Turnstone White-faced Heron Cape Barren Goose Little Penguin Caspian Tern and Crested Tern Fairy Tern Pacific Gull Little Pied Cormorant & Little Black Cormorant Pied Cormorant & Black-faced Cormorant White-bellied Sea Eagle Eastern Osprey Rock Parrot | Robinson et al. 1996; ALA 2014 Nesting of sea eagle recorded at Haystack Island (Robinson et al. 1996) |
| Wardang Island | Caspian Tern and Crested Tern Little Penguin Red-capped Plover Masked Plover Pacific Gull Australian Pelican Great Cormorant Little Black Cormorant and Little Pied Cormorant | Copley 1995, 1996; Robinson et al. 1996; SA DTUP 2003; ALA 2014 |
| Birds Islands | Fairy Tern Rock Parrot Musk Duck Pied Oystercatcher Sooty Oystercatcher Cape Barren Goose Osprey Caspian Tern Crested Tern Black-fronted Dotterel Great Cormorant Black-faced Cormorant & Pied Cormorant Little Pied Cormorant White-faced Heron Sacred Kingfisher Australian Pelican Sharp-tailed Sandpiper Red Knot Red-necked Stint Greater Sand Plover Grey-tailed Tattler Caspian Tern Terek Sandpiper Mongolian Plover / Lesser Sand Plover | Robinson et al. (1996); DTUP (2003); DEH (2009) Rock Parrot has a coastal association and sometimes nests in the spray zone. From <i>Register of the National Estate</i> listing; White-faced Heron nest in the mangroves. More than 20 herons were observed during a previous survey, and such relatively high numbers of this species in one locality is considered unusual for islands in SA (Robinson et al. 1996). Migratory waders (listed under JAMBA and/or CAMBA) |

Table 15.2.3 (continued)

| | | |
|--|---|---|
| <p>Goose Islands (Goose I., Little Goose I., White Rocks, Seal Rocks and Rocky I.)</p> | <p>Fairy Tern Hooded Plover Caspian Tern (Rocky I.) Crested Tern (Rocky I., Goose I. & White Rocks) Little Penguin Pacific Gull Great Cormorant and Black-faced Cormorant Little Black Cormorant Pied Cormorant (Little Goose I. & Seal Rocks) Pacific Gull (Little Goose I.) White-faced Heron Pied Oystercatcher Rock Parrot Black Swan Swamp Harrier Australian Pelican Sharp-tailed Sandpiper Ruddy Turnstone Red-Necked Stint Great Knot</p> | <p>Robinson et al. (1996); DTUP 2003 DEH data (in DTUP 2003), indicate that there may be more than 600 Crested Terns breeding on Goose Island. Small breeding populations of Little Penguin (50 – 100 penguins, according to one previous count). Around 600 black-faced cormorants were recorded in a previous survey at Rocky I. (see Robinson et al. 1996). Goose Islands are a refuge for international migratory species (Robinson et al. 1996; Environment Australia 2000). Although it is a land bird, Rock Parrot is known to nest in the spray zone of islands in SA Migratory Great Knot is rare in southern States of Australia (Garnett et al. 2011).</p> |
| <p>Green Island</p> | <p>Caspian Tern Pied Oystercatcher Pied Cormorant Crested Tern</p> | <p>Nesting area for Caspian Tern Caspian Tern listed under the international JAMBA and CAMBA agreements for migratory birds.</p> |

Table 15.2.4: Examples of bird species which utilise rock islands in NY NRM Region (from Robinson 1996; Copley 1995, 1996; DTUP 2003; DEH 2009; Baker 2004 and references therein; Birdlife Australia records, cited in ALA 2014). Listings under SA *National Parks and Wildlife Act*, and under international migratory bird agreements, are included.















| Common Name and Latin Name | Common Name and Latin Name |
|--|---|
| <p>White-faced Storm Petrel <i>Pelagodroma marina</i></p>  <p>© J.J. Harrison, CC Licence</p> | <p>Short-tailed Shearwater <i>Ardenna tenuirostris</i> (JAMBA, ROKAMBA)</p>  <p>© J.J. Harrison, CC Licence</p> |
| <p>Sooty Oystercatcher <i>Haematopus fuliginosus</i> (Rare, under NPW Act in SA)</p>  <p>© J.J. Harrison, CC Licence</p> | <p>Pied Oystercatcher <i>Haematopus longirostris</i> (Rare, under NPW Act in SA)</p>  <p>© J.J. Harrison, CC Licence</p> |
| <p>Musk Duck <i>Biziura lobata</i> (Rare, under NPW Act in SA)</p>  <p>© J.J. Harrison, CC Licence</p> | <p>Cape Barren Goose <i>Cereopsis novaehollandiae</i> (Rare, under NPW Act in SA)</p>  <p>© J.J. Harrison, CC Licence</p> |

Table 15.2.4 (continued)

| | |
|---|---|
| <p>Hooded Plover <i>Thinornis rubricollis</i> (<i>Vulnerable</i>, under NPW Act in SA)</p>  <p>© J.J. Harrison, CC Licence</p> | <p>Mongolian Plover / Lesser Sand Plover <i>Charadrius mongolus</i> (Bonn, JAMBA, CAMBA, ROKAMBA; <i>Rare</i>, under NPW Act in SA)</p>  <p>© J.J. Harrison, CC Licence</p> |
| <p>Greater Sand Plover <i>Charadrius leschenaultii</i> (Bonn, JAMBA, CAMBA, ROKAMBA; <i>Rare</i>, under NPW Act in SA)</p>  <p>© C. Lam, CC Licence</p> | <p>Fairy Tern <i>Sterna nereis</i> (<i>Endangered</i>, under NPW Act in SA)</p>  <p>© J.J. Harrison, CC Licence</p> |
| <p>Pacific Gull <i>Larus (Larus) pacificus</i></p>  <p>© J.J. Harrison, CC Licence</p> | <p>Little Penguin <i>Eudyptula minor</i></p>  <p>© J.J. Harrison, CC Licence</p> |
| <p>Rock Parrot <i>Neophema petrophila</i> (<i>Rare</i>, under NPW Act in SA)</p>  <p>© C. Liber, CC Licence</p> | <p>Eastern Osprey <i>Pandion haliaetus</i> (<i>Endangered</i>, under the NPW Act in SA)</p>  <p>© P. Massas, at Wikimedia Commons</p> |

Baker, J. L. (2015) *Marine Assets of Yorke Peninsula*. Volume 2 of report for Natural Resources - Northern and Yorke, South Australia