

## 14. Rhodolith Beds

Asset	Rhodolith Beds
Description	Gravelly sea floor cover, made up of living and dead pieces (including nodules) of hard, crusty coralline algae, often forming concentric layers around sand grains or gravel.
Examples of Main Species	<ul style="list-style-type: none"> <li>• Species of <i>Lithophyllum</i>, <i>Sporolithon</i> and <i>Mesophyllum</i></li> <li>• An abundant invertebrate fauna: segmented worms (polychaetes), numerous crustacean species, bryozoans (“lace corals”), ascidians (“sea squirts”), sponges, bivalve molluscs, chitons, echinoderms, and various squid and cuttlefish species, amongst others</li> <li>• Fishes which feed in the rhodolith beds, such as Pink Snapper, Trevally, Yellowtail, and various species of flathead and leatherjacket, amongst others</li> <li>• Various shark and ray species, such as Port Jackson shark, Cobbler Wobbegong, Fiddler Ray, Smooth Stingray and Eagle Ray.</li> </ul>
Main Locations	Deeper waters (e.g. 20-25m) of mid Spencer Gulf seaward of Port Broughton to Wallaroo. Several tidal channels in central SG near the western boundary of the NY NRM Region. Investigator Strait, particularly the western end, off the “toes” of Yorke Peninsula.



**14.1: (A) Example of rhodolith pieces. (b) *Sporolithon durum*, one of the coralline algae species which commonly forms rhodoliths.**

One of the least common marine habitat types in the NY NRM region is rhodolith beds, made up of both living and dead unattached nodules of crustose coralline algae (e.g. species of *Lithophyllum*, *Sporolithon* and *Mesophyllum*), which are sometimes called “popcorn” by fishers, or “maerl” (Svane and Shepherd 2014). The layers of hard, crusty algae (which are often pink) grow successively round a grain of sand or piece of gravel, in waters which have sandy or gravelly bottom, and high calcium carbonate content. The pieces are rolled about by tidal currents and swell, and thrive in areas of moderate to high water movement. In quiet waters, they would soon become buried, but in areas of highest water movement, they would be rolled or swept away and broken up.

Rhodoliths have been recorded in few areas of South Australia (Shepherd and Edgar 2013). Within the NY NRM region, rhodolith beds occur in the following areas (O’Connell 2012, cited by Baker et al. 2014; S. Shepherd, pers. comm. 2013):

- in deeper waters (e.g. 20-25m) of mid Spencer Gulf seaward of Port Broughton to Wallaroo;
- several other tidal channels throughout SG, near the western boundary of the NY NRM Region;
- Investigator Strait, particularly the western end, off the “toes” of Yorke Peninsula.

Rhodoliths are long-lived, with various age estimates for living beds in deeper waters across southern Australia ranging from dozens to many hundreds of years. In other parts of the world, studies have indicated growth rates of only millimetres per year (Foster et al. 2013). Rhodolith beds are calcium carbonate producers (Amado-Filho et al. 2012) and therefore help to form sediment (calcareous sand) in marine environments. Increasing global levels of carbon dioxide, which results in increased ocean acidity, may adversely affect production of rhodoliths and other calcareous organisms in future (Foster al. 2013). This is discussed further in the report on **Impacts and Threatening Processes**.

Rhodolith beds have important ecological roles. They provide hard surfaces to which some animals (such as sponges and sea squirts) and small seaweeds can attach, and also spaces - on branching rhodoliths, and also between rhodoliths - in which small invertebrates can live. A study at the Recherche Archipelago in southern WA showed that 52 species of small green, brown and red seaweeds were associated with a rhodolith bed at 38m depth (Goldberg and Kendrick 2004). Some of the invertebrate species which utilise rhodolith beds for shelter, feeding and breeding include segmented worms (polychaetes), bivalve molluscs, bryozoans ("lace corals"), ascidians, sponges, chitons, echinoderms and small crustaceans (Mathis et al. 2005; Harvey and Bird 2008; Shepherd and Edgar 2013). Many of these small invertebrates become food for fishes and other larger animals.



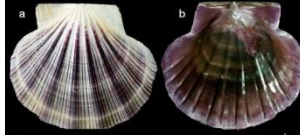


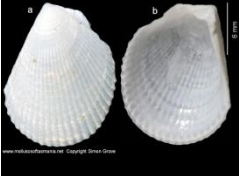








During trawl surveys in Spencer Gulf, some of the invertebrate species which were recorded on the sea floor off the area between Wallaroo and Port Broughton where rhodolith beds exist include the following. It is noted that none of these species is restricted to rhodolith bed habitat, and most are broadly distributed in several habitat types:

- solitary ascidians (e.g. *Herdmania* sp. and *Ascidia sydneyensis*, and species in *Pyura* and *Polycarpa*);
- bryozoans in genera *Celleporaria* and *Steginoporella*;
- numerous crustaceans, such as Western King Prawn and Strawberry Prawn *Metapenaeopsis* sp., Blue Swimmer Crab *Portunus armatus*, Balmain Bug *Ibacus peronii*, Great Spider Crab *Leptomithrax gaimardii*, Ramshorn Spider Crab *Naxia aurita*, Hairy Snapping Shrimp *Alpheus villosus*, a mantis shrimp (probably Southern Mantis Shrimp *Belosquilla laevis*), Shaggy Sponge Crab *Lamarckdromia globosa*, and a hairy crab species in Pilumnidae;
- large sea cucumbers (e.g. *Holothuria* and/or *Stichopus*), and other echinoderms such as featherstars e.g. Passion Flower featherstar *Ptilometra macronema*, Thorny Sea Urchin *Goniocidaris tubaria* and brittlestars (e.g. species in *Ophiothrix*);
- bivalve molluscs (e.g. Queen Scallop *Equichlamys bifrons*, Hammer Oyster *Malleus meridianis*, White Rock Shell *Cleidothaerus albidus*, File Clam *Lima nimbifer*, and *Dosinia* and *Eurassatella* shells);
- various cephalopods, such as Nova Cuttlefish *Sepia novaehollandiae*, Giant Cuttlefish *Sepia apama*, Southern Calamari *Sepioteuthis australis*, Striped Pyjama Squid *Sepioloidea lineolata*, Southern Bottletail Squid *Sepiadarium austrinum*, and *Octopus* species;
- unidentified gorgonian coral with tropical affinity; and
- various species of sponges (e.g. in genera *Clathria*, and *Holopsamma*, and numerous unidentified sponges in the Demospongiae class).

Rhodolith beds also provide a foraging ground for fishes, some species of which can move the nodules around to search for food. According to a study in southern WA, some of the fishes associated with rhodolith beds include trevally, yellowtail, blue morwong, various wrasse species, leatherjackets, goatfish, flathead species, grubfish and stinkfish (Harvey et al. 2004). A similar suite of species has been recorded in trawl surveys off mid Spencer Gulf, seaward of the coastal area between Wallaroo and Port Broughton, where rhodolith beds occur (Currie et al. 2009; O'Connell 2012).


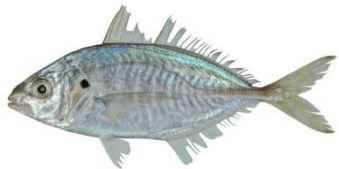








Examples of fish species which occur in the area of rhodolith beds in Spencer Gulf (and most also in Investigator Strait) include Skipjack Trevally *Pseudocaranx wrighti*, Pink Snapper *Chrysophrys (Pagrus) auratus*, King George Whiting *Sillaginodes punctatus*, Smalltooth Flounder *Pseudorhombus jenynsii*, Little Gurnard Perch (Little Scorpion Fish) *Maxillcosta scabriceps*, Spiny Gurnard *Lepidotrigla papilio*, Gulf Gurnard Perch *Neosebastes bougainvillii*, Elongate Bullseye *Parapriacanthus elongatus*, Spotted Dragonet (Spotted Stinkfish) *Repomucenus calcaratus*, Blue-spotted Goatfish *Upeneichthys vlamingii*, Leatherjacket species (e.g. Rough, Degen's, Bridled, Toothbrush, Mosaic, Southern Pygmy), flathead species (e.g. Tiger, Rock, Yank), Silverbelly *Parequula melbournensis*, Beaked Salmon *Gonorynchus greyi*, Wavy Grubfish *Parapercis haackei*, Scarlet Cardinalfish *Vincentia badia*, and Orange-barred Pufferfish *Polyspina piosae*. Some of these species are depicted in **Table 14.2**.

**Table 14.1: Some of the invertebrate species which are found in rhodolith beds in NY NRM region, according to results of trawl surveys in Spencer Gulf.**

Species Name	Representative Image	Species Name	Representative Image
solitary ascidian species e.g. <i>Herdmania</i>	 © M. Norman, Museum Victoria	Sea cucumbers (e.g. species in <i>Holothuria</i> and/or <i>Stichopus</i> )	 © P. Southwood, CC Licence
Queen Scallop <i>Equichlamys bifrons</i>	 © S. Grove, molluscsoftasmania.net	Hammer Oyster <i>Malleus meridianus</i>	 © Howies SCUBA
White Rock Shell <i>Cleidothaerus albidus</i>	 © Biodiversity Heritage Library. After Stutchbury, 1830	File Clam <i>Lima nimbifer</i>	 © S. Grove, molluscsoftasmania.net
Thorny Sea Urchin <i>Goniocidaris tubaria</i>	 © R. Stuart-Smith, RLS	bryozoans e.g. <i>Celleporaria</i>	 © Howies SCUBA
Giant Cuttlefish <i>Sepia apama</i> and Nova Cuttlefish <i>Sepia novaehollandiae</i>	 © H. Crawford	Striped Pyjama Squid <i>Sepioloidea lineolata</i>	 © K. Hart, A&K Diving
Western King Prawn <i>Melicertus latisulcatus</i>	 © Museum Victoria	Balmain Bug <i>Ibacus peronii</i>	 © M. Norman, Museum Victoria
Southern Mantis Shrimp <i>Belosquilla laevis</i>	 © Howies SCUBA	Great Spider Crab <i>Leptomithrax gaimardii</i> and Smooth seaweed Crab / Decorator Crab <i>Naxia aurita</i>	 © P. Southwood, CC Licence



**Table 14.2: Some of the fish species which are found in the vicinity of rhodolith beds in NY NRM region, according to results of trawl surveys in Spencer Gulf.**

Species Name	Representative Image	Species Name	Representative Image
Pink Snapper <i>Pagrus auratus</i>	 © B. Gratwicke, CC Licence	Skipjack Trevally / Sand Trevally <i>Pseudocaranx wrighti</i>	 © Australian National Fish Collection CSIRO
King George Whiting <i>Sillaginodes punctatus</i>	 © Reef Life Survey	Blue-spotted Goatfish / Red "Mullet" <i>Upeneichthys vlamingii</i>	 © D. Muirhead
Smalltooth Flounder <i>Pseudorhombus jenynsii</i>	 © J. Lewis	Rock Flathead <i>Thysanophrys cirronasa</i>	 © R. Ling, CC Licence
Southern Pygmy Leatherjacket <i>Brachaluteres jacksonianus</i>	 © M. Norman, Museum Victoria	Little Gurnard Perch / Little Scorpionfish <i>Maxillicosta scabriceps</i>	 © J. Finn, Museum Victoria
Scarlet Cardinalfish <i>Vincentia badia</i>	 © D. Muirhead	Cobbler Wobbegong <i>Sutorectus tentaculatus</i>	 © C. Hall

Various sharks and rays also utilise rhodolith beds, such as Eagle Ray, Southern Fiddler Ray, Smooth Stingray, Gummy Shark (Harvey et al. 2004), Black Stingray, Port Jackson sharks and Cobbler Wobbegong / Carpetshark (SARDI data from Spencer Gulf).

There have been few studies of richness and diversity in rhodolith beds compared with adjacent bare sand areas, but one study in California showed species richness to be almost twice as high, and total animal abundance up to 900 times higher, in rhodolith beds compared with adjacent sand areas (Steller al. al, 2003, cited by Foster et al. 2013 and Shepherd and Edgar 2013). Rhodolith beds are an uncommon habitat type, and they occur in few areas of the NY NRM region, and in few other locations in South Australia. Their ecological significance cannot be underestimated, but their future is uncertain, due to a number of threats and impacts, both short and long term. These are discussed in the companion report on **Impacts and Threatening Processes**.