

12. Subtidal Sand and Rubble

Asset	Subtidal Sand Habitats and Rubble Habitats
<p><i>Description</i></p>	<p>Areas below tide level in which the sea floor is composed of visible sand and/or rubble, and not covered with structural forms such as seagrasses or high densities of attached invertebrates. Sand habitats within the region differ according to location and oceanographic conditions, particularly strength of currents and wave energy. Finer sand and silt occur where minimal wave action enables accumulation of small particles; coarser sediments occur in areas of greater water movement.</p>
<p><i>Main Species</i></p>	<p>Crustaceans</p> <ul style="list-style-type: none"> • Western King Prawns and smaller prawn species • Blue Swimmer Crabs • Sand Crabs • pebble crabs and other crab species • Balmain Bug • many small crustaceans (copepods, amphipods, isopods, sand shrimps etc) <p>Shells</p> <ul style="list-style-type: none"> • Razorfish <i>Pinna</i> shell • King Scallop <i>Pecten fumatus</i>, Queen Scallop <i>Equichlamys bifrons</i>, and other scallop species • Hammer Oysters <i>Malleus meridianus</i>, and a diverse and abundant suite of other bivalves, such as nut shells, venus shells (many species), dog cockles, trough shells, tellin shells, sunset shells, lucinid shells, limopsid shells, philobryid shells, galeommatids, neoleptonids, costellate mitre shells, thraciid shells, cardita shells, cuspidariids, myadora shells, crassatella shells, burrowing / sand-boring shells in Gastrochaenidae, and many others groups • Volute shells, and dozens of other gastropod shells (snails), such as moon snails, marginellid shells, dove shells, bubble shells, helmet shells, wentletrap shells, buccinid whelk shells, auger shells, turrid shells and many others • unusual shells, such as Carrier Shells <i>Xenophora</i> and Watering Pot Shells - e.g. <i>Brechites (Humphreyia) strangei</i> <p>Anemones</p> <ul style="list-style-type: none"> • Burrowing sand anemones, including possibly endemic species <p>Squids and Octopus</p> <ul style="list-style-type: none"> • Southern Calamari • Striped Pyjama Squid • Sand Octopus, Pale Octopus and several other octopus species <p>Echinoderms</p> <ul style="list-style-type: none"> • various echinoderms such as Southern Sand Star and other sea stars, urchin and heart urchin species, sea cucumbers and brittlestars

<p><i>Main Species (continued)</i></p>	<p>Bony Fishes</p> <ul style="list-style-type: none"> • nursery area for juvenile King George Whiting • School Whiting and other whiting species • Yellow-eye Mullet • Southern Sand Flathead, Southern Blue-spotted Flathead, and other flathead species • Many of the flounder species in SA (e.g. Spotted, Small-toothed, Crested, Derwent, Longsnout, Elongate, and other flounders) • several species of sole and tongue sole • Silverbelly and other small fishes which school in sand habitats • Toadfishes and pufferfishes • various species of Hardyhead • several species of pipefishes • many goby species (e.g. Marine Goby, Bridled Goby, Fray-finned Goby, Long-finned Goby, Groove-cheek Goby and several <i>Nesogobius</i> sand goby species) • well camouflaged sea floor fishes such as Warty Handfish, Common Stargazer, and Sculptured Seamoil • Little Scorpionfish, and several species of Gurnard • Burrowing fishes such as serpent eels and worm eels <p>Sharks and Rays</p> <ul style="list-style-type: none"> • sharks such as Gummy Shark, Common Sawshark, and Australian Angelshark • Port Jackson Shark • Australian Numbfish and other electric rays • Fiddler Ray, Shovelnose Ray, Eagle Ray, Smooth Stingray, Black Stingray • various species of Skate (e.g. Melbourne, endemic Pygmy Thornback Skate; White-spotted Skate, and others) • various stingaree species (e.g. Coastal, Sparsely-spotted, Banded, Spotted) • Elephant Fish (Elephant Shark) <p>Rarely Recorded Species</p> <ul style="list-style-type: none"> • rare fishes (e.g. handfishes) • rare species of octocoral • rare species of byozoan
<p><i>Main Locations</i></p>	<ul style="list-style-type: none"> • Area seawards of the shallow seagrass between Price and Sandy Point, in northern Gulf St Vincent • Area between Wool Bay and Edithburgh, seaward of the shallow reef platforms and seagrass • Parts of Sturt Bay • Western Investigator Strait • Expanses of sand habitat between the patch reefs along the “toes” of Yorke Peninsula (e.g. between Browns Beach and Corny Point) • Parts of Hardwicke Bay, including areas north of Corny Point, Point Souttar, Point Turton, and the centre of the bay • Some deeper sections of central eastern Spencer gulf • Deeper waters between Port Pirie and Port Germein, seaward of the seagrass beds • Part of central channel in uppermost Spencer Gulf, south of Port Augusta

Ecological Significance of Sand and Rubble Habitat

NY NRM region supports a number of subtidal sand and rubble habitats which have important ecological functions. Although sand habitats may appear “bare”, they are rich in life, and in one square metre of sand, hundreds to thousands of individual invertebrate animals can occur. Different sand habitats, which may appear superficially similar, support different invertebrate assemblages, depending upon numerous factors, such as biogeography (e.g. warmer upper gulf water locations versus cooler Investigator Strait and south-eastern Spencer Gulf locations); sediment type (shelly rubble, coarse sand, fine sand etc); organic content; wave exposure level; and depth, amongst others. Furthermore, there are numerous “micro-habitats” in sandy areas. For example, both living and dead shells of sand-dwelling molluscs such as cockles are used as substrate by various species of green seaweed (e.g. the tropical species *Acetabularia calyculus*, which is found in the NY NRM region), and by stalked and encrusting invertebrates that require hard substrate for attachment. Some species of seaweed that are found in sand habitats (e.g. *Caulerpa trifaria* and *Caulerpa cactoides*) bind the sand with root-like structures, and help to prevent erosion. Fine-scale oceanographic processes, for example the eddies that occur in many coastal sand beds, help to trap decomposing seaweeds and seagrass in areas of bare sand, and these clumps of decomposing vegetation provide feeding areas for invertebrates such as small shrimps, and for juveniles of some fish species, which are also protected from predators in this “mobile micro-habitat” (Baker 2004). Coastal sand habitats also provide feeding, breeding and/or sheltering areas for numerous fish and invertebrate species, as discussed in sections below.

Generally, sand and other soft substrates provide habitat for some of the most basic life forms, such as amoebas, foraminifera, and large ciliates, which are an important food source for some invertebrates. Sand beds trap organic particles, which are also eaten by small crustaceans and many other invertebrates. In the ecosystem associated with sand-dominated habitat, numerous species of minute gastropod shells, mostly less than 5mm long, play important roles in food supply and nutrient recycling. A full list of marine species that utilise marine sand habitats in the NY NRM region would be very large, but examples are provided in the tables below.

Marine Invertebrates

The sand habitats of the NY NRM region are important habitats for a variety of crustaceans, including commercially and recreationally significant species, such as Western King Prawn, Blue Swimmer Crab and Balmain Bug, as well as many other smaller crustaceans which have ecologically important roles, particularly as food sources for other marine animals in the region.

Western King Prawn *Penaeus (Melicertus) latisulcatus* is found through the NY NRM region, with juveniles in mangrove areas and intertidal sand- and mud-flats, and adults in deeper water, often over sand and rubble. Some of the largest prawns are found in the central waters of both gulfs. In GSV, this includes the central gulf area between Port Vincent and Edithburgh, and in Spencer Gulf, the north central gulf area seaward of Port Pirie; the central gulf waters seaward of Wallaroo and also area west of Wardang Island, and north of Corny Point (Currie et al. 2009; Dixon et al. 2013). Deeper waters of eastern Investigator Strait off the heel of Yorke Peninsula are also important habitat for adult Western King Prawns (maps in Dixon et al. 2011).

Blue Swimmer Crab *Portunus armatus* is abundant in the northern parts of the NY NRM region, and the adults are common in sandy habitats of the upper gulfs. This species is fished commercially and recreationally in both GSV and Spencer Gulf (e.g. Baker and Kumar 1994; Dixon et al. 2013), and is also a major bycatch species in prawn trawls in both gulfs (e.g. Broadhurst et al. 2000; Carrick 1997; Currie et al. 2009), including the NY NRM region. Blue Swimmer Crabs eat a number of species which are also abundant in the sand habitats of the NY NRM region, such as *Pinna* (razorfish shell), polychaete worms, brittlestars and hermit crabs. The swimmer crabs are an important prey item for Pink Snapper *Chrysophrus auratus*, and are also eaten by gummy sharks, stingrays, fiddler rays and other large fauna in the gulfs.

The broadly distributed Balmain Bug *Ibacus peronii* is found in part of the NY NRM Region, particularly sandy sea floors in Spencer Gulf. This species, which is found around Australia, occurs in sand and other soft sediments, and ranges from several metres deep to more than 600m deep in some parts of the range, but more common in water less than 100m deep (Butler et al. 2013). Balmain Bugs have two flat plates (resulting in the alternative common name “shovel nose lobster”) which are flattened antennae.

Balmain Bugs bury in sand during the day and are not usually seen unless observed by divers at night when they are active, or when caught in prawn trawls. Balmain Bug *Ibacus peronii* is a relatively slow-growing, long-lived species (to 18 years), and does not move far in its life-time, with tagging data indicating movement within 5 km after 10 years (Stewart 2003, cited by Butler et al. 2013).

The subtidal sand habitats of the NY NRM region, as well as the seagrass beds, provide important habitat for King Scallops *Pecten fumatus* and Queen Scallops *Equichlamys bifrons* (Bryars 2003). King Scallop is a relatively long-lived species, to at least 10 years (Boyd 2011). Scallops are a food source for sea stars, whelk shells and octopus (Kailola et. al. 1993, cited by Mavrakis and Sullivan 2006). There is a commercial fishery for this species in Hardwicke Bay, extending from the Corny Point area northwards to Wardang Island (Mavrakis and Sullivan 2006).

Table 12.1: Examples of invertebrate species which are common in sand habitats of the NY NRM region.











Species Name	Representative Image	Species Name	Representative Image
Western King Prawn <i>Penaeus (Melicertus) latisulcatus</i>	 © M. Norman, Museum Victoria	Blue Swimmer Crab <i>Portunus armatus</i>	 © J. Lewis
Numerous crab species such as Sand Crab <i>Ovalipes australiensis</i>	 © D. Muirhead	Balmain Bug <i>Ibacus peronii</i>	 © M. Norman, Museum Victoria
Pebble Crabs e.g. <i>Bellidilia laevis</i>	 © M. Marmach, Museum Victoria	amphipods	 © M. Marmach, Museum Victoria
isopods, such as <i>Heteroserolis</i> sand skaters	 © M. Marmach, Museum Victoria	sand shrimps and mantis shrimps	 © Howies SCUBA
Razorfish Shell <i>Pinna bicolor</i>	 © H. Crawford, SACReD	King Scallop <i>Pecten fumatus</i>	 © D. Staples, Museum Victoria

Table 12.1 (cont.): Examples of invertebrate species which are common in sand habitats of the NY NRM region.

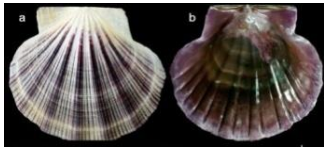











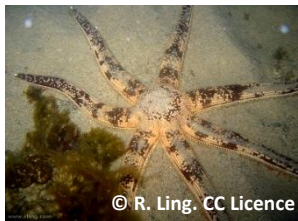





Species Name	Representative Image	Species Name	Representative Image
Queen Scallop <i>Equichlamys bifrons</i>	 © S. Grove, molluscsoftasmania.net	Hammer Oyster <i>Malleus meridianus</i>	 © Howies SCUBA
bivalve shells (many species, such as trough shells, clams, venus shells, dog cockles, tellin shells, sunset shells, lucinid shells, crassatella shells, and many others)	 © D. Staples, Museum Victoria	volute shells, such as Lightning Volute <i>Ericusa fulgetrum</i> , Wavy Volute <i>Amoria undulata</i> , and others	 © J. Lewis
whelk shells, such as <i>Nassarius pauperatus</i> and numerous others	 © T. Alexander, ausmarinverts.net	moon snails such as <i>Polinices conicus</i> , and many other gastropod species	 © Friends of Gulf St Vincent
bubble shells e.g. <i>Bulla quoyii</i> and others	 © G. Bould. CC Licence	head shield slugs, such as <i>Philinopsis troubridgensis</i>	 © P. Mercurio
Watering Pot Shells such as <i>Brechites (Humphreyia) strangei</i>	 © G. & P. Poppe, www.conchology.be	Southern Calamari <i>Sepioteuthis australis</i>	 © J. Finn, Museum Victoria
Striped Pyjama Squid <i>Sepioloidea lineolata</i>	 © K. Hart, A&K Diving	Southern Keeled Octopus <i>Octopus berrima</i> , Pale Octopus <i>O. pallidus</i> , Hammer Octopus <i>O. australis</i> and several other octopus species	 © J. Finn, Museum Victoria

Table 12.1 (cont.): Examples of invertebrates which are common in sand habitats of the NY NRM region.

Species Name	Representative Image	Species Name	Representative Image
Southern Sand Star <i>Luidia australiae</i> and other sea stars	 © R. Ling, CC Licence	sand-dwelling brittlestars such as <i>Ophiocrossota multispina</i> and <i>Ophiura kinbergi</i>	 © B. Patullo, Museum Victoria
sea cucumbers (e.g. <i>Holothuria hartmeyeri</i> and other species)	 © P. Southwood, CC Licence	burrowing sand anemones, such as <i>Edwardsia vivipara</i>	 © P. Mercurio
sand-dwelling ascidians, such as <i>Sycozoa murrayi</i>	 © J. Finn, Museum Victoria. CC Licence	polychaete worms (many species)	 © H. Hillewaert. CC Licence.

The squid Southern Calamari *Sepioteuthis australis* utilises both seagrass beds and sand habitats throughout its short life, and this commercially and recreational important species is also a major part of the bycatch in prawn trawls in both Gulf St Vincent and Spencer Gulf (e.g. Broadhurst et al. 2009; Currie et al. 2009).

The species diversity of some groups, such as the bivalves, is rich in sand habitats, and more than 200 species occur in South Australian waters (Baker 2004 and references therein). There are dozens of species of bivalve mollusc within sand habitats of the NY NRM region, and one of the best known is the *Pinna bicolor*. In the soft sand habitats in parts of the NY NRM region, razorfish provide a hard surface which enables reef species to settle on the shell surfaces, such as small sponges, ascidians (sea squirts), bryozoans, and tube worms (Shepherd and Sprigg, 1976, and J. Baker, pers. obs.). Bivalve shells are important food sources for many animals, particularly in sand and sand-gravel habitats. Similar species richness to the bivalves occurs with the snails (gastropod shells), and many species occur in sand and rubble habitats of the NY NRM. More than 200 of the larger (e.g. 1cm - 10+cm) species of gastropod occur in sand habitats in SA, plus dozens more species from at least 10 families of minute snails.

Some of the numerous small, sand-dwelling invertebrates ("meiofauna"), such as foraminifera, polychaete worms, small molluscs, and copepods and other small crustaceans, are an important food source for sand-dwelling fish species (e.g. whiting species; flounders, and numerous others), and also for crustaceans such as Western King Prawn (Carrick, pers. obs., cited by PIRSA, 2003).

In deeper water of Investigator Strait off southern Yorke Peninsula, sandy areas were previously colonised by sparse *Heterozostera* seagrass, with few obvious invertebrate animals, such as the button-shaped bryozoan *Lunularia capulus* and the brachiopod shell *Magadena cumingi* lying on the sand, and the sea pen coral *Sarcoptilus grandis* and the stalked bryozoan *Parmularia smeatoni* anchored in the sand, along with stalked *Pyura* ascidians (Shepherd and Sprigg 1976). Sampling during the 2000s indicated that this sparse seagrass and invertebrate assemblage on sand is no longer present, and trawling since the 1960s is considered to be the main cause of the disappearance (Tanner 2005).

Rare Species

A number of rarely recorded species have been found in the sands of Investigator Strait. One example is the strap-like octocoral *Pseudogorgia godeffroyi* (Utinomi and Harada 1973), which was first described from Investigator Strait in 1870, and not found again for almost 100 years. More specimens were recorded in 1971, in sand at 35-40m deep (collected by J. Watson), and this unusually-structured is known from only two other localities, those being an island in the eastern great Australian bight, and a site off Lakes Entrance in Victoria, at 45m deep (Utinomi and Harada 1973; Atlas of Living Australia, 2014).

The rarely recorded bryozoan *Quadriscutella papillata* (Bock and Cook 1993) has been found in sand, in deeper waters of Investigator Strait off Foul Bay. There are no other records of this species in Australian museums (Atlas of Living Australia 2014), other than the type specimens from off Yorke Peninsula, and all other members of the genus are fossils, known from few locations in South Australia and Victoria (Bock and Cook 1993; museum records, in Atlas of Living Australia 2014).

Fishes

Some of the many fishes which are found over sand bottom habitats in NY NRM region are shown in the table below. This includes two species of whiting which are highly sought after by commercial and recreational fishers - King George (for which bare sand in the gulfs is a nursery habitat: James et al. 2010) and Yellow-fin Whiting. Both of these species are fished in the region. A number of fishes school over sand habitats, with examples in the NY NRM including Southern School Whiting, Southern Silverbelly, and Yelloweye Mullet.

Some of the most abundant fishes in sand habitats around the NY NRM region are not commercially or recreationally popular as food fishes, but they are caught in large numbers in the bycatch of prawn trawls in both gulfs, and in Investigator Strait (see Broadhurst et al. 2000; Carrick 1997; Currie et al. 2009). Examples include Skipjack (Sand) Trevally *Pseudocaranx wrighti*, Blue-spotted Goatfish (Red "Mullet") *Upeneichthys vlamingii*, Southern Silverbelly *Parequula melbournensis*, and two leatherjacket species - Degen's *Thamnaconus degeni* and Rough *Scobinichthys granulatus*.

Unvegetated sand habitats in the western part of the NY NRM reportedly support larvae and juveniles of Southern Sea Garfish, post-larvae of Yellow-fin Whiting, and juvenile King George and Yellow-fin Whiting, Pink Snapper, West Australian Salmon, Tommy Ruff, Yellow-eye Mullet, Blue-spotted Goatfish, Trevally, flathead species and flounder species. The subtidal sand habitats in some areas of south-eastern Spencer Gulf also provide habitat for Snook, including spawning adults (Bryars, 2003).

Fishes which live on the sea floor in sand habitats are usually well camouflaged. Some of these species also bury into the sand, particularly those which are active at night, and escape predation during the day by burrowing. There are several species of flatfishes (flatheads, flounders and soles) in sand habitats of the NY NRM. Some of these species are fished commercially and/or recreationally in SA, and some are caught in large numbers in the bycatch of prawn trawls in the gulfs (Broadhurst et al. 2000; Currie et al. 2009). Examples include Southern Sand Flathead *Platycephalus bassensis* and *Neoplatycephalus* species, Smalltooth Flounder *Pseudorhombus jenynsii*, Crested Flounder *Lophonectes gallus*, and Southern Tongue Sole *Cynoglossus broadhursti*. Some other sea floor species in sand and rubble habitats of the NY NRM region include burrowing species such as Sculptured Seamoil *Pegasus lancifer*, Common Stargazer *Kathetostoma laeve*, Short-finned Worm Eel *Scolecenchelys breviceps*, and Slender Sandburrer *Creedia haswelli*. The unusual and very cryptic fish Warty Handfish *Thymichthys verrucosus* is also found in the region, and is one of only two handfish species known from South Australia (Baker 2012). Both are uncommonly recorded.

Sand habitats are important for many species of small fish in the goby family. Many of South Australia's goby species live in sand and rubble areas, and some make burrows to sleep in, and to help them escape predation. Gobies lay eggs in a nest, which is guarded by the male. Gobies are food sources for larger fishes such as flatheads, Australian salmon, and anglerfishes. Gobies are also eaten by sea birds such as cormorants. Some examples of goby species from NY NRM region include Southern Longfin Goby *Favonigobius lateralis*; Krefft's Frillgoby *Bathygobius krefftii*; Blue-spot goby *Pseudogobius ororum*; Sculptured Goby *Callogobius mucosus*; Sailfin goby *Nesogobius pulchellus*, and various other species in *Nesogobius*, such as Threadfin Sand Goby, Groove-cheeked Goby, and Sicklefing Sand Goby (South Australian Conservation Research divers records, and Baker, pers. obs. 2007-2014; Baker et al. 2009; ALA 2014).

Table 12.2: Examples of fishes which are common in sand and rubble habitats of the NY NRM region.






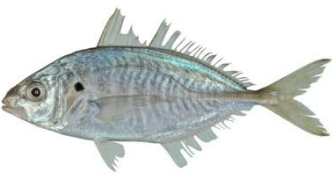













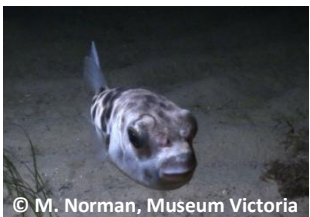




Species Name	Representative Image	Species Name	Representative Image
Southern School Whiting <i>Sillago bassensis</i>	 © Australian National Fish Collection CSIRO	Yellow-fin Whiting <i>Sillago schomburgkii</i> (adults)	 © D. Muirhead, MLSSA
King George Whiting <i>Sillaginodes punctata</i>	 © Reef Life Survey	Yellow-eye Mullet <i>Aldrichetta forsteri</i>	 © Auckland Council
Blue-spotted Goatfish / Red "Mullet" <i>Upeneichthys vlamingii</i>	 © D. Muirhead, MLSSA	Skipjack Trevally / Sand Trevally <i>Pseudocaranx wrighti</i>	 © Australian National Fish Collection CSIRO
Beaked Salmon <i>Gonorynchus greyi</i>	 © J.E. Randall @ Fishbase	Southern Silverbelly <i>Parequula melbournensis</i>	 © J. Finn, Museum Victoria
Warty Handfish <i>Thymichthys verrucosus</i>	 © Australian National Fish Collection CSIRO	Common Stargazer <i>Kathetostoma laeve</i>	 © J. Finn, Museum Victoria
Sculptured Seamoth <i>Pegasus lancifer</i>	 © J. Finn, Museum Victoria	Common Stinkfish <i>Foetorepus calauropomus</i>	 © Australian National Fish Collection CSIRO
Flathead species e.g. Southern Sand Flathead <i>Platycephalus bassensis</i> and other species	 © S. Speight, CC licence	Most species of flounder (e.g. Small-toothed, Crested, Long-snouted, Spotted, Elongate, Greenback, and other flounders) several species of sole and tongue sole	 © Australian National Fish Collection CSIRO















Table 12.2 (cont.): Examples of fishes which are common in sand and rubble habitats of the NY NRM region.

Species Name	Representative Image	Species Name	Representative Image
Various species of goby, such as Sailfin Goby <i>Nesogobius pulchellus</i> and Sicklefin Sand Goby <i>Nesogobius</i> sp.	 © S. Speight, CC licence	Wavy Grubfish <i>Parapercis haackei</i> and Spotted Grubfish <i>Parapercis ramsayi</i>	 © H. Crawford SACReD
Degen's / Bluefin Leatherjacket <i>Thamnaconus degeni</i>	 © D. Muirhead	Rough Leatherjacket <i>Scobinichthys granulatus</i>	 © R. Ling / Flickr. CC Licence.
Globefish / Slender-spined Porcupine Fish <i>Diodon nictemerus</i>	 © J. Finn, Museum Victoria	Toadfishes and pufferfishes, such as Barred Toadfish <i>Contusus richiei</i>	 © M. Norman, Museum Victoria
<i>Pseudophycis</i> cods	 © S. Speight, CC licence	Little Gurnard Perch / Little Scorpionfish <i>Maxillicosta scabriceps</i>	 © J. Finn, Museum Victoria
several pipefish species, such as Rhino Pipefish <i>Histiogamphelus cristatus</i>	 © D. Muirhead	burrowing fishes such as Short-head Worm Eel <i>Scolecenchelys breviceps</i> , and serpent eels	 © W. Butvila, M.E. Dive

Sharks and Rays: Many of the sharks and rays which are found over sand and rubble habitats in the NY NRM region also occur in other habitats, such as seagrass beds, and some are also found on reefs, and in mixed sand / seagrass patch reef habitats. Examples include Black Stingray and Smooth Stingray, Southern Fiddler Ray, Southern Eagle Ray, Port Jackson Shark, Gulf Catshark and Elephant Shark. Other species are found mainly in sand habitat, particularly species of stingaree, skate, angel shark and coffin ray, and some of these rays burrow into the substrate as a means of camouflage, and eat small fishes, and also octopus, crustaceans, worms, and other invertebrates which are found in and on the sand. One of the most unusual species in the region is the Elephantfish / Elephant Shark *Callorhynchus milii*, which has some anatomical features of sharks, but belongs to a separate group, the chimaeras. This species eats a very limited diet (particular species of clam), and moves seasonally into the shallow sand areas from deeper waters to lay eggs.

Within the NY NRM region, some shark and ray species are caught in large numbers as bycatch in prawn trawls in Spencer Gulf, Investigator Strait and/or Gulf St Vincent. Examples include Port Jackson Shark, and Sparsely-spotted Stingaree (e.g. Currie et al. 2009).

Table 12.2: Shark and ray species which are common in sand and rubble habitats of NY NRM region.

Species Name	Representative Image	Species Name	Representative Image
Australian Angel Shark <i>Squatina australis</i>	 © M. Norman, Museum Victoria	Coffin Ray <i>Hypnos monopterygius</i>	 © S. Rohrlach. CC Licence
Western Shovelnose Ray <i>Aptychotrema vincentiana</i>	 © H. Crawford, SACReD	Southern Fiddler Ray <i>Trygonorrhina dumerilii</i>	 © J. Finn, Museum Victoria. CC Licence
Southern Eagle Ray <i>Myliobatis australis</i>	 © J. Bennett, CC Licence	Smooth Stingray <i>Dasyatis brevicaudata</i> and Black Stingray <i>D. thetidis</i>	 © S. Speight, Flickr. CC Licence
Melbourne Skate <i>piniraja whitleyi</i> , white-spotted Skate <i>Dipturus cerva</i> , and other skate species	 © CSIRO National Fish Collection	Sparingly-spotted Stingaree <i>Urolophus paucimaculatus</i> , Western Shovelnose Stingaree <i>Trygonopectera mucosa</i> and other stingaree species	 © M. Norman, Museum Victoria
Gulf Catshark <i>Aymbolus vincenti</i>	 © J. Lewis	Sawsharks <i>Pristiophorus nudipinnis</i> and <i>P. cirratus</i>	 © CSIRO National Fish Collection
Piked Spurdog <i>Squalus megalops</i>	 Image by R. Starr. © NOAA CBNMS	Port Jackson Shark <i>Heterodontus portusjacksoni</i>	 © M. Norman, Museum Victoria
Gummy Shark <i>Mustelus antarcticus</i>	 © CSIRO National Fish Collection	Elephantfish / Elephant Shark <i>Callorhynchus milii</i>	 © fir0002 / flagstaffotos.com.au CC Licence

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