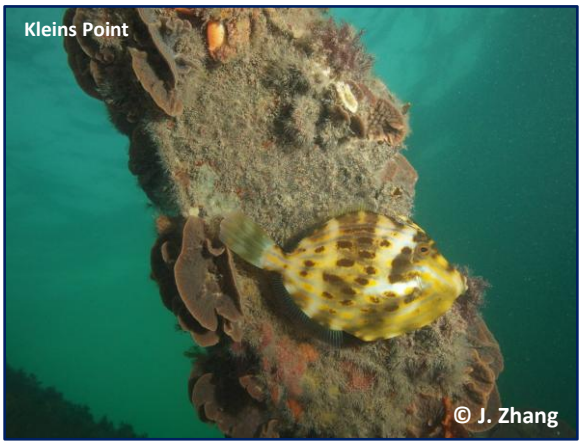
16. Jetties, Shipwrecks and Other Artificial Reefs



Asset	**Jetties, Shipwrecks and other Artificial Reefs**
Description	Structures of wood, iron, steel, and other materials, throughout the NY NRM region, ranging from oceanographically exposed through to sheltered locations. Jetties and shipwrecks function as surfaces for attachment of marine plants and attached invertebrates; sheltering and feeding areas for fishes, sharks, rays and invertebrates; and as "fish-attracting" devices, periodically visited by schooling fishes which are attracted to vertical structure. Surrounding sea floor varies according to the location of the jetty or wreck, and includes reef, seagrass, sand, and rubble. There are also two purpose-built artificial reefs in the NY NRM region, constructed of tetrahedon module units, made up vehicle tyres.
Main Species	***Sponges*** sponges (numerous species, in genera *Dysidea*, *Euryspongia*, *Darwinella*, *Aplysilla*, *Dendrilla*, *Clathrina* and many others) ***Ascidians / Sea Squirts*** • Red-mouthed Ascidian, Obese Ascidian, and other solitary ascidians / sea squirts • Brain Ascidian, and other colonial ascidians • Spongy Compound, Leach's Compound & other compound ascidians ***Corals*** • gorgonian corals such as *Mopsella zimmeri* (on current-exposed jetties) • soft corals, such as *Carijoa* (also *Drifa* sp. on current-exposed jetties) • solitary coral *Scolymia* ***Bryozoans*** • various species, including various species in *Cellaporaria* (such as Orange Plate Bryozoan and Nipple Bryozoan) and species in *Triphyllozoon* (Lace Bryozoans) ***Gastropod Shells*** • Cowries, Cartrut shell, Triton shells ***Bivalve Shells*** • Doughboy Scallop, Razorfish Shell, juvenile Native Oyster

Cephalopods

- Southern Blue-ring Octopus
- Velvet Octopus
- Maori Octopus
- Giant Cuttlefish
- Striped Pyjama Squid
- bobtail squids
- Southern Calamari
- Giant Cuttlefish

Echinoderms

- Biscuit Star, Vermilion Biscuit Star, Velvet Star, Spotted Seastar, Wilson's Seastar, Mosaic Seastar, Many-spotted Sea Star and other sea star species
- Hartmeyer's Sea Cucumber, Southern Sea Cucumber and several other sea cucumber species
- Orange Featherstar, Variable Featherstar and other featherstar species
- Basket Stars (on current-exposed jetties)

Crustaceans

- Southern Rock Lobster
- Decorator Crabs and Spider Crabs
- Sponge Crabs
- Hermit Crabs
- Stone Crabs
- Blue Swimmer Crab
- Pistol Shrimps
- Cleaner Shrimps (e.g. Aesop Shrimp)
- small crustaceans (copepods, amphipods, isopods etc)

Other Groups

- hydroids (various species, including Salt and Pepper Hydroid *Pennaria disticha*)
- anemones (numerous species)
- nudibranchs (numerous species)
- polychaete worms, ribbon worms and many other worm groups
- sea spiders

Seaweeds

- Canopy brown: species of *Cystophora* and *Sargassum,*
- *Scytothalia dorycarpa, Ecklonia radiata (kelp), Caulocystis species, Myriodesma* species*, Scaberia.*
- Turfing brown: e.g. *Lobophora variegata, Zonaria species, Homoeostrichus sinclairii*
- Green: *Caulerpa* flexilis, *C. brownii* and other *Caulerpa* species, *Codium* species, such as *C. australasicum*, *Dictyosphaeria sericea*
- Red*: Plocamium species, Asparagopsis taxiformis, Ballia callitricha, Rhodophyllis* and *Rhodymenia* species*, Thuretia quercifolia, Laurencia* species*, Wrangelia* species*; Delisea* species*, Haliptilon roseum,* and numerous others
- encrusting coralline algae

Main Species	***Bony Fishes*** • Sea Sweep (less commonly Banded Sweep) • fishes which utilise both reef and seagrass habitats, such as Dusky Morwong, Rainbow Cale, Zebra Fish and several leatherjacket species • Silver Drummer • Old Wife, Six-Banded Coral fish, Western Talma, Magpie Perch, and other "picker feeder" fish • leatherjacket species, such as Horseshoe, Six-spine and Yellow-striped (around wrecks), Mosaic Leatherjacket and Southern Pygmy Leatherjacket • Rough Bullseye and other bullseye species • Yellow-headed Hulafish • Long-snouted Boarfish • Victorian Scalyfin • Cowfish • Globefish • Southern Blue Devil (around wrecks) • wrasse species such as Blue-throated Wrasse, Castelnau's Wrasse, Black-spotted Wrasse (around wrecks) • Rock Ling • Anglerfishes / frogfishes (under jetties) • highly mobile fishes which visit wrecks and/or jetties periodically, such as Pink Snapper, King George Whiting, Snook Australian Herring / Tommy Ruff and Mulloway • syngnathid fishes associated with structure (seadragons, seahorses) • pipefishes • small benthic fishes (weedfishes, blennies, snakeblennies, gobies, threefins / triplefins, cleaner clingfishes ***Sharks and Rays*** • Benthic sharks such as Port Jackson Shark, Cobbler Wobbegong, Spotted and Large Ornate Wobbegong • Smooth Stingray • Southern Fiddler Ray • Southern Eagle Ray • Coffin Ray • Stingarees (e.g. Coastal Stingaree and Western Shovelnose Stingaree) • Mobile pelagic sharks species which visit wrecks and jetties: White Shark, Bronze Whaler, Smooth Hammerhead, and Gummy Shark

Locations	***Jetties*** • Ardrossan • Port Julia • Stansbury • Kleins Point • Port Giles • Wool Bay • Edithburgh • Marion Bay • Stenhouse Bay • Point Turton • Port Victoria • Wallaroo • Port Hughes • Moonta Bay • Port Broughton ***Main Wrecks*** • *No. 5* (dumb hopper barge) • *Zanoni* • *Marion* • *Iron King* • *Clan Ranald* • *Yatala Reef* • *S.S. Pareora* • *Willyama* • *Hougomont* • *S.S. Marion* • *Moorara* • *Songvaar* • *Aagot* • *S.S. Investigator* • *Notre Dame D'Arvor* • *S.S. Australian* • *Macintyre* • *San Miguel / San Miquel*

Jetties, Shipwrecks and other Artificial Reefs

Jetties around Yorke Peninsula are situated in areas which vary widely in their coastal position, oceanographic influences, and substrate. Many jetties have important ecological functions, and those around Yorke Peninsula are no exception. Most of the jetties on Yorke Peninsula have been standing for many decades, with a few examples including Edithburgh, built in 1869; Ardrossan (1876); Stansbury (1905), Stenhouse Bay (1913) and Wallaroo (the currently operating jetty is the third, and was built in 1927). Such long-standing jetties build up a rich flora and fauna over time on the surfaces for attachment - such as jetty piles, cross beams and bracing fenders - and also between the jetty piles on the sea floor, and on any debris under the jetty. Shaded areas under jetties, particularly in the lee of jetty piles, can simulate conditions like a shaded cliff face (A. Butler, marine ecologist, pers. comm. 2014), and in areas of moderate to high current strength and water movement, these conditions support the growth of a rich, filter-feeding fauna of sponges, ascidians, soft corals and bryozoans.

Like the jetties, a number of shipwrecks in the NY NRM region have important functions as artificial reefs, because they provide hard surfaces for attachment of marine plants and invertebrate animals, and their three-dimensional structure provides fishes (and some sharks and rays) and mobile invertebrates with areas for feeding, and/or shelter from predators and wave action.

The variety of micro-habitats on, under and around jetties and shipwrecks attracts many fishes and mobile invertebrates, including those which prefer lower light conditions, and others which utilise the readily available food sources from recreational fishing discards. Lower light levels at the end of jetties, and under jetty platforms and inside wreck structures, can enable various species of fishes, sharks, rays, benthic fishes and invertebrates which are normally found on reefs in deeper water to exist in shallower areas. One example is the slow-moving Short Boarfish *Parazanclistius hutchinsi*, which is strongly site associated with reef structure, and has been recorded at Port Giles jetty (photo by D. Muirhead).

Ecological Significance Jetties and Shipwrecks

The jetties around Yorke Peninsula are situated in locations which vary greatly in oceanographic conditions. These range from jetties in the calmer waters of both mid gulfs (e.g. Moonta Bay and Ardrossan), through to the more swell-exposed and higher-current southern waters of Investigator Strait (e.g. Stenhouse Bay). Some of the jetties are situated in ideal conditions to promote species richness: they are in semi-sheltered locations which are well flushed by moderate tidal flow, but not much wave action, and Edithburgh is a good example (A. Butler, marine ecologist, pers. comm. 2014). Jetties exposed to cooler Investigator Strait waters with greater swell and stronger currents support a variety of filter feeding invertebrates, such as soft corals, gorgonian corals and larger sponges.

Structure is also important to promote growth on jetties. Wide and/or long jetties support more micro-habitats than do short and/or narrow jetties. Long jetties provide significant habitat for both shallow and deeper water fishes, as well as numerous invertebrates that are associated with the jetty piles and material under the jetty. Hard structures such as jetties and wrecks in areas provide important habitat for animal and seaweeds which require hard surfaces for attachment. In this way, jetties and wrecks function as artificial reefs, and their ecological significance is greater in areas with mainly soft-bottom surrounds (i.e. seagrasses and/or subtidal sand), because they provide living and feeding spaces which would otherwise not be available. Some of the ecologically significant jetties are briefly described below, in **Table 16.1.** Some jetty and wreck habitats can support many of the ecological functions of plant-dominated reefs, and invertebrate-covered reefs, due to the coverage on the surfaces.

There are also numerous “micro-habitats” on and under jetties and wrecks. This includes the blades / “leaves” of the plants; the attached sponges, ascidians, bryozoans, corals and other invertebrate fauna on the jetty piles and on shaded surfaces of shipwrecks; the spaces on and under dislodged jetty planks and metal plates and other jetty surfaces; and the abundant metal and wooden wreckage at shipwreck sites (see **Table 16.2** for examples). Jetty debris such as decaying wood, metal scraps and other such materials on the sea floor, and well and rocks and rubble provide significant, sheltered micro-habitats for animals such as benthic fishes (e.g. anglers / frogfishes), octopus, chitons, gastropod shells, ribbon worms, flatworms, many kinds of polychaete worm, brittlestars and numerous other fauna.

In addition to habitat for strongly site-associated animals, jetties and wrecks provide feeding, breeding and sheltering space for animals which move between habitats. This includes some of the pelagic schooling fishes (e.g. Pink Snapper, Australian Salmon, Yellowtail); some of the pelagic sharks; and various fishes which utilise both seagrass beds and reefs, or those which prefer the edges of a particular habitat. An example of the latter would be syngnathids - seadragons and seahorses, and many of the pipefish species - which often feed at the edges of seagrass beds, or at the edges of reef patches near sand, where food sources such as mysid crustaceans accumulate. A number of these syngnathid fishes are found around jetty piles. Sand and rubble patches at the edges of jetties and shipwrecks also attract plant detritus, such as dead seagrass blades and pieces of seaweed, and these piles of decaying material provide habitat for various animals, such as some of the pipefishes, weedfishes and snakeblenny species. This detritus also provides food sources, in the form or organic particles, for small crustaceans, worms and many other invertebrates. Numerous pipefish species have been recorded around the edges of jetties of NY NRM, including endemic Gulf Pipefish *Stigmatopora narinosa*.

Many of the jetties in the NY NRM region are used for fishing, and the discarded bait, and fish remains provide food sources for scavenging animals under jetties, such as crabs.

More details about the species composition and ecological functions of jetties are provided below, in the sections on **Marine Plants**, **Invertebrates**, **Bony Fishes**, and **Sharks and Rays**.

Table 16.1: Description of Some Ecologically Significant Jetties in NY NRM Region
(*References*: Fairhead et al. 2002; J. Baker, pers. obs. 2002-2011; photographs by P. Mercurio 2008; Baker et al. 2009; Sorokin and Currie 2009; A&K Diving 2013, 2014. Note: Port Germein jetty not included, because it is largely intertidal.

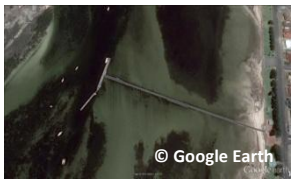
Jetty	*Description of jetty surrounds*	*Description of jetty pile cover*
Port Broughton  	Sand and silt; dredged areas; sparse *Posidonia* seagrass	Wooden jetty piles, extending from shore to 400m seaward, and including "T" section. Patches of *Posidonia* seagrass near "T" section, and brown, green and red seaweeds at base of jetty piles (D. Muirhead, pers. comm. 2015). Anemones on piles, and other attached fauna typical of lower energy environments.
Wallaroo Jetty  	Sand and rubble; seagrass detritus; dead shells (oysters and mussels); embedded razorfish (live). Small patches of reef / rock / hard debris with *Sargassum.*	Jetty piles with soft corals (*Carijoa*), sponges, ascidians, bryozoans and bivalve molluscs such as oysters. Under and around the jetty: razorfish shells with sponge and filamentous red epiphyte cover; solitary ascidians; small rocks; metal and cement debris.
Moonta Bay jetty  © D. Kinasz  © D. Kinasz	Sand and seagrass, and seagrass debris	Wooden jetty piles support sponges (e.g. *Aplysilla rosea*, and ancorinid sponges, amongst others), bryozoans (e.g. *Cellporaria*), ascidians (e.g. colonial *Botrylloides* and solitary styelid sea squirts), hydroids, turfing brown seaweeds such as *Lobophora*, and small red seaweeds such as *Botryocladia sonderi* ("red grapeweed"). On the sea floor: *Posidonia* and *Amphibolis* seagrass on sand, with dead seagrass debris, rubble, shell debris, sparse *Caulocystis* brown seaweed, scattered small red seaweeds (e.g. *Laurencia*), small sponges, and bryozoan pieces (e.g. *Triphyllozoon* lace bryozoans).

Table 16.1: (continued)

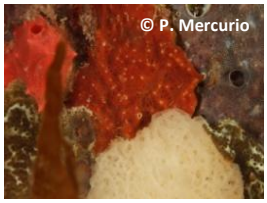
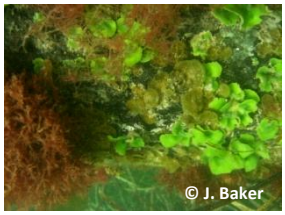
Jetty	*Description of jetty surrounds*	*Description of jetty pile cover*
Port Hughes Jetty  	Sand and shell debris, wood / jetty debris, rhodoliths and some seagrass. Turfing brown seaweeds such as *Lobophora* on small rocks.	Attached invertebrates such as sponges (*Aplysilla*, *Euryspongia*, and many others), colonial ascidians (e.g. *Botrylloides,* and *Scycozoa*); bryozoans (e.g. *Schizoporella* and *Celleporaria*); hydroids, and soft corals (such as *Carijoa*) on jetty piles; anemones (e.g. *Epiactis*); and encrusting red seaweeds such as *Peyssonnelia*. On the sea floor: sparse *Posidonia* seagrass with red filamentous epiphytes, interspersed with encrusted *Pinna* razorfish and mussels; abundant shell debris; patches of wood and metal debris; sparse rocks with *Scaberia* and *Sargassum* species, multi-branched red seaweeds, and sparse turfing seaweeds such as *Lobophora.*
Port Victoria Jetty 	Sand and seagrass (*Amphibolis* and *Posidonia* with epiphytes), rubble, dead shells.	Jetty piles with ascidians (e.g. *Herdmania* sea squirt, and *Sycozoa* "brain ascidian"), hydroids (e.g. *Pennaria disticha* - "salt and pepper" hydroid), sponges (e.g. *Sycon*, *Clathrina*) and other attached fauna; green seaweeds such as *Caulerpa flexilis* and *C. obscura;* red seaweeds (e.g. *Dasya* species, *Botryocladia*, *Laurencia*, *Thuretia*). Under and around jetty: sand, rubble, dead shells and jetty debris; dense *Amphibolis* with abundant red seaweed epiphytes. Calcareous epiphytes and small brown and red epiphytes on *Posidonia* seagrass.
Point Turton jetty and surrounds 	Seagrass and silty sand	Jetty piles covered with mixed sponges (e.g. *Aplysilla, Dendrilla, Sycon*), ascidians (e.g. *Leptoclinides* compound ascidians), bryozoans, hydroids and mixed red seaweeds, including *Bortyocladia sonderi* ("red grapeweed"). *Posidonia* seagrass surrounding jetty is heavily covered with fine filamentous epiphytes.
Stenhouse Bay jetty 	Sand, with sparse patches of seagrass (*Posidonia*, *Amphibolis Halophila*) on sand under and around jetty.	Dense cover of attached invertebrates (soft corals, gorgonian corals, solitary and colonial ascidians, sponges) and multi-branched red seaweeds (numerous species) on jetty piles; also sparse cover of green seaweed (*Caulerpa* species) on jetty piles.
Marion Bay jetty 	Sand, seagrass detritus, rubble, metal and wooden debris (including rock lobster larvae collectors)	*Posidonia* and associated seagrass detritus (dense). Mixed red and green macroalgae, turfing brown seaweed (e.g. *Lobophora*) and attached invertebrates on piles. Green seaweeds include *Dictyosphaeria sericea*, and species of *Caulerpa*, and red seaweeds include species of *Laurencia* and *Thuretia*.

Table 16.1: (continued)

Jetty	*Description of jetty surrounds*	*Description of jetty pile cover*
Edithburgh Jetty   	Sand, small rocks / rubble (some covered with encrusting coralline algae), shell grit; jetty debris (see next column). Sparse *Halophila* (paddleweed) & *Posidonia* seagrass with razorfish surrounding jetty; patches of brown seaweeds (*Caulocystis, Scaberia*, *Sargassum*) & filamentous & encrusting red seaweed (e.g. *Peyssonnelia*) on small rocks.	Jetty piles support a variety of sponges (e.g. *Aplysilla*, *Dysidea*, *Euryspongia,* amongst others); bryozoans (e.g. *Cellarporaria, Triphyllozoon*); doughboy scallops; calcareous tube worms, ascidians (e.g. colonial such as *Clavelina* "bluebells", compound such as *Botrylloides*, and solitary such as *Phallusia* and *Polycarpa* sea squirts). There is a significant amount of wood and metal jetty debris on the sea floor, including remains of jetty piles, some of which support sponges, ascidians and bryozoans.
Port Giles jetty  	Sand (with seagrass) and rubble in most areas, and some patches of rock.	600m long grain-loading jetty. Under some sections of the jetty, there is coarser bottom, with rubble, shell debris and rhodoliths. At mid section of jetty, patches of rocks with brown canopy seaweeds (e.g. *Scaberia*, *Sargassum* species, and *Cystophora botryocystis*). Some of the attached fauna on jetty piles include *Celleporaria* bryozoans, sponges, solitary ascidians (e.g. *Phallusia obesa* sea squirts), oysters, colonies of an undescribed anemone (in tropical family Sagartiidae), filamentous red seaweeds, and encrusting seaweeds such as *Lobophora*. Sand supports *Posidonia* & *Amphibolis* seagrass in shallower parts, and *Halophila* "paddle weed" seagrass in deeper water, with shell debris and didemnid ascidians.
Wool Bay jetty  	Sand, rubble, mixed seagrass, and brown seaweeds on scattered rocks (see adjacent column)	Eroded wooden jetty piles with *Galeolaria* worm tubes on shallow section, and mixed sponges, bryozoans, filamentous red seaweed, and *Lobophora* brown seaweeds on deeper sections. Surrounding seafloor supports mixed seagrass (*Posidonia* and *Amphibolis*) on sand, and *Caulocystis*, *Cystophora* and *Sargassum* brown seaweeds (with epiphytic red seaweeds such as e.g. *Hypnea ramentacea*) on hard surfaces such as scattered rocks and jetty debris.
Kleins Point jetty  	Sand and seagrass, scattered rocks.	Jetty with concrete piles extending to about 60m seaward, with a "t" section about 220m across the end of the jetty. Some of the attached fauna on jetty piles include *Celleporaria* bryozoans, sponges, solitary ascidians (e.g. *Phallusia obesa* sea squirts), filamentous red seaweeds, and encrusting seaweeds.

Table 16.1: (continued)

Jetty	*Description of jetty surrounds*	*Description of jetty pile cover*
Stansbury Jetty 	*Posidonia* seagrass on sand, and shell debris / grit, and rubble, with *Pinna* razorfish.	Wooden jetty piles with sponges, compound ascidians, bryozoans, filamentous red seaweeds, turfing brown seaweeds, and bare patches.
Port Julia jetty  © A. Chappel @ Wikimedia Commons - CC Licence	Sand bottom, with patches of dense seagrass in deeper water near end of jetty. Drift clumps of sponge and red seaweed in shallows.	Wooden jetty piles support calcareous tube worms, mussels, sponges, and mixed seaweeds, including filamentous brown; red (e.g. *Wrangelia*, *Polysiphonia*), and green (e.g. *Caulerpa*) seaweeds. Seagrass at base of deeper jetty piles.
Ardrossan Jetty 	Jetty piles surrounded by sand, shell grit, small rocks / rubble, seagrass, sparse canopy seaweeds	Wooden jetty piles with mixed sponges, compound and colonial ascidians, bryozoans, oysters, filamentous and multi-branched red seaweeds (e.g. *Gracilaria, Hypnea, ?Carpothamnion, Griffithsia, ?Ceramium, ?Euptilota*) and turfing brown seaweeds. *Posidonia* and *Halophila* seagrass on sand; sparse *Caulocystis* and *Scaberia* brown seaweed and dense patches of filamentous red seaweeds growing on rocks / rubble and jetty debris on sea floor. Sparse *Sargassum* plants.

More details about the species composition and ecological functions of jetties are provided below in the sections on **Marine Plants**, **Invertebrates**, **Bony Fishes**, and **Sharks and Rays**.

As discussed in the introductory section above, the hard surfaces of shipwrecks of NY NRM also have ecological significance. In south-western Gulf St Vincent, and around the "heel" of Yorke Peninsula, a number of shipwrecks in the area are semi-intact, or if broken up, contain large portions of the hull and fittings, which provide additional habitat for attached invertebrates and plants. Some of these wrecks also act as fish-attracting devices, due to their three dimensional structure, and the additional habitat provided for sheltering and feeding. Examples include: *Clan Ranald*, west of Troubridge Hill; *Sultana*, near Sultana Point; *Marion* at Marion Reef; and the *Iron King*, south-east of Edithburgh (near the *Marion*). These shipwrecks are discussed further in **Table 16.2** below, along with several other wrecks which form part of the Maritime Heritage Trails in Investigator strait and also around Wardang Island. The former comprises 26 wrecks, and the latter trail 8 wrecks. Not all of the Investigator Strait wrecks function as significant artificial reefs, due to the lack of remains at the wreck site, but many do, namely those for which substantial portions of the original vessel and fittings remain. The wrecks around the "heel" of Yorke Peninsula provide habitat for numerous common fishes (many of which are included in **Table 6.5**), as well as species of conservation concern, such as western blue groper, boarfish, wobbegong sharks, and baler shells.

One example of a wreck which was deliberately sunk in the NY NRM region to attract fishes is the No. 5 Dumb Hopper Barge off Ardrossan, which was originally used for dredge spoil transport, and the remains of the barge after scuttling have been in place on the sea bed since 1984 (Branden 1984; DEH, undated).

Figure 1A,B: Wreckage of the *Songvaar*, NE Wardang Island, illustrating its function as artificial reef habitat. Photos: © D. Warren.

There are more than a dozen shipwrecks in the Wardang Island area off mid-western Yorke Peninsula, most are formally protected under heritage legislation, and 8 of the wrecks are included in a Maritime Heritage Trail (DEP 1991). All wrecks are broken up (and some have been blasted by explosives), and they are scattered widely over the area (DEP 1991; Loney 1993; Stone, undated; DEH data, 2003). Several of these shipwrecks have important functions as artificial reef habitat. The *Songvaar* (**Figure 1**)*, Notre Dame d'Arvor* and *Moorara* have a lot of marine plant life growing on the light-exposed wreck surfaces, and attached invertebrate colonies on shaded surfaces underneath remaining structures (see **Table 16.2**). The shipwrecks off the Port Victoria and Wardang Island area support abundant fish life (Christopher 1988; DIASA, undated; Saville 2014, and see **Table 16.5** for examples of the many fish species which exist around the wrecks of the NY NRM region). In recent years, marine documentary film maker S. Saville has produced videos of marine life around a number of wrecks in the Wardang area, and other parts of Yorke Peninsula.

The wreck sites in the Wardang and Port Victoria area provide sheltered habitat for benthic sharks such as Port Jackson and wobbegongs, which seasonally aggregate in some areas. The wrecks also attract cuttlefish, and Australian Sea Lions, from the nearby White Rocks / Goose Island colony. Examples of NY NRM shipwrecks for which significant hard structure remains at the site and functions as artificial reef, are listed below in **Table 16.2**. Some fishes and benthic sharks reside in the wreck structure, and reproduce in the area, with limited dispersal of young. This makes site-associated populations vulnerable to localised impacts.

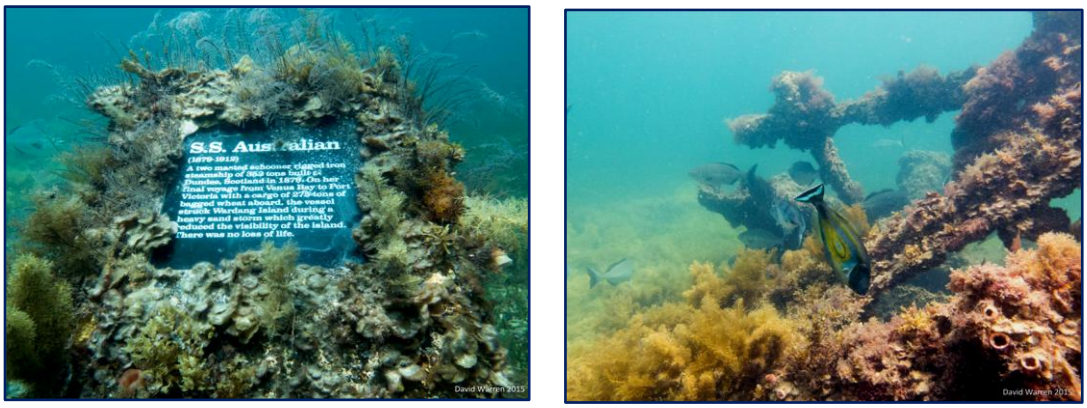


Figure 2: Explanatory plaque near the *S.S. Australian* wreck, SE corner of Wardang Island (A); wreckage of the *S.S. Australian*, illustrating its function as artificial reef habitat (B). Photos: © D. Warren.

Table 16.2: Description of Some Ecologically Significant Subtidal Shipwreck Sites in NY NRM Region
(*References*: Branden 1984; Christopher 1988; DIASA, undated; Stone, undated; Department of Environment and Planning 1991; Loney 1993; Arnott 1996; Neuman et al. 2001; Baker 2004; DEH, undated; DEH data 2003; DEH, undated; Saville 2013 and 2014). N = north; S = south; W = west; SE = south east; SW = south west.

Notes:

Wrecks which do not provide subtidal habitat, such as the ***Ethel*** (on shore, Innes National Park) and the ***S.S. Ferret*** (in the surf zone, near ***Ethel***) are not included here.

- Several of the smaller wrecks at Althorpe Island are not included in the table below. This includes the wooden schooner ***Young St George*** (wrecked 1878), the wooden cutters ***Welling*** (1892) and ***Rapid*** (1937); the ***Altair*** (1971) and the steel trawler ***Mylor Star*** (1982).
- Several broken up wooden wrecks off Sultana Point, in the passage between the "heel" of Yorke Peninsula and Troubridge Shoals are not discussed here. These include the ***Sultana***, wooden barque built 1837 and wrecked 1849, and the ***Dart*** and the ***Parsee*** (both wrecked 1838).

Wreck Name and Description	***Date and Location of Wrecking or Scuttling***	***Notes about Wreck Cover and Surrounds***
No. 5 dumb hopper barge	Scuttled 1984 off Ardrossan	Scuttled as an artificial reef to attract fishes (see section on **Fishes**)
Zanoni, composite (iron and wood) 3-masted barque	1867, off Ardrossan	Located off Ardrossan, 18m deep. Wreck densely covered with mixed sponges (species in *Euryspongia*, *Clathrina* and many others); ascidians (compound, colonial and solitary); *Carijoa* soft coral (in less exposed parts); oysters, and filamentous red seaweed. Sea floor mainly sand, shell rubble, filamentous red seaweed (sparse), and wreck debris.
Marion, 3-masted wooden ship built 1850	1851 at Marion Reef, near Troubridge Shoals	Located on shallow limestone reef in 4m of water, approximately 9km south-east of Edithburgh. Part of the hull, and many artefacts and fittings remain. (See *Iron King* below for example of wreck cover in this area).
Iron King, a 3-masted iron barque, built 1867	1873, approx. 9km SE of Edithburgh, near Troubridge Shoals	Located in waters ~ 5m deep. Many parts of the ship remain, including plating, frames, cables, machinery, and part of the hull, as well as cargo and other artefacts. Wreck surfaces covered with turfing brown seaweeds (such as *Lobophora*); flat, encrusting sponges and bryozoans, and scattered plants of *Cystophora* (zig-zag weed) and red seaweeds. Colonial ascidian colonies occur on some of the more shaded surfaces.
Clan Ranald, 3,600t single-screw turret deck steamer built 1900	1909, W of Troubridge Hill	Located in 22m of water, approximately 700m from shore. The hull was blasted with explosives during the 1960s and has thus collapsed into a heap of wreckage about 1m high, but parts of it are still visible. Examples include the hull and sections of masts, and various fittings and machinery, such as winches and boilers. Shaded surfaces covered mainly with mixed sponges (including entrusting species), filamentous and multi-branched red seaweeds, bryozoans, oysters and encrusting coralline algae. Some areas with *Mopsella* gorgonian coral and solitary ascidian (e.g. *Herdmania*). Upper surfaces of wreck which are exposed to more light support seaweeds such as *Ecklonia* kelp, *Scytothalia*, and multi-branched red seaweeds such as *Plocamium*.

Table 16.2: (continued)

Wreck Name and Description	***Date and Location of Wrecking or Scuttling***	***Notes about Wreck Cover and Surrounds***
Yatala Reef, single screw, wooden motor vessel built 1948, and used as tuna and prawn boat	1981, near Mozzie Flat (W of Point Gilbert, southern Yorke Peninsula	Wreck is 1km from shore in about 10 - 11m of water. Although much of the hull is covered with sand now, the stern is intact, and sits 2m high off the sea floor. Other vertical structures at the site include the main frame used for hauling prawn nets (5m high), the fish well (3m high off the sea floor), and part of a hauling tractor and its engine (Arnott 1996). Exposed wreck surfaces covered with encrusting brown seaweeds such as *Lobophora*, the encrusting green seaweed *Dictyosphaeria*, and the long, multi-branched red seaweed, and coralline algae. Scattered patches of brown seaweed such as *Sargassum* on some hard surfaces. Encrusting sponges and coralline algae on shaded surfaces. Around the wreckage, sandy sea floor with *Posidonia* and *Halopilia* seagrass, and mixed red and brown seaweeds on small patches of reef.
S.S. Pareora, screw steamer built 1986	1919, wrecked at Monument Rock near N end of Althorpe Island.	Broken up and scattered wreckage lies around 13m deep, on reef and in reef gullies. Remains include a 3.5m wide boiler, steel frames, hull plating, engine, and part of the bow structures and machinery. No information available for this report about the coverage on the wreck, and this site is largely un-diveable, due to strong currents and large swells.
Willyama, schooner-rigged steel screw steamer	1907, south of Penguin Point (in "Willyama Bay" adjacent to Marion Bay)	The sternpost and steering quadrant at the stem are visible above water, and the submerged parts of these structures are now covered with canopy seaweeds. Structures which remain on the bottom include the inspection tunnel for the propeller shaft (which now provides a shaded surface for gorgonian corals such as *Mopsella*, large solitary ascidians [e.g. *Herdmania*] and sponges); the port and starboard boilers; remains of the derricks, and deck beams (Arnott 1996). Light-exposed structures of the wreck support dense marine plant cover, including species of *Cystophora* and *Sargassum*, as well as multi-branched red seaweeds such as *Laurencia* and *Plocamium*.
Hougomont, 4-masted steel barque built 1897	scuttled at Stenhouse Bay in 1933 to form a breakwater	Collapsed hull lies in about 9m of water at Stenhouse Bay. Some of the remains which provide settlement surfaces for marine plants and attached animals include the stanchions (deck supports), bow and stern, rudder on the sternpost, and a boiler. Similar cover of attached plants and animals to Stenhouse Bay jetty (see **Table 16.1** above).
S.S. Marion, schooner-rigged, single screw steamer built 1854	1862, at Cable Hut Bay, 5km W of Stenhouse Bay, SW Yorke Peninsula	Remains lie 2m - 7m deep in reef habitat at the base of a cliff in a high energy, wave-exposed area. The front sections of the wreck are scattered over a submerged reef platform, and the stern is on patchy sand, in deeper water at the edge of the reef (Arnott 1996).

Table 16.2: (continued)

Wreck Name and Description	***Date and Location of Wrecking or Scuttling***	***Notes about Wreck Cover and Surrounds***
Moorara, 33.8m long composite barge built in 1909; altered in 1930 to a 3-masted schooner with auxilliary motor	1975, NE Wardang Island, near the old Wardang Island jetty	Located 4m deep, wooden planking of the hull is largely intact and sitting upright. This includes the centreboard casings, the hatch, deck house, engine room and two companionways. The deck of the bow and stern are 1-2m deep. On light-exposed surfaces, hard structures are now covered with mixed *Sargassum* plants, and scattered plants of "warty weed" *Scaberia*, *Caulocystis* and *Myriodesma*. Surfaces heavily covered with filamentous and turfing brown seaweeds (e.g. *Dilophus*) in the understorey. Also filamentous red seaweed and some green *Caulerpa* plants on exposed surfaces. Shaded surfaces support bryozoans, ascidian colonies (e.g. *Clavelina* "bluebells"), & encrusting sponges.
Songvaar, 3-masted iron ship bulit 1884	1912, NE Wardang Island, between Green & Goose islands.	Remains in 8m of water include the stem and keel of the bow; fore- and main-masts, yards and rigging; hatches; iron hull plating and frames, and deck beams (DEP 1991). Plant cover is sparse, and includes *Cystophora botryocystis*, *Scaberia*, low *Sargassum* plants, *Ulva* (sea lettuce), turfing seaweeds such as *Lobophora* (covered with silt) on most wreck surfaces, plus fine filamentous red seaweeds, flat green *Dictyosphaeria,* and encrusting coralline seaweeds in some areas. Sparse cover of sponge, bryozoan, small ascidians and oysters, with denser cover in completely shaded areas. See **Figure 1**.
Aagot, 3-masted iron barque, built 1882	1907, W side of Wardang Island	Scattered remains at about 2-4m deep, including iron hull plating and frames, anchors, sections of mast, and rudder. Information about wreck cover is not available for this report, but it is noted that the W side of Wardang Island has stronger currents and swells, and is more exposed than the east and north. There is patch reef and sparse seagrass on the W side. The patch reef is dominated by mixed species of brown and red seaweeds, and invertebrates. At the time of a 1995 government survey, calcareous reef at 10m on the W side of Wardang was dominated by several species of *Cystophora* and *Sargassum*, and the large "leathery" red seaweed *Osmundaria* prolifera, with the turfing brown *Lobophora* common in the understorey, along with various attached invertebrates such as ascidians. There are also "bare" patches of reef in the area, without any visible cover.
Monarch, 3-masted wooden schooner built in 1871	1909, at the southern end of Wardang Island	Most of the wreckage is in the intertidal, and is thus not described here. Scattered remains in about 2m of water include anchor and deck winch.

Table 16.2: (continued)

Wreck Name and Description	***Date and Location of Wrecking or Scuttling***	***Notes about Wreck Cover and Surrounds***
S.S. Investigator, 3-masted schooner-rigged iron screw steamer built in 1882	1918, on rocks SW of Wardang Island. *(Note: The **Monarch**, 3-masted wooden schooner built 1871 and wrecked 19090 on the southern end of Wardang Island is not discussed here, as most of the scattered remains are above the water line, except for an anchor and deck winch.*	Wreck parts which remain include part of the stern, propeller remains and shaft, engines and boiler. On the flattened bow section, there are internal frames, keelson and stringers leading to an anchor, chain and a mast section (DEP 1991). Light-exposed structures are covered with brown seaweeds (e.g. species of *Cystophora*, *Sargassum*, *Caulocystis*), red seaweeds (such as the tropical *Asparagopsis taxiformis*) and green seaweeds (e.g. *Caulerpa flexilis*), turfing brown seaweeds (e.g. *Lobophora*), articulated corallines (e.g. *Haliptilon*) and encrusting coralline algae. Encrusting seaweeds on wreck surfaces.
Notre Dame D'Arvor, 3-masted steel barque built 1902.	1912, SW corner of Wardang Island.	Remains in about 4m of water include frames, hull plating, and sections of mast, and anchors. Part of both the bow and stern are above water at low tide. Wreckage is densely covered with seaweeds, including *Cystophora* species forming a canopy (with less cover of *Sargassum*), the multi-branched red *Asparagopsis taxifolia* and green *Caulerpa flexilis*. Encrusting coralline algae, encrusting sponges and small red seaweeds cover part of the wreckage in shaded areas.
S.S. Australian, schooner-rigged iron screw steamer built in 1879	1912, SE corner of Wardang Island.	The bow is inshore between rocks, about 100m NE of the stern. Stern is 8 - 9m deep, and includes rudder and propeller remains (DEP 1991). Other remains at the site include frames, deck beams and pieces of iron plate. Wreckage extends to as shallow as 2.5m, on reef bottom. Wreck remains are scattered over mixed reef, seagrass (*Amphibolis*) and sand habitat. *Cystophora* plants are dense around the wreck in some areas (with *Sargassum* and sparse *Scaberia* plants amongst the coverage). *Ecklonia* kelp also occurs on and around the wreck, with clumps of multi-branched red seaweeds, such as *Asparagopsis*. On exposed wreck surfaces, brown turfing species such as *Lobophora* also present. See **Figure 2.**
Macintyre, iron barge built 1877, converted to a 3-masted schooner.	1927, SE end of Wardang Island, SE of the *S.S. Australian*.	Iron bow is at 5m deep, and broken, scattered stern at 10m. Wreck remains include hatches, iron stringers, bollards, and windlass.
San Miguel / San Miquel, 3-masted iron barque, built 1864	1865, Tiparra Reef near Wallaroo.	*No information available for this report*

Marine Plants

Jetties and wrecks provide hard surfaces upon which seaweeds can grow, when the algal spores settle. The artificial reef surfaces around NY NRM region thus provide an important additional habitat for marine plants, especially in areas where the surrounding substrate is sandy bottom, upon which few seaweeds can grow. The seaweeds in turn provide living space and/or food sources for numerous marine invertebrates, and also places for fishes and larger mobile invertebrate to shelter from storms, to escape predation, and in some cases, to feed and breed. Some fishes are herbivorous, and others are "picker" feeders which take the small invertebrates such as micro-crustaceans, small shells and worms which live on the seaweed blades.

Some examples of common seaweeds which are found on jetty surfaces; on wooden and metal debris under and around jetties; and on shipwreck debris, at various locations around the NY NRM region, are shown in **Table 16.3** below.

Table 16.3: Examples of some marine plant species which are common on shipwrecks in the NY NRM region.

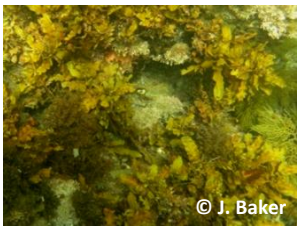
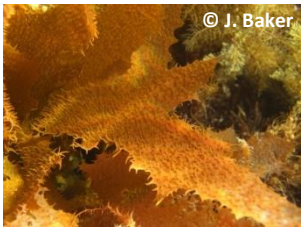
BROWN SEAWEEDS			
Species Name	**Representative Image**	**Species Name**	**Representative Image**
Cystophora species (e.g. *C. moniliformis, C. monilifera, C. siliquosa, C. retorta)*	 © M. Norman, Museum VIC	*Sargassum* species (e.g. *S. fallax* and *S. linearifolium, S. spinuligerum, S. sonderi*) and *Sargassopsis* species (e.g. *S. heteromorphum*)	 © J. Baker
Scytothalia dorycarpa	 © H. Crawford	*Ecklonia radiata* (kelp)	 © J. Baker
Caulocystis species	 © J. Baker	*Myriodesma* species (e.g. *M. integrifolium*)	 © University of New Brunswick
Lobophora variegata	 © Smithsonian Institution	*Zonaria* species (e.g. *Z. spiralis* and *Z. angustata*), and *Homoeostrichus sinclairii* and other turfing brown species	 © J. Finn, Museum Victoria

Table 16.3: (continued)

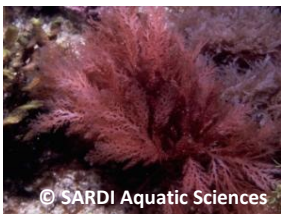
RED SEAWEEDS			
Species Name	**Representative Image**	**Species Name**	**Representative Image**
Plocamium species	 © SARDI Aquatic Sciences	*Asparagopsis taxiformis*	 © J-P Quod @ Wikimedia Commons
Ballia callitricha	 © Royal Botanic Gardens & Domain Trust. Photo by J. Taylor	*Rhodophyllis* and *Rhodymenia* species	 © H. Crawford
Thuretia quercifolia	 © J. Baker	*Laurencia* species	 © J. Baker
Delisea species	 © University of New Brunswick	*Peyssonnelia* species.	 © H. Crawford
Haliptilon roseum	 Photo by J. Huisman. © WA Herbarium, DPW (http://florabase.dpaw.wa.gov.au)	encrusting coralline algae	 © J. Baker

Table 16.3: (continued)

GREEN SEAWEEDS			
Species Name	**Representative Image**	**Species Name**	**Representative Image**
Caulerpa flexilis	 © J. Finn, Museum Victoria	*Caulerpa brownii* and other *Caulerpa* species	 © C. Hall
Codium species (e.g. *C. australasicum*, and others)	 © M. Norman, Museum Victoria	*Dictyosphaeria sericea*	 © J. Baker

Marine Invertebrates

Artificial reef surfaces such as jetty piles, wooden and metal debris under jetties, and also the remains of wooden, steel and iron ships in NY NRM region, all provide surfaces for attachment of various marine invertebrates. Examples include sponges, bryozoans, corals, hydroids, anemones and ascidians, the latter including solitary "sea squirts" and also colonial ascidians, and compound encrusting forms. This attached invertebrate cover in turn provides habitat for a variety of mobile animals which live on the invertebrates. Some invertebrates eat the sponges, bryozoans, corals, hydroids and ascidians which live on jetty and wreck surfaces, and others use them for shelter, and laying eggs. Examples of sponge-eaters include various species of nudibranch (e.g. species in *Chromodoris*, *Dendrodoris*, *Doriopsilla*, and *Rostanga*), and some gastropod shells, such as cowries. Some nudibranchs eat the hydroids and anemones on jetty piles, and store the stinging cells in sacs, at the tips of specialised body extensions called cerata, filled with digestive glands. Small crabs also live on and around the attached invertebrates on jetty piles. The sponge crabs in Dromiidae and decorator crabs in genus *Schizophrys* are common examples from Yorke Peninsula.

A number of small fishes also utilise the attached invertebrate cover on jetty piles and wreck surfaces as living habitat, and/or as food sources, as discussed in the section on **Bony Fishes**.

Common invertebrate species on wrecks in the NY NRM region include colonial ascidians (e.g. *Clavelina* "bluebells"), sea stars (such as those in genera *Nectria, Plecaster, Pentagonaster,* and *Fromia*) and bryozoans. Mobile invertebrates such as *Octopus* species, Giant Cuttlefish Sepia *apama*, and Blue Swimmer Crabs are also attracted to jetties and shipwrecks in the NY NRM region. The fallen wooden and metal debris, small rocks, and shell rubble under jetties and at wreck sites provide habitat for abundant worm fauna, including polychaete worms in numerous families, ribbon worms, flatworms, and several other worm groups. A number of recently named worm species (e.g. Pleijel et al. 2009) as well as new, undescribed worm species (e.g. Baker et al. 2014, 2015) have been recorded at jetties in the NY NRM region. The suite of invertebrate species associated in mixed habitats is too numerous to list here, but some of the main examples are provided in **Table 16.4** below. The chapters of this report on plant-covered reefs, seagrass beds, and subtidal sand habitats provide more examples of invertebrate species which may also occur around jetties and shipwrecks and other artificial reefs in the region.

Table 16.4: Examples of invertebrate species which are common on or around jetty piles and/or shipwrecks in the NY NRM region.

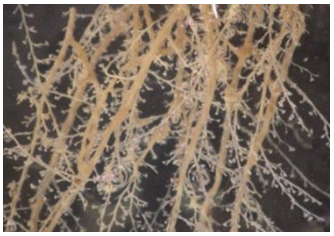
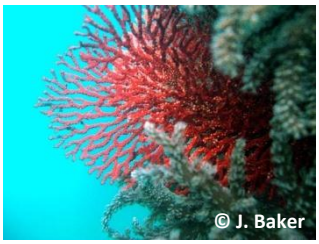
Species Name	Representative Image	Species Name	Representative Image
sponges - many species, some on jetty surfaces, and others on shaded parts of wrecks	 © D. Kinasz	Anemones (numerous species)	 © H. Crawford
Hydroids (various species)	 © J. Baker	Bryozoans, such as species in genera *Cellaporaria* and *Triphyllozoon*	 © J. Baker
gorgonian corals *Mopsella* sp. (on current-exposed jetties, such as Stenhouse Bay)	 © J. Baker	soft corals, such as *Carijoa* (also *Drifa* sp. on current-exposed jetties, such as Stenhouse Bay)	 © D. Muirhead
colonial ascidians (numerous species) and compound ascidians	 © J. Baker	*Phallusia obesa*, and other solitary ascidians / sea squirts (e.g. in genera *Herdmania*, *Pyura* and *Polycarpa*)	 © J. Lewis
Biscuit Star *Tosia australis*	 © C. Hall	sea stars (e.g. *Nectria wilsoni*, *Plecaster decanus*, *Pentagonaster dubeni*, *Fromia polypora* and numerous others)	 © J. Baker
Basket Stars e.g. *Astroboa ernae* (on current-exposed jetties, such as Stenhouse Bay)	 © J. Baker	featherstars (e.g. *Cenolia trichoptera*)	 © A. Brown

Table 16.4: (continued)

Species Name	Representative Image	Species Name	Representative Image
sea cucumbers (e.g. *Holothuria hartmeyeri* and other species)	 © P. Southwood, CC Licence	Nudibranchs and other sea slugs (many species)	 © J. Baker
Doughboy Scallop *Mimachlamys asperrima*	 © L. McLean	juvenile Native Oyster *Ostrea angasi*	 © H. Crawford
Abalone cyclobates (and several other species and forms)	 Image: J. Delsing, Wikimedia Commons	Cartrut shell *Dicathais orbita*	 © P. Southwood, CC Licence
Spengler's Triton *Cabestana spengleri*	 © R. Ling @ Wikimedia Commons CC Licence	cowries, such as Compton's Cowrie *Notocypraea comptoni*	 © P. Mercurio
Giant Cuttlefish *Sepia apama*	 © H. Crawford	Striped Pyjama Squid *Sepioloidea lineolata*	 © K. Hart, A&K Diving
Southern Calamari *Sepioteuthis australis*	 © J. Finn, Museum Victoria	Maori Octopus *Octopus maorum*	 © M. Norman, Museum Victoria

Table 16.4: (continued)

Species Name	Representative Image	Species Name	Representative Image
Velvet Octopus *Grimpella thaumastocheir*		Southern Blue-ring Octopus *Hapalochlaena maculosa*	 © J. Lewis
Hermit Crabs (Diogenidae and Paguridae family)		Sponge Decorator Crabs such as *Schizophrys* species	
Decorator Crabs and Spider Crabs *Naxia aurita* and *Leptomithrax gaimardii*		Blue Swimmer Crab *Portunus pelagicus*	
Stone Crabs *Actaea* species		Southern Rock Lobster *Jasus edwardsii*	
Ancylomenes aesopius Aesop Shrimp / Cleaner Shrimp		Pistol Shrimps (e.g. *Alpheus villosus*)	
Polychaete worms and other worm groups	 © P. Mercurio	Ribbon Worms (numerous species)	 © L. Altoff

Bony Fishes

The fish fauna of some jetties on Yorke Peninsula is rich and diverse. At Edithburgh jetty, at least 120 bony fish species have been recorded, a combined total from several surveys (including Reef Life Survey, and SACReD) and also incidental observations by divers, verified by photographs (Baker and Shepherd, in prep.).

Jetties support numerous types of fishes, some of which include:

- common reef fishes which feed in the vicinity of the jetty (such as cowfishes, magpie perch, six-banded coral fish, leatherjackets and other "picker" feeders);
- mobile pelagic fishes which are wide-ranging, but swim in schools around the jetty structures periodically;
- low mobility, benthic fishes which live on or underneath debris under the jetty (such as anglerfishes and snakeblennies);
- small, site-associated fishes such as blennies (e.g. Tasmanian Blenny), threefins / triplefins and clingfishes (e.g. which live on invertebrate surfaces on the jetty piles); and
- various fish species which live in and around the seaweed or seagrass adjacent to the jetties. Examples include rainbow cale, dusky morwong, weedy whiting species, weedfishes, and also seahorses and various pipefish species.
- Fishes which live on or in the sand under or around jetties, including *Nesogobius* gobies, flathead and flounder species, and the unusual Sculptured Seamoth *Pegasus lancifer*.

Some of the many fishes which are found around jetties in the NY NRM region are shown in the table below. There are numerous other species, not listed here, and the reader is referred to the chapters on invertebrate-dominated reefs, plant-dominated reefs, seagrass beds, and subtidal sand habitats for additional examples.

Table 16.5: Examples of fishes which are common around jetties in NY NRM Region

Species Name	Representative Image	Species Name	Representative Image
Silver Drummer *Kyphosus sydneyanus*	 © R. Ling, Flickr, CC Licence	Sea Sweep *Scorpis aequipinnis*	 © R. Stuart-Smith, RLS
Yellowtail Scad *Trachurus novaezelandiae*	 © R. Ling Wikimedia Commons, CC Licence	Australian Herring / Tommy Ruff *Arripis georgiana*	 © Reef Life Survey
Old Wife *Enoplosus armatus*	 © J. Lewis	Dusky Morwong *Dactylophora nigricans*	 © J. Lewis

Table 16.5: (continued)

Species Name	Representative Image	Species Name	Representative Image
Blue-spotted Goatfish / Red "Mullet" *Upeneichthys vlamingii*	 © J. Finn, Museum Victoria	Painted Stinkfish *Eocallionymus papilio*	 © D, Muirhead
Rough Bullseye *Pempheris klunzingeri* and other bullseye species	 © G. Short, CC Licence	Wood's Siphonfish *Siphamia cephalotes*	 © G. Short, CC Licence
Six-banded Coral Fish *Tilodon sexfasciatus*	 © J. Finn, Museum Victoria	Shaw's Cowfish *Arana aurita* and Ornate Cowfish *Aracana ornata*	 © D. Muirhead
Soldierfish *Gymnapistes marmoratus*	 © J. Lewis	Globefish / Slender-spined Porcupine Fish *Diodon nicthemerus*	 © J. Finn, Museum Victoria
Mosaic Leatherjacket *Eubalichthys mosaicus*	 (juvenile) © J. Lewis	Southern Pygmy Leatherjacket *Brachaluteres jacksonianus*	 © H. Crawford
Anglerfishes (> 6 species)	 © J. Lewis	Grubfishes *Parapercis* species	 © H. Crawford

Table 16.5: (continued)

Species Name	Representative Image	Species Name	Representative Image
Warty Prowfish *Aetapcus maculatus*		Western Cleaner Clingfish *Cochleoceps bicolor*	
Seadragons and Seahorses		Pipefishes (numerous species)	
Weedfishes *Heteroclinus* species		Snakeblennies (species in *Ophiclinops* and *Ophiclinus*)	
Threefins / Tripefiins, such as Crested Threefin *Trinorfolkia cristata*		Gobies (e.g. Sailfin Goby *Nesogobius pulchellus* and Sculptured goby *Callogobius mucosus*)	

The structure of shipwrecks in the NY NRM region also provides significant additional habitat for fishes, including mobile pelagic species such as Pink Snapper which school around the wrecks, and also more strongly site-associated species which feed on invertebrates and/or plants on the wreck surfaces, or feed on small fishes in the vicinity of the wrecks. Some fishes seek shelter and others live in the cave-like habitat (and also the ledges and crevices) provided by some of the vertical wreck debris. **Table 16.6** lists some of the fish species commonly seen around wrecks in the NY NRM region.

Wrecks such as the *Songvaar* and *The Investigator* attract schools of fish such as Pink Snapper, Old Wives, Magpie Perch, Silver Drummer, Zebra Fish and many others. Resident schooling fish include Rough Bullseye and other bullseye species, and Yellow-headed Hulafish. Schools of whiting, Southern Sea Garfish, and Australian Herring (Tommy Ruff) are also attracted to the structure of some of the wrecks in the Wardang area, including the *Moorara* barge. The coastal iron screw steamer *SS Australian* on the south-eastern side of Wardang Island provides little support for attached plants and animals, but schools of fish are attracted to the structure, such as Sea Sweep, Silver Drummer, and leatherjacket species, amongst others.

The No 5 Dumb Hopper Barge off Ardrossan was deliberately sunk in 1984 to attract fish to its structure. The barge is situated 1.5km south of the historic shipwreck *Zanoni*, which is a marine reserve, and cannot be fished. Pink Snapper, King George Whiting, Snook and other species aggregate around the Ardrossan hopper barge.

Artificial reefs made of dumped materials also function as fish-attracting devices, and this was promoted by the former South Australian Department of Fisheries (SADF) during the mid 1980s, with the construction in the gulf of 7 artificial reefs made of motor car tyres. One of these - at Port Pirie - is within the NY NRM region. Each artificial reef is made of so-called tetrahedron module units ("TMU"s), each unit comprising 28 tyres secured by stainless steel crimp seals and polyester taping (Branden et al. 1994). The tyre reef at Port Pirie Reef had 1,000 TMUs when it was first constructed and laid. A similar but smaller tyre reef (100 TMUs) was dumped off Port Giles by a fishing club during the end of the 1980s, with support and advice from SADF. Many of the fish species which occur around artificial tyre reefs in the NY NRM region are shown in **Table 16.6** below.

Table 16.6: Some examples of fishes which are recorded (some commonly) around shipwrecks and/or artificial reefs in the NY NRM Region. Those species which have been recorded during survey at the artificial reefs made of tyre modules at Port Pirie (Branden et al. 1994) are marked with "T".

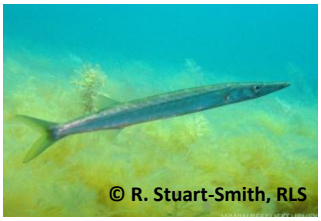
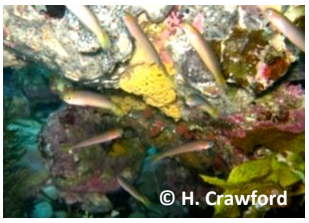
Dusky Morwong *Dactylophora nigricans*	 © J. Lewis	Silver Drummer *Kyphosus sydneyanus* **T**	 © A. Brown
Pink Snapper *Pagrus* (*Chrysophrys*) *auratus* **T**	 © S. Speight @ Flickr, CC Licence	King George Whiting *Sillaginodes punctatus* **T**	 © Reef Life Survey
Snook *Sphyraena novaehollandiae*	 © R. Stuart-Smith, RLS	Australian Herring / Tommy Ruff *Arripis georgiana*	 © Reef Life Survey
Mulloway *Argyrosomus japonicus*	 © R. Stuart-Smith, RLS	Blue-throated Wrasse *Notolabrus tetricus*	 © H. Crawford
Castelnaus Wrasse *Dotalabrus aurantiacus*	 © R. Stuart-Smith, RLS	Black-spotted Wrasse *Austrolabrus maculatus*	 © H. Crawford

Table 16.6: (continued)

Species Name	Representative Image	Species Name	Representative Image
Sea Sweep *Scorpis aequipinnis* and/or Banded Sweep *Scorpis georgiana* **T**	 © R. Stuart-Smith, RLS	Zebra Fish *Girella zebra*	 © Reef Life Survey
Yellow-striped Leatherjacket *Meuschenia flavolineata*	 © M. Norman, Museum Victoria	Horseshoe Leatherjacket *Meuschenia hippocrepis* & other leatherjacket species, such as Six-spine (*M. freycineti*), Mosaic (*Eubalichthys mosaicus*) and Bridled (*Acanthaluteres spilomelanurus*) **T**	 © A. Brown
Magpie Perch *Cheilodactylus nigripes*	 © J. Lewis	Long-snouted Boarfish *Pentaceropsis recurvirostris* **T**	 © R. Stuart-Smith, Reef Life Survey
Victorian Scalyfin *Parma victoriae*	 © J. Finn, Museum Victoria	Western Talma *Chelmonops curiosus*	 © R. Stuart-Smith, Reef Life Survey
Yellow-headed Hulafish *Trachinops noarlungae*	 © H. Crawford	Six-banded Coralfish *Tilodon sexfasciatus*	 © J. Finn, Museum Victoria
Spiny /Gurnard *Lepidotrigla papilio*	 © J. Finn, Museum Victoria	Rock Ling *Genypterus tigerinus*	 © J. Lewis
Rough Bullseye *Pempheris klunzingeri* and other bullseye species	 © G. Short, CC Licence	Southern Blue Devil *Paraplesiops meleagris*	 © D. Kinasz

Sharks and Rays

Many of the sharks and rays which are found around jetties and wrecks in the NY NRM region also occur in other habitats, such as reefs, seagrass beds, sand habitats, and in mixed sand / seagrass patch reef habitats. Others, such as Bronze Whaler and White Shark are wide-ranging pelagic species which periodically visit jetties and wrecks in the region.

Some of the sharks, rays, stingrays and stingarees which are commonly seen around jetties and shipwrecks in the NY NRM region are shown in the table below.

Examples include Smooth Stingray, Southern Fiddler Ray, Southern Eagle Ray, Port Jackson Shark, wobbegong sharks, and stingarees such as Coastal Stingaree and Western Shovelnose Stingaree. Eagle Ray and Smooth Stingray often live on sandy bottom or among seagrasses, but occasionally visit adjacent jetty habitats. Some of the sharks and rays found around jetties in the NY NRM region are strongly site-associated with their chosen habitat throughout the year, and others are migratory, such as Port Jackson sharks.

Table 16.7: Examples of shark and ray species which are found around jetties and/or shipwrecks in the NY NRM region

Species Name	Representative Image	Species Name	Representative Image
Smooth Stingray *Dasyatis brevicaudata*	 © Alpha @ Wikimedia Commons	Southern Fiddler Ray *Trygonorrhina dumerilii*	 © J. Finn, Museum Victoria. CC Licence
Southern Eagle Ray *Myliobatis australis*	 © D. Muirhead	Coffin Ray *Hypnos monopterygius / H. monopterygium*	 © C. Rapson
Western Shovelnose Stingaree *Trygonoptera mucosa*	 © B. Battersby	Coastal Stingaree *Urolophus orarius*	 © C. Rapson

Table 16.7: (continued)

Species Name	Representative Image	Species Name	Representative Image
Wobbegongs *Orectolobus maculatus* and/or *O. halei*	 © R. Ling, Flickr. CC Licence	Port Jackson Shark *Heterodontus portusjacksoni*	 © M. Norman, Museum Victoria
White Shark / Great White Shark *Carcharodon carcharias*	 © L. Baade	Bronze Whaler *Carcharhinus brachyurus*	 (juvenile) © M. Hands
Smooth Hammerhead *Sphyrna zygaena*	 © CSIRO National Collection	Gummy Shark *Mustelus antarcticus*	 © CSIRO National Collection