

# Marine ALIEN & INVASIVE SPECIES



**SANBI**   
Biodiversity for Life  
South African National Biodiversity Institute



# Contents

What are marine alien and invasive species? .....	1
Categories .....	3
<i>Boccardia proboscidea</i> .....	4
<i>Discinisca tenuis</i> .....	6
<i>Dodecaceria fewkesi</i> .....	8
<i>Carcinus maenas</i> .....	10
<i>Ficopomatus enigmaticus</i> .....	12
<i>Semimytilus algosus</i> .....	14
<i>Mytilus galloprovincialis</i> .....	16
<i>Crassostrea gigas</i> .....	18
<i>Litopenaeus vannamei</i> .....	20
<i>Penaeus monodon</i> .....	22
<i>Penaeus indicus</i> .....	24
<i>Metridium dianthus</i> .....	26
<i>Ostrea edulis</i> .....	28
<i>Sagartia ornata</i> .....	30
<i>Ciona robusta</i> .....	32
<i>Balanus glandula</i> .....	34
Glossary .....	36

# What are marine alien and invasive species?

Alien invasive species are plants, animals, pathogens and other organisms that are exotic, non-indigenous or non-native to an ecosystem, and which may cause economic or environmental harm or adversely affect human health. They spread aggressively, which subsequently threatens indigenous ecosystem functioning and biodiversity. Marine alien species are species whose presence in a region is attributed to human actions that enable them to overcome geographical barriers and invasive species are alien species that have self-replacing populations over several generations that have spread from their point of introduction. Coastal systems such as rocky intertidal shores, sandy bays, estuaries and harbours are becoming increasingly impacted and transformed by these species. The transfer of marine alien species involves a variety of vectors and pathways, such as live food and aquaria, ballast water discharge and hull fouling or biofouling of ships, and species or associated species farmed in aquaculture facilities. In marine ecosystems, alien species may become invasive and displace native species, causing the loss of the genetic make-up of native organisms, modify habitats, change community structure, affect foodweb properties, ecosystem processes, obstruct the provision of ecosystem services, impact human health and further cause substantial economic losses.

**The South African National Biodiversity Institute (SANBI)** is mandated by the National Environmental Management: Biodiversity Act (NEM:BA), Act 10 of 2004, Alien and Invasive Species (AIS) regulations, to monitor and report on the state of biodiversity and to provide scientific advice to inform policy

and decision-making. As part of this mandate, SANBI's Marine Programme reports on the status of marine alien and invasive species and monitors for new introductions in South Africa, as well as providing scientific advice on their management. The AIS regulations list four different categories of invasive species that must be managed, controlled or eradicated from areas where they may cause harm to the environment, or that are prohibited to be brought into South Africa.

# Categories

- Category 1a:** Listed Invasive Species are those species which must be combatted or eradicated. Any form of trade or planting is strictly prohibited.
- Category 1b:** Listed Invasive Species are those species which must be controlled and where possible, removed and destroyed. Any form or trade or planting is strictly prohibited.
- Category 2:** Invasive species or species deemed to be potentially invasive, in which a permit is required to carry out a restricted activity. Category 2 species include commercially import species such as pine, wattle and gum trees.
- Category 3:** Invasive species which may remain in prescribed areas or provinces. Further planting, propagation or trade is prohibited.

## Shell worm

### **Description:**

The tube-dwelling shell worm is approximately 20 mm long. Its body is yellow when it is alive with visible red blood vessels. The head has a pair of extended feeding tentacles and black eyes. The gills are found on segment 1 and 2, then on segment 6 onwards. The tail is a rounded disc with dorsal notch.

### **Vector/Pathway:**

Fouling on aquaculture species.

### **Impacts:**

Reduce the condition of cultured abalones.

### **Habitat:**

Populations have been reported from widely differing habitats including mudflats, sandy harbours, seagrass beds, amongst barnacles, in coralline algae, Kelp (*Macrocystis pyrigera*) holdfasts, sandstone or sedimentary rocks, shale and limestone reefs, sewage outfalls and gastropod shells inhabited by hermit crabs.



## Disc lamp shell

### **Description:**

The shell is flat, round with transparent horny discs up to 20 mm across. They show circular growth lines and may be fringed by long, straight hairs. In their native range they are usually found in large clumps.

### **Vector/Pathway:**

Aquaculture.

### **Impacts:**

Reduce the visual appeal of oysters for market.

### **Habitat:**

Introduced populations are usually attached to oysters or other shellfish as single individuals or in small groups.







## Black coral worms

### **Description:**

Colonies of the black coral worm form hard, grey, semi-circular reefs about 100 mm across. They comprise of hard, chalky tubes. Each colony houses 10–20 mm long individual jet-black worms, each with a long pair of feeding limbs, behind which lie 4–5 pairs of extended tube-like gills. The colonies are derived asexually from single individuals, hence retaining the sex of the founder.

### **Vector/Pathway:**

Shipping.

### **Impacts:**

It forms hard coral-like colonies and is a potential ecosystem engineer.

### **Habitat:**

It is found on hard substrata like harbour wharfs, harbour walls and rocks.





## European shore crab

### **Description:**

The adult crab reaches up to about 60 mm long and 90 mm wide. The colour of the crab is variable, from a dark brownish-green to a bluish colour. It is distinguished by the three 'teeth' on the front margin of the carapace between the eyes and five along the margins. They have a row of lighter coloured spots which are yellowish white to darker in colour ventrally. The male abdomen is triangular and the female is subtriangular but rounded laterally.

### **Vector/Pathway:**

Shipping.

### **Impacts:**

Competes with native crab species and preys on clams, mussels and other species in natural settings and in aquaculture.

### **Habitat:**

The impact of this crab is potentially most intense in estuaries and bays with soft sediment.





## Reef-building worm

**Description:**

The reef-building worms are usually 20–40 mm in length. They form clusters of large intertwining reef-like masses that may be approximately 7 m in diameter. The tubes are flared at the openings and have collar-like rings along their lengths. Their colour is white in the early stages, but brown stains occur when they are older. The tubes are often covered with green algae.

**Vector/Pathway:**

Ship fouling.

**Impacts:**

Forms large colonies that foul the hulls of boats.

**Habitat:**

Populations occupy lagoons, marinas and estuaries.





## Bisexual mussel

### Description:

The bisexual mussel is small, elongated, relatively fat and smooth, with a brown-green shell; its maximum growth is 50 mm. Most specimens are hermaphroditic, having a male gonad on one side and female one on the other. Mussels have small rope-like tentacles that they use to attach to hard substrates or to each other in colonies.

### Vector/Pathway:

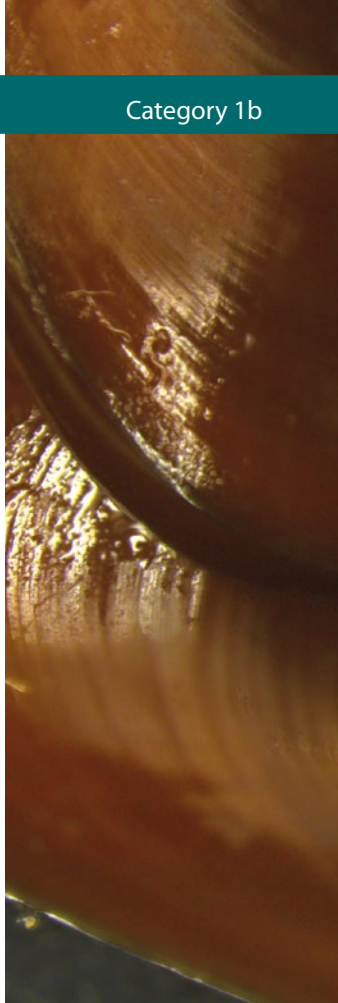
Fouling on large fishing vessels, oil rigs and aquaculture.

### Impacts:

Displacement of native limpets.

### Habitat:

Populations occupy the lower intertidal zone.







## Mediterranean mussel

### **Description:**

The Mediterranean mussel is a large, smooth-shelled black to blue mussel, typically from 50 mm up to 120 mm long. It is a bivalve with two shells that are equal and nearly square. The outside of the shell is black-violet in colour; on one side the rim of the shell ends with a pointed and slightly bent umbo (the highest point of each valve of a bivalve shell) while the other side is rounded. It is fat in cross-section compared to the black mussel.

### **Vector/Pathway:**

Aquaculture, shipping.

### **Impacts:**

They monopolise space on intertidal rocks. They displace indigenous mussels and large limpets.

### **Habitat:**

The mussel has dominated the rocky shores and has displaced indigenous mussels and limpets.





## Giant Pacific oyster

### **Description:**

The shell of the giant Pacific oyster is long and can reach a length of 200–300 mm, but their individual size is extremely variable. The left (upper) valve is slightly curved; the right (lower) valve is deep and cup-shaped. The two valves are solid but unequal in size and shape. One shape is usually cemented to a hard substratum. The valves are carved, with large, irregular, rounded circular folds. Circular ribs are present on both valves starting from the umbo (the highest point of each valve of a bivalve shell). Usually whitish in colour, they also display purple streaks and spots. The inner surface is partly milky white.

### **Vector/Pathway:**

Aquaculture.

### **Impacts:**

Outcompetes and replaces native bivalves and shellfish for food and space.

### **Habitat:**

It is able to grow in very varied environments, ranging from estuarine areas (brackish waters) to offshore oceanic waters.





## Whiteleg shrimp

### **Description:**

The colour of the whiteleg shrimp is typically translucent-white but varies in cases of nutritional deficiencies. The postlarvae ranges from 0.88–3.00 mm in carapace length. The body is divided into specialised regions: head and main internal organs, highly muscularised and specialised abdomen for swimming, and telson (a tail-like structure). Each region bears specialised appendages, either for feeding and crawling or for swimming and breathing. The swimming limbs of the tail fan are used for escape propulsion.

### **Vector/Pathway:**

Aquaculture.

### **Impacts:**

There are no known impacts but in areas where it has invaded it is reported to potentially compete with native shrimp species because it approaches food items faster and more aggressively.

### **Habitat:**

This marine shrimp likes muddy bottoms at depths from the shoreline down to about 72 m.





## Giant tiger prawn

**Description:**

The largest giant tiger shrimp available commercially reaches total lengths of 330–336 mm. It is light to dark olive green in colour throughout its body. The head extends beyond the tip of the first pair of appendages. It is s-shaped, with 6–8 dorsal teeth and 2–4 ventral teeth.

**Vector/Pathway:**

Aquaculture.

**Impacts:**

Compete with, or prey directly upon native shrimp species.

**Habitat:**

Populations are found occupying shallow coastal estuaries, lagoons and mangrove areas; sand or muddy sand bottom nearshore marine habitats.







(formerly *Fenneropenaeus indicus*)

## Indian prawn

### **Description:**

The Indian prawn is light in colour with tiny blue and reddish-brown pigment spots. Prawns have a head (thorax), a tail and an abdomen with six segments. The head region is slightly curved at the tip but s-shaped. It also bears 7–9 upper and 3–6 lower teeth. The head region has a spine that bears one pair of eyes, two pairs of feeding appendages and five pairs of walking legs.

### **Vector/Pathway:**

Aquaculture.

### **Impacts:**

Vector to viruses and bacteria that affect shrimps.

### **Habitat:**

Adult populations have been found in widely differing habitats including: mangals, large bays, offshore, sandy beaches and sheltered mangrove areas.





## Feather duster anemone

### **Description:**

This anemone is white, brick red-orange, or tan-brown often with a white circle around its mouth. It grows up to about 100 mm tall and has up to 100 slender tentacles. Recognised by the lobed oral disc and hundreds of short limbs, which give the species a characteristic fluffy appearance. They are often found in closely packed groups and can reproduce by basal laceration, whereby small sections tear free from the base of the column and develop into new individuals.

### **Vector/Pathway:**

Fouling on petroleum infrastructure.

### **Impacts:**

Compete with local species for food.

### **Habitat:**

It is usually found attached to rocks or other hard surfaces. The depth range is from the subtidal zone and down to 100 m.





## European flat oyster

### **Description:**

The European flat oyster grows up to a maximum length of 110 mm. Living specimens are yellowish white. It is flat or slightly curved shell, with concentric (semi-circular) grooves and ridges, with ten or more ribs on the lower but none on the upper shell. The inner surfaces are pearly white or bluish-grey, often with darker blue areas. The left shell is concave and fixed to the substratum, the right shell is flat and sits inside the left.

### **Vector/Pathway:**

Aquaculture.

### **Impacts:**

Potential vector for the oyster disease bonamiosis and the oyster pathogen marteiliosis.

### **Habitat:**

Populations are found occupying sheltered locations, usually in shallow water.





## Brooding sea anemone

### **Description:**

The mouth of the brooding sea anemone is creamy-white; the rest of the oral disc is brownish internally and greenish externally, with creamy circular stripes. The oral disc is typically flat with the mouth slit-like to egg-shaped. It has up to 200 tentacles arranged in 4–5 cycles. The internal cycle of tentacles is longer than the external cycle. The last two cycles are considerably smaller than the others. It readily releases sticky white threads when disturbed.

### **Vector/Pathway:**

Ballast water.

### **Impacts:**

The brooding sea anemone is an ecosystem engineer as it alters the surrounding consolidating sand and traps coarse sediment, thus affecting the natural biota.

### **Habitat:**

Populations are found intertidally on sandy shores partially covering the underlying rocks and in cordgrass beds.







(formerly *Ciona intestinalis*)

## Sea vase tunicate

### **Description:**

The body of the sea vase tunicate is long reaching a maximum length of 100 mm. It is attached to the substratum by the posterior end or more frequently by the left side near the posterior end of the body. It has two tube-like structures that are situated at the anterior end of the body nearly equal in length. The tunic of the sea vase ascidian is cartilaginous and so robust that such individuals in a preserved state can be held upright. The body wall is very delicate and transparent such that the internal structure of the body can be seen through it. Also, its body wall is barely pigmented. It is faintly greenish with eye spots on the margins of the openings. The surface of the robust test may be covered partly by multiple colonies of some sea squirts or some bivalves and thus the tunic becomes quite non-transparent.

### **Vector/Pathway:**

Shipping, fouling, natural dispersal.

### **Impact:**

Preys directly on oyster larvae; inhibits oyster settlement by covering them and thereby reducing the amount of free substrate available for attachment.

### **Habitat:**

The species is well established in artificial habitats including marinas and harbours.



## Pacific barnacle

### **Description:**

The Pacific barnacle is small and approximately 10–18 mm long. Its shell colour is greyish blue. Adult Pacific barnacles are encased in a cone-shaped shell of 4–8 hard chalky plates and live attached to rocks or hard surfaces. When they are emerged in water, the feathery legs are extended through an opening at the top where they combine to capture food particles. When exposed to air these feathery legs are withdrawn and the shell is sealed by four additional shell plates. The Pacific barnacle has a combination of six shell plates and that is how it is distinguished from other barnacles. It also possesses a chalky base and an m-shaped opening.

### **Vector/Pathway:**

Fouling in ship hulls or ballast.

### **Impacts:**

Displaces populations of formerly abundant indigenous barnacle species.

### **Habitat:**

It is mainly found on intertidal rocks, in the open ocean and protected waters.





# Glossary

**Abalone** – an edible mollusc of warm seas, with a shallow ear-shaped shell lined with mother-of-pearl and pierced with a line of respiratory holes.

**Antennular peduncle** – small appendages by which an animal is attached to the rest of the body.

**Aquaculture** – is the farming of fish, crustaceans, molluscs, aquatic plants, algae and other aquatic organisms.

**Bivalve** – an aquatic mollusc which has a compressed body enclosed within a hinged shell, such as oysters, mussels, and scallops.

**Carapace** – the hard upper shell of a tortoise, crustacean or arachnid.

**Coralline algae** – a branching reddish seaweed with a calcareous jointed stem.

**Fouling** – is the accumulation of unwanted material on solid surfaces to the detriment of function.

**Laterally** – at, towards, or from the side or sides; sideways.

**Larvae** – the young of any invertebrate animal.

**Mangals** – a swampy forest of mangroves.

**Pathogen** – a bacterium, virus, or other microorganism that can cause disease.

**Rostrum** – anterior prolongation of the head.

**Substrate/substratum** – a substance or surface that an organism grows and lives on and is supported by.

**Subtriangular** – nearly but not quite triangular.

**Tentacles** – a slender, flexible limb or appendage in an animal, especially around the mouth of an invertebrate, used for grasping or moving about, or bearing sense organs.

**Umbo** – the highest point of each valve of a bivalve shell.

**Ventrally** – on or relating to the underside of an animal or plant; abdominal.

## Additional information

See SANBI's Seakeys species pages for marine species, including alien and invasive species, at:  
<http://seakeys.sanbi.org/search/node>.

Contact the SANBI Marine Programme  
(Marine Alien and Invasive Species Project):

Tel.: +27 21 799 8716

E-mail: [invasivespecies@sanbi.org.za](mailto:invasivespecies@sanbi.org.za)

Editing and design: SANBI Graphics & Editing, December 2017.