



This booklet has been produced by
Friends of the Bluff in association with Parks Victoria.
Cover image: *Plagusia chabrus* - Red Notched Crab.

Life on the Edge

A Guide to the Animals and Plants
of the Barwon Bluff Marine Sanctuary

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INTRODUCTION

It is amazing just how many plants and animals are living on the edge of "The Bluff".

The Barwon Heads Bluff is a local icon and a profound aboriginal place. It is of geological significance and an area of scientific and educational importance.

And below the imposing dune limestone cliffs lies the rocky reefs of the Barwon Bluff Marine Sanctuary. To the east, black basalt boulders are reminders of a violent volcanic past. And to the west the ancient cliff is worn flat by centuries of untamed tides and weather.

For life on the edge, living between the tides is a rugged and tenuous existence. It is a place of pounding waves and ripping tides; of baking summer sun and icy winter winds; of shifting sands and stalking skilful predators.

Yet thousands of species have adapted to cling and grasp and grip and hold on in this wild space and forage and grow and reproduce. There are giant sweeping kelps and delicate algal lattices. There are tiny crustaceans whose size defies the power of the elements. There are also seastars of exquisite beauty, patient anemones, and squiggly lines in the sand that map a mollusc's journey.

So search gently every rock and crack and fissure, every ledge and overhang, every pool deep and shallow. And look through, and under, and among the myriad of colourful seaweeds, or along the high tide line for the remnants of past lives. For every day life on the edge changes.



Discover the wealth of plants and animals that live in this special wild place and help protect the remarkable "Life on the Edge".

Barwon Bluff Marine Sanctuary

Barwon Bluff Marine Sanctuary is one of 11 Marine Sanctuaries and 13 Marine National Parks across Victoria that form a system of highly protected areas of the sea. These reserves complement our National Park system on land and provide protection for Victoria's rich marine and coastal diversity of habitats and species.

Barwon Bluff Marine Sanctuary covers 17 hectares and is located at the mouth of the Barwon River in Barwon Heads, about 20 km to the west of the entrance to Port Phillip Bay.

Both sandstone and basalt intertidal and shallow subtidal reefs within the Marine Sanctuary provide habitat for a diverse range of marine flora and fauna and offshore support extensive kelp forests.

The Marine Sanctuary is a popular area for activities including walking, exploring local marine life, swimming, snorkelling, and diving. The rock platforms are home to an abundance of life while the waters provide stunning underwater vistas amongst the rich kelp forests.

The Bluff is a significant place for local Wathaurong people that have visited the area as an important summer camping ground for many thousands of years. With a combination of sea, rock platforms, the river, and extensive wetlands to the north, the area provided a wide diversity of food sources and today has many reminders of this rich history including shell middens, campsites, and tools.

Due to the wide diversity of habitats within a small area Barwon Bluff Marine Sanctuary has enormous importance for students and teachers wanting to learn about Victoria's marine and coastal environments.



For the protection of the marine environment, a number of activities are prohibited within the boundaries of Victoria's marine national parks and marine sanctuaries. No fishing, netting, spearing, taking or killing of marine life is permitted and all methods of fishing, from the shore or the sea, are prohibited.



Remember, all objects (artefacts), animals, plants, and the seabed are totally protected in the Marine Sanctuary.

LOOK AFTER THE BLUFF! LOOK AFTER YOURSELF!

While providing many great opportunities for people to enjoy themselves the Barwon Bluff Marine Sanctuary needs your help in caring for its animals and plants.

Similarly it is important to be aware of potential hazards and ensure that you, and your friends and family, have a safe and enjoyable experience on the rock platform or in the water.

Looking After the Environment:

- Please avoid trampling sensitive plants and animals and try to stay on rock surfaces when walking.
- Take all rubbish and litter home with you. If you have carried it in ... carry it out. Go one step further - remove rubbish left by others - if you don't who will?
- Avoid damage to sand dunes by staying on the tracks when going to or from the beach and use the beach not the sand dunes when playing.
- Leave all shells on the beach for use by other animals for shelter.
- Don't let litter, oil, or chemicals get washed down gutters into drains which lead to the river and the sea.
- Use environmentally friendly washing detergents at home - check the packet to see if it is biologically soft and has little or no phosphate content.
- Be careful with use of chemical fertilisers to prevent excessive algal growth or use organic alternatives.
- If fishing, outside the Marine Sanctuary, don't leave bait wrappers or fishing tackle around where they can entangle wildlife.

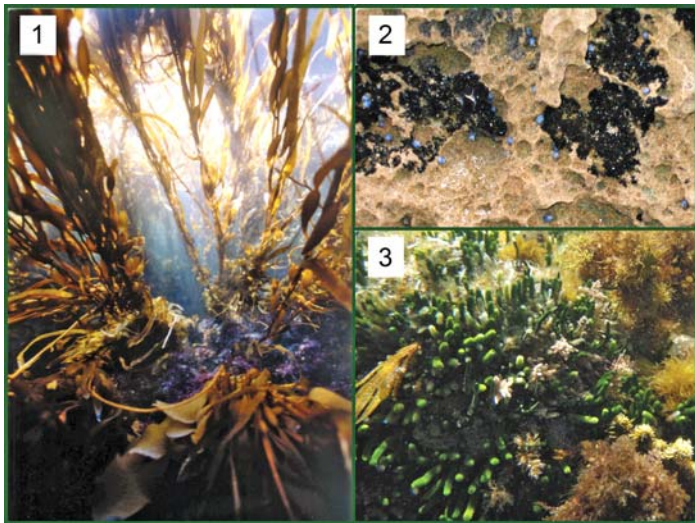
Looking After You and Yours:

- Wear adequate protective footwear when exploring intertidal rockpools and other coastal environments.
- Take extra care on wet, slippery rocks.
- Always keep a lookout for larger waves and don't turn your back on the sea.
- Learn to recognise possible animal hazards, including the blue ringed octopus and cone shells, and do not pick them up or handle them.
- Make sure you can always see where you place your hands to avoid potentially dangerous creatures.
- Ensure adequate protection from the sun by wearing a hat, loose clothing, and sunscreen.
- Avoid standing close to or under the edges of sea cliffs or overhangs as many are unstable and can collapse without warning.
- Watch for the tide coming in to avoid being trapped.
- Keep a close eye on children especially near the edge of pools and the rock platform.



Marine Plants

(Kingdom Protista)



Peering into rockpools and examining the rocks at the Bluff reveals a wealth of marine plants both large and small. With more than 1000 species found in Victorian waters this is a region of high species diversity with many species found nowhere else in the world.

Marine plants at the Bluff fall into six major groups.

Blue-green Algae are the simplest marine plants and can be seen on rocks nearest the shore, usually growing as threadlike filaments, irregular sheets, or branching fronds.

The three larger algal groups (1 & 3), **Rhodophyta – Red Algae**, **Heterokontophyta – Brown Algae**, and **Chlorophyta – Green Algae**, are the most conspicuous plants in the sanctuary.

Often appearing as crusty peeling growths on higher rocks and creatures at the Bluff **Lichens** (2) are actually a remarkable symbiotic association between fungi and Blue-green Algae.

Seagrasses are not algae but true **flowering plants** and include two species growing within the Barwon Bluff Marine Sanctuary. These are described in the next section.

Blue-green Algae

(Phylum: Cyanophyta)



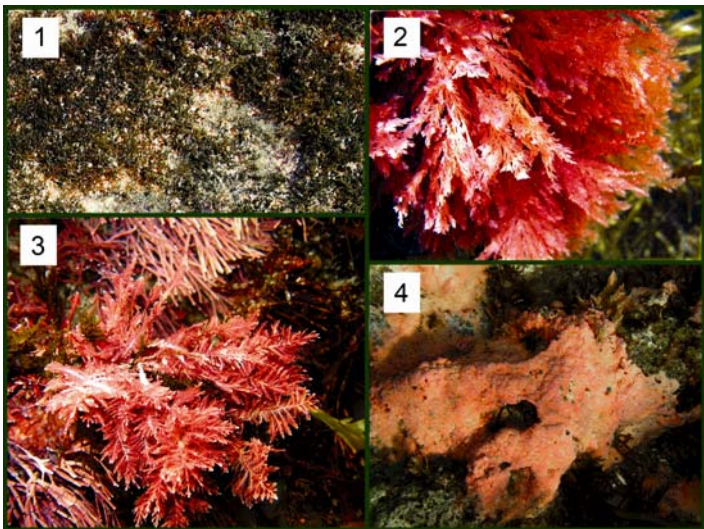
Blue-green Algae are also known as *Cyanobacteria* and are among the earliest forms of life on earth. Unlike other bacteria they can *photosynthesise* (use sunlight energy to convert water and carbon dioxide into food and oxygen) and prior to their arrival there was very little oxygen present in the atmosphere. About 2400 million years ago, the "Great Oxidation Event", initiated by Cyanobacteria, led to the evolution of life as we know it.

Blue-green Algae are a significant part of the marine nitrogen cycle and important primary producers in many areas of the ocean, shoreline, and in soils.

	Name	Description
1	<i>Rivularia firma</i>	Occurring intertidally these Blue-green Algae form slippery greenish firm gelatinous bubbles on rocks growing up to 20 mm across.
2	<i>Symploca</i> sp	This simple life form is seen as irregular dark patches on rocks and creatures in the intertidal zone rocks.

Red Algae

(Phylum: Rhodophyta)



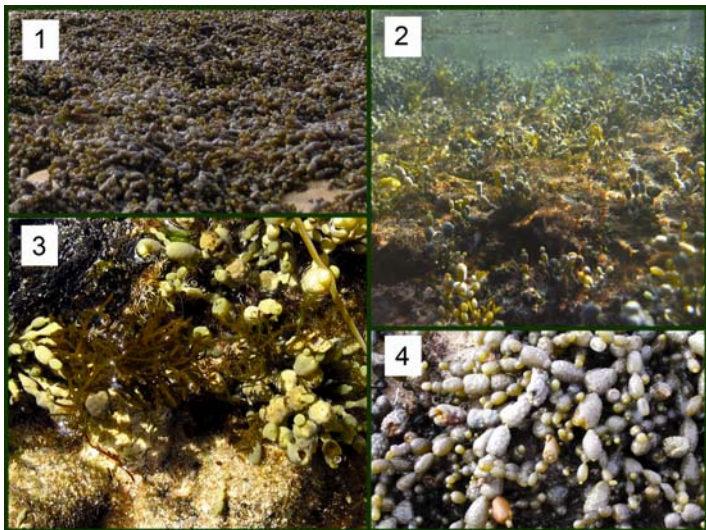
Southern Australia is home to about 800 species of Red Algae, making it the most diverse region for Red Algae in the world. Many species can be recognised by their colour, ranging from pinks through red to purple, although in shallow pools or intertidally, they may appear greenish, brown, yellow, or even bleached white.

Because of special light absorbing pigments Red Algae can tolerate lower light levels and often grow in darker areas such as on the floor of a kelp forest or under ledges.

	Name	Description
1	<i>Capreolia implexa</i>	Forming a low, olive-brown turf, this alga grows intertidally on rock platforms.
2	<i>Plocamium</i> sp.	Occurring subtidally and in shaded parts of rockpools, this soft red alga has a distinctive branching pattern of its flat fronds
3	<i>Corallina officinalis</i> Coralline Algae	Reinforced with calcium carbonate this pink delicate, feathery alga has a crunchy feel and is often seen washed up and bleached.
4	Encrusting Coralline Algae	Widespread encrusting algae like this species gives rocks, and even some living shells, a rich pink glow.

Brown Algae

(Phylum: *Heterokontophyta*)



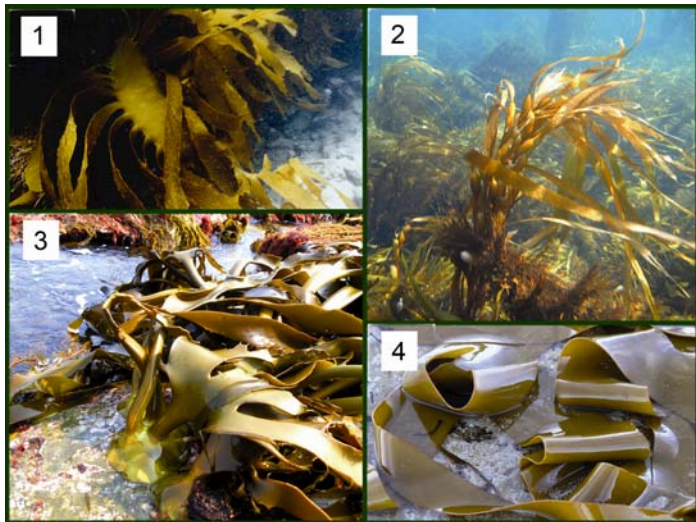
The Brown Algae are the most conspicuous algae found in the mid to lower intertidal zone and larger rockpools as well as forming extensive *kelp forests* offshore.

Intertidal Brown Algae must cope with exposure to the air at low tide. Neptune's Necklace, with its small bead-like blades, stores water, allowing it to survive between the tides. It is vulnerable to trampling by eager visitors so please watch your feet!

	Name	Description
1	<i>Hormosira banksii</i> Neptune's Necklace	The most obvious of the intertidal algae at the Bluff this species forms a living carpet over many areas of the rock platform.
2	<i>Hormosira banksii</i> Neptune's Necklace	These beds of Neptune's Necklace provide important shelter for many grazing and scavenging animals.
3	<i>Notheia anomala</i>	Growing only attached to <i>Hormosira banksii</i> or to itself, each "branch" is a separate plant of this unusual algae.
4	<i>Hormosira banksii</i> Neptune's Necklace	Everybody's favourite seaweed! The distinctive string of beads makes this alga the easiest to identify.

Brown Algae

(Phylum: *Heterokontophyta*)



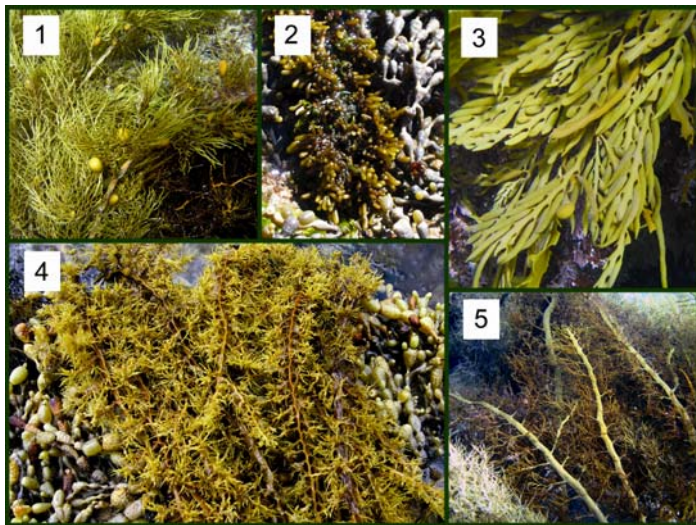
Large Brown Algae that form habitats in deeper pools or on the reef edge are referred to as “kelps” and the dense habitat they create referred to as a “kelp forest”. The species shown on this page grow on the outer reef areas of the Marine Sanctuary and are also found in deep pools.

Strong attachments called *holdfasts* allow these algae to withstand strong wave action. Some holdfasts are big enough to create microhabitats for many smaller marine species.

	Name	Description
1	<i>Ecklonia radiata</i> Leathery Kelp (to 2 m)	Forming a complex habitat this species has fish using the blades for cover, while invertebrates and smaller red algae live beneath.
2	<i>Macrocystis angustifolia</i> Giant String Kelp (to 10 m)	Large flotation bladders support this fast growing kelp which forms extensive forests across the outer sandstone reef.
3	Bull Kelp holdfast	Marine algae do not have roots but are cemented onto reefs with a tough structure called a “ <i>holdfast</i> ”.
4	<i>Durvillea pototarium</i> Bull Kelp (to 8 m)	This massive cool water species has tough fronds and a large holdfast allowing it to thrive where there is plenty of wave action.

Brown Algae

(Phylum: *Heterokontophyta*)



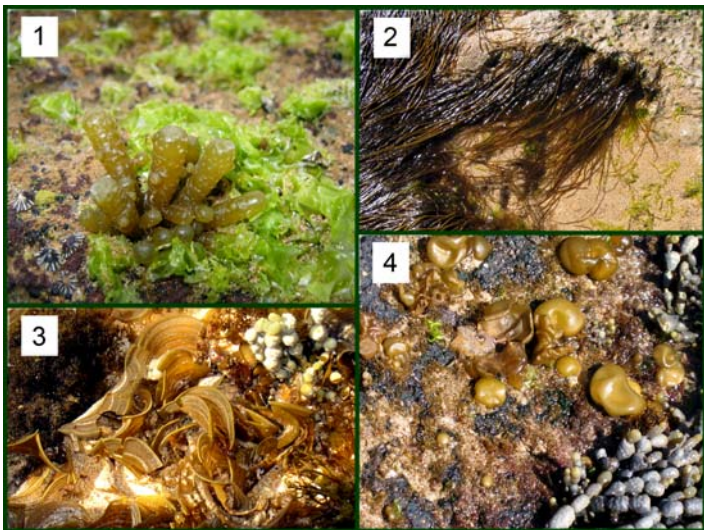
Growing up from the sea floor many species of Brown Algae have *pneumatocysts*, or floats, to help lift the blades of the plant nearer the surface - giving them better exposure to sunlight.

The various species of *Cystophora* shown here grow abundantly on subtidal reefs and within deep rockpools, and provide shelter for many creatures beneath their fronds.

	Name	Description
1	<i>Cystophora retorta</i> (to 1.2 m)	Distinctive squiggly shape, few air bladders, long thin final branches, regular rounded forking of lower branchlets.
2	<i>Cystophora torulosa</i> (to 1.5 m)	A short, yellow-brown ground-hugging alga with cylindrical fronds and distinctive club shaped branchlets, exposed on very low tides.
3	<i>Cystophora platylobium</i> (to 4 m)	This striking species with blades of flattened lobe shaped thick fronds usually lives in deeper water.
4	<i>Cystophora subfarcinata</i> Crayweed (to 2 m)	Forming dense growth and an important habitat, the side fronds of this species branch irregularly and have small olive-shaped floats.
5	<i>Cystophora monilliformis</i> (to 4 m)	Another deeper pool species with a broad flat branched axis and no air bladders.

Brown Algae

(Phylum: *Heterokontophyta*)



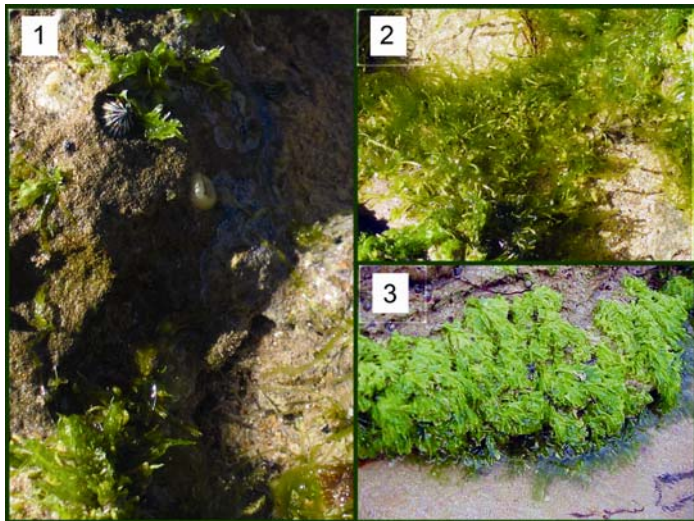
About 240 of Brown Algae species are found in southern Australia ranging from massive kelps to tiny tufted species growing attached to larger plants.

With additional light absorbing brown pigments in their cells brown algae can live at greater depths than green algae. These pigments often mask what would otherwise be green plants.

	Name	Description
1	<i>Splachnidium rugosum</i>	Growing intertidally, this gelatinous filled plant is more conspicuous during the warmer months.
2	<i>Scytosiphon lomentaria</i>	The unbranched fronds of this hair like algae are most conspicuous during cooler months growing both intertidally and sub-tidally.
3	<i>Padina fraseri</i>	Part of a largely tropical group of partially calcified algae this species forms tough flat fan shaped fronds around rockpools.
4	<i>Colpomenia sinuosa</i>	The most common of the globular Brown Algae this species grows intertidally and subtidally, and is more common in warmer months.

Green Algae

(Phylum: Chlorophyta)



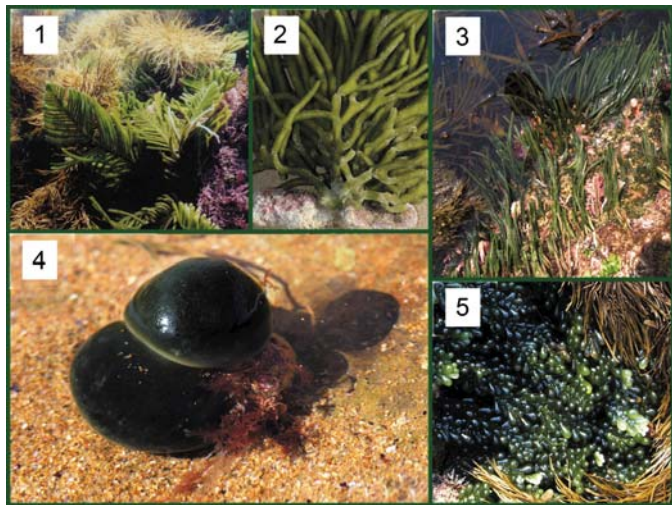
Only about 10% of Green Algae are restricted to marine habitats. There are around 140 species known from southern Australian waters. Generally smaller and less robust than the Brown Algae, they can usually be recognised by their bright, grass-green or darker green colour. They contain the same photosynthetic pigments as land plants and it is thought that all terrestrial plants evolved from Green Algae.

Green Algae live in shallow waters where sunlight is readily available.

	Name	Description
1	<i>Ulva</i> spp. Sea Lettuce	Most abundant during spring and dying off over summer, there are a few closely related species of <i>Ulva</i> called Sea Lettuce.
2	<i>Ulva compressa</i> (to 400 mm)	Growing intertidally as hollow, unbranched tubes, often near freshwater soaks, this species is often an indicator of nutrients.
3	<i>Ulva</i> species Sea Lettuce (to 300 mm)	Sea Lettuce grows in shallow pools and across the tops of the reef where it provides food for many grazing animals.

Green Algae

(Phylum: Chlorophyta)

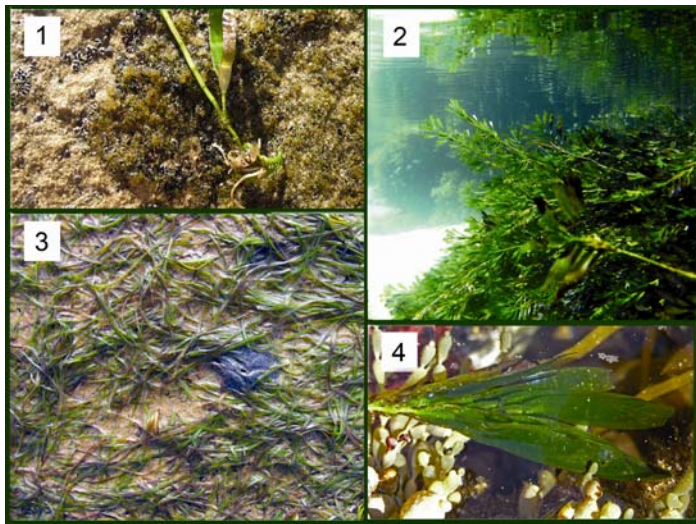


The genera *Caulerpa* and *Codium* are some of the most diverse of the Green Algae found at the Bluff and come in many forms in rockpools and along the edge of the reef. All *Caulerpa* species are recognised by having creeping *stolons* that grip the sand or rock, and having erect stems of different shapes. All occur sub-tidally or in rockpools.

	Name	Description
1	<i>Caulerpa flexilis</i> (to 300 mm)	This "conifer-like" erect <i>Caulerpa</i> is common on the edge of pools in wave exposed areas of the Bluff.
2	<i>Codium fragile</i> Dead Man's Fingers	This dark green mop-like alga has regularly forked cylindrical branches and grows in shallow sections of the reef platform.
3	<i>Caulerpa brownii</i> (to 400 mm)	Forming moss like textures in deeper pools exposed to waves this erect green alga has dense, unbranched thin fronds.
4	<i>Codium pomoides</i> Sea Apple	Resembling an apple in shape, this firm semi-spherical alga grows on the edge of shaded rockpools and subtidally.
5	<i>Caulerpa cactoides</i> (to 400 mm)	Succulent-like in appearance this species is also common in sheltered areas of rockpools and the reef edge.

Flowering Plants

(Kingdom Plantae - Phylum: Magnoliophyta / syn. Angiosperma)



Seagrasses are one of the few groups of flowering plants that have evolved means of coping with the challenges presented by the intertidal marine environment. With tiny underwater flowers and water born pollen grains seagrasses can propagate by seed although often spread by sending out rhizomes or drifting *propagules*.

In estuaries like the Barwon and along the reef edges seagrass beds play an important role as nurseries for juvenile fish and many invertebrate species.

	Name	Description
1	<i>Amphibolis antarctica</i> propagule	<i>Amphibolis</i> species have hooked propagules that cling to the rocky shore allowing it to disperse by being carried by the sea.
2	<i>Amphibolis antarctica</i> Sea Nymph Seagrass	A tough wiry seagrass, with erect stems, and broad flattish leaves, this species is abundant in larger sandstone pools on the reef.
3	<i>Zostera muelleri</i> Seagrass/Eelgrass Grows to 600 mm	Growing along the edges of the Bluff and in the estuary, seagrass beds are important nurseries for juvenile fish, crustaceans, and molluscs.
4	<i>Amphibolis antarctica</i> Sea Nymph Seagrass	On sunny days the leaves of these plants can be seen producing masses of tiny oxygen bubbles, thus sustaining life in the rockpool.

Marine Animals

(Kingdom Animalia)



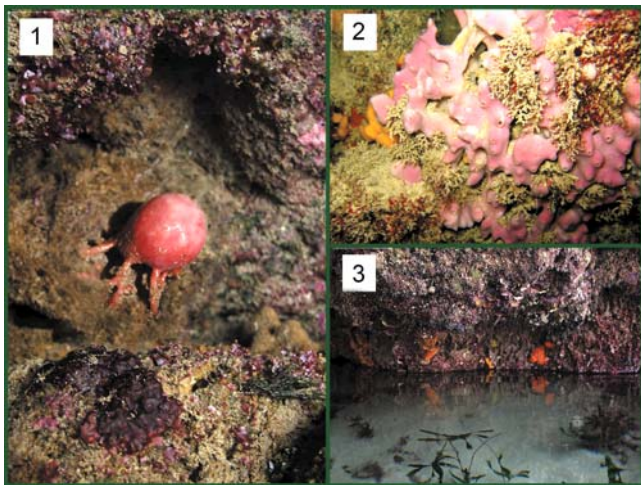
Marine animals differ from the plants because they obtain their energy and building materials by consuming other living things and have developed many different strategies for obtaining food.

On the rock platforms at the Bluff you can find examples of *herbivores*, *carnivores*, as well as numerous *scavengers* and *detritivores* that feed on dead organisms and their remains. Some of the many creatures include crabs (1 & 3), anemones (2), barnacles (4) and Elephant Snail (5).

The intertidal area is an extreme environment and all its inhabitants must cope with the challenges of changing tides and exposure to air, pounding waves, and a wide range of predators both from sea and land.

Sponges

(Phylum: Porifera)



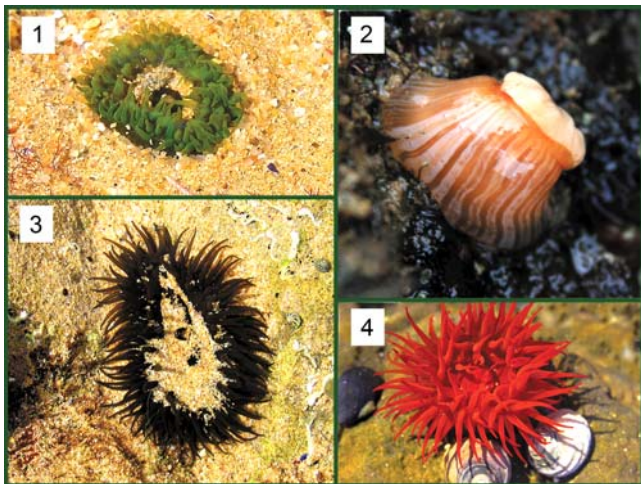
Sponges are colonial animals that grow attached to rocks or living things and obtain food filtering particles of plankton and detritus from the water through an intricate network of pores and internal spaces. Many sponges are brightly coloured and their presence on reefs, particularly deep reefs and beneath ledges, gives a lot of Victoria's underwater environments their spectacular colour.

The remains of sponges are often left on the beach or rocks. The skeleton of a sponge consists of an elastic material called *spongin* (used in bath sponges), as well as in many species, a network of needle-like *spicules* of silica.

	Name	Description
1	<i>Tethya australis</i> Golfball Sponge	Growing beneath ledges and visible during very low tides these are one the easier to identify sponges. Grows to 40 mm.
2	<i>Callyspongia</i> sp	With colours in pastel shades ranging from beige, lilac, blue to pale pink this sponge has a rounded shape with lots of large holes.
3	Encrusting sponges	Many different sponges can be glimpsed under rocks during low tides or on the reefs as encrusting splashes of colour.

Anemones

(Phylum: Cnidaria)



Related to jellyfish and corals, anemones are carnivores capturing food using sticky tentacles lined with specialised stinging cells. These cells fire venom laden harpoons into their prey on contact. To humans this feels sticky but to small animals this is deadly! While under water, anemones extend their tentacles to capture food. When the tide has fallen anemones withdraw tentacles to reduce water loss from their soft bodies.

	Name	Description
1	<i>Aulactinia verata</i> Green Anemone	Algae living inside this anemone's tentacles allow them to make their own food in sunlight in return for a safe environment for the plants.
2	<i>Anthothoe albocincta</i> Striped Anemone	With striped orange and white column and white tentacles, this small anemone forms small colonies on the underside of rocks.
3	<i>Aulactinia</i> sp Brown Anemone	Attached to a rocky base these anemones are often covered in sand allowing them to withdraw when the tide is out.
4	<i>Actinia tenebrosa</i> Waratah Anemone	Often appearing as red blobs on rocks at low tide the colour makes this one of the most conspicuous anemones on the rocks.

Crustaceans

(Phylum: Arthropoda – Subphylum Crustacea)



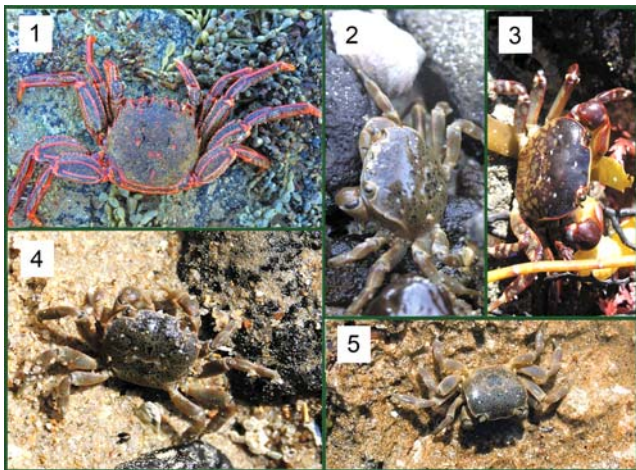
Crustaceans, like insects, have segmented bodies and jointed legs and are one of the largest groups of invertebrates, prolific in all the habitats within the Barwon Bluff Marine Sanctuary. From the barnacles in the splash zone at the base of the Bluff to cryptic shrimp in the depths of the rockpools crustaceans are abundant everywhere. Tiny sandhoppers devour the massive drifts of kelp while myriads of crabs, shrimp, and isopods feast on other remains left by the tide.

Crustaceans are also characterised by their jointed calcified plates which form a tough exoskeleton, and gills for obtaining oxygen, which must be kept moist.

The group of "Higher Crustaceans" represented in this book includes the most familiar species such as crabs, lobsters, shrimp, slaters and sandhoppers. They share a similar body plan of a fused head, thorax, and abdomen segments and are found in marine, freshwater and terrestrial environments.

Shore Crabs

(Class: Malacostraca - Order: Decapoda - Family: Grapsidae)

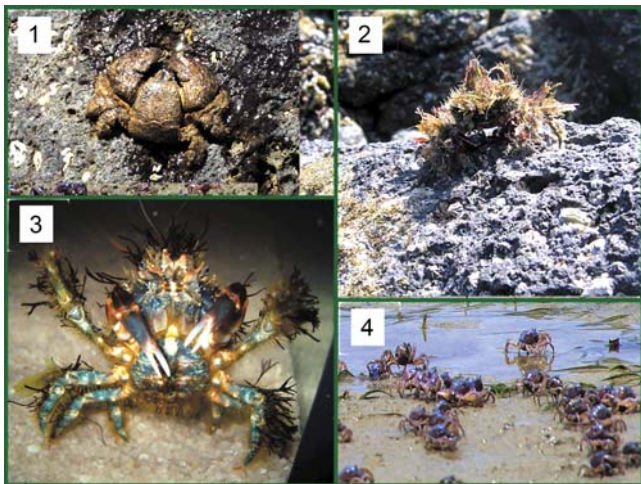


Shore crabs, also known as *grapsid* crabs, gain protection from predators and drying out at low tide by taking cover under rocks. *Grapsids* are the most abundant crabs found in intertidal areas where loose rocks provide shelter. They are generally scavengers and feed on food materials left by the retreating tide.

	Name	Description
1	<i>Plagusia chabrus</i> Red Notched Crab	A large very active reddish crab with sharp points on its legs to help it cling to rocks in the wave zone. Body width to 70 mm.
2 5	<i>Paragrapsus quadridentatus</i> Common Shore Crab	Recognised by its fawn coloured shell and rectangular body this crab has a body width to 30 mm.
3	<i>Cyclograpsus granulatus</i> Purple Mottled Shore Crab	Common beneath basalt boulders this common grapsid has a distinctive purple colour and body width to 35 mm.
4	<i>Cyclograpsus audouinii</i> Smooth Shore Crab	Tufts of hairs at the base of the legs distinguish this crab from the previous species - if you care to look! Width to 40 mm.

Other Crabs

(Class: Malacostraca - Order: Decapoda)

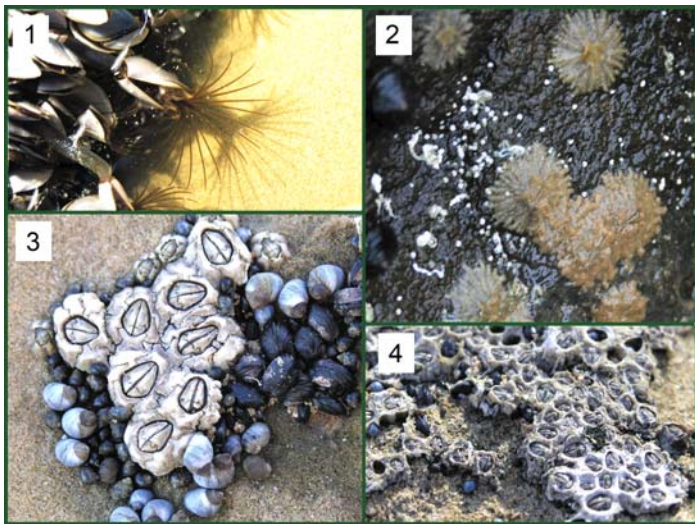


The crabs on this page come from a number of different families and have specialised features that allow them to compete with, and share the rock platforms with, the more common *grapsids*.

	Name	Description
1	<i>Lomis hirta</i> Hairy Stone Crab (Family: <i>Lomisidae</i>)	This unique crab has only three pairs of legs compared with the usual four, and lives beneath rocks where its body shape and colour disguise them from potential predators. Body width to 25 mm
2	<i>Notomithrax ursus</i> Decorator Crab (Family: <i>Majidae</i>)	These hard to find crabs create camouflaging gardens on their bodies from seaweeds and encrusting animals. Body width to 40 mm, with distinctive pointed shape.
4	<i>Mictyris platycheles</i> Soldier Crab (Family: <i>Mictyridae</i>)	Forming large armies on the sandflats around the Bluff, these scavengers emerge as the tide recedes to sift through the sand for food particles. Body width to 15 mm

Crustaceans – Barnacles

(Class: Cirripedia)



After spending the first phase of their life drifting as one of many planktonic animals, barnacles build a solid shell permanently attached to the rocks or other solid structures.

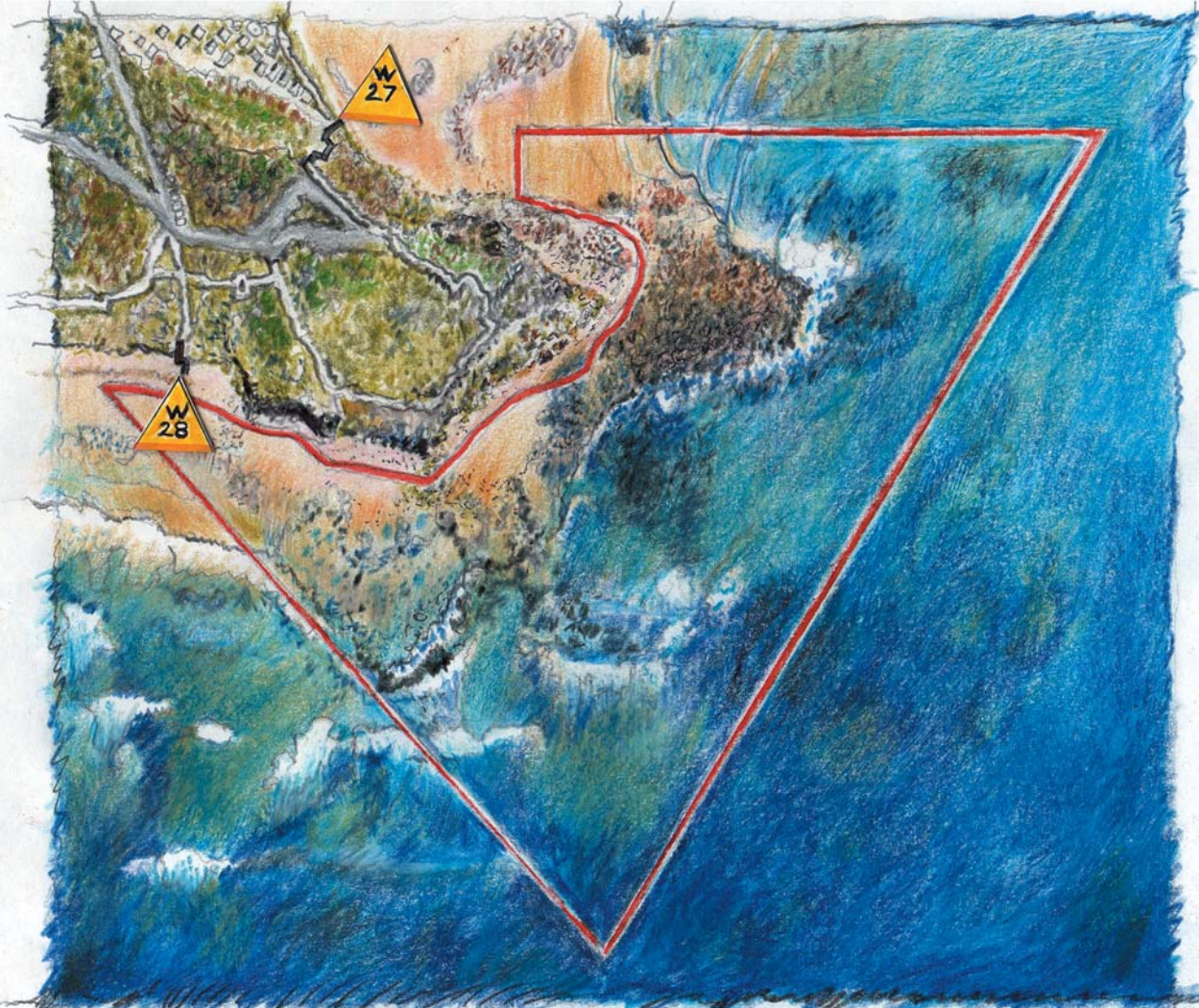
At low tide barnacles shut tight the valves on the top of their shells to prevent water loss while uncovered. When covered by water again will open the valves and use long hairy feet to strain food from the water.

	Name	Description
1	<i>Lepas australis</i> Goose Neck Barnacles	Attached to objects drifting at sea, Goose Neck Barnacles filter plankton from the surrounding waters. Diameter to 80 mm.
2	<i>Tetraclitella purpurascens</i>	This barnacle lives in the mid-to high intertidal, usually in shaded surfaces or crevices. Diameter to 25 mm.
3	<i>Chthamalus antennatus</i> Six-plated Barnacle	This barnacle occurs in the upper parts of the shelf platform & lower splash zone. Diameter to 12 mm.
4	<i>Chamaesipho tasmanica</i> Honeycomb Barnacle	This small barnacle can occur singly or cover large areas on the upper shoreline with a honeycomb texture. Diameter to 8 mm.

Other Crustaceans



Shrimp (Family: Palaemonidae)		
1	<i>Palaemon serenus</i> Body length to 60 mm	There are many groups of scavenging shrimp-like animals found in rockpools including myriads of transparent shrimps.
Isopods (Order: Isopoda)		
2	<i>Paradiotea</i> sp Sea Centipede Body length to 13 mm	A larger isopod with long antennae this harmless species lives higher on the shoreline where drift algae collect.
3	<i>Zuzara venosa</i> Pill Bug	Like their cousins on land, the slaters, many marine isopods feed on decaying plant and animal material.
Order: Stomatopoda		
4	<i>Squilla laevis</i> Mantis Shrimp	A burrowing scavenger on the mudflats and estuary side of the Bluff.
Ghost Shrimp (Family: Callinassidae)		
5	<i>Trypaea australensis</i> Bass Yabby Body length to 65 mm	An important burrowing scavenger on the mudflats and estuary side of the Bluff these landscape architects create complex burrows and a haven for other species.

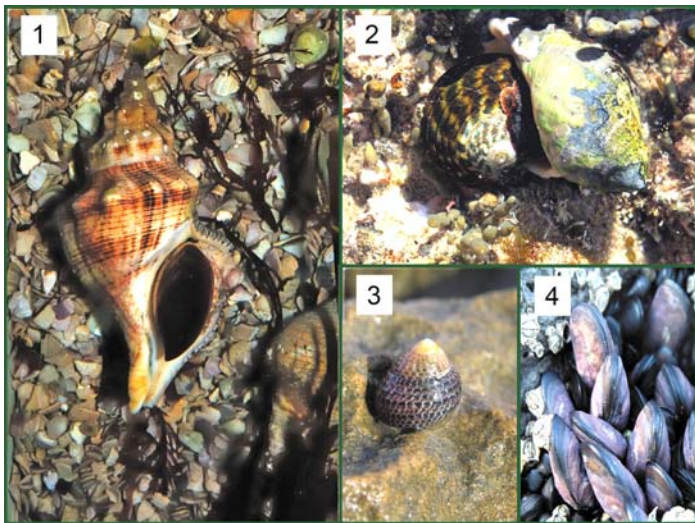


The Barwon Bluff Marine Sanctuary

8/09 '09

Molluscs

(Phylum Mollusca)



Molluscs are one of the largest groups of invertebrates and at the Bluff they can be found from high in the spray zone to the bottom of deep pools. There are four easily recognised groups of molluscs and the pages following describe some of the more notable local species.

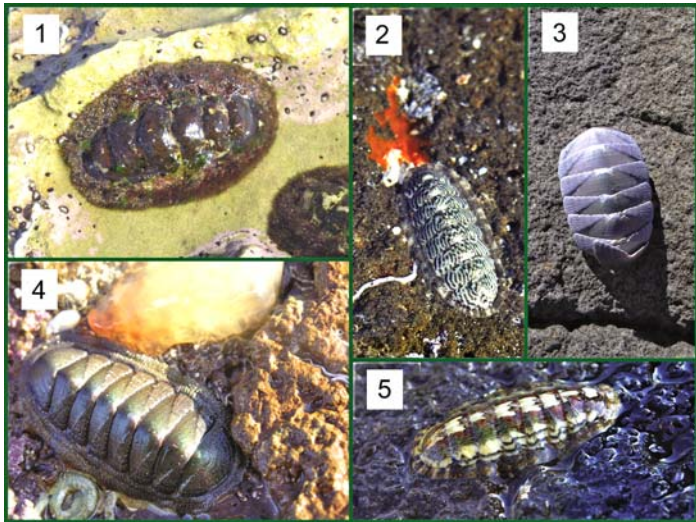
Gastropods (1, 2 & 3) are the largest group of molluscs and usually have a single spiralled shell though there are many variations. Most gastropods are grazers feeding on algae but there are also a large number of carnivores and scavengers in the group. Some groups of gastropods have either very thin and much reduced shells, or as in the case of the nudibranchs, or sea slugs, no shell at all.

Cephalopods have characteristic suckered tentacles and a large water filled mantle covering their internal organs.

Bivalves (4) have two shells which can be tightly closed and are often found in sand, in crevices, or attached to rocks.

Chitons

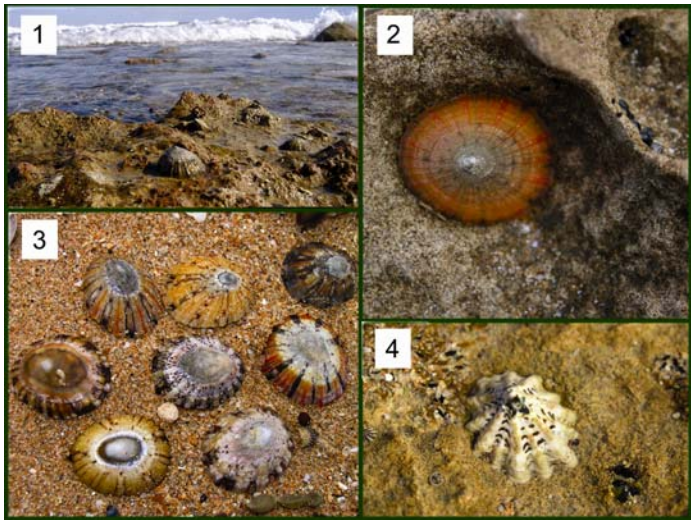
(Class Polyplacophora)



Chitons are distinctive grazing molluscs which have eight slightly overlapping plates joined together that allow flexibility while moving around rocks. A large muscular foot makes Chitons well suited for living in areas of high wave activity and also allows them to clamp themselves tightly down if disturbed.

	Name	Description
1	<i>Plaxiphora albida</i> Hairy Chiton Length to 100mm	Living on the top of the reef close to the low water edge these large chiton are often covered in a growth of algae making it hard to distinguish the plates on their backs.
2	Other Chitons	There are many other small pale or multicoloured chitons such as these found in the rockpools. Many are unique to south eastern Australia.
5	<i>Ischnochiton elongatus</i>	
3	Chiton shells	Empty chiton shells can be found washed up on the shore. Here you can clearly see the eight plates.
4	<i>Ischnochiton australis</i> Green Chiton Length to 90mm	Found in large numbers on the underside of basalt boulders these dark green chitons move quickly (relatively!) if exposed to light.

Grazing Gastropods – Limpets

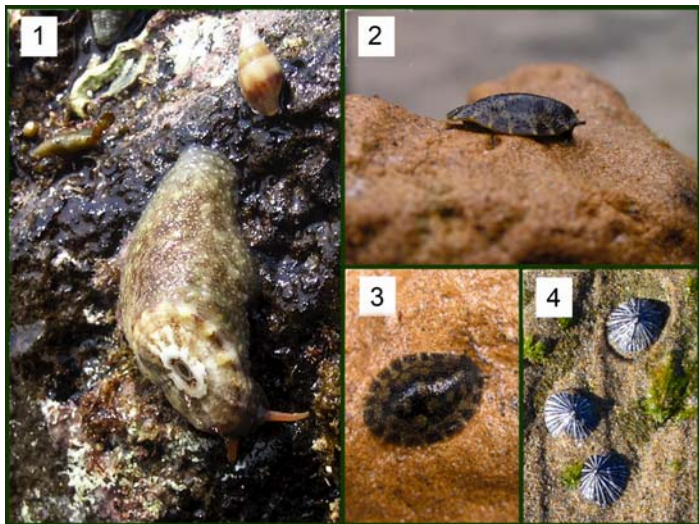


The conical water shedding shells of limpets help withstand drying in the intertidal zone and a strong muscular foot allows them to cling to the surface of the reef in areas washed by waves.

Limpets are grazers and use a rasp like tongue called a *radula* to actively scrape off micro-algae which grows as a thin cover over the rock surfaces.

	Names	Description
1	Limpets on rocks	Limpets can survive high on the wind and wave swept rocky shore.
2	<i>Cellana tramoserica</i> Variegated (Smooth) Limpet Height to 50 mm	A large orange-brown limpet with radiating dark stripes, these animals tolerate both waves as well as exposure and are found right across the intertidal area.
3	Variegated (Smooth) Limpet	This variegated limpet can be found in a variety of colours. Here are some samples found washed up on the sandy beach.
4	<i>Patelloida alticostata</i> Scaly Limpet Height to 40 mm	Also found on wave washed rocks this slightly smaller limpet has distinctive ribs and a scalloped edge to the shell.

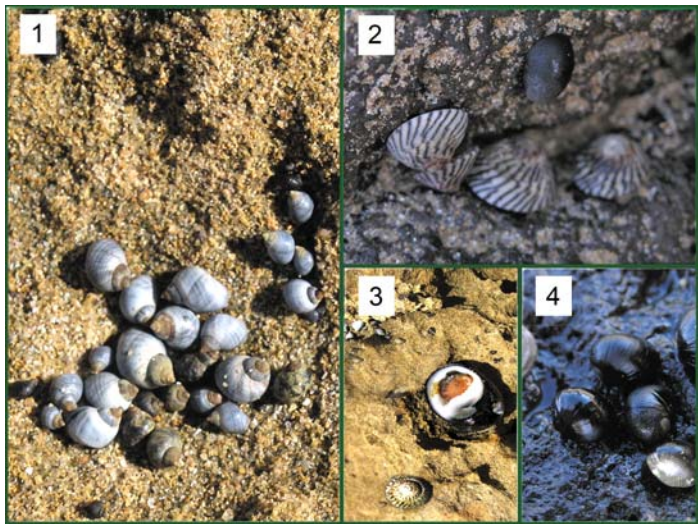
Grazing Gastropods – Keyhole Limpets, False Limpets and Onchidellids



True limpets have a network of gills under the edge of the shell that allows them to absorb oxygen from water. False or *pulmonate* limpets have a space beneath the shell that acts like a lung to get oxygen from air.

	Names	Description
1	<i>Amblychilepas nigrita</i> Keyhole Limpet Shell length to 25 mm	Found beneath rocks these molluscs have a limpet like shell, only partially covering their soft bodies, with a small opening which allows water to flow over their gills.
4	<i>Siphonaria diemenensis</i> False Limpet Van Diemen's Siphon Shell/Striped Limpet	Found in large numbers on the upper shoreline this air-breathing limpet has a striped shell and distinctive <i>siphon</i> canal under one side of their shells. Length to 20 mm
2 3	<i>Onchidella patelloides</i> Onchidellids Length to 25 mm	An unusual greenish-brown air breathing mollusc with a leathery mantle and no shell. Onchidellids live in crevices during the day, feeding at night and on dull days.

Grazing Gastropods - Snails



Grazing snails such as these also use their *radula* to feed on a variety of algae from microscopic to larger green, red and brown algae.

Their empty shells are a conspicuous feature of some beaches around the Bluff where they continue to provide habitat for smaller creatures.

	Names	Description
1	<i>Austrolittorina unifasciata</i> Blue Periwinkle Height to 15mm	Surviving high on rocks in the spray zone these tiny grazers are able to survive long periods out of the water.
2	<i>Bembicium nanum</i> Striped Conniwink Height to 10mm	These small grazers live in the upper sections of the intertidal area and are easily recognised by the black and white patterns.
3	<i>Nerita atramentosa</i> Black Nerite	An herbivorous snail, the Black Nerite is particularly abundant in the holes on the basalt boulders within the Barwon Bluff Marine Sanctuary.
4	Height to 28mm	They are glossy black on the top and have a distinctive white lip underneath.

Grazing Gastropods - Snails



Most grazing gastropods have a typical snail-like shell to protect their soft bodies. These shells usually have some kind of *operculum* or lid to seal in moisture at low tide, or to seal out predators if disturbed.

	Name	Description
1	<i>Austrocochlea constricta</i> Ribbed Top Shell Height to 25 mm	The whorled ribs of the shell give this abundant grazer the appearance of an old fashioned spinning top.
2	<i>Chlorodiloma odontis</i> Height to 25 mm	Living in more exposed conditions than its cousins, this snail has thicker green and black bands.
4	<i>Turbo undulatus</i> Warrener or Turbo Height to 50 mm	A large active grazer found lower on the reef or in pools, the Turbo has a thick green and white shell with a characteristic white <i>operculum</i> , often found washed up on the beach.
5		

Grazing Gastropods – Elephant Snail

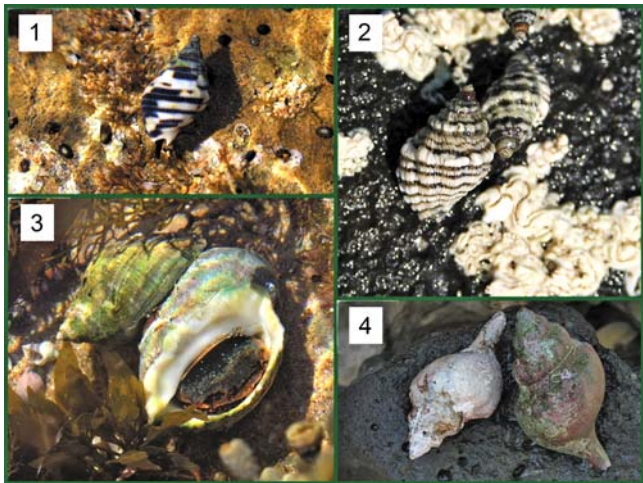


The Elephant Snail is the largest mollusc commonly found in the intertidal area of the Bluff. They are more numerous where there are large loose boulders or crevices in the rock where they can hide when the tide is out to avoid drying out.

Like many other species on the rock platform these animals depend on their immediate environment for their survival and should always be left where they are found.

Name	Description
<p data-bbox="55 1132 218 1180"><i>Scutus antipodes</i> Elephant Snail</p> <p data-bbox="55 1205 225 1228">Length to 100 mm</p>	<p data-bbox="301 1110 977 1161">Easy to distinguish by their size and black colouration Elephant Snails are grazers related to keyhole limpets.</p> <p data-bbox="301 1195 967 1246">The large body of this animal has an inadequately small white shell, making it very vulnerable to exposure.</p> <p data-bbox="301 1282 977 1333">Large tentacles at the front of the head help this snail to move out from under rocks at night to feed on drift algae.</p>

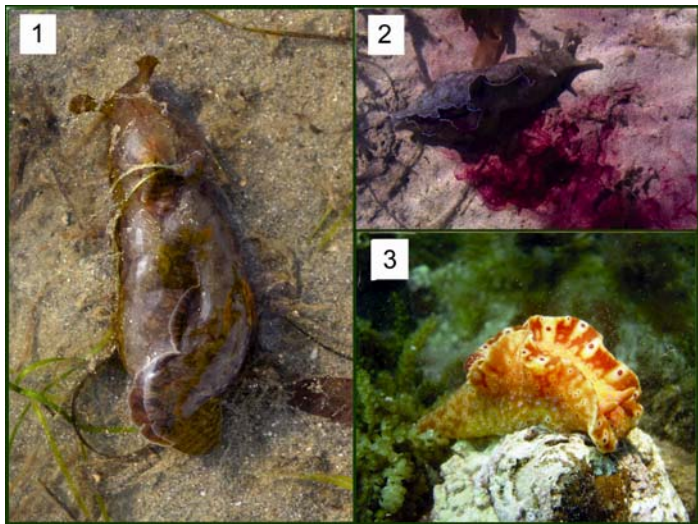
Gastropods – Carnivores & Scavengers



Animals that need to seek out food, rather than live on it as do most herbivores, need a good sense of direction. Carnivorous and scavenging molluscs use a specialised tube known as a *siphon* to detect their food in the water and then move to it. The shells of these animals have a distinctive groove at one end to allow the siphon to extend out from the body.

	Name	Description
1	<i>Cominella lineolata</i> Lineated Cominella Chequer Board Shell Height to 30 mm	Cominellas are active scavengers that use their siphon to detect dead animals on rocky shores.
2	<i>Lepsiella vinosa</i> Wine-mouthed Lepsiella Height to 20 mm	A much smaller predator, this species tends to seek out white tube worms or barnacles for its prey.
3	<i>Dicathais orbita</i> Dog Whelk Height to 75 mm	With its creamy white shell covered in rut like grooves this active predator can sometimes be seen feeding on other snails, sea squirts, or tube worms.
4	<i>Pleuroploca australasia</i> Tulip Shell Length to 150 mm	This powerful, largely nocturnal, predator has a bright red body and large brown spiralled shell that tapers to a narrow groove for the <i>siphon</i> . It hides in crevices around the edges of rockpools and reefs.

Sea Slugs and Sea Hares



Some groups of gastropods have either very thin and much reduced shells, or as in the case of the *nudibranchs*, or sea slugs, no shell at all. These animals rely on chemicals (taste toxic!) and colour (looks really nasty!) deterrents to avoid becoming lunch for their neighbours.

Nudibranchs are brightly coloured sea slugs that have their feathery gills on the outside of their body, unlike most molluscs where they are hidden by a shell or the mantle, hence the name *nudi* – meaning naked, and *branch* – referring to the gills.

	Names	Description
1	<i>Aplysia sydneyensis</i> Sea Hare	Sea Hares are a group of large slug-like molluscs, with a thin shell hidden beneath folds in the skin and obvious rolled tentacles.
2	<i>Aplysia sydneyensis</i> Length to 150 mm	These seemingly defenceless animals can produce a vivid purple dye to ward off predators themselves if disturbed from their grazing.
3	<i>Ceratosoma brevicaudatum</i> Short –tailed Sea Slug	This spectacular animal can be found amongst rockpools or on the reef edge where it feeds on otherwise toxic sponges or bryozoans.

Mussels



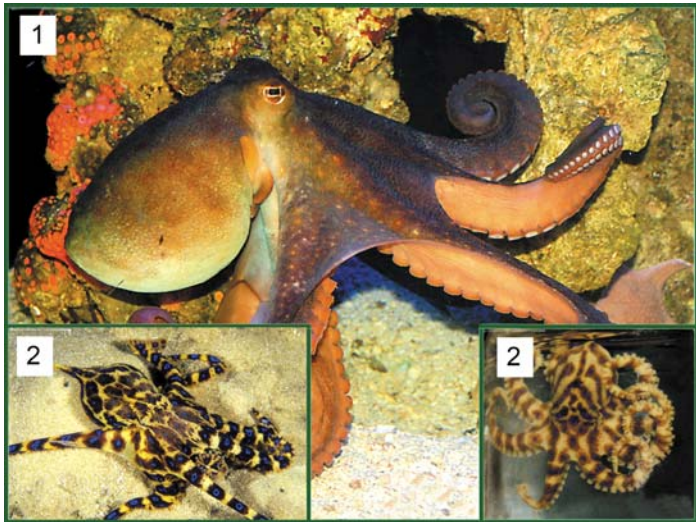
Bivalve means 'two shells' and describes these highly evolved molluscs. Most are filter feeders capable of straining plankton and detritus from the water through a complex filter system. Their tough shells help them to avoid most predators although many become food for larger animals.

Bivalves are often found in sand or sediments and are numerous in the estuary, a few like scallops are free swimming, and some attach themselves to rocks and other solid surfaces.

	Names	Description
1	Carpets of mussels	Mussels grow in carpets over the rock platform and create shelter for grazers as well as barnacles and other fixed creatures.
2	<i>Brachidontes rostratus</i> Beaked Mussel Length to 40 mm	More purple in colour, with a long symmetrical shaped body showing regular radial ribs, this mussel also forms mats in similar habitats to <i>Xenostrobus pulex</i> .
3	<i>Xenostrobus pulex</i> Little Horse Mussel Length to 25 mm	These small black mussels form dense mats on the rocky shore and attach themselves with strong threads. Mussels are filter feeders and in turn are prey for a number of birds, fish, crabs, and carnivorous snails.

Cephalopods – Octopus

(Class: *Cephalopoda*)



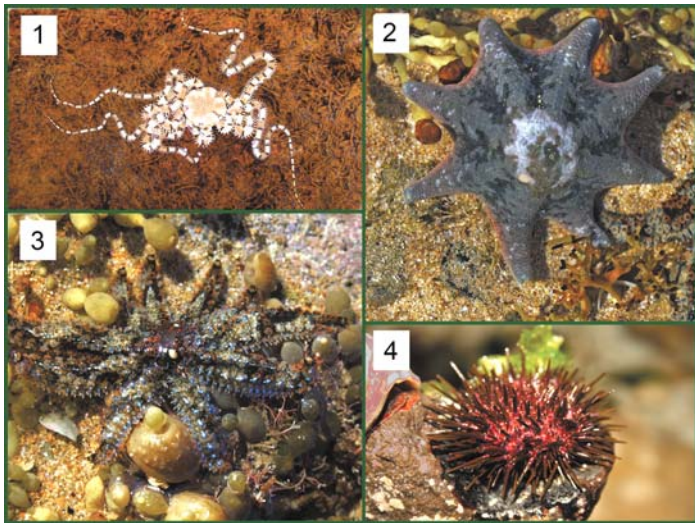
The cephalopods are highly evolved and active hunters with characteristic suckered tentacles, a large water filled mantle covering internal organs, great vision, and many have specialised pigment cells that allow them to change colour rapidly.

Their *siphon* is used for “jet” propulsion and they can also produce clouds of ink to help avoid capture. This group includes octopus, squid, and cuttlefish - all of which occur within the Barwon Bluff Marine Sanctuary.

	Names	Description
1	<i>Octopus maorum</i> Maori Octopus Length to 1.2 m	The grand nocturnal predator of the reef the Maori Octopus may be seen in rockpools or on the reef edges when low tides and good torches coincide.
2	<i>Haplochlana maculosa</i> Blue Ringed Octopus Length to 12 cm	Generally a timid animal, the Blue Ringed Octopus hides in crevices during the day emerging mainly at night to hunt out crabs. The distinctive blue rings appear when the octopus feels threatened. Care should be taken to avoid accidental encounters by always watching where hands are going in rockpools.

Echinoderms – Seastars and Relatives

(Phylum: Echinodermata)



Echinoderms are a group of exquisitely beautiful exclusively marine animals. They are “spiny skinned” animals that have radial symmetry, usually with rays or arms in fives or multiples of fives.

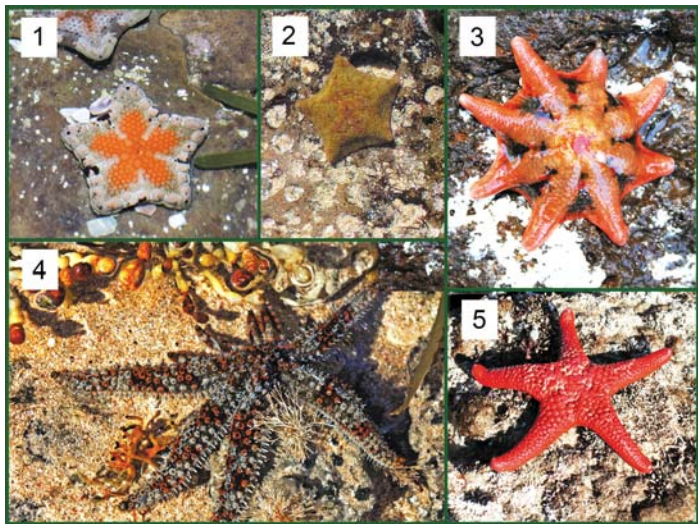
They have water filled spaces in their bodies, and many have sucker-like *tube feet*, which they use for movement or for gripping objects.

The group includes well known marine creatures such as seastars (2 & 3) and sea urchins (4), as well as feather stars, sea cucumbers, and brittle stars (1) which are less often seen but reasonably common subtidally.

Echinoderms are mostly found as bottom dwelling animals both in rockpools and the deep ocean. Limestones often contain many marine fossils sometimes including the hard remains of echinoderms.

Echinoderms – Seastars

(Class: Asteroidea)

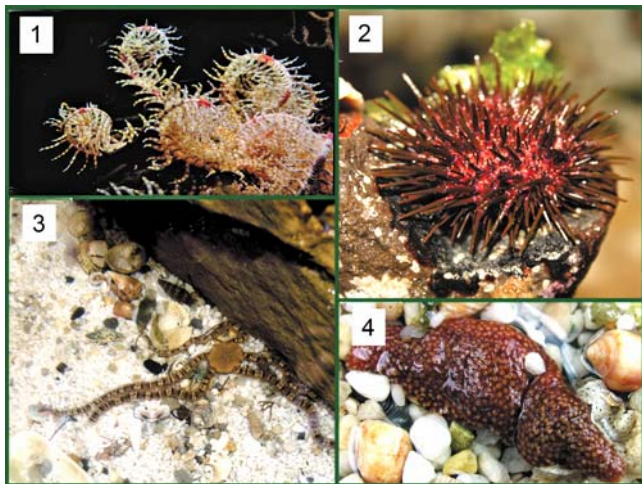


Seastars are instantly recognisable and have a body comprising a hollow central disc and multiple arms radiating out from this and canals of water flowing through them. Under the arms are grooves containing the tube feet which can cling to surfaces and aid in obtaining food. To feed, seastars push out their stomachs and digest food externally before slurping it up.

	Names	Description
1	<i>Tosia australis</i> Biscuit Star	Feeding mainly on sponges, bryozoans and other attached invertebrates these stunning seastars are occasionally seen in deeper pools. Diameter to 100 mm
2	<i>Parvulastra exigua</i> Little Green Seastar	Common in shallow pools at the base of the Bluff this small five sided seastar is greenish in colour. Diameter to 13 mm
3	<i>Meridiastra calcar</i> Common Seastar	Many different colours including orange, blue, green and grey make these colourful scavenging seastars popular features of many rockpools on the Bluff. Diameter to 100 mm
4	<i>Coscinasterias muricata</i> 11 Armed Seastar	One of the larger predatory seastars in Victoria this seastar feeds on molluscs like mussels and has interesting spines equipped with tiny pinners on its arms. Diameter to 500 mm
5	<i>Nectria ocellata</i> Ocellate star	Another deeper reef species these orange, red or yellow seastars are occasionally washed into rockpools. Diameter to 260 mm

Echinoderms – Seastars and their Relatives

(Phylum: Echinodermata)

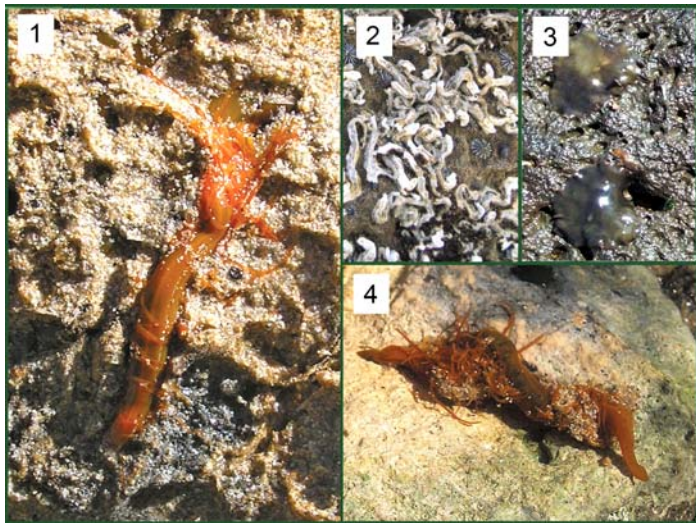


Other members of this group, while perhaps less well known, are also important parts of the reef community and play roles as grazers, scavengers, and recyclers.

They all share the basic features of echinoderms as outlined but have very different body shapes that match their lifestyles.

	Names	Description
1	Feather Star Class: Crinoidea	The feathery arms of these stars are covered in sticky tentacles to capture food when extended into the water.
2	<i>Helicidaris erythrogramma</i> Purple Sea Urchin Class: Echinoidea	Urchins have a rounded shape and are covered in spines with a set of powerful triangular teeth on the base, used for munching through algae. Diameter to 70mm
3	Brittle Star Class: Ophiuroidea	With long slender but solid arms brittle stars are often found under rocks where they feed on small pieces of organic material.
4	Sea Cucumber Class: Holothuroidea	During the daytime sea cucumbers are found under rock, emerging at night to consume large quantities of sediment to get their food.

Worms



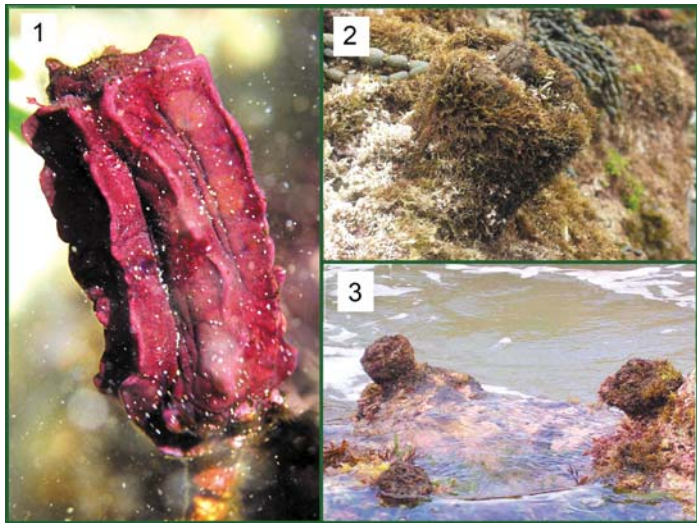
Worm-like animals are common in the sea and come from a number of different groups or phyla. They are an important and diverse group that include a range of carnivores, scavengers and important recyclers, and in turn are a food source for many species including fish and birds. They live in sand, rubble, or even in crevices in rocks.

Marine worms in this group have soft segmented bodies and range from microscopic to giant sandworms over a metre. They are found in most marine habitats and play important roles in intertidal food webs.

	Names	Description
1 4	Terrellid Worms (Class: <i>Polychaeta</i>)	With large segmented bodies, normally buried in sediment hidden in cracks, the long sticky tentacles of these worms capture particles of food, which is then passed along narrow mucous filled grooves to the mouth.
2	<i>Galeolaria caespitosa</i> Tube Worms (Class: <i>Polychaeta</i>)	At high tide feathery mouthparts used to strain plankton from the water emerge from the white calcified tubes made by these worms.
3	<i>Notoplana australis</i> Flatworm (Phylum: <i>Platyhelminthes</i>)	Intertidal flatworms are often found on the underside of rocks where they slide across the surface seeking out small encrusting animals.

Sea Squirts / Tunicates

(Phylum Chordata/Class: Ascidiacea)



Tunicates begin life as free swimming tadpole-like larvae with a distinct notochord, similar to the early vertebrae in higher animals and hence they are placed in the same major group of living things as us. After attaching to rocks larvae lose their tail, form two openings, and then obtain food by siphoning water in through one valve and out the other.

They range in size from tiny zooids that live together in a jelly like matrix to large solitary individuals such as the cunjevoi.

	Names	Description
1	<i>Pyura gibbosa</i> Sea tulip Height to 320 mm	Sea Tulips have two large siphons on the side of their red body and can be seen around the edge of deeper pools or attached to the reef.
2	<i>Pyura stolonifera</i> Cunjevoi	Looking much like a rock with some growth on the lower edge of the reef these larger ascidians can often be seen after waves crash over them squirting jets of water into the air.
3	Height to 300 mm	

Bony Fish

(Class: Osteichthyes)



Fish require a constant supply of water to maintain their gills to gain oxygen so they are only found on the intertidal reef in places where water is trapped, e.g. in rockpools or beneath rocks.

Included here are some species which may be seen in the sanctuary.

	Names	Description
1	<i>Parablennius tasmanianus</i> Tasmanian Blenny Length to 130 mm	Blennies are small fish with long fringed tentacles over their eyes. They often live in holes beneath rocks or inside larger shells.
2	<i>Bovichtus angustifrons</i> Dragonet Length to 150 mm	This small mottled and quite colourful fish, with a small spine projecting from the rear of the head, has large fan shaped fins and often sits on the bottom of pools.
3	<i>Girella zebra</i> Zebra fish Length to 540 mm	Often occurring in sizable schools around shallow reef areas of the Bluff the juveniles of this fish are often seen in deeper rockpools.
4	<i>Scorpius aequipinnis</i> Sea sweep Length to 560 mm	Enjoying the turbulent water around reef edges, the juveniles of this species are also often seen in rockpools.

Shorebirds

(Class: Aves)



	Names	Description
1	<i>Larus novaehollandiae</i> Silver Gull	A common species on southern Australian coasts this gull is a scavenger and spends much time sorting through the flotsam.
2 5	<i>Larus pacificus</i> Pacific Gull	Often seen flying on the shore-line where it finds beach-cast fish, squid, and even small sea birds on which it feeds. The large brown juvenile (5) is often mistaken as a different species.
3	<i>Threskiornis molucca</i> - Australian White Ibis	With its long, curved beak, it is well able to probe deeply into estuarine silt for worms, crustaceans and other invertebrates, but frogs, fish and small reptiles are also eaten. There are several breeding sites close to Barwon Heads.
4	<i>Phalacrocorax melanoleucos</i> Little Pied Cormorant	Often noted perched on the rock platforms, or more often on pier structures or moored boats, this cormorant feeds mainly on crustaceans and small fish it pursues underwater.
6	<i>Egretta novae-hollandiae</i> White-faced Heron	This heron is a common inhabitant of wetlands, tidal estuaries and occasionally rocky reefs. It feeds by stalking and stabbing at small fish, crustaceans, frogs and other aquatic fauna. In early spring it builds a flat stick nest in a tall tree and raises up to five or six young.

Other treasures of the rocky shores



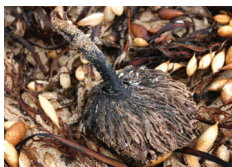
Cuttle skeleton



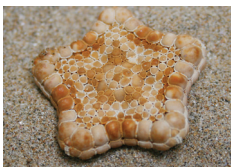
**Gastropod operculum
(trap door)**



Sea Urchin test (skeleton)



Seaweed holdfast



Biscuit Star



Elephant Snail shells



**Draughtboard Shark egg
case**



Catshark egg case



Crab moult



Chiton plates



Brown Algae washed up



Moon Snail with egg case



Puffer Fish air bladder

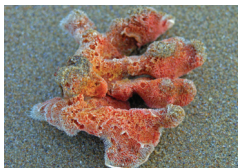


Puffer Fish



Abalone shell

Other treasures of the rocky shores



Sponge



Sponge



Sponge



Cone Shell



Lace Bryozoan



Crab exoskeleton



Pheasant shells



Bivalve (Mollusc) shell



Bivalve (Mollusc) shells



Decorator Crab



Jellyfish



Seaweed pneumatocysts



Goose Neck Barnacles



Weedy Seadragon



Bleached Coralline Algae

GLOSSARY

- Adaptation:** structures, behaviours or physiologies which provide survival advantages to an organism
- Bivalve:** a two-shelled mollusc (e.g. mussel).
- Carnivore:** an organism that consumes other animals for energy and building materials
- Competition:** the struggle between organisms or groups of organisms for similar biological or physical resources.
- Consumer:** an organism that obtains energy by feeding on the tissues of another organism.
- Cyanobacteria:** simple organisms that can photosynthesise
- Detritivore:** an organism that consumes the broken down remains of plants and animals
- Ecosystem:** a complex set of physical and biological elements interacting with each other.
- Endemic:** only found in a particular area
- Gastropod:** a mollusc that has a large, muscular foot.
- Holdfast:** an strong attachment point for marine algae that prevents them being washed away
- Herbivore:** an organism that consumes plants or algae
- Invertebrate:** an animal without a backbone.
- Kelp forest:** a community of large brown algae
- Mantle:** the outer part of a mollusc that secretes the shell
- Operculum:** a structure that is used to seal the entrance to shells found in tubeworms and molluscs
- Photosynthesis:** the process used by green plants to convert carbon dioxide and water into carbohydrate and oxygen, using the sun's energy
- Phytoplankton:** plankton able to photosynthesize.
- Plankton:** free floating plants and animals, usually microscopic.
- Pneumatocysts:** air filled bladders found in some larger algae for floatation
- Predator:** an organism that hunts live food.
- Prey:** an organism that is eaten by a predator.
- Propagule:** a part of a plant or animal that continues to grow when detached from the parent.
- Radula:** a rasping structure found in the mouths of molluscs used for feeding
- Scavengers:** animals that feed on dead animals and plants
- Siphon:** a tube like structure allowing water to flow into or out of an animal
- Stipe:** the stalk of larger seaweeds
- Tube feet:** small water filled tubes exclusive to Echinoderms with a tiny sucker on the end



Disclaimer:

While all due care has been taken to provide factual information this guide is not perfect. It is intended to be a simple guide to the remarkable life on our Bluff and should be considered as such.

For more comprehensive information try the references below:

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