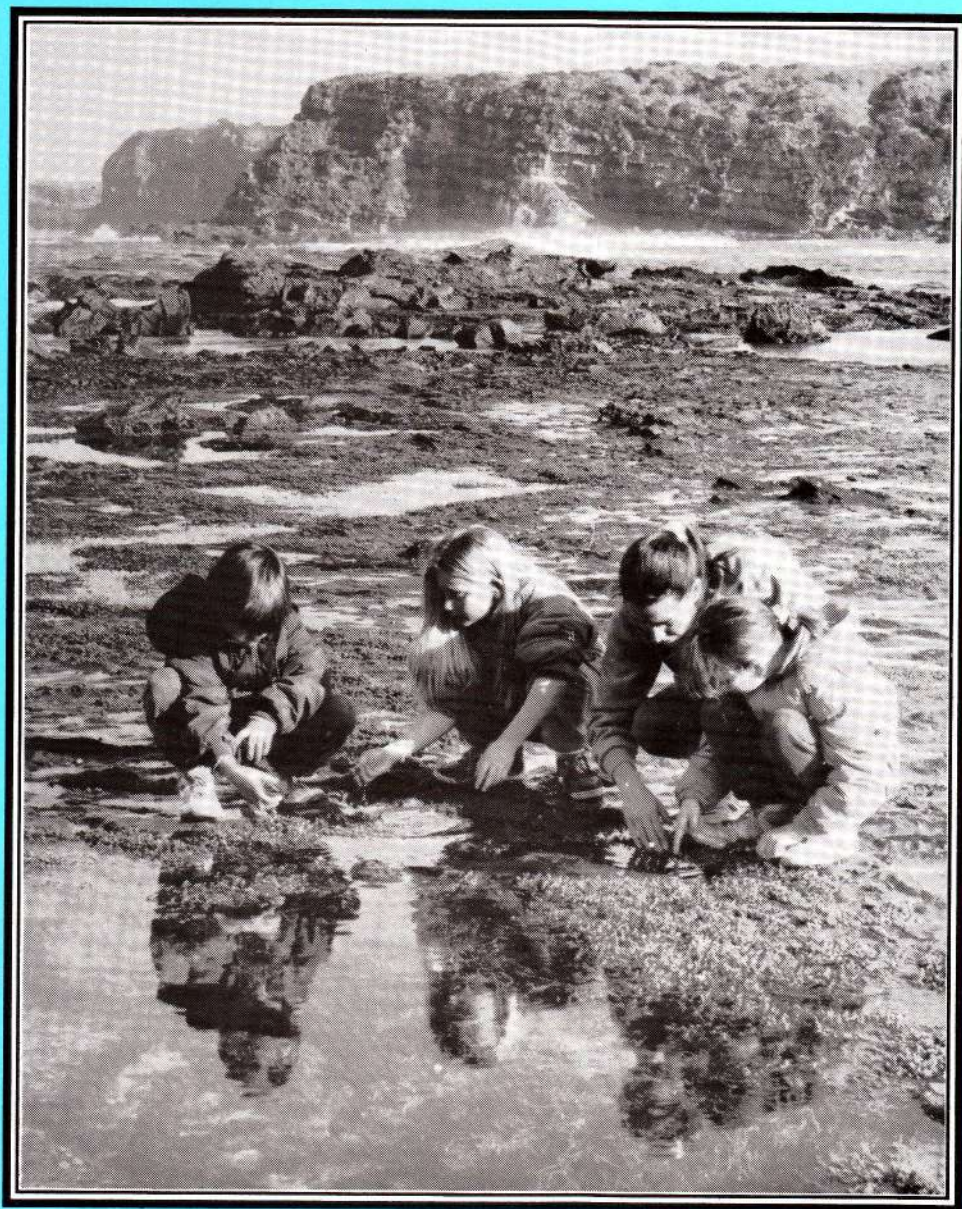
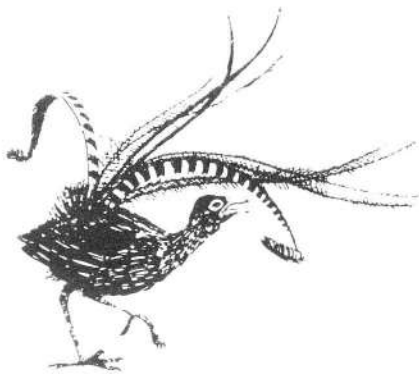


Environmental Activities Around Inverloch

- Activity sheets for children
- Identification charts
- Maps
- Information for teachers and parents
- Self guided nature trails



Produced and published by South Gippsland Conservation Society



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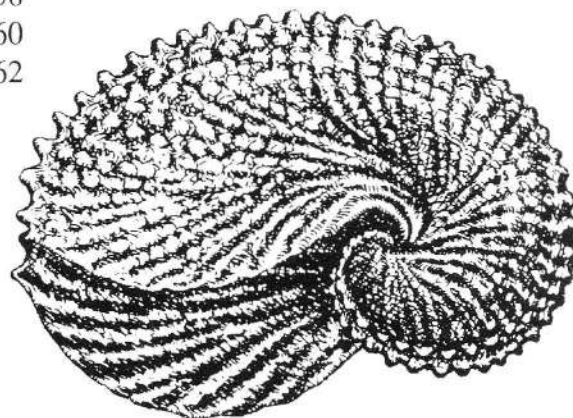
Front cover: ROCKPOOLING, BUNURONG COAST

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Introduction

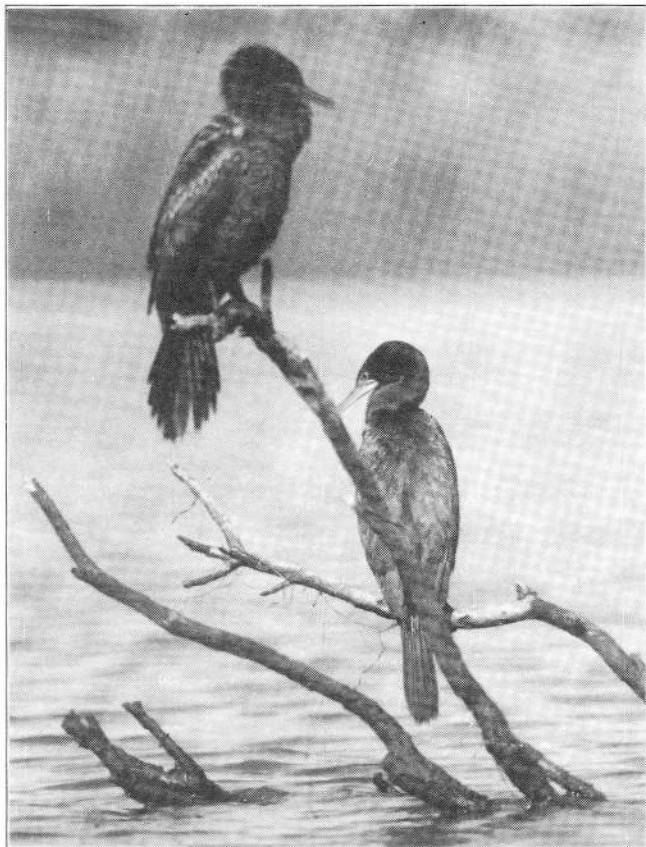
This book has been prepared by members of the South Gippsland Conservation Society. It is hoped that it can be used and appreciated by children and adults learning together. It is appropriate for use by school groups and families. It combines information with activities and does not require special scientific or environmental knowledge for its use.

The Society, through its Environment Centre, has been assisting residents and visitors to the area, including holiday makers and school groups, since 1981. During this time we have prepared a number of publications on the local area.

A Guide to Inverloch. This is a map of the coastline from Mahers Landing (4 kilometres east of the town) to Cape Paterson, with brief notes about places to visit and activities appropriate for certain areas.

Shells of the Inverloch Area. This chart illustrates the common shells found in the local area and gives some information about the live shellfish.

Eagles Nest, Bunurong Coast. A coloured poster.



CORMORANTS, PHOTO BY NOEL MAUD

Beachcombing Guide for South Gippsland Coastal Areas. This chart illustrates and names over 30 interesting beachcombing features washed up on our beaches. The Guide describes how these discoveries are often only a part of a plant or animal and gives interesting information about each.

Rockpooling Around the Bunurong. This 26 page booklet is a field guide, illustrating and giving information on the different plants and animals found living on our rocky shores.

Bunurong Coastal Reserve. This 20 page booklet gives general information on local Aboriginal history, white settlement, geology, flora and fauna of the Bunurong coastal area. It includes species lists.

Andersons Inlet: Waders and Waterbirds. This 60 page book is a comprehensive work on the birds found in the Inlet. It includes information on the natural history of the area, where and when to observe birds, their migration paths and feeding habits.

The Society has been involved in organising field excursions. For many years members organised a summer program of walks conducted during the six weeks of the Christmas holidays. The Environment Centre has also responded to requests from schools to help run field activities, prepare worksheets and give talks. The Environment Centre has several educational displays, concentrating on local natural history. With an increasing pressure on our limited voluntary services, the Society has now produced this book which we hope will make some of our local knowledge available to many people.

This book combines information for both adults and children. The information for adults is in the general text and is not always appropriate for children. It does not include sections on flora and fauna of the area as these are already well documented in other Society publications. Children learn more easily through experience, which can be simply observing or performing some activity in the natural environment. The *activity sheets* in the book are designed for middle to upper primary school level, but can be adapted for any age. Adults are encouraged to read the book and explain relevant facts to the children in conjunction with doing the activity.

About the Area

This book refers to the coastal area around Inverloch, including parts of Andersons¹ Inlet and the Bunurong Coast. The area which we consider local and accessible can be seen in the maps on pages 32 and 33.

Andersons Inlet

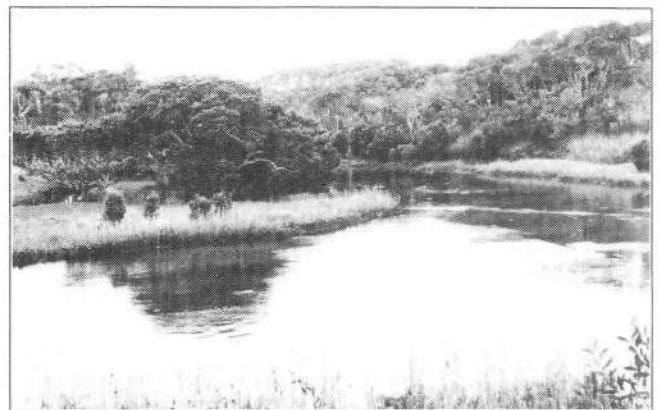
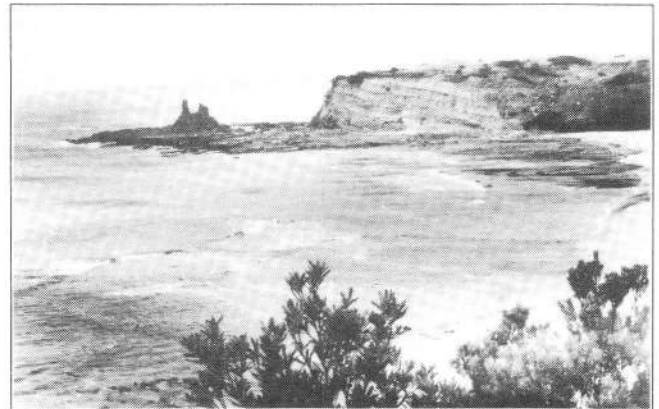
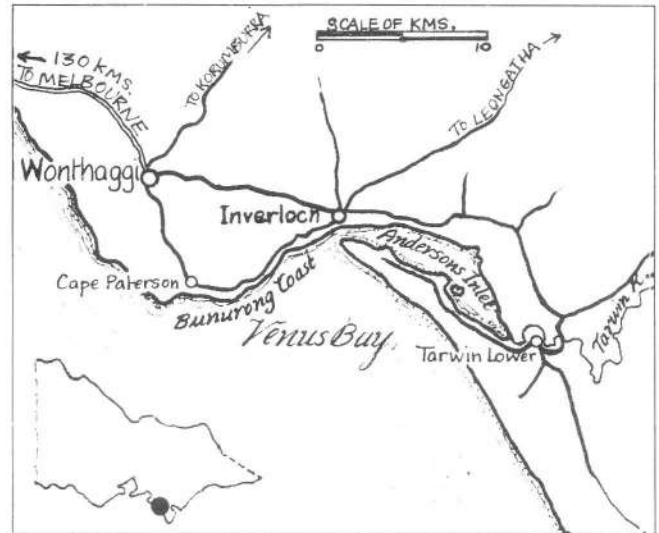
To the east of the township lie the usually calm waters of Andersons Inlet. Inverloch lies at the entrance of the Inlet. Across the water can be seen the vegetated sandspit of Point Smythe. The Inlet is the estuary of the Tarwin River. The dunes of Venus Bay form a barrier preventing the river opening more directly to the sea. The Inlet is relatively shallow, and at low tide extensive mudflats are exposed. These mudflats are intersected by a deep channel which caters for the tidal waters and water entering from the Tarwin River and smaller creeks. The channel meanders to the mouth creating shifts in the sand bars and troughs. This constant movement has been responsible for the changes to Inverloch's coastline since its settlement. There is a lot of evidence of human attempts to alter its course. As the shifting sand threatened human structures, stone and redgum walls were erected, levee banks were built and piles of bluestone spalls were dumped.

Andersons Inlet is an important area for waders and waterbirds, some of which are migratory species which travel to the northern hemisphere. A threat to the feeding grounds of these birds is Rice Grass (*Spartina*), an introduced plant which is colonizing the mudflats.

Bunurong Coast

The Bunurong cliffs stretching from Wreck Creek, 4 kilometres west of Inverloch, to Cape Paterson, consist of sandstone cliffs up to 40 metres high, broken by thickly vegetated gullies. At the base of these cliffs are rocky shores with caves and rock pinnacles, interrupted occasionally by sandy coves. The rock stack, known as Eagles Nest, provides the dominant landmark. The area is largely in its natural state with little development evident from the scenic coastal road. There are carparks and beach access at several points along the road.

The area extending 1 kilometre out to sea from the high water mark along this stretch of coast, is now part of the Bunurong Marine Park.



¹ "Andersons Inlet" is the name most widely used by local residents, maps and publications. However, the government place names register records its correct name of Anderson Inlet.

Aborigines

The Aborigines who lived in the country between the Bass and Tarwin Rivers were the Yowenjerre, the most easterly clan of the Bunurong people. They used local stone to fashion tools and occupied a large area of land from the Strzelecki Ranges to the coast. They created tracks linking swamps and other places where food was plentiful.

To the east of the Tarwin River the traditional inhabitants were the Jatowarawara, a clan of the Kurnai people, who occupied the Gippsland area. The Yowenjerre and the Jatowarawara often mingled, maintaining a friendly relationship and intermarrying. The Yowenjerre had access to stone from local quarries and stone from other Bunurong people which was needed by the Jatowarawara, to fashion tools including axes. It is known that the people of the Tarwin River area used stones from the Mornington Peninsula. It is also believed that one of the basalt quarries was about 1 kilometre out of Inverloch.

After 150 years of European settlement the remains of coastal middens and occasional tools and artifacts found in swampy areas are all the evidence we have of the Aboriginal occupation that may have spanned 40,000 years. The middens can be identified by the presence of blackened sand with burnt and blackened shells. These are usually exposed in layers in an eroding dune and are uncovered and covered periodically according to the changing nature of the dune system.

Studies of the middens will show what sort of food was eaten. In this area it was predominantly shellfish; such as limpets and warreners gathered from the rocky shores. The relatively shallow depth of the middens, and the separation of the fire scars by clean sand, would indicate their stays on the coast were short and intermittent.

Within Andersons Inlet, ducks, swans and their eggs, and fish were part of the diet. The area surrounding the Inlet before European settlement would have been extensive swamps, providing a rich source of food also.

The Yowenjerre possibly were numbered only in the hundreds and largely living in small family groups. They were nomadic people and their movement most probably depended on food

sources, availability of shelter, the need to barter for tools and stones and the joining for ceremonies. Aborigines generally travelled along well known routes between favoured campsites. These routes could be maintained with the use of fire if necessary.

Fire was also used to create pasture type areas where game such as kangaroos and swans could be easily hunted. Kangaroos as well as possums also provided the animal skins which were used to make clothes and blankets.

Some of our local coastal plants would have been used as a diet supplement. Pollen from the banksia flowers, the berries of the Coast Beard Heath and the bulbs of several native annuals. Bull-kelp from the sea and Spiny-headed Matrush from the bush were used for making bags.

According to most accounts the number of Bunurong people was in rapid decline by 1840. The decline was most possibly due to conflict with European whalers and sealers in the early 1800s and the introduction of diseases such as measles and syphilis.

The low-impact lifestyle of the Aborigines meant that the land could support only a small population, but the resources of the land were ingeniously used to sustain a healthy lifestyle and ensured a renewable and plentiful supply of food and other necessities.

The State Government's Coastal Policy (Victorian Government 1988) highlights the importance of the preservation of Aboriginal relics along the coastline, noting their significance in developing an understanding of the Aboriginal culture.

Aboriginal middens are protected and must not be disturbed. If you locate what you believe to be a previously unknown site, it would be appreciated if you report this. Information can be sought from the Department of Conservation and Environment².

2: Department of Conservation and Environment, hereafter referred to as DCE.

European Settlement

In 1835 the land along the coast between the Bass River and the Tarwin River was claimed by Samuel Anderson.

In 1840 he undertook an expedition in the hope of finding land suitable for cattle, and on that expedition noted a large inlet that was almost blocked by a sand bar. Later that year Governor Latrobe sent Assistant Surveyor Townsend and a survey party to map the Inlet. Townsend, in his journal, described Andersons Inlet as a "blue lagoon" indicating it may have been cut off from the sea. They made their base camp at the spot where Inverloch now is. Inverloch was then named Andersons Inlet, for Samuel Anderson, and Townsends Bluff, for the Surveyor Townsend. Between 1841 and 1846 the Surveyor Smythe named Point Smythe, Eagles Nest and Petrel Rock.

When land selection took place in the 1870s, the coast played a major role. Boats using jetties at Mahers Landing and Inverloch brought supplies and left with the farmers' produce of potatoes, butter, hides, wattle bark and wool.

In 1883, Andersons Inlet Post Office opened, but six years later, the name was changed to Inverloch, after Loch Inver in Scotland (Inver - "at the entrance to", Loch - "lake"). The school was established in 1886 and in 1897 the Mechanics Institute and Public Library were built. By the end of the 1800s, Inverloch was established as a fishing port and holiday resort. Most visitors still came by sea although some travelled by horse.



At this time, smaller properties were taken up on the Bunurong cliffs. In the early 1900s E.G. Fitzgibbon (a town clerk of Melbourne at the time) built a fine house on the cliffs. The house remains today. When the Powlett coalfield was opened up, coal was brought to Inverloch and shipped to Melbourne.

Once Wonthaggi was settled, and a rail link for coal transport established, Inverloch returned to a quiet coastal resort and fishing village. A track was cut from Cape Paterson to Inverloch making the Bunurong coast accessible. Holiday huts sprang up in sheltered bays. The first of them was built at The Oaks in 1934. The last few of these illegal dwellings were demolished at Shack Bay in 1977.

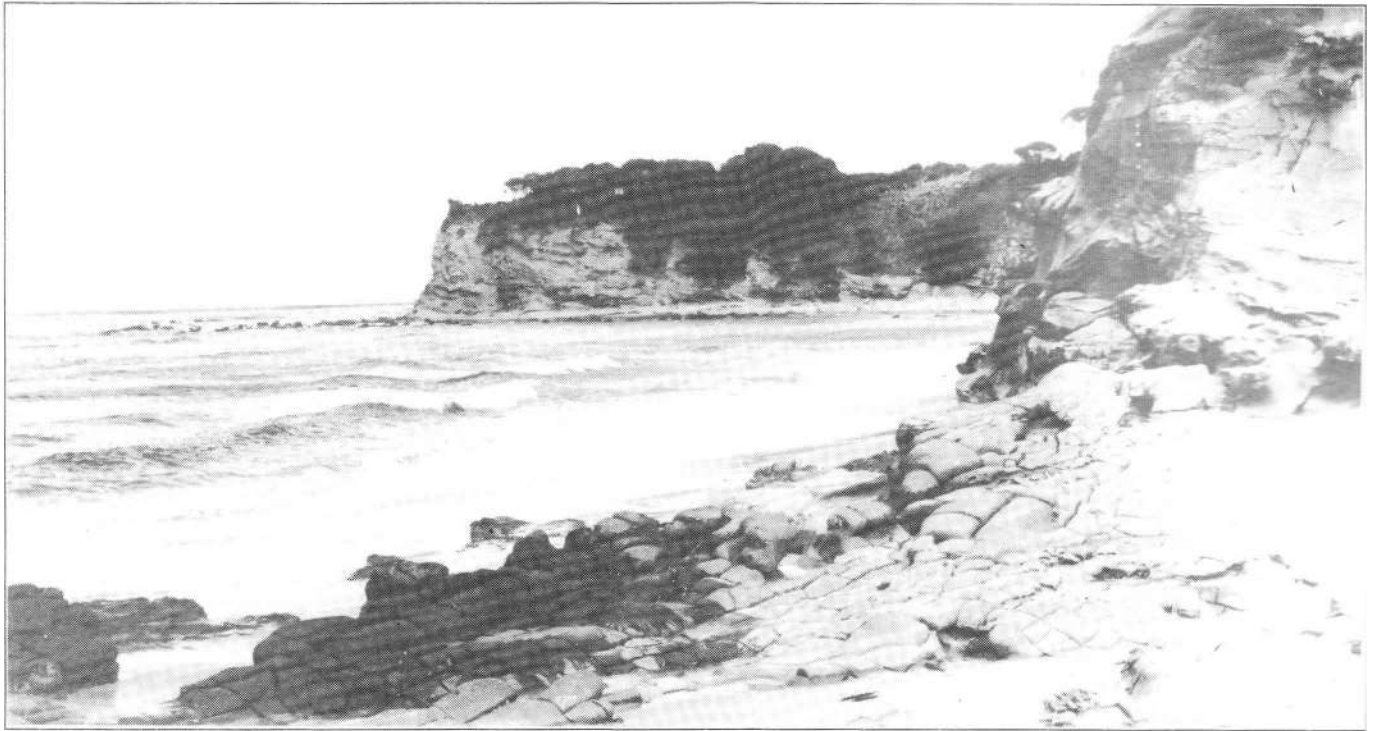
In 1914 the Inverloch Foreshore Committee of Management was formed and for over sixty years managed the coastal area. During this time two enclosed bathing places, changing sheds and wells were provided in the town area, and later camp sites and toilets. In the 1960s, the Committee granted occupancies on the foreshore to a number of organisations including the Bowling Club, Angling Club and Yacht Club. In 1977, the former Department of Crown Lands and Survey took over responsibility for the coastal area and has administered it since, although the Government department has had two name changes; the Department of Conservation, Forests and Lands, and in 1990 the Department of Conservation and Environment.

The tourist interest in the Bunurong coast has grown recently. In the late 1970s the entire coastal road between Cape Paterson and Inverloch was sealed and the Bunurong coastal area was named at the suggestion of members of the newly formed South Gippsland Conservation Society. The name derived from the Bunurong Aborigines, the former occupiers of the area.

Two of the nature trail walks in this book discuss some of the man-made historical coastal features still visible along the town beaches.

The presence of some exotic plants at Shack Bay and The Oaks, are reminders of the gardens planted near the shacks once there.

LEFT: BATHING ENCLOSURE, INVERLOCH, EARLY 1800s.
FROM WOORAYL SHIRE HISTORICAL SOCIETY, PHOTO BY G. FORD



The cliffs of the Bunurong coast are composed mostly of Cretaceous sandstones, part of the Strzelecki sandstones of eastern Victoria believed to be between 140 and 105 million years old. Caves have been carved into the cliffs and erosion along other fault lines has created some interesting formations.

Eagles Nest remains as a prominent rock stack on the shore platform after erosion along a fault line across the adjacent headland. The extensive rock platforms have formed after the sea has pounded at the base of the cliffs, undercutting it and causing it to collapse. It takes with it remains of animal bones and vegetation and all the components of the sedimentary sandstone. Over thousands of years these platforms become moulded into the pools and nooks and crannies we see today, with the rock containing small seams of coal, petrified wood, fossils and iron coatings. The petrified stumps and branches of trees are easily recognisable at the Eagles Nest rock platform. There are also areas of conglomerate rocks, large concretions of ironstone and dykes of volcanic rock. Coal seams are a prominent feature in the carbonaceous mudstones around Flat Rocks.

Andersons Inlet is, in geological terms, a new feature. About seven thousand years ago the present northern shore of the Inlet, including Townsends Bluff and Nolans Bluff would have

been exposed to the ocean. At this time the sea level was slightly higher than today due to the decline of the last ice age. Point Smythe would not have existed.

As the sea levels fell again the sand dunes of Venus Bay and Point Smythe were formed, cutting the Tarwin River off from the sea and creating the Inlet. There is a continual shifting of silt determined by the varying water flows of the Tarwin River.

Dinosaur Fossil Remains

The most important early discovery of fossils in Victoria was made by a government geologist, W.H. Ferguson, while mapping part of the coal bearing sandstones of the Strzeleckis, early in the 1900s. He discovered two bones in the Eagles Nest area, one a tooth from a lungfish and another a claw from the foot of a carnivorous dinosaur. This became known as the "Cape Paterson Claw" and was Victoria's only dinosaur fossil for over 70 years! In 1978 the search for more fossils was undertaken using Ferguson's map, locating the site of the original dinosaur bone. A fossil was soon found and the site continues to be visited regularly and is noted for its significance. In 1978 a part of the upper arm bone of a dinosaur was discovered and in 1979 an ankle bone of an Allosaurus was found. We now know that these long extinct creatures roamed our area some 105-140 million years ago!

Shellfish Protection Regulations

The activities of humans have begun taking their toll on our coastal environment. There are of course many obvious examples including erosion of dunes, pollution, and landfilling of important sea nursery areas. Not so well recognised is the devastation and destruction caused by people taking shellfish for food and bait. This not only depletes a certain species but affects the whole balance of marine life. It upsets fragile ecosystems, where a link in a food web might mean other species will be affected also. Shellfish are an important food source for many fish and birds. Removal of shellfish by humans, for eating or as bait, can cause local populations of species to disappear.

The Shellfish Protection Regulations aim to prevent the over exploitation of shellfish communities by people. In recognition by the government the **Shellfish Law** now provides protection for most of the shellfish on the coastline close to Melbourne covering almost all areas of the coast from Barwon Heads to Cape Liptrap, Venus Bay. In Marine and Coastal Parks and Reserves these regulations, as well as other restrictions, also apply.



What the Law Means

The term "shellfish" applies to all living Crustaceans and Molluscs (see page 64, scientific classification of marine animals).

"Protection" means that shellfish must not be removed, unless exemptions apply.

The regulations (Shellfish Law) protect shellfish in areas referred to as "recognised shellfish habitat". These areas are designated as "between the high tide mark and two metres below the low tide mark". As two metres below the low tide mark is a long way off shore, it is a very wide area. Also included also are estuaries, rivers and creeks that are affected by the tide. These areas are referred to as the Shellfish Protection Zones.

There are signs erected at intervals along our local coastline to indicate the zones.

The Exemptions to the Law

Within the Shellfish Protection Zone.

- * All Crustaceans are protected and cannot be taken except for crabs, sandfleas, Bass Yabbies (Ghost Shrimp) and limited numbers of Southern Rock Lobster. Size limits and restrictions on the method of collection also apply for some species.
- * All Molluscs are protected and cannot be taken except for squitters, octopus and cuttlefish and limited numbers of squid, abalone, scallops and pipis. Size limits and restrictions on the method of collection also apply for some species.
- * You may only collect the exempted species of shellfish for bait or food. Any other activity, such as collections for study must have a permit from the Director of Fisheries, Department of Conservation and Environment, 240 Victoria Pde, East Melbourne, 3002.
- * If you wish to collect the exempted species for bait or food, you should check bag limits, minimum size and allowable methods of collection. Pamphlets and information are available from any DCE offices.

The Bunurong Marine Park



EAGLES NEST BEACH

The Bunurong Marine Park was proclaimed on the 18th December 1991. It includes the area between high water mark to one kilometre out to sea. There is a proposal for a Bunurong Coastal Park which would include the public land area immediately adjacent to the Marine Park. These two linked areas would be known as the Bunurong Marine and Coastal Park.

The Bunurong Marine Park stretches along the coast for about 17 kilometres from Coal Point (west of the hamlet of Harmers Haven) to Wreck Creek (west of Inverloch). For the purpose of this book only the section from Cape Paterson to the eastern boundary is shown in the map (opposite).

The protection of the Bunurong coast marine area has come in recognition of the high conservation value of the extensive intertidal rock platforms which contain a huge diversity of marine plants and animals. The rock landscapes in the subtidal reef area are outstanding as are the rugged sandstone cliffs within the proposed coastal park.



ELEPHANT SNAIL AND SEASTAR

The Park is divided into two distinct zones. The *Sanctuary Zone* of the Park has the highest level of protection. Conservation zones flank the Sanctuary Zone and these are referred to as the *Western* and *Eastern Conservation Zones*.

Park Regulations apply to the Bunurong Marine Park under the National Park Act. Regulations under the Fisheries Act have been proclaimed for the Sanctuary Zone. The Conservation Zone regulations will be introduced in late 1992 (see table below).

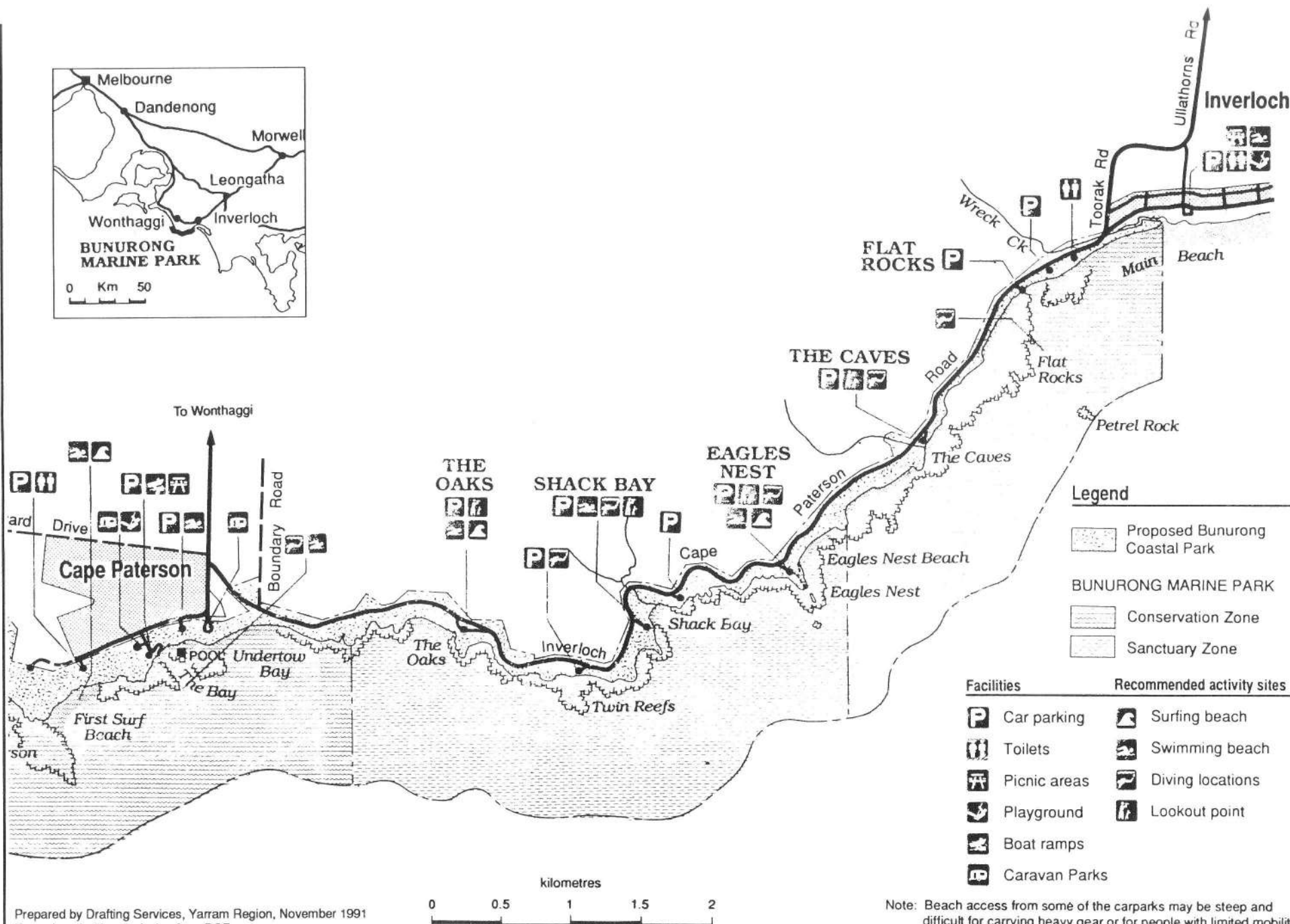
Pamphlets and information on the Park are available from the DCE (see page 60). There are no developed nature walks within the park, however, there are car parking facilities along the coast and access to several of the beaches. There are no beaches with access specifically designed for people with disabilities.

Bunurong Marine Park - recreational and commercial activities

Activity	Sanctuary zone	Conservation zones*
Amateur- Angling	No	Restricted
Spearfishing	No	Restricted
Abalone fishing	No	Restricted
Rock Lobster fishing	No	Restricted
Angling or spearfishing competitions	No	No
Collection of plants and animals	No	No
Removal of rock, sand etc.	No	No
Commercial - Abalone fishing	No	Yes
Rock Lobster fishing	No	Yes
Mesh netting	No	Restricted
Other commercial fishing methods	No	No
Boating	Yes	Yes
SCUBA diving and snorkelling	Yes	Yes
Educational excursions (no collection)	Permit	Permit
Scientific research	Permit	Permit

*Fishing regulations for the Western and Eastern Conservation Zones will be put in place during 1992. Detailed information sheets on fishing restrictions and permits are available from DCE offices. Sanctuary Zone regulations are in place.

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Care for our Environment



All the land along the coastline is reserved for public use and all flora and fauna are protected. With such a spectacular and diverse coastline accessible around Inverloch, many activities are possible: snorkelling, rockpooling, diving, swimming, sailing, walking, boating and fishing to name a few. These activities will, to different degrees, take their toll on the environment and its inhabitants. Even an activity as passive as walking can create environmental damage if you go trampling over sand dunes. It is important to use only defined tracks to gain access to beaches.

Apart from looking unsightly, a piece of rubbish you leave on the beach could spell disaster for marine life. It is not uncommon to find a dead penguin, strangled by a piece of fishing line or a bird starved to death because it could no longer move, its feet bound with plastic.

Always remember that everywhere you go is a special home for some marine animal. When rockpooling always leave animals exactly where you find them and gently replace any rock you pick up in exactly the same position. Many small marine animals live on the underside of rocks or lay their eggs there. If you leave rocks upturned you expose these animals to dehydration and predators.

Never collect live animals, unless it is for the purpose of food or bait, and then you must be aware of the Victorian Shellfish Protection Regulations which apply to our area and the restrictions within the Bunurong Marine Park. If you are shell collecting always check that your shells do not house any live animals.

Algae, the plants of the sea, and seagrasses are often washed up in great quantities on our shores. These die and decay and provide a constant source of nutrients in the ocean, upon which our marine life depends for its survival. The removal of seaweed from the beach is interfering with a cycle that is natural and essential.

Perhaps we should well remember the saying "*take only photographs, leave only footprints*".

Planning your Outing

There is a wide choice of different coastal habitats to visit within a few kilometres of Inverloch. These include mangroves, sand and mudflats, rocky shores, inlet and ocean beaches, windswept cliffs and sheltered sand dunes.

Likewise there is a choice of activities within these different habitats ranging from simple beachcombing hunts and shell fossicking to studies of ecosystems and food webs. The types of activities chosen must be suitable for the chosen habitat.

It is important that you choose activities such as the ones we have prepared in this book that have little if any impact on the environment. These activities should be carried out in places that are easily accessible, both from the point of view of lessening the damage to the environment and being safer for the participants.

Certain requirements and knowledge about hazards will be specific to each habitat or activity but there are some general guidelines.

GENERAL GUIDELINES

1. **Clothing** should be suitable according to the weather. In summer protection from the sun, includes wearing sunblock cream and hats, and in winter protection from the cold and wind includes coats.
2. **Footwear:** runners with good treads are important for any activities on or around rocks. It is also sensible to wear similar footwear for activities on the sandy beaches because of the danger of objects like broken glass and fishing hooks.
3. Make yourself familiar with the area. Are there any **dangers**? What should you do for conservation's sake?
4. You must be aware of any **regulations** and **restrictions** which vary according to the area you are using and/or according to the type of activity. These will also be different depending on whether you are a small family group or a school group (see sections on Victorian Shellfish Protection Regulations and the Bunurong Marine Park, pages 7-9). You will notice some activities require permits. All educational excursions within the Bunurong Marine Park require a permit. **Check with DCE for current information.**
5. The Inverloch DCE office appreciate if schools notify them in advance of any coastal activities. They like to know the areas used by schools and the number of students involved. These statistics help in present and future management of our area. (This applies where permits are not required.)
6. If you are planning a long hike make sure you tell someone of your plans and notify them of your safe return. For any activity always stay within a group.
7. It is a great idea to take a rubbish bag with you. An empty milk carton, open at one end, is an ideal container for broken glass. Apart from being hazardous to us, fishing lines and plastics do kill our marine life.
8. Always **check the tides** when planning an activity but remember that conditions can change according to the weather. A strong south westerly wind can produce a bigger swell and raise the tide higher than anticipated. Large waves can sometimes come in unexpectedly over the rock platforms.

Reading a Tide Chart

You can either obtain a tide chart or read the tides in the newspaper. Tide times are printed for each day in the daily newspapers or for the week in local newspapers. Tide charts are printed for 12 month periods and are essential for schools planning field excursions in advance. In Inverloch, charts can be obtained from service stations.

The day and date of the month appear in bold print on the left hand side of two columns. There are 3 (occasionally) or 4 (usually) sets of numbers for each day, corresponding with the two high tides and two low tides. The right hand column (m, for metre) gives the height of the tide, generally around 0.2m-0.6m for a low tide and 1.2m-1.6m for a high tide. The variations depend on the moon phases, which are shown on the charts also. The left hand column gives the time, in maritime time 0001-2400. (Refer to sample tide chart printed below.)

The tide times on the chart are for Port Phillip Heads and you must add or subtract to these times according to the "Tidal Differences" table on the tide chart. So, for the Bunurong coast east to Point Norman at the entrance of the Inlet, we add 10 minutes. For Inverloch's town beach which is within Andersons Inlet we add 20 minutes. We have to keep in mind that the tide takes about 3 hours to reach Tarwin River, so the further east in the Inlet from Inverloch, e.g. Screw Creek or Mahers Landing, the later the tides.

Remember during daylight saving time you must make adjustments also - add 1 hour to the times listed.

It is often preferable to read the tide chart *backwards* and find a suitable tide and time of day and plan an excursion on that date.

TIDE TABLES PORT PHILLIP HEADS

SEPTEMBER 1992

TIMES AND HEIGHTS (METRES) OF HIGH AND LOW WATERS

Time m	Time m	Time m	Time m
1 0240 1.61 0812 0.36 TU 1444 1.57 2042 0.12	9 0210 0.45 0933 1.19 WE 1432 0.74 2109 1.10	17 0302 1.47 0851 0.46 TH 1502 1.40 2105 0.22	25 0229 0.41 0959 1.24 FR 1519 0.58 2222 1.25
2 0330 1.63 0857 0.40 WE 1523 1.56 2129 0.10	10 0321 0.48 1031 1.18 TH 1601 0.71 2222 1.11	18 0339 1.47 0925 0.48 FR 1536 1.38 2136 0.20	26 0354 0.45 1100 1.30 SA 1637 0.46 2336 1.38
3 0421 1.60 0940 0.45 TH 1602 1.53 2213 0.12	11 0433 0.48 1125 1.21 FR 1717 0.63 2330 1.16	19 0417 1.44 1000 0.51 SA 1610 1.35 2208 0.20	27 0511 0.46 1156 1.37 SU 1742 0.32
4 0510 1.53 1021 0.50 FR 1642 1.47 2256 0.17	12 0535 0.47 1211 1.25 SA 1812 0.53	20 0459 1.40 1034 0.55 SU 1646 1.31 2244 0.20	28 0039 1.52 0614 0.45 MO 1245 1.44 1837 0.19
5 0600 1.45 1101 0.55 SA 1723 1.40 2338 0.24	13 0025 1.23 0626 0.45 SU 1248 1.30 1853 0.44	21 0544 1.34 1112 0.59 MO 1726 1.27 2326 0.22	29 0134 1.62 0706 0.44 TU 1330 1.49 1928 0.10
6 0651 1.36 1143 0.61 SU 1806 1.31	14 0111 1.32 0707 0.44 MO 1322 1.35 1929 0.35	22 0635 1.29 1155 0.63 TU 1815 1.23	30 0225 1.68 0752 0.44 WE 1414 1.51 2015 0.06
7 0022 0.32 0743 1.28 MO 1228 0.67 1856 1.23	15 0149 1.39 0743 0.44 TU 1355 1.38 2001 0.29	23 0015 0.27 0738 1.24 WE 1246 0.65 1919 1.19	
8 0111 0.39 0837 1.22 TU 1321 0.72 1957 1.15	16 0226 1.44 0817 0.44 WE 1429 1.40 2033 0.24	24 0114 0.34 0849 1.22 TH 1355 0.64 2048 1.18	

MOON PHASES:

First 4th - 0839 Last 20th - 0553
Full 12th - 1217 New 26th - 2040

An example:

You are hoping to run an excursion to Flat Rocks to coincide with a low tide and have two possible dates, Friday 4th September and Thursday 10th September. You must allow for travelling time and will only be on the beach between 10 a.m. and 2 p.m. Are either of these days suitable?

Friday 4th September 1992

4 0510 1.53
FR 1021 0.50 low tide at 10.21 a.m.
1642 1.47
2256 0.17 low tide at 10.56 p.m.

Therefore low tide during daylight hours is at 10.21 a.m. + 10 min. = 10.31 a.m.

Thursday 10th September 1992

10 0321 0.48
TH 1031 1.18 low tide at 3.21 a.m.
1601 0.71
2222 1.11 low tide at 4.01 p.m.

Therefore low tide during daylight is at 4.01 + 10 min. = 4.11 p.m.

Clearly Friday 4th September would be your choice.

How to use this Book

Beginning on page 14, twelve **environmental activities** including three **self guided nature trails** are described for the local area. We have included as many activities as possible for the coastal area adjacent to the Inverloch township so that you are not always relying on transport to get to a particular place.

For the various activities, *where appropriate*, we have detailed:

- General information about the activity
- Where to go (including map reference)
- When to go
- What to wear/take (apart from the obvious)
- Conservation values associated with the activity and information on permits and regulations
- Hazards

There are sixteen **Activity Sheets** for children beginning on page 40. Notes and solutions (where appropriate) to the sheets are on page 58.

Although this publication, like all S.G.C.S. publications, has copyright, we grant permission to teachers and leaders of groups undertaking environmental activities, to reproduce the activity sheets for student use. For this reason this book has been produced so that the activity sheets are A4 size, that most commonly used in photocopy machines. Only a limited number of activity sheets have been prepared as many are available through other sources. We also believe that activity sheets are better prepared by a teacher for a particular student group. We hope that by providing the background information in this book teachers feel confident in preparing their own excursions and activities.

Many of our activity sheets are designed to be done *indoors*. Generally young children love field studies and are so enthused by this practical experience that it would spoil their delight to be coping with paper and pens, particularly at the beach. There are some simple tasks to be completed *in the field* requiring a small amount of writing. Consistent with what the majority of young children enjoy, there are a number of fun activities, including puzzles, colouring and craft work. All these activities in some way contribute to their environmental knowledge.

With environmental issues becoming increasingly prominent in current affairs and environmental studies growing in popularity in secondary and tertiary education, it becomes imperative that

environmental studies are taken more seriously in primary schools. Where once 'nature study' was an opportunity for outdoor education it now forms a basis for a science that is integral to many careers. Developers are now required to prepare environmental effect statements, governments are more sensitive in their management of public lands, and local councils are having to plan with regard to the natural environment.

A section has been included in this book "**Biology for the Non-Biologist**" on pages 62-64. It is simple but introduces some basic concepts and terminology. It is appropriate to use correct terms for children as this then provides a basis on which their future studies are built. It should also help adults to interpret other texts which are only accessible to those educated in Environmental Science or Biology. Many basic conservation principles can be shared with children through thoughtful and sensitive discussion.

There are many good publications on environmental activities. The Gould League have a number of publications, which are particularly good as they are published for school aged children and produced in Victoria. Be wary of overseas or interstate publications which may include information and pictures about the natural environment, including animal and plant life alien to Victoria. It is out of context to give a child an activity sheet on coral reef fish when she/he has been studying crabs in the Inverloch rockpools. Information on pages 60 and 61 give sources for **relevant materials and contacts**.

We would encourage school and family groups to visit the **Environment Centre** in Inverloch. The Centre has a number of displays, including local shells, local beachcombing finds, a representation of an Aboriginal midden, a constructed cross section through a mudflat area and a wildflower photographic display. It also has a childrens' 'touch corner' and a marine tidal tank display. Voluntary help is not always available but sometimes a local expert will be on hand to give a talk or help with an excursion.

The information in this book should be used in conjunction with current DCE pamphlets detailing restrictions on some activities and permit requirements.

Rockpooling

Rockpooling is one of the most popular and exciting activities for children. There is an opportunity for a whole range of activities to be enjoyed here, from simple observation and appreciation of the plant and animal life to studying animal behaviour, understanding an ecosystem and looking at food webs. In fact, rockpooling is so fascinating to children that often all that is needed is to provide the setting. Children's natural inquisitiveness will do the rest!

Around Inverloch, the rocky shores are more correctly called rock platforms. They are formed where the sea has pounded at the base of the cliff for thousands of years causing it to collapse. Over many more years the base will be shaped by the waves and nooks and crannies will remain. The soft parts wear away, the swirling stones and debris grind into the larger rock to form the rockpools. The rock platform is at sea level, and is covered and uncovered by the tides, and they are often called "tide pools". The entire area is called the intertidal zone.

There is a huge diversity and abundance of plant and animal life on the rock platforms. A rockpool gives a glimpse of this life as each has its own community of organisms, all interacting with each other and subject to non-living factors such as temperature, exposure by the tides, salinity, rain and sunlight. Some plants and animals can withstand these harsh conditions and live quite exposed, others more vulnerable, shelter under rocks and in crevices or amongst seaweed.

Where to go

The rock platforms at Flat Rocks (Map II, G 8) are the most easily accessible and extensive along the Bunurong Coast. They have very abundant and diverse plant and animal life. The rock platforms at The Caves (Map II, H 7) and Eagles Nest (Map II, I 6) are also popular.

The rock platform extending west along the beach, reached from where Venus Street meets Ramsay Boulevard (Map I, I 11) is within the town environs and is thus accessible even if transport is not available. Although not as diverse in plant and animal life as the Bunurong rock platforms, there are an abundance of crabs, anemones and different gastropods and, at certain times of the year, elephant snails and spawning sea hares.

Other rocky shores within the town beaches are around Point Norman (Map I, J 8 and K 4). These are exposed periodically, covered and uncovered with the ever shifting sands. They have therefore not been colonized by many rockpool animals or plants and are not suitable for rockpooling.

When to go

Visit the rock platforms within an hour or so of low tide.

What to wear

Wear footwear that protects your feet and does not slip easily. Sandshoes with a good tread are suitable.

What to take

Take a magnifying glass to study the plants and animals a little closer. An underwater viewer is also an asset as it is best to disturb the rockpool as little as possible and animals will behave differently when removed from the water.

Conservation

Thousands of people visit the rock platforms each year. The rock platform communities are very easily damaged. Care should be taken not to trample seaweeds. Animals should be observed and not handled unnecessarily. If turning up rocks, care should be taken not to dislodge the inhabitants. Always put any animal or rock back *exactly* where you found it. If you are rockpooling within the Bunurong Marine Park with a school group, you require a permit (contact DCE).

Hazards

Tread carefully avoiding slippery (often due to algal growth) and jagged rocks. There may also be fish hooks, broken glass, rusty metal pieces, or sharp shell fragments, embedded in rock crevices. Be aware of the tides and weather conditions and the possibility of unexpected large waves. The Blue Ringed Octopus is known to live along our coast. It is usually sheltering in dark crevices, under overhanging rocks or in old rusty tins. Be careful where you put your hands. The Anemone Cone Shell and the Striped Sea Anemone are also known to sting.

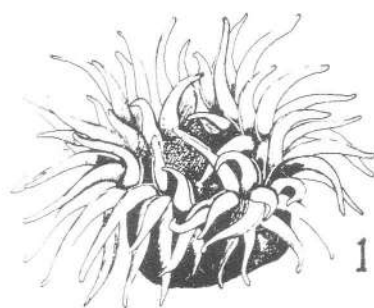
For a very different activity go rockpooling at night! However, take extra care at this time.



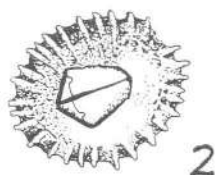
USING AN UNDERWATER VIEWER



ROCKPOOLING, BUNURONG COAST



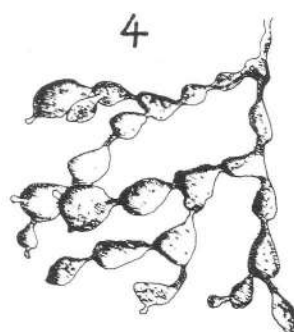
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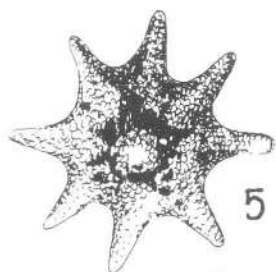
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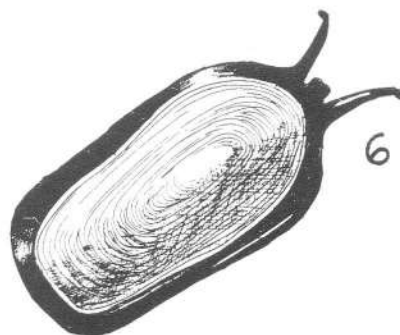
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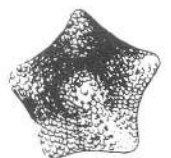
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5



6



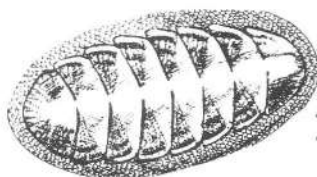
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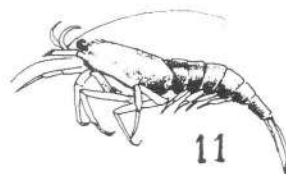
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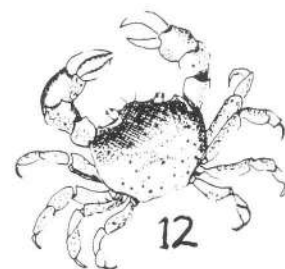
9



10



11



12

- 1 SEA ANEMONE
- 2 BARNACLE
- 3 a GREEN ALGAE

- 4 'NEPTUNE'S NECKLACE'
- 5 SEA STAR (STARFISH)
- 6 ELEPHANT SNAIL

- 7 SMALL GREEN SEA STAR
- 8 SEA URCHIN
- 9 BRITTLE STAR

- 10 CHITON
- 11 ROCKPOOL SHRIMP
- 12 the NOTCHED SHORE CRAB

ILLUSTRATIONS TAKEN FROM THE S.G.C.S. PUBLICATION *Rockpooling Around the Bunurong*

Shell Fossicking

Here we are referring to the fossicking along the tide lines for *empty shells*. Children love to collect shells for various reasons. Shells can be taken home and incorporated into indoor activities, such as making wind-chimes, decorating boxes, making shell creatures or collected as specimens and named. The collection of empty shells along the Bunurong coast is prohibited in some areas and restricted in other areas.

Shell collecting for museums differs greatly from this activity. Museums house perfect specimens of shells from marine animals. These specimens are usually collected as live animals. Museums, such as the Inverloch Shell Museum, display shells from around the world collected in this way. These collections are important for reference and study and often show rare specimens. Shells usually appear more highly polished because they have been collected with the animal still living, whereas the shells you find on the tide lines will be empty, often old and weathered. To collect shells with live animals as for a collection or a museum you need a permit.

The empty shells we find washed up on our beaches were once home to marine animals which we refer to as shellfish but are correctly named *Molluscs*. These animals have usually died of old age or disease or have been eaten by birds or other marine molluscs.

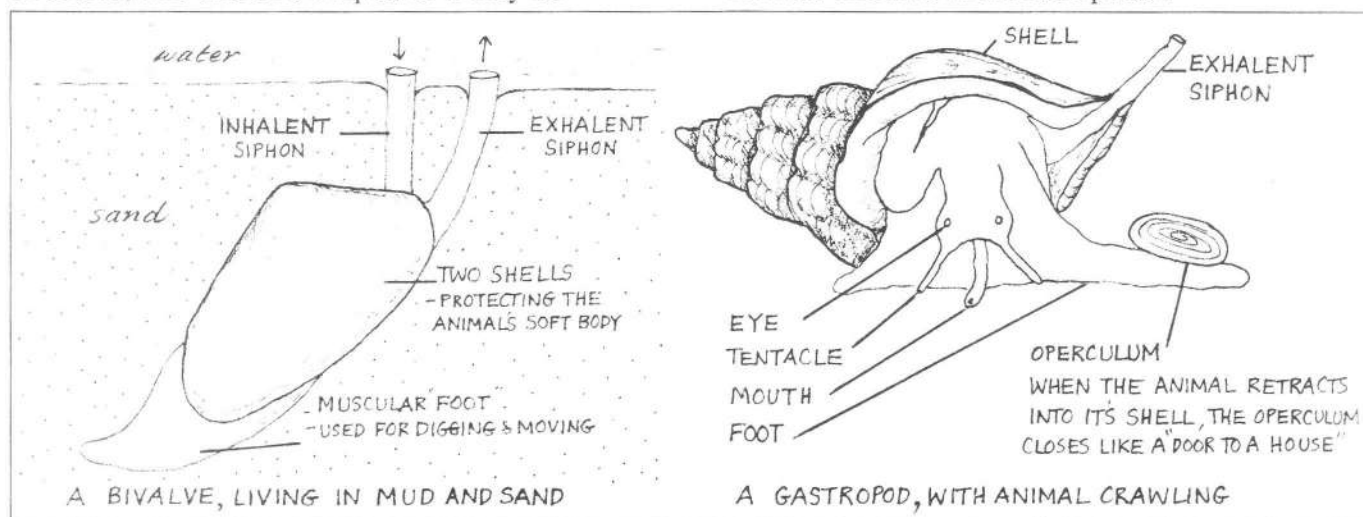
The most abundant Molluscs are the *bivalves* and *gastropods*. The bivalves are animals which have two distinct shells (or valves) such as tellins, cockles and mussels. The gastropods have only one shell. Sometimes this shell is very simple in structure, like that of a limpet, or it may be

twisted spirally, as in a snail or whelk. Sea slugs are also gastropods and, although they appear not to have a shell, they do have a small oblong shaped shell which is concealed beneath the skin.

Many of the bivalves of Andersons Inlet, such as mud arks and pipis, are burrowing animals. They are *filter feeders* as they ingest sand and mud through a siphon and, as it passes around the body, detrital food will be filtered out. Wastes are then expelled through a second siphon. Bivalves will protect themselves from predators by sealing the two shells tightly together. However, some predators are adapted to penetrate this method of defence! Shells of bivalves are often found washed up with a neat hole drilled through the shell. Some gastropods, such as the Sand Snail, which makes the familiar tracks seen in the sandflats of the Inlet, are carnivores, preying on other molluscs, particularly the bivalves. The Sand Snails hold their prey with their muscular foot and drill a hole into the victim's shell, through which they insert a *proboscis*, so that the animal's body can be eaten. Likewise many gastropod shells found washed up around the rocky shores of the ocean beaches will show signs that they too have fallen prey to other gastropods.

Where to go

Most coastal areas will have shells, but the type of shells found will depend on the immediate habitat. The shells found in the Inlet will be those of animals that live in the sand, mangrove/mudflat environment and shallow warmer waters. Many of these are bivalves. Shells found near rocky shores will be predominantly small gastropod shells from the animals that live in the rock pools.



Shells on the sandy ocean beaches will often be from animals living in deeper ocean waters.

The most accessible beaches for shell fossicking are:

- Mahers Landing - Andersons Inlet (Map II, E 18)
- Point Norman to Inverloch Surf Beach (Map II, E 10 - also on Map I, J 4)
- Flat Rocks (Map II, G 8)

When to go

Shell fossicking is most fun at low tide because of the abundance of shells washed up and deposited on the low tide line, but shells can be found at any time and often very high tides dump more unusual shells. Look along the various high tide lines.

What to wear/take

As shell fossicking can make one forget the length of time exposed to the elements wear

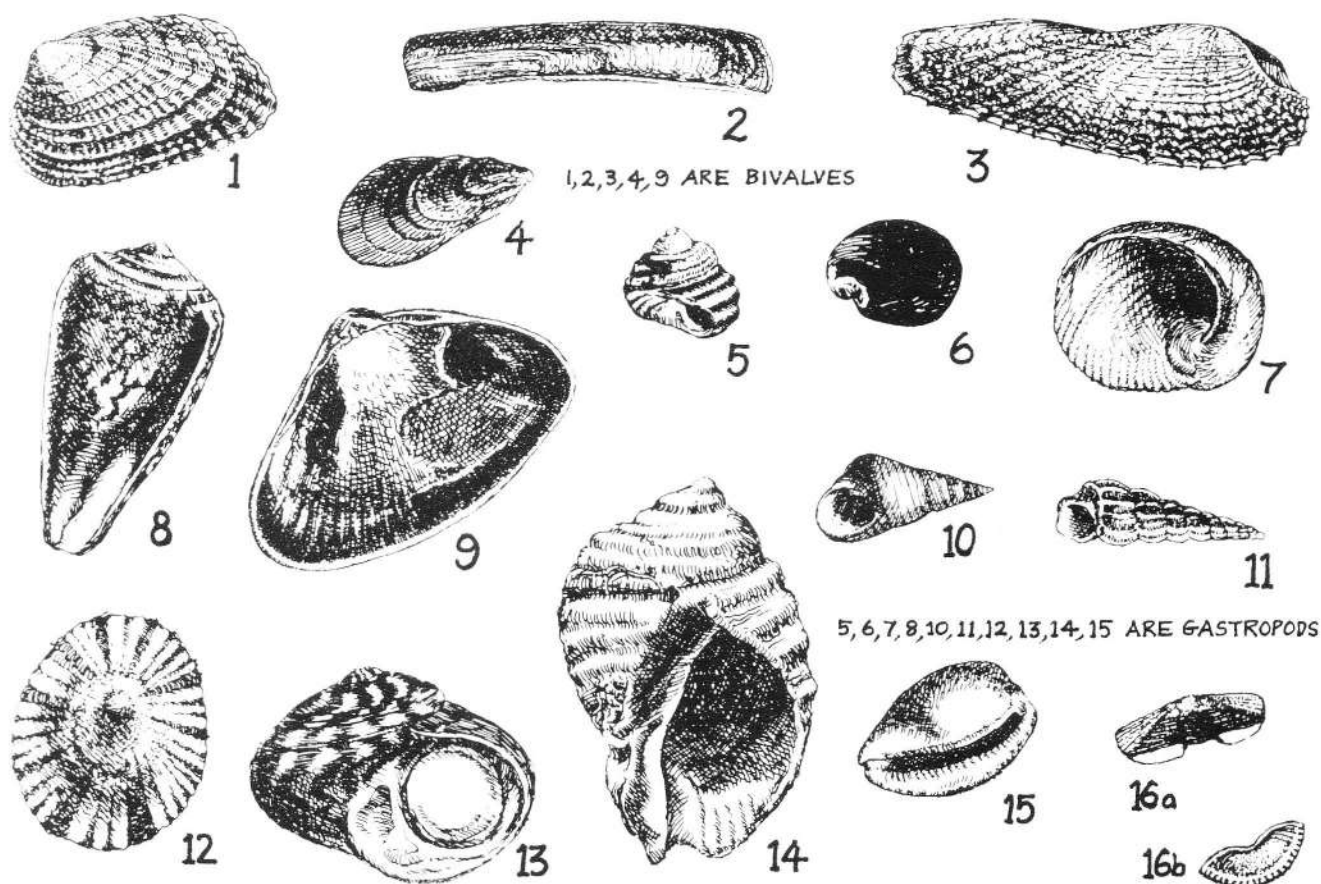
appropriate clothes. On the Inlet beaches the numerous bivalves means you will need to wear good footwear to avoid cut feet.

Conservation

Always check that your shells do not have live shellfish in them. Eventually all shells and natural debris will be broken-down returning once again into the ecosystem of living organisms. Only collect shells you want for a specific purpose, the rest, leave where they are. There are restrictions on the collection of (empty) shells within the Bunurong Marine Park (contact DCE).

Hazards

The weather. Broken glass and fishing hooks, rusty tins and other dangerous items can often be camouflaged or buried amongst the natural debris on the shore. Watch where you tread and what you are picking up.



1,2,3,4,9 ARE BIVALVES

5,6,7,8,10,11,12,13,14,15 ARE GASTROPODS

- | | | | |
|--------------------------|--------------------------|-------------------------|-----------------------------|
| 1 BORING VENERID (VENUS) | 5 RIBBED TOP SHELL | 9 PIPI | 13 WARRENER (OR WAVY TURBO) |
| 2 RAZOR SHELL | 6 BLACK NERITE (OR CROW) | 10 CHOICE SEAWEED SHELL | 14 DOG WINKLE |
| 3 ANGEL WING BORER | 7 IMBRICATED PEARL SHELL | 11 SOUTHERN WENTLE-TRAP | 15 BROWN COWRIE |
| 4 BEAKED MUSSEL | 8 ANEMONE CONE SHELL | 12 VARIEGATED LIMPET | 16a, b CHITON SHELLS |

ILLUSTRATIONS TAKEN FROM THE S.G.C.S. PUBLICATION, *Shells of the Inverloch Area*

Beachcombing

We stroll along the shoreline watching the waves lap onto the sand, listening to the surf and wondering at the beautiful shells. But what of the beauty and complexity of the underwater world, whose secrets are concealed. For the beachcomber, ocean debris strewn on the shore provides a glimpse.

Rough weather brings in large seaweeds, delicate red algae, sponges, and parts of, or whole, oceanic animals, from the deep seas. They are carried shorewards until they are flung by huge waves out of reach of the receding waters. On our highest tide lines these plants and animals are left to blacken or bleach, decaying in the elements. Along the daily tide line, fresher material is left, carried in from the shallower water.

Thankfully in this area, most of the debris is natural wreckage, but unfortunately, through human carelessness or disregard, human garbage is disposed of at sea and evidence of this is also strewn on our shores.

Where to go

Any beach will yield delights to the beachcomber, although ocean beaches can provide a greater diversity. Along the beaches from Flat Rocks west to Cape Paterson can be found sea dragons, various shark egg cases, cuttlefish bones and beautiful coloured seaweeds and other debris representing the marine life of

the oceans. On many beaches will be found the beautifully preserved *test* (body case) of the sea urchin. Within Andersons Inlet, the even more delicate test of the sand urchin can be found, as well as the strange looking germinating mangrove seed and often masses of dead soldier crabs.

When to go

Any time is suitable for beachcombing as it is often most rewarding by looking along the highest tide line. Rough weather will often bring in some more unusual finds.

What to wear/take

See under "Shell Fossicking" activity.

Conservation

Never take any live animal. Plant and animal material is best left to decay and be returned as nutrients to the ocean. If you do wish to collect some things, be selective, only take what you absolutely must have! You can make a contribution in caring for our environment by taking a receptacle to collect any human rubbish you may find. There are restrictions on the collection and removal of any dead plants and animals within the Bunurong Marine Park (contact DCE).

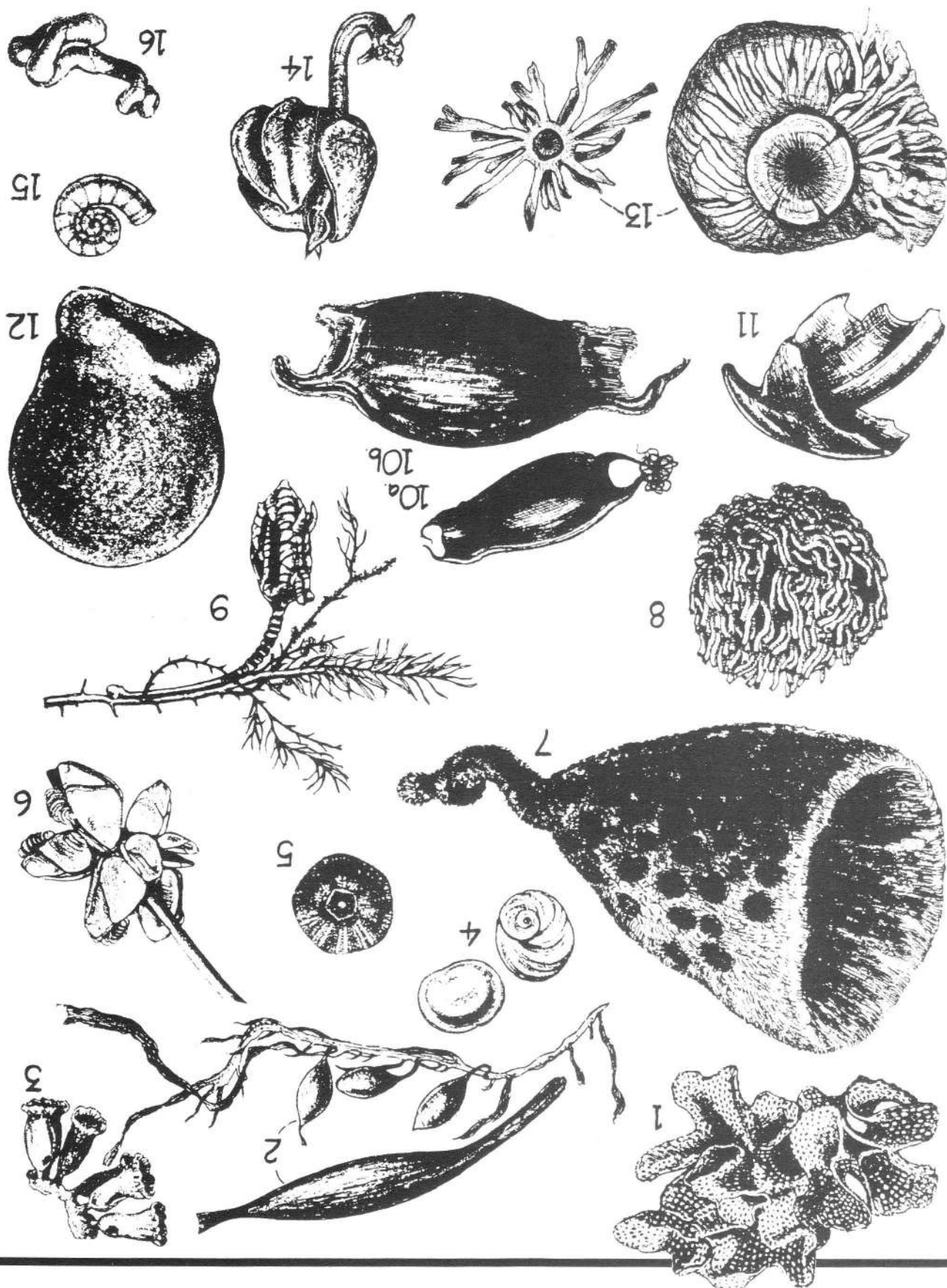
Hazards

See under "Shell Fossicking" activity.



ILLUSTRATIONS TAKEN FROM THE S.G.C.S. PUBLICATION, *Beachcombing Guide*

- 1 LACE CORAL
2 SEAWEED FLOATS
3 GASTROPOD EGG CAPSULES
4 OPERCULUM
5 SEA URCHIN TEST
6 GOOSE BARNACLES
7 CUP SPONGE
8 WORM TUBES 'en masse'
9 SEA TULIP (with algae)
10a, b. SHARK EGGS
11 CUTTLEFISH BEAK
12 CODIUM (ALGAE)
13 SEAWEED HOLDFASTS
14 MANGROVE SEEDLING
15 RAM'S HORN SHELL
16 WORM TUBE



Birdwatching in Andersons Inlet

The first impressions of the early white settlers to the area noted the natural beauty and the abundance of bird life. Along the Bunurong cliffs many sea birds can be seen, but it is the mudflats in Andersons Inlet, with their rich food source of small marine animals, which attract migratory and nomadic water and wading birds in their thousands.

Each tide change offers a different feeding or roosting option. Pelicans and terns feed on the high tides and roost on the low tides. Swans, ducks, spoonbills, egrets and gulls feed on both high and low tides. Red-necked Stints, Curlew Sandpipers, Sharp-Tailed Sandpipers, Golden Plovers, Greenshanks and Curlews feed on the low tides when the mudflats are exposed and roost on small sand spits, beaches and islands when the tides are high.

Changing seasons in turn produce conditions for a different array of birds as the migratory birds travel to or from the northern hemisphere or New Zealand and the resident bird population wanders to and from their usual feeding locations.

While it is the vast sand and mudflats and shallow waters of the Inlet with their abundant food source of burrowing worms, crabs, shrimps, small molluscs and fish which attract the greatest numbers and diversity of waterbirds to the area, our town beaches at the entrance to the Inlet also have attractions for other birds.

Although the Pied Oystercatcher happily feeds on crustaceans and pipis further down the Inlet, the rock platforms at the entrance to the Inlet are home to large clusters of Beaked Mussels and other shellfish which are eaten by its close relative the Sooty Oystercatcher. The cormorants also are seen here, usually in pursuit of small fish. Terns too, will be seen catching fish in the relatively calm shallow waters.

It is the gulls, however, which most frequent the town beaches. Usually with a diet of molluscs, seabird eggs and chicks, carrion and offal, they will supplement this with food scraps; bread, chips, picnic scraps and even that which is put in the rubbish bins. This has given the gulls the reputation of being aggressive scavengers.

Pacific Gulls are seen throughout the year, although their numbers decline over winter.

They are big, heavy birds with very thick bills. The adult birds are black and white and the immature younger birds appear the same size but are brown.

Silver Gulls, commonly called "seagulls" are much smaller and sleeker than the Pacific Gulls and are resident throughout the year. They are a medium sized grey and white bird. The immature Silver Gulls are white and mottled brown, with a brown beak which will turn red as the bird matures.

Unlike the Pacific Gull which is usually seen as a solitary bird or in pairs, the Silver Gull is very gregarious and will be seen in large flocks. Because of the scavenging nature of these birds when feeding and their presence in large flocks, their behaviour is interesting and easily observed. It appears that some individuals are more dominant than others and there appears to be a lot of bossing going on. It is usually easy to observe the winners and losers in a group.

The frantic aggressive scavenging of the gulls seems in stark contrast to the behaviour of other birds in the Inlet which are so easily disturbed by our presence, whether they are spread out on the sand and mud flats feeding at low tide, congregated and resting while the tide is high, or fishing the Inlet waters with great concentration and skill. Whichever we are watching, the most important consideration with birdwatching is to be patient and very quiet. It is best to choose a vantage point and remain in that location for a time.

To observe the waders and waterbirds in large numbers, and at close range, you must choose your watching points and times of observation very carefully. While feeding on the low tide the waders are dispersed throughout the vast mudflat area and are difficult to observe. On the high tide the birds will congregate at roost sites and this is when they are best observed. To observe particular species of migratory birds you must understand more of their migratory patterns (see page 29).

Where and when to go

1. Toys Backwater (Map I, H 15) The eastern end of the sand spit at Toys Backwater provides a very good winter bird watching site. On winter high tides a variety of roosting birds can be observed from the carpark at the bottom of Cuttriss Street.

2. Screw Creek (Map II, E 14) Screw Creek is a tidal creek which provides an excellent habitat for waterbirds. The creek can be traversed from the Inverloch-Tarwin Lower Bridge by foot (not a well defined track) or by canoeing from the mouth of the creek north. From the mouth of the creek it is always a delight to see Royal Spoonbills, egrets, herons, swans, pelicans, gulls and the roosting cormorants perched in the mangroves, with their wings spread out to dry. At any time you will see some birds feeding or roosting.

3. Mahers Landing (Map II, E 18) From the carpark a walk east up the Inlet will reveal a number of sandy spits popular with waders and waterbirds for roosting on the high tide.

Spurwinged Plovers, Royal Spoonbills and Sacred Ibis are frequently seen in the paddocks adjoining the Inlet.

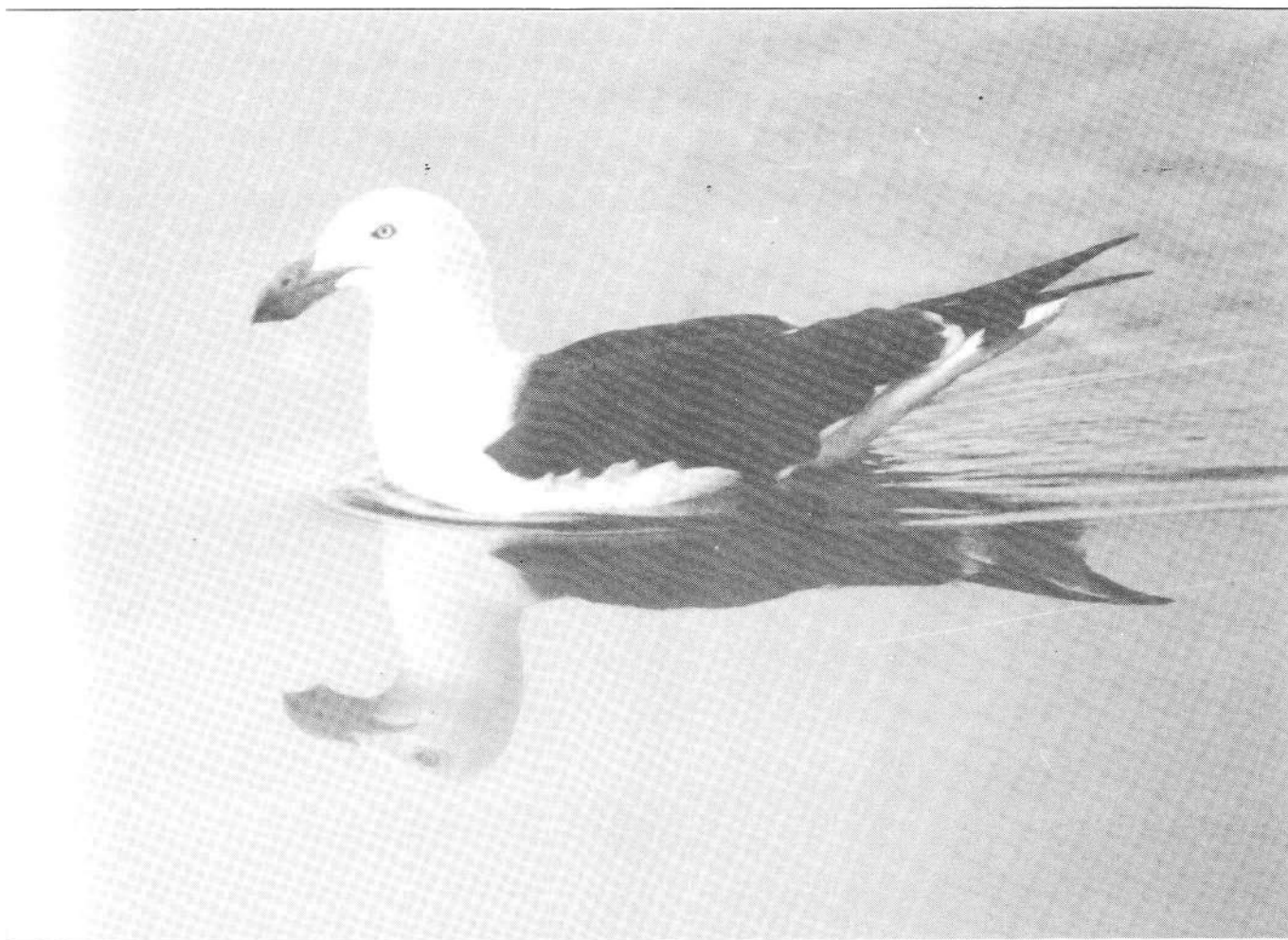
4. Town beaches (Entrance to the Inlet) - Ayr Creek - Jetty (Map I, I 8 - H 14) The majority of birds seen here are gulls. Around the rock platforms watch for terns, Sooty Oystercatchers and cormorants. Birds can be observed at any time.

What to take

Essential are a pair of binoculars and helpful is a bird identification book or chart.

Conservation

While it should be obvious that there should be no interference with the birds, it is also important to give consideration to the habitat you are entering. The places mentioned (1,2 and 3) all contain saltmarsh and/or mangrove habitats. These environments are very easily damaged if trampled and should be negotiated by existing tracks only.



PACIFIC GULL, PHOTO BY NOEL MAUD

Coastal Walking & Hiking

The coastal stretch from Cape Paterson to Mahers Landing, east of Inverloch (entire Map II), contains a variety of coastal landforms and habitats. Walking in this area can mean rock walking, climbing steep cliffs (on tracks only), walking on the sand and skirting saltmarsh areas and mangroves. Virtually the entire section is suitable for beach hiking, providing that the walk is planned to coincide with appropriate tide heights.



Town Beaches

The coastal strip adjoining the town environs from the Ranger's Office (Map I, I 17) to Surf Beach (Map I, J 3) is suitable for beach walking

at most times, although at high tide it may be necessary to divert along the foreshore in some places. As the beach accesses are frequent in the section there is no problem diverting. It would be preferable though to walk along the beach at low-mid tide when features such as the rock platforms and the saltmarsh and sand bars are exposed. It is interesting to look across to Point Smythe and see the extensive mudflats and to observe where the tide is rushing in or out of the channel.

Inlet Walking

Inlet walking is best done at low tide. A favourite feature of the extensive sand flats is the great armies of soldier crabs. Thousands and thousands of these crabs appear to move 'en masse' and if disturbed will quickly burrow, in a corkscrew fashion, into the sand. Map II gives some idea of the extent of the exposed sand flats at low tide within the Inlet (see Legend of Map II). The exposed intertidal flats around Toys Backwater and the Ranger's Office (Map II, E 14) are relatively solid and are surfaced with clean sand. Any worm hole with its diggings deposited on the surface will show you how mud-like the subsurface is. Further east in the Inlet the exposed flats are often less solid and can be very muddy.

As you walk east from the Ranger's Office, the beach will lead you to the mouth of Screw Creek (Map II, E 14). There is also a pleasant 200 metre walk through the foreshore from the Screw Creek carpark to this area.



MOUTH OF SCREW CREEK, ANDI RYONG, 1981

Although Townsends Bluff then appears easily accessible across the intertidal flats, it is a very boggy surface and the young mangroves in this area can be easily damaged. There is a foot bridge across Screw Creek just north of its mouth which leads into the saltmarsh and then to Townsends Bluff and beyond. The track through the saltmarsh is barely recognisable and care should be taken in this very sensitive environment, home to a great number of different plants and numerous crabs and gastropods. It is not recommended for groups of people and, schools are asked to contact the local DCE if they wish to walk in the area beyond Screw Creek. Inlet walking can however be done from Mahers Landing (Map II, E 18).

Bunurong Marine Park

An approximately five hour coastal walk can be taken from Cape Paterson to Inverloch Surf Beach (Map II, J 1-E 10). If a hike of this length were taken it is advisable that it be done as a one way journey necessitating a car shuttle. The views en route are spectacular, with the peaks of Wilsons Promontory on the south eastern skyline as a backdrop to Cape Liptrap. To the north the hills around Foster are visible.

Assuming that you begin the walk at Cape Paterson, you will need to leave two hours before the low tide. (Check that the tides are average or below, that there is not an exceptionally high low tide.) There is only one section of the walk where you will need to detour onto the hinterland.

A deep crevice occurs on the Cape Paterson side of The Oaks beach. Return to the beach from the road by The Oaks access track. There is a lot of rock walking en route and care should be taken over slippery and wet rocks and rocks covered with algae. Extra care should be taken once the tide has turned, watching for swells. You will need to be appropriately dressed for the weather and have good well-treaded footwear. There are no sources of fresh water along the route, so drinks should be taken.

There are some difficult sections on this walk and it is only advised for moderately fit people and for children under strict supervision. It is not advisable for groups of children unless the adult leaders are familiar with the route.

There are sections of this longer walk which are suitable for groups and inexperienced hikers.

Suggested walks at low tide:

- Eagles Nest - Caves
- Caves - Flat Rocks
- Flat Rocks - Surf Beach

A "Bunurong Coastal Walk" being developed by local community groups is in its early stages of planning (June 1992). The DCE should be contacted with regard to any walks which have been developed since the publication of this book.



THE CAVES, BUNURONG COAST

Coastal Dunes & Shifting Sands

Coastal sand dunes are a feature of much of the Australian coastline. They form a barrier between the land and the beach. They can cover a large area, but in Inverloch people have built their houses and roads right across the sand dunes and they are not so obvious. We have also shaped the effect of natural processes on our coastline by building walls, dumping rocks and introducing plants. We have tended to stabilize our dunes and coastline, so that it is no longer the dynamic system that it would have been in its natural state.

It is important to understand that there are many natural causes of erosion, particularly considering that the sensitive primary dunes are so exposed. In the natural course of events these primary dunes are scoured and eroded by wind and waves in rough weather and then rebuilt again by the more gentle action of these elements in calmer weather. However human activity has a far greater impact and the simple action of people walking on the dunes is one of the most serious. Once the dune is able to support some vegetation, the impact of erosion is lessened. This single factor has been the justification for the introduction of Marram Grass which has been planted on the dunes along vast stretches of the Victorian coastline. But like the building of walls and the dumping of rocks and large tyres it impedes the natural forces that for so long were constantly shaping and reshaping our coastline.

The topic of sand dunes and shifting sands is an extremely broad one and it is difficult to illustrate the natural processes in such a modified coastal strip as in the Inverloch area where only small areas have been left in their natural state.

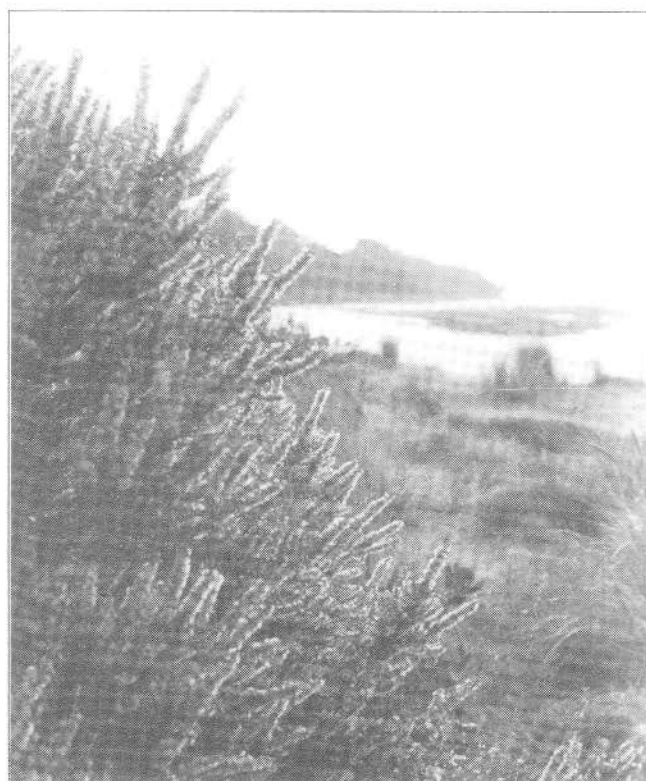
Two nature trails described elsewhere in this book feature many aspects on the shifting sand, however two different locations are described here so as to offer a comparison, a sheltered beach and an exposed beach.

A Sheltered Beach

The dunes backing the beach between Ayr Creek and Point Norman are well vegetated with largely native plants, including banksias, teatrees, Coast Wattle, coast daisies, Coast Beard Heath and Prickly Box. The dunes are fairly sheltered here at the mouth of the Inlet and the plants have been able to become quite established thus stabilizing the dunes and guarding against erosion by wind. The channel between the Inlet and ocean however is constantly changing course scouring the sands and depositing it at different locations. Both Point Norman and Point Smythe are changing. During the past ten years the beach at Point Norman has changed from having a large sheltered lagoon with huge sand surrounds to its present state where the channel has shifted and exposed a large rocky shore. At high tide the channel can be seen to be cutting quite close to



COAST BANKSIA



COAST DAISY BUSH

the beach between Point Norman and Ayr Creek. Wave action has taken its toll on the dunes despite efforts in the past when large blue stone rocks and tractor tyres were dumped to lessen the impact of the natural forces. In this area the foreshore is narrow and the road constructed across the dune, only metres from where the sea is carving a new coastline (via the channel).

An Exposed Beach

At the Inverloch surf beach the sand dunes back a wide sandy beach. Here is a more exposed location open to the forces of wave action of the open ocean and the unhindered winds. In a natural situation the dunes here would be in ever changing succession. It would be difficult for plants to establish on the foredunes with the ever shifting sands. The evidence of sand covering posts or fences left stranded above ground, and steps collapsing, show these constantly shifting sands. The planting of Marram Grass, an introduced plant, on the sand dunes has enabled humans to partly halt nature's course.

At both locations it would be interesting to pose these questions:

1. What are the main forces of nature shaping the coastline?
2. What impact have humans had on nature's course?
3. How different would things be if humans had not interfered at all?

A Sheltered Beach

Where to go

Ayr Creek to Point Norman (Map I, I 8-K 5)
There is access via a car park at Point Norman and also west of the Ayr Creek bridge.

When to go

Preferably between the times three hours either side of low tide.

Conservation

Care should be taken if you leave the sandy beach and proceed on to the dunes. Sand and vegetation are easily dislodged where the sea has cut into the dune. Although there are no properly constructed steps or ramps in this area, tracks through the dunes are well used and easily identified. Use only these tracks.

An Exposed Beach

Where to go

Surf beach (Map I, J 3) Use the beach access leading over the dunes from the Surf Beach Car Park at the end of Goroke Street.

When to go

Any time.

Conservation

Beach access is clearly defined in this area. Use only properly constructed tracks. Do not stray from the tracks on to the dunes.



SURF BEACH, INVERLOCH

Exploring Mudflats, Mangroves

In the relatively sheltered Andersons Inlet the low tides expose great expanses of sand or mud flats, often referred to as *intertidal flats*. It is a peaceful environment compared with the crashing waves of the surf beach or rock platforms. At first glance the area appears lifeless, but the pitted surface gives some indication of the busy life beneath its surface. Apart from the masses of soldier crabs, there are worms, shrimps and mud crabs in abundance. Another interesting but lesser known feature is the thousands of tiny transparent tubes protruding above the surface. These are the feeding tubes, or siphons, of several different bivalve shellfish species living in the sand.

Below the low tide mark are great expanses of seagrass. Seagrass is different to other sea plants because it is like a land plant with roots, stems and leaves. It grows like bracken with underground stems. The dead leaves of the seagrass are often washed up on the beach in huge piles. Behind the mudflats are the White Mangrove trees. Very high tides often wash up over these trees and leave debris, such as Eelgrass hanging in their branches. Like the mudflats life is hidden, although many animals can be found living on the trees and below the surface.

The mystique of the mangroves is enhanced by gnarled protuberances coming from the muddy

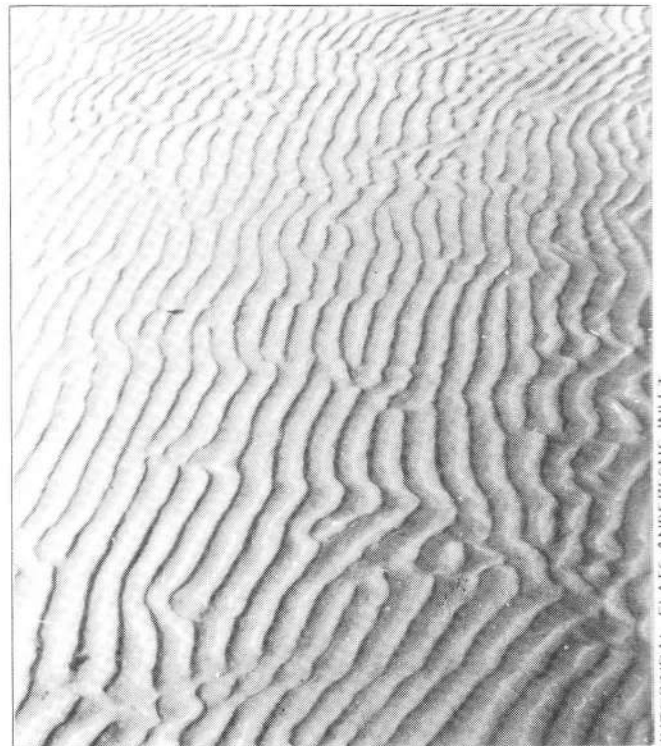
surface. Often encrusted with marine snails and barnacles, these are the *pneumatophores* or breathing roots, part of the extensive root system of the mangrove. They are like a filtration and storage system for the plant, providing it with nutrition from soil which is often lacking in oxygen and very salty, and storing gases from the air which they get when exposed at low tide. Although the mangroves also have *prop roots* coming from their main trunk the underground network associated with the pneumatophores also help to anchor the plant in very muddy ground.

Mudflats and mangroves are usually separated from the land vegetation by great expanses of saltmarsh. This area is still too salty for our usual vegetation to grow. However, lots of grasses, sedges and fleshy herbs love it, even if they do get covered in times of high spring tides. Like the mangroves it is teeming with crabs and marine snails. You may have heard of the Orange-Bellied Parrot, noted as a rare species. The saltmarshes are its habitat. In the past, it has been these areas which have been "claimed", using landfill to build them up out of the reach of those occasional high tides, so that many of our saltmarsh areas around popular locations have disappeared.

Further into Andersons Inlet there are extensive saltmarshes. Close to Inverloch however, we have Toys Backwater, which remains relatively natural, despite pressure by some local residents



SALTMARSH, TOYS BACKWATER



INTERTIDAL FLATS, ANDERSONS INLET

& Saltmarshes

to have it filled and landscaped as carparking and picnic areas. Toys Backwater adds another coastal habitat which is easily accessible from the town, and brings our migratory and wader birds within easy viewing.

Where to go

- Toys Backwater: saltmarsh habitat, sandflats. (Map I, H 15)
- Screw Creek: saltmarsh, mangroves, mudflats. (Map II, E 14)
- Mahers Landing: saltmarsh, mudflats. (Map II, E 18)

There is a lot of animal life below the surface in these habitats which is difficult to visualize. The Environment Centre has a constructed cross section showing, among other things, the animals in burrows and holes.

When to go

Low tide. Check the tide charts and choose a very low tide (less than 0.3m) to maximise the enjoyment of these habitats.

What to wear/take

You may have to consider your footwear if visiting mangroves, as you are likely to sink well into the mud. Take binoculars if you are interested in the view or birds.

Conservation

At present there are no defined tracks or constructed accesses to these habitats. Boardwalks and tracks are planned in the future for Toys Backwater and Screw Creek. The mangroves and saltmarshes in particular are very environmentally sensitive areas. Pneumatophores and small fleshy plants can be easily damaged, and animals suffocated, by trampling. It is not recommended that groups go into these areas without proper instruction and supervision.

At Toys Backwater sandy tracks skirt the saltmarsh and lead on to the sandy spit and beyond to the sandflats. Screw Creek can be reached by road and a short bush track or via the beach. For groups it is best to observe the mangroves from or near the bridge just up from the mouth of the Creek. Care should be taken at these locations not to disturb any birds, either roosting in the mangroves or on sandy spits or, feeding on the mudflats.

Hazards

The tide comes in much more quickly over the mud and sandflats than on open beaches. Watch that you do not get cut off and stranded on sand bars in the Inlet.



MANGROVES, SCREW CREEK

Seasonal Visitors & Occasional

No, we are not talking about the tourists or the odd days when Inverloch's population can swell by the thousands. Our natural environment too has its visitors, some which visit regularly to lay their eggs or feed on the abundant food sources. Others, which we see only occasionally, maybe thrown off course by the unpredictable weather or rough seas. Here is some information about a few of them.

The Paper Nautilus

One of the most exciting sporadic occurrences on our local shores is the appearance of the Paper Nautilus shells. Sometimes the empty shells are found tossed high up on the tide line and one wonders how such delicate shells have survived intact. Often the shells are found filled with eggs and housing the female animal. This makes us realize that it is only the ravages of nature with an unfavourable weather pattern that has stranded these animals, showing us one of the open sea's many fascinating secrets.

The Paper Nautilus shell is unlike most other shells which provide a home for animals in that it is an egg case. The shell is made by the female Argonaut, an octopus like animal, to lay her eggs in and protect them.

It has become a popular myth that Paper Nautilus appear once every seven years, but this is not true. Strandings of Paper Nautilus have occurred more frequently in the past four years than in the previous ten. Paper Nautilus were found in June 1988 and again on two occasions in April and June 1990. With each appearance the Paper Nautilus were only washed up on one or two tides and were therefore only found over a period of a few days.

Where to look

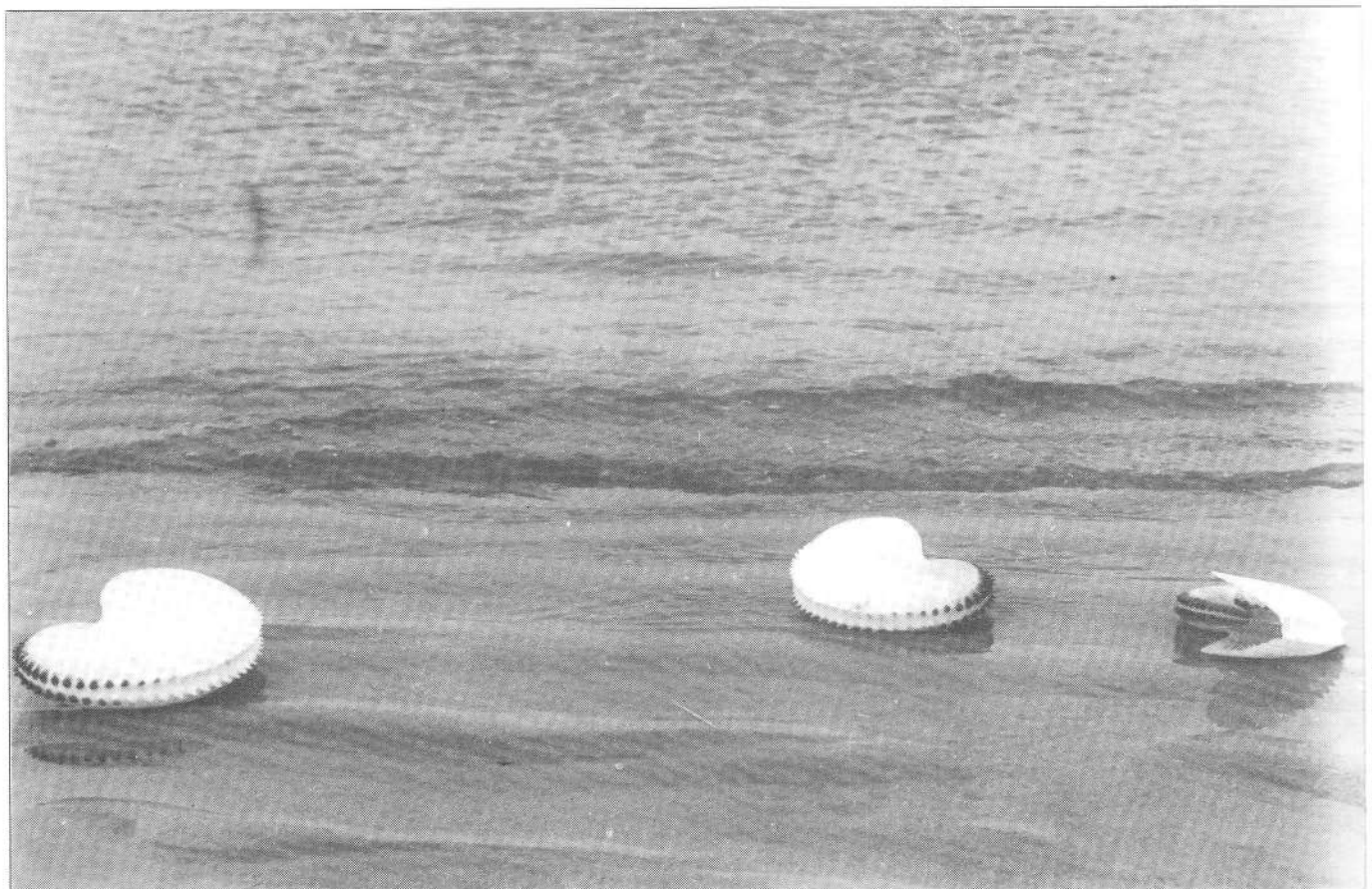
Paper Nautilus have been found on all beaches from Inverloch into Andersons Inlet. They are generally on the high tide line.

When to look

It is said that the occurrence is due to three factors:

1. Winter west wind drift current, moving from south west Bass Strait to the southern Victorian coast.
2. Prevailing westerly winds.
3. Stronger than normal tide flow.

In short, quite unpredictable!



PAPER NAUTILUS SHELLS

Happenings

Victims of Stormy Seas

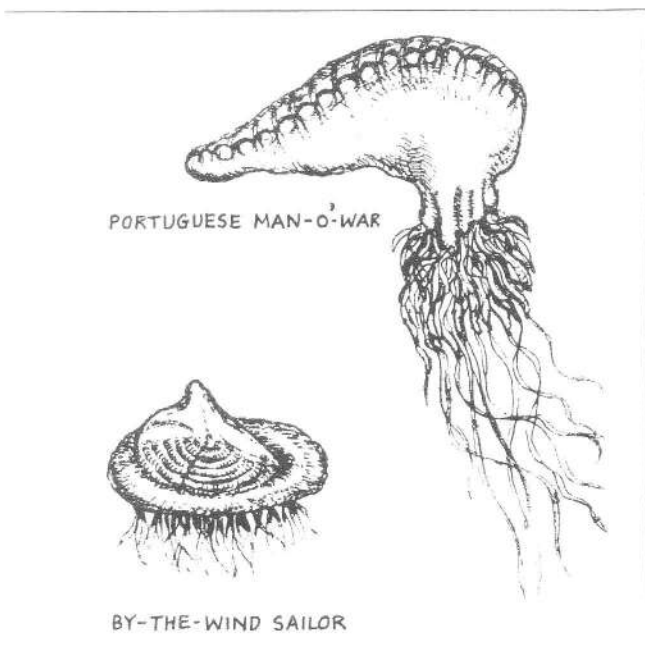
Some oddly "out-of-place" animals appear on our shores. These are ones from tropical waters, which include the brilliantly blue coloured By-the-Wind Sailor and Portuguese Man-o'-War. These animals from tropical waters are carried south by currents. During summer months, after strong prevailing winds, large numbers are blown shorewards and strewn on the beach. Mostly they are dead. The Portuguese Man-o'-War has a large gas filled float with stinging tentacles which may trail the float for several metres. The sting is dangerous to humans. Care should be taken if this animal is found. They are very commonly washed up on the south west coast, but only occasionally end up on our beaches.

Where to look

High tide line of ocean beaches from Point Norman to Cape Paterson.

When to look

Unpredictable.



Other Victims of Stormy Seas

These include cuttlefish, penguins and seals which are generally dead.

Where to look

Ocean beaches from Point Norman to Cape Paterson.

When to look

Usually in winter.

Waders and Waterbirds

Some waders and waterbirds can be found on our shores throughout the year, but others are part-time residents, from other parts of the world and arrive in certain seasons. We call these migratory birds. Most arrive in Australia from Mongolia, Siberia and Alaska. During the northern hemisphere's summer the birds take advantage of the abundant food sources in their breeding grounds and then migrate south, avoiding the freezing winters there, and arriving for our spring and summer.

Many of these birds from the northern hemisphere arrive in September and some as early as August and leave again in March or April. The juveniles migrating with the adult birds do not always leave here after their first migration and stay over our winter. Andersons Inlet is particularly important as a feeding ground for the juveniles of some species. This makes our area important to the future survival of many of the migratory species.

Other migratory birds make a trans Tasman crossing arriving from New Zealand, to spend our winter here.

Other birds also visit our shores although they are not as predictable in their arrival and departure. These birds are residents of Australia and their migration will depend on seasonal weather conditions and food availability in other parts of the country.

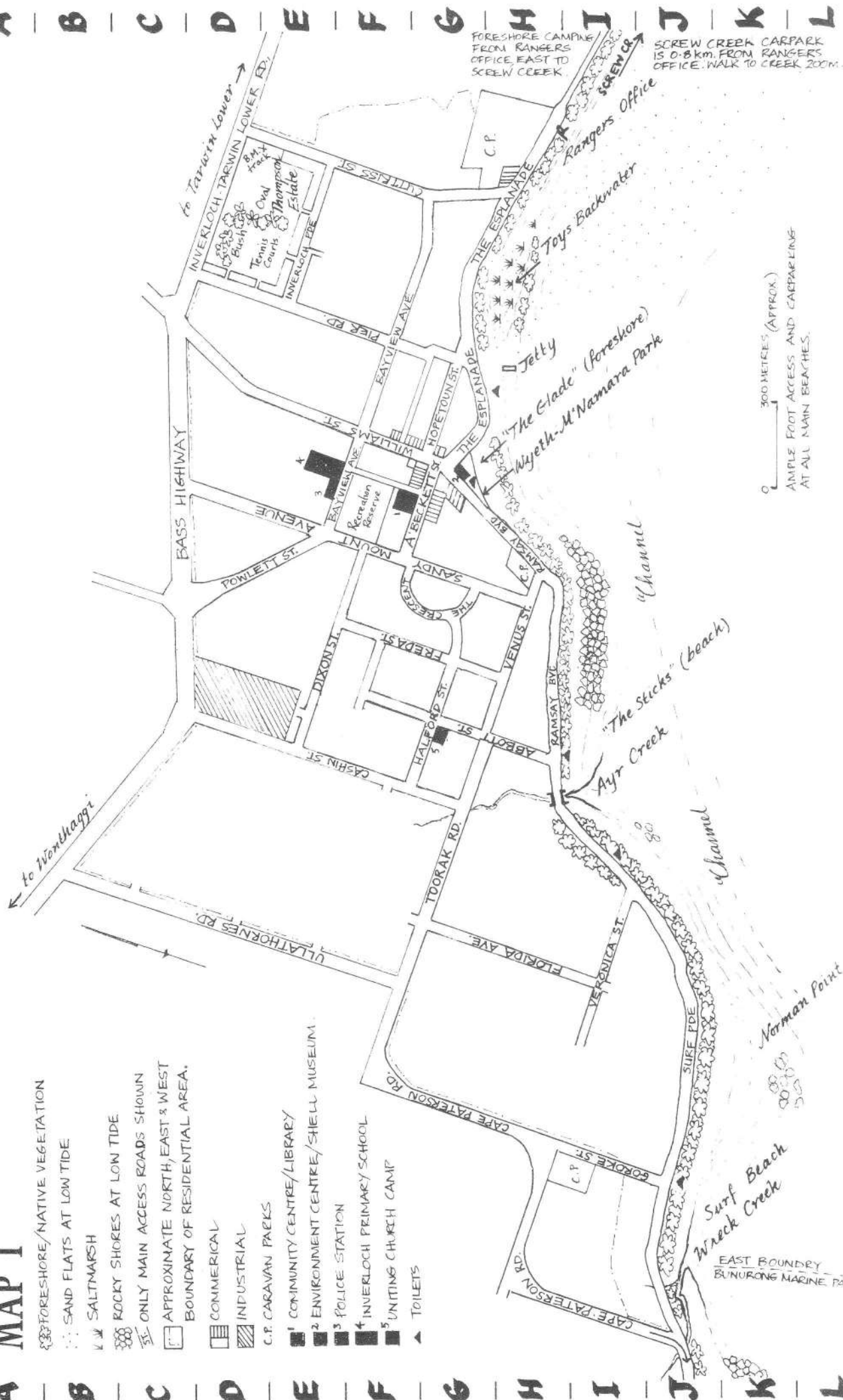
Migratory birds from the northern hemisphere and New Zealand arrive for the abundant food source that the vast areas of intertidal sand and mudflats of inlets and bays offer. In Victoria, Western Port Bay and Port Phillip Bay (near Melbourne) and Corner Inlet (near Wilsons Promontory) offer the largest feeding grounds, but of equal significance are Andersons Inlet, Inverloch and Shallow Inlet (near Wilsons Promontory).

The S.G.C.S. publication, *Andersons Inlet: Waders and Waterbirds*, describes each species of migratory bird found in the area. It records its global range, its periods of residency in the Inlet, a description of its habits and where and when you are likely to observe it.

Visitors from the northern hemisphere which you

MAP I

- FORESHORE/NATIVE VEGETATION
- SAND FLATS AT LOW TIDE
- SALT MARSH
- ROCKY SHORES AT LOW TIDE
- ONLY MAIN ACCESS ROADS SHOWN
- APPROXIMATE NORTH, EAST & WEST
- BOUNDARY OF RESIDENTIAL AREA.
- COMMERCIAL
- INDUSTRIAL
- C.P. CARAVAN PARKS
- 1 COMMUNITY CENTRE/LIBRARY
- 2 ENVIRONMENT CENTRE/SHELL MUSEUM
- 3 POLICE STATION
- 4 INVERLOCH PRIMARY SCHOOL
- 5 UNITING CHURCH CAMP
- TOILETS








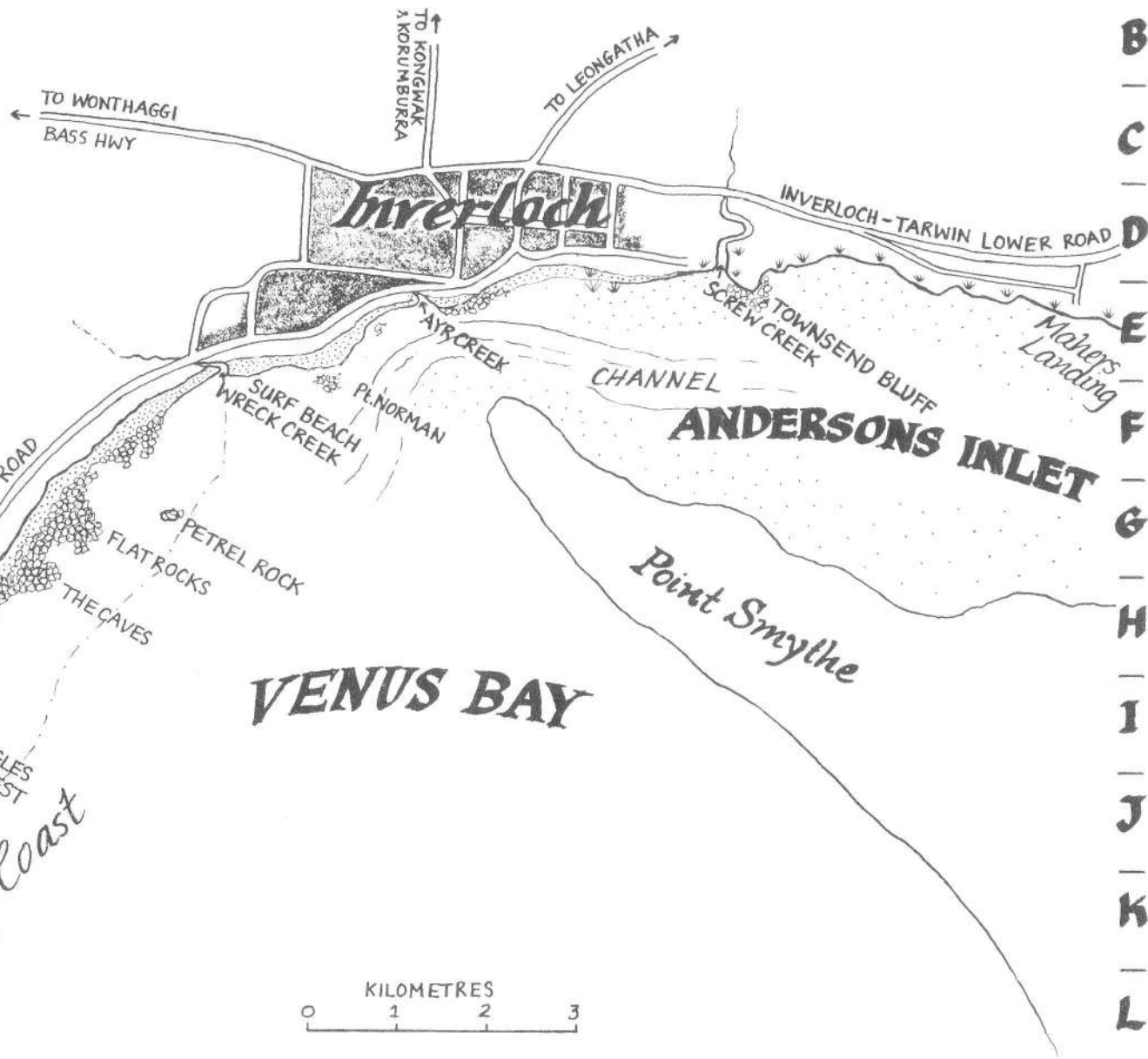
300 METRES (APPROX.)
AMPLE FOOT ACCESS AND CARPARKING
AT ALL MAIN BEACHES.

FORESHORE CAMPING
FROM RANGERS
OFFICE, EAST TO
SCREW CREEK

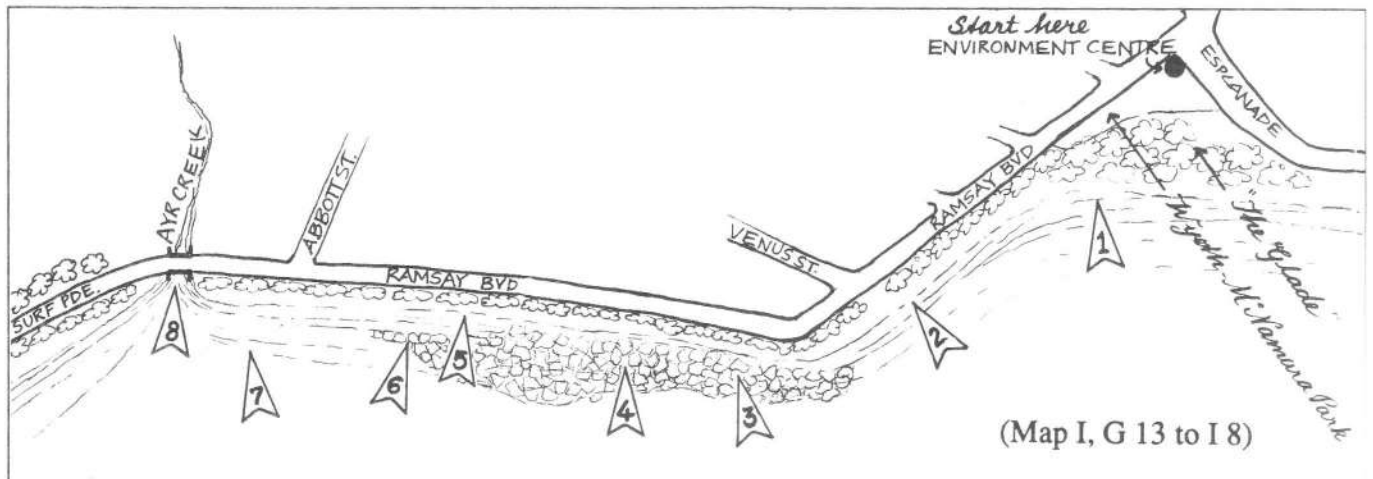
SCREW CREEK CARPARK
IS 0.8 km. FROM RANGERS
OFFICE. WALK TO CREEK 200m.

MAP II

- 
 SALTMARSH AND/OR MANGROVES
- 
 ROCKY SHORES
- 
 SANDY COVES & BEACHES
- 
 SAND FLATS AT LOW TIDE
- 
 BUNURONG MARINE PARK BOUNDRY
- 
 B/W. ROAD & BEACH, IS COASTAL & PUBLIC RESERVE
 MOST OF THIS IS NATIVE VEGETATION



Ayr Creek Nature Trail



This trail will take you to Ayr Creek, west of the township. The walk is along the shores of Andersons Inlet. The features discussed are indicated on the map. The round trip (from the Environment Centre) will take 40 minutes at a leisurely stroll. You start by making your way directly to the beach from the Environment Centre. The beach is reached through either the Wyeth-Macnamara Park or "The Glade". *If you take a plastic bag with you, you can collect rubbish on the way - lets clean up our environment as we enjoy it!*

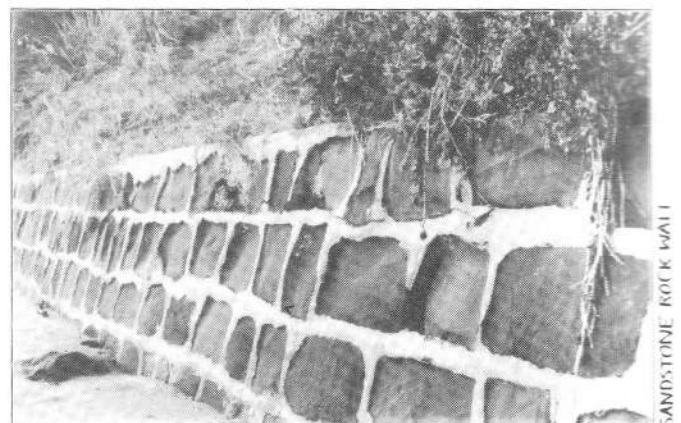
1 You will notice after you get on to the beach that there are some stone retaining walls. The walls nearer the jetty are constructed from bluestone blocks. They were built in the 1930s. Andersons Inlet is constantly changing, these changes being driven by currents, winds, storms and floods. The sand will build up at one spot on the shore one year, then the channel may cut in at the same location the next year. These stone retaining walls were built when people were worried about the channel moving in and eroding away the foreshore.

2 Further along the beach there are more stone retaining walls built in the 1930s. These were built from sandstone. How are these walls different? Do you notice the mortar between the stones stands out a lot more? The softer sandstone has been eroded by the gritty sand which is blown by the wind or swept along by the sea. On the intertidal rock platforms you may observe a similar effect where cracks occur in the flat rock. The rock along these cracks has eroded less, leaving them slightly raised, and giving them a pavement appearance. The minerals that concentrate along the cracks (by leaching) make

the rocks harder and hence more resistant. Likewise the cement in the mortar helps the mortar resist the weathering agents.

3 Further along we have a rock platform, exposed at low tide. There are numerous animals found in the rock pools and crevices here. The activity sheet on rockpooling in this book will give you some idea of what to look for, but watch out for anemones, rockpool shrimps, elephant snails, chitons, small fish called blennies and many crab species (one large crab which is very common is the "green meanie", introduced to Australia, probably riding on the hulls of ships). A seasonal visitor (February/March) to this spot is the sea hare which emits a dark purple dye when alarmed. **Remember, do not disturb the animals. Turn all rocks back to their original position.**

4 Some other visitors to these rocks may be checking the rockpools in search of food. You will often see Sooty Oystercatchers on the rocky shores, black birds with bright red beaks. Around these rocks the oystercatchers are looking for mussels and other rockpool shellfish, as well as



SANDSTONE ROCK WALL

crabs. The Sooty Oystercatcher has a close relative, the Pied Oystercatcher (Pied means black and white), which prefers sandy beaches and tidal mudflats. You will often hear the searching cry of either oystercatcher, usually when they're flying.

5 Instead of stone walls, piles of bluestone rock have been dumped here to prevent erosion. Which do you find more attractive?

6 On the rock platform here you will see the dark purplish Southern Mussel growing in big clumps. While it might be hard for them to protect themselves from the oystercatchers, they do have a very good method to protect themselves from waves and rough weather. Have you any idea what it is? (Hint: look at where they are attached to the rocks - is it the flat exposed regions?)

7 The pole in the water is the only remaining evidence of a bathing enclosure that was located near the mouth of Ayr Creek. Two enclosures were built at the start of the century as bathers were fearful of sharks in the Inlet. One was located near the Inverloch jetty and was built by the community for communal use. The Ayr Creek enclosure however was a more private concern. It was constructed, along with change sheds, by some of the *well-to-do people* who lived on this side of town in quite substantial holiday homes. It is alleged that on the outgoing tide etiquette dictated that you leave the water for fear it had been contaminated by the *commoners* swimming up the Inlet in the other enclosure!

Buried under the sand dunes behind the beach here are the stumps of the old change sheds. The original stumps are exposed when rough seas remove the covering sand.

There were still four poles remaining until recently. This surviving pole is made use of by the cormorants of the Inlet. You can almost be guaranteed that there will be a Pied Cormorant perched there at high tide. Unlike other waterbirds cormorants do not have waterproof plumage, so they must dry their wings after each time in the water. This keeps them airborne. A prominent spot like this pole provides an excellent perch for the cormorants to spread their wings in a drying ritual. Cormorants are sometimes mistakenly referred to as "shags".

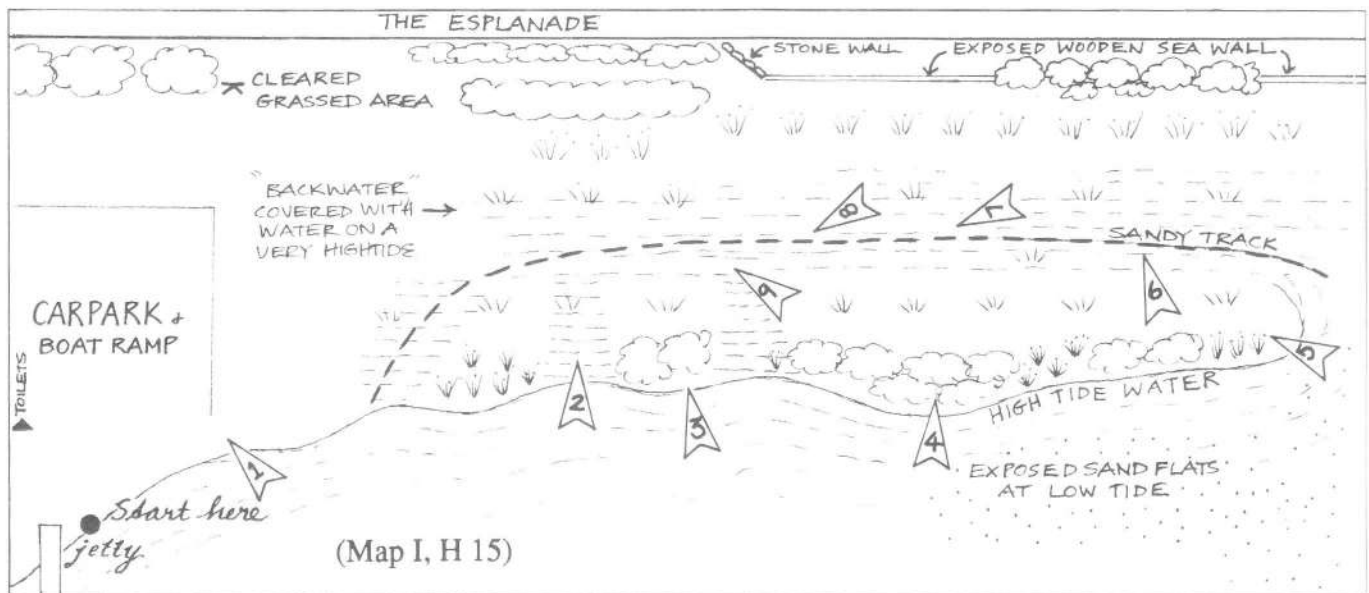
8 This spot marks the end of our walk. Ayr Creek runs occasionally depending on the rainfall. The concrete culvert which carries Surf Parade over Ayr Creek replaced an old timber bridge in the 1980's. The rickety one lane bridge is remembered fondly. A track winds upstream along the creek for about 500m.

You can return to the Environment Centre along the beach or by following Ramsay Boulevard. As an alternative you can continue along the beach beyond Ayr Creek to Point Norman (500m), Surf Beach (1.5 kilometres) or Flat Rocks (2.8 kilometres).



ROCK PLATFORM, ANDERSONS INLET

Toys Backwater Nature Trail



This trail looks at an interesting part of Andersons Inlet located not far from the centre of town. We start our walk at the jetty. To get to the jetty you follow the Esplanade for about 300 metres from the Environment Centre. The walk is a round trip of 30 minutes, at a gentle pace. *Help clean up the environment by collecting rubbish along the way.*

1 From this vantage point on the beach scan across to the Point Smythe Coastal Reserve on the other side of the Inlet. In 1841 Government surveyor George Smythe named this point.

The landform that is Point Smythe is quite young, in geological terms. Around seven thousand years ago sea levels were higher. Point Smythe was not there and Andersons Inlet was part of a much larger Venus Bay. The sea came in much further and sudden rises in the topography around Inverloch indicate the old coastline (seen easily from the Cape Paterson road near Flat Rocks or north of the Tarwin Lower road near Mahers Landing). The flat sandy areas of Inverloch like Lohr Avenue would also have been part of Venus Bay.

However, during the most recent ice age (20,000 years ago), the seas were much lower and a land bridge existed between the mainland and Tasmania. Then it was 200 kilometres to the beach! Presently the sea levels are rising again. In recent times global warming caused by human activity (the "enhanced greenhouse effect") has led to a disturbing acceleration in the rise of the

sea level. This rise may not be apparent from casual observation of the primary sand dune ahead or the tidal backwater behind it. This section of the Inlet's shore is in fact building up, and is being progressively colonised by coastal plants which are suited to exposed situations.

2 Look across towards the Esplanade to view the extent of Toys Backwater. This area fills with water on a very high tide. Many residents remember when it was a permanent, deep backwater where boats were moored, and the existing frontal dune was then only a sand bar. The backwater became known as Toys Backwater because local resident Alan Toy moored his pleasure boats there. These rowing boats were available to the public for hire.

The backwater had the inglorious title of 'stinkhole' because of the stench which wafted from it. A large drain emptied stormwater from the eastern side of town into the backwater. In later years as the backwater began to silt up, it had fewer decent flushings, causing intermittent stagnation.

We now see the foredune well colonised by Coastal Teatree, Coast Wattle and Coast Beard Heath. The gradual process by which dunes build up by the accumulation of sand carried in by on-shore winds, and the subsequent stabilisation by plant colonisation, is known as *sand dune succession*. Behind the dune is a substantial saltmarsh which we will examine more closely on our return route.

3 The Inlet shoreline is far from static. There is clear evidence here of the intrusion of the sea into the sand dune. As the force of the waves remove the sand, established trees collapse onto the beach. This erosion may continue its inward assault, or conditions may alter and we will see the front part of the dune re-establish. These narrow coastal margins are unpredictable in their behaviour, and the sea walls observed along the coast here represent our misguided attempts to try and modify the dynamic nature of this coastal system.

4 The plants colonising the foredune in this vicinity are much younger. This makes the dune here more vulnerable to erosion. The stability of the dune depends on the binding effect of the dune plants. These sensitive plants would be easily destroyed by trampling, leaving the dune unprotected against erosive action of the winds. The lesson here is to stay off the dunes and let these plants carry out their important natural functions.

5 The sand dune finishes here at what is called a *sand spit*. On the high tide some of the Inlet's waders and waterbirds congregate here as the tidal flats, their primary feeding habitats, are flooded. Ahead you will see the distinctive landmark of Townsends Bluff. At the base of the Bluff is the mouth of Screw Creek, a tidal estuary lined by mangroves. The mangroves of Andersons Inlet are the second most southerly occurrence of mangroves in the world (the most southerly is in Corner Inlet). Explore the tidal flats around here. You should find (depending on the tides) armies of blue soldier crabs scurrying to get out of your way. The curious tracks of the Sand Snail (Moon Shell) left as they burrow along just under the sand's surface may lure you in pursuit.

6 We will return along a sandy track in the backwater. This section is now a saltmarsh community. Amazingly hardy plants which can tolerate very salty conditions share the saltmarsh with very specialised animals. Many saltmarsh plants are *succulents* (have fleshy, swollen leaves). The extra water in these leaves helps them cope with the salt they absorb.

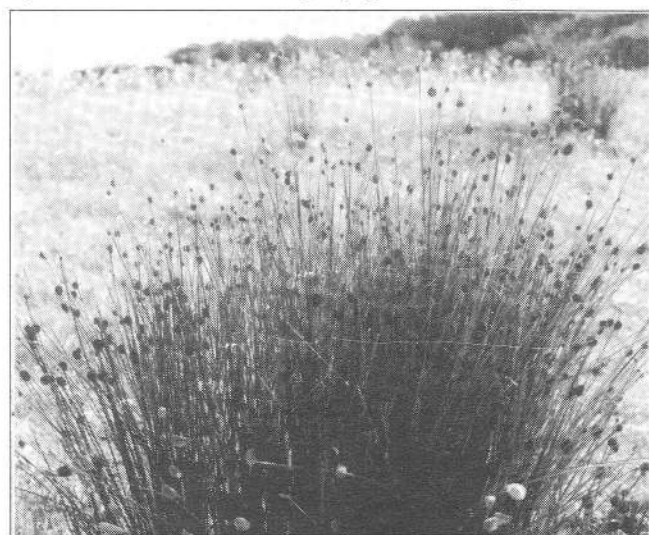
7 You will have noticed the extensive wooden retaining walls. These were built by the original foreshore committee in the 1950s. At that

stage the water went right up to the wall, and the wall was in fact used to moor boats. Around you is the typical saltmarsh plant community containing Australian Seablite, Beaded Glasswort, Chaffy Saw Sedge, and the occasional Swamp Weed.

The distinctive Yellow Sea Lavender with its rosette (ring) of spoon-shaped leaves has small yellow flowers in summer. The endangered Orange-Bellied Parrot, a winter visitor from Tasmania to the south coast of the mainland feeds on the new tips of the glasswort. This is one reason that saltmarshes have significant conservation value.

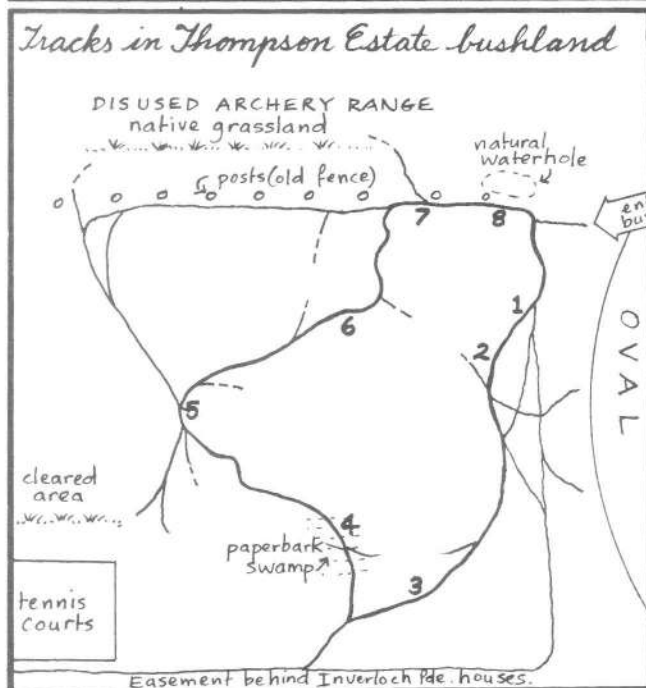
8 The snail tracks in the sand are made by the air breather snails. The larger holes are made by yabbies. The plants and animals in this community are especially adapted to exist here. Generally you won't find them anywhere else except for this zone between the average high spring tide and the absolute highest spring tide. Some sections of a saltmarsh may be covered momentarily each day, others may only be covered two or three times a year.

9 The sandy rises here are being colonised by a mixture of saltmarsh plants like Marsh Saltbush and 'pioneer' dune plants such as the mauve flowered and vigorous Sea Rocket (the fruit of this plant is shaped like a rocket). The native Hairy Spinifex and the introduced Marram Grass are also found here, binding these young sand rises. The Hairy Spinifex's greyish leaves are furry and its stems creep across the sand. The Marram Grass has been planted extensively around the coast to stabilise dunes. It is taller than spinifex and occurs in grey-green clumps.



KNobby CLUB RUSH

A Bush Adventure



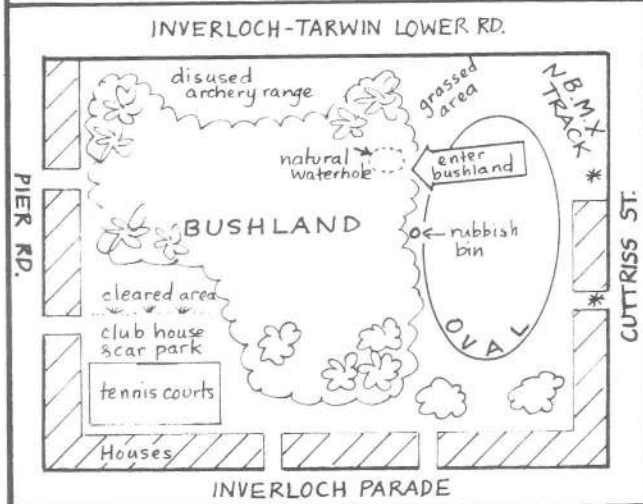
Within Thompson Estate, which is a public recreational area managed by the Shire of Woorayl, is an area of natural bushland. While you have probably spent most of your time in Inverloch exploring the coastline, beaches, dunes and cliffs, you may not have seen very much of the natural vegetation of coastal heathlands, swamps and woodlands and the animals which favour these habitats, which once covered the area where Inverloch now is. The Thompson Estate bushland gives us a glimpse of this.

In recent years Thompson Estate has been claimed for various active recreational pursuits, a sports oval, a B.M.X. track, an archery range (now disused) and tennis courts. On the remaining few acres the bush and its wildlife remain.

For more than a decade many local people have lobbied to have this area proclaimed as a fauna and flora reserve, however its future is uncertain. Its present status is "Land for Wildlife". However no works have been done to ensure its protection. Unfortunately the once pleasant loop track which traversed the bushland has turned into a labyrinth of narrow tracks and access routes. If you are planning to lead a group into the bushland, it is well worth a preliminary trip to gain your bearings.

The easiest access to the bushland is from the oval which can be reached from Cuttriss Street. The guided nature walk takes about 45 minutes.

Location of Thompson Estate
(Map I, E 16)
*It is easiest to access the bushland via Cuttriss St. at either point * and then walk around oval.*



1 The Thompson Estate Bushland is predominantly a woodland, with three main types of eucalypts. Around you now is the Messmate. As opposed to a 'gum', which exposes a smooth trunk, the Messmate falls into a group of eucalypts called the 'stringybarks'. The bark type is unmistakably fibrous and stringy, persistent to the smaller branches. Its goblet shaped fruits appear in large clusters.

Beginning at this spot, make a point of searching the upper branches of the eucalypts for Koalas. It is not true that the Koala feeds only on the leaves of the Manna Gum. In fact, they require a varied diet selected from a few eucalypt species. Each of the three eucalypt species in this area provide this source.

Koalas consume about one kilogram of leaves a day, so if they are around there should be plenty of evidence. The droppings are dull green, about 2 cm in length. Check around your feet!

2 Look at ground level. The large tussock of long firm grass-like leaves is that of the Spiny-headed Matrush. The name is derived from its mustard coloured flowers appearing in clusters and enveloped in sharp spines. A widespread plant, it was used by the Aborigines for making dilly-bags and the base of the leaf was chewed.

3 This is another type of eucalypt called the Swamp Gum. These trees shed their rough hard bark in ribbons to expose a smooth grey

surface. Their funnel shaped fruits appear in clusters of three to four. As their name suggests they are typical of swampy flats and poorly drained soils. As is common here they often have an understorey of Swamp Paperbark.

4 Here the dominant understorey of the woodland now stands almost alone. The Swamp Paperbark with its creamy coloured flower arrangement like a bottlebrush is a member of the Melaleuca family. Strangely "Melaleuca" comes from the Greek words "melos" meaning black and "leukos" white. Apparently the first trees recorded and named had been burnt. Our common name "Paperbark" more aptly describes this plant with its pale, soft papery bark.

This tall shrub is common on wet ground near swamps and streams and is still well represented along roadsides and paddocks around Inverloch.

Look here amongst the Swamp Paperbarks for an untidy looking ball of twigs and leaves about 25 cm across. These are the nests, or dreys, of the Ringtail Possum, which favours sites of closely spaced trees. Ringtails are nocturnal; as with so many of our native animals. The bushland here provides a great opportunity for some night spotlighting. You're sure to see the possums, but watch out for owls, bats and marsupial mice too.



5 The cypress-like, pyramid shaped trees here are the Wild Cherry (or Cherry Ballart). It is partly parasitic on the roots of other trees (especially eucalypts). As its fruit matures, its stalk increases too, eventually becoming larger than the fruit and forming a fleshy, red, pear shape. These "cherries" were eaten by Aborigines and early settlers. In the early days of Australian settlement this "cherry with a stone on the outside" was cited as evidence of the bizarre state of affairs in the new land!

6 Here we meet our last eucalypt type, the Peppermint. The tree takes its name from the particularly strong odour of the leaves when crushed. This small to medium tree has a fine weeping foliage. Notice the prominent oil dots on its leaves.

Look at the understorey plants. There are a variety of wattles, peas, heaths, and various climbing plants. In spring you will see a few orchids and in autumn and winter a spectacular array of mosses and fungi.

7 At this point diverge from the track onto the open area of the disused archery range. Despite some exotic grasses there is still an abundance of native heathland plants and native grasses. Without the competition of large trees these smaller plants can survive in this crowded situation very happily. There are teatrees, blue lillies, flag lillies, and many annual wildflowers such as Milkmaids and Yellow Stars. There are large clumps of summer flowering Kangaroo Grass which is easily recognised with its reddish brown flower spikes.

8 At the waterhole, close your eyes for 30 seconds and listen for the sounds of the bushlife around you. You will probably hear several different birds and sounds of life in the water hole.

The water hole is an ecosystem itself. There are algae and plants around and in the water. Insect larvae and water fleas feed on this vegetation. Their waste products accumulate on the bottom and are recycled by bacteria and micro-organisms. So much is happening in and around the water hole, with many of the organisms being so minute we cannot even see them. We can, however, see Water Fleas, larvae and frogs that provide a valuable source of food for the many birds and animals in the surrounding woodland.

This rich food source, coupled with the availability of drinking water and shelter of the dense bushland offers a perfect home for our wildlife.



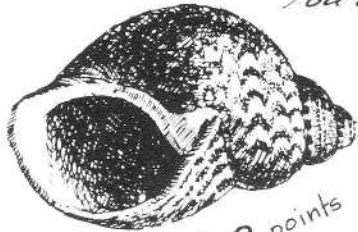
BUNURONG BEACHCOMBING TREASURE HUNT-1

There are 12 objects to find. Collect only one of each. Depending on how common or unusual the objects are you gain points for your collection.

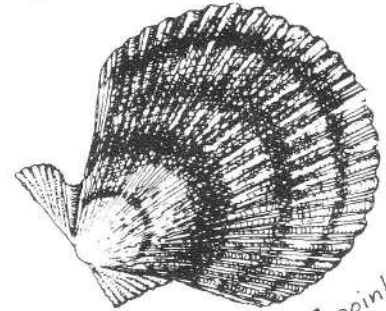
You could get **50 points!**



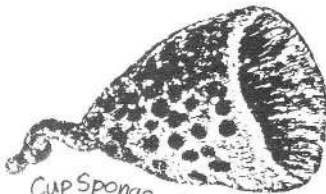
Abalone shell. 2 points



Pheasant shell 2 points



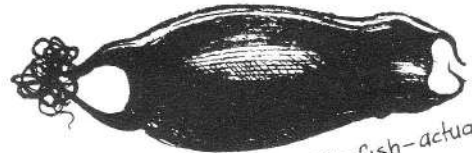
Scallop shell 3 points



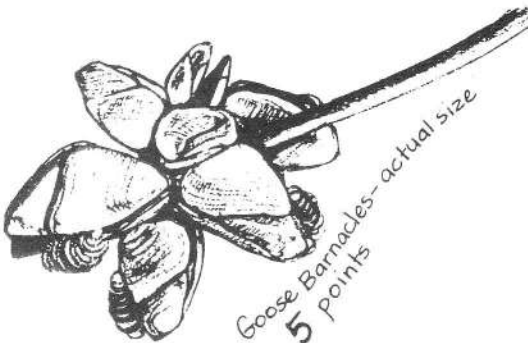
Cup Sponge - can be as big as 30cm.
4 points



Crab skeleton
- varying sizes
6 points



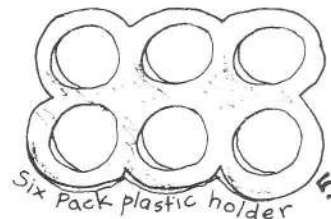
Eggcase of the Dogfish - actual size
4 points



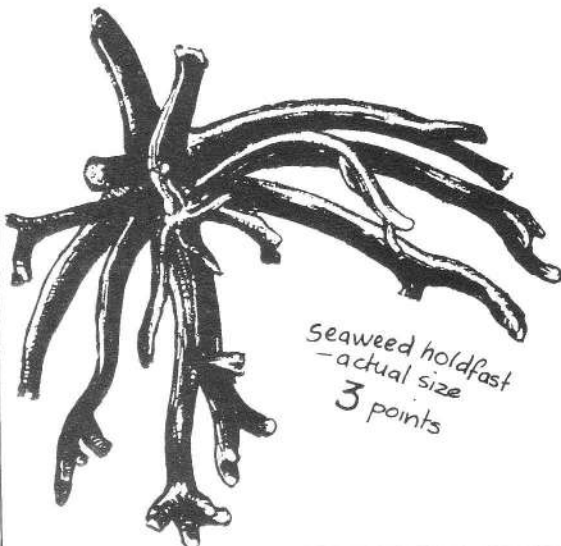
Goose Barnacles - actual size
5 points



Drink can 5 points



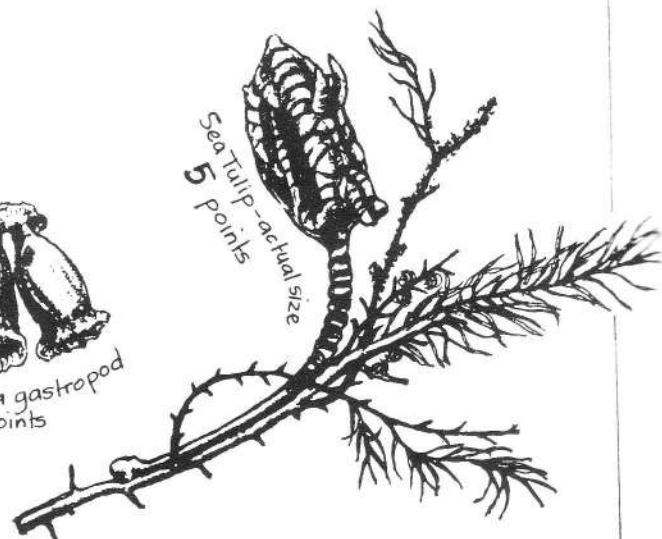
Six Pack plastic holder 5 points



Seaweed holdfast
- actual size
3 points



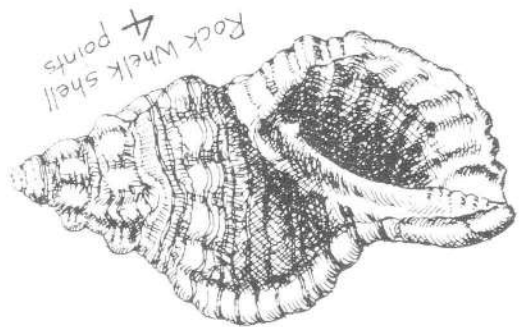
Egg capsules of a gastropod
- actual size 6 points



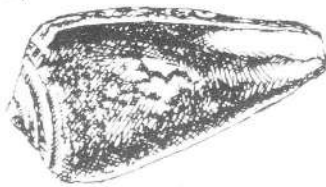
Sea Tulip - actual size
5 points

BUNURONG BEACHCOMBING TREASURE HUNT.2

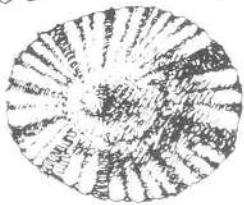
There are 12 objects to find. Collect only one of each. Depending on how common or unusual the objects are you gain points for your collection. You could get 50 points!



Rock Whelk shell
4 points



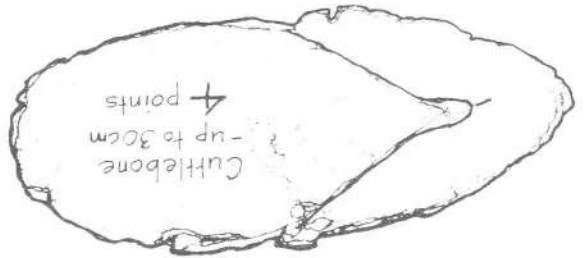
Cone shell 2 points



Limpet shell 2 points



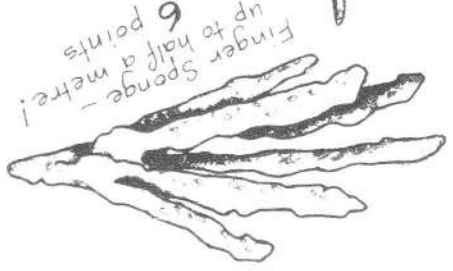
Rusty Catshark eggcase
- actual size
3 points



Cuttlebone
- up to 30cm
4 points



fishing line
5 points



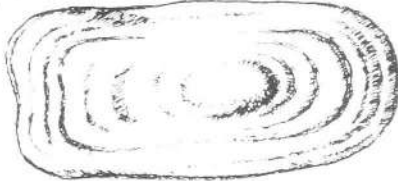
Finger Sponge -
up to half a metre!
6 points



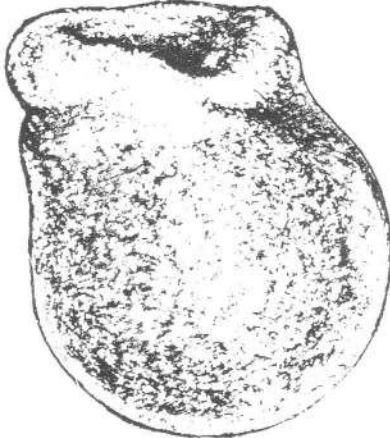
Fish vertebrae
6 points



Glass bottle
5 points



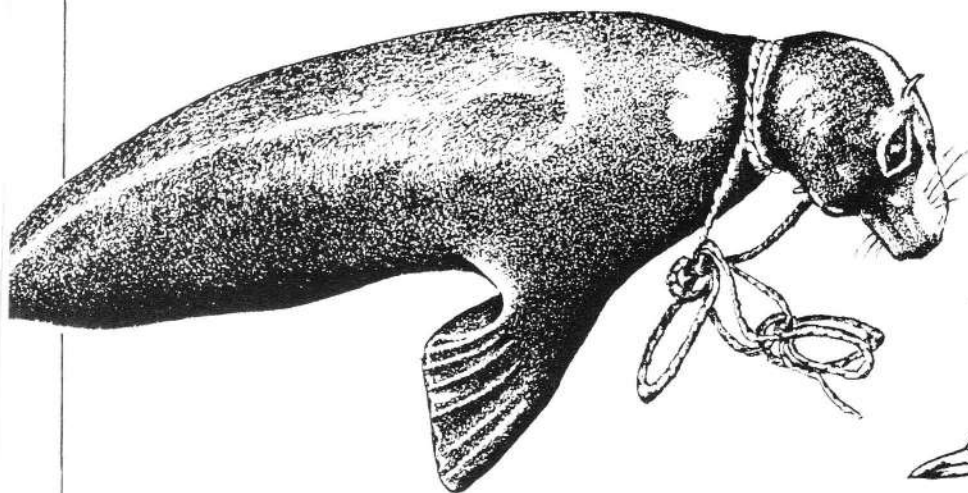
Elephant Snail shell 3 points



Codium - a squashy round ball of green algae
actual size
5 points



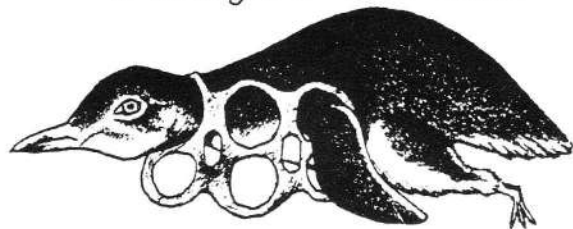
Seaweed with "seaweed floats" attached - actual size
5 points



Sssshhhh
Said the sea
Please listen to me

Sssshhhh
Said the sea
Or polluted I'll be

Please don't dump your litter
Please show me you care
Leave nothing but footprints
To show you've been there.



INVERLOCH LITTER SURVEY

- You will need a big bag for collecting and a solid container for glass and other sharp objects.
- Wear rubber gloves or use tongs to pick up the rubbish.
- Don't touch anything you think could be harmful.

COUNT HOW MANY YOU FIND OF EACH DIFFERENT OBJECT AND RECORD:

OBJECT	number collected	OBJECT	number collected	OBJECT	number collected
DRINK CANS		PLASTIC BOTTLES		PLASTIC BAGS	
BEER BOTTLES		PIECES OF BROKEN GLASS		
OTHER GLASS CONTAINERS		PLASTIC STRAWS		
SIX PACK PLASTIC RINGS		FISHING LINE		
BOTTLE TOPS & RING TOPS		CIGARETTE BUTTS		
FOOD WRAPPERS		ROPE/STRING		TOTAL	

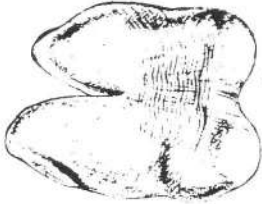
The most common type of litter found is/are.....

NOW, SORT YOUR LITTER INTO THESE 3 CATEGORIES, COUNT AND RECORD:

	total number
1. NATURALLY RECYCABLE i.e. BIODEGRADABLE	
2. COMMERICALLY RECYCABLE e.g. some glass, aluminium plastic & paper.	
3. NON RECYCABLE e.g. many plastics and other synthetic products.	

Most of the litter we found was
(out of the 3 categories)

BUNVRONG DETECTIVE



← *What is it? It is light, hollow, the shape of a tooth, but much much bigger, and can be found washed up on the Bunvrong Coast. Amazingly enough, it's an air bladder from a fish!*

WHEN ANIMALS DIE IN THE SEA, ONLY THE HARDIEST PARTS, SUCH AS SHELLS, SKELETONS AND THEIR EGG CASES SURVIVE TO BE WASHED UP ON THE BEACH. PLAY "**BUNVRONG DETECTIVE**" AND MATCH THE BEACHCOMBING FINDS (AT THE BOTTOM OF THIS PAGE) TO THE ANIMALS THEY COME FROM.



RUSTY CATSHARK



WARRENER



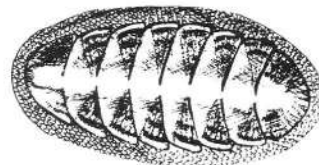
DOGFISH (SPOTTED CATSHARK)



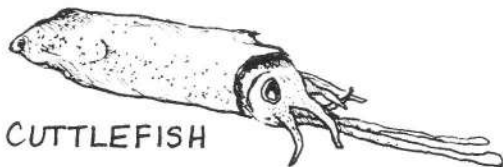
SEA URCHIN



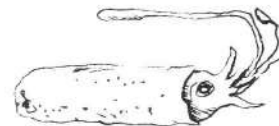
SKATE



CHITON



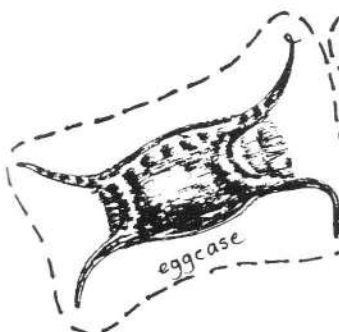
CUTTLEFISH



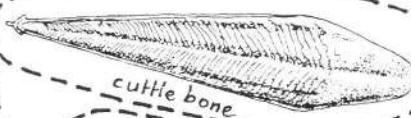
SPIRULA

CUT OUT AND PASTE THE OBJECTS PICTURED BELOW NEXT TO THE ANIMAL THEY CAME FROM

CUT ALONG THIS LINE



eggcase



cuttle bone



egg case



operculum



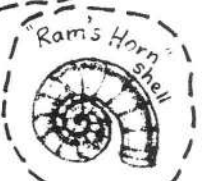
shells



eggcase



rest of sea urchin



Ram's Horn shell

date:

location:

habitat type:

some of the plants:

what animals did you see?

what evidence of animals
did you see?

a nest of a
tracks of
droppings of
other

what else did you see?

what abiotic factors
affect this habitat?



date:

location:

habitat type:

some of the plants:

what animals did you see?

what evidence of animals
did you see?

a nest of a
tracks of
droppings of
other

what else did you see?

what abiotic factors
affect this habitat?
(e.g. tides, sunlight)

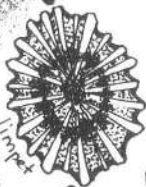
ROCKPOOLING

THE TIME TO VISIT A ROCKPOOL IS WHEN THE TIDE IS LOW. ROCKPOOLS ARE WET AND SLIPPERY, SO WEAR SOFT SOLED SHOES AND WALK CAREFULLY. A ROCKPOOL IS A VERY CROWDED HABITAT, WHERE THERE ARE MANY DIFFERENT PLANTS AND ANIMALS. TO PRESERVE THE NATURAL HABITAT, DON'T COLLECT ANY LIVE PLANTS OR ANIMALS, & IF YOU PICK UP AN ANIMAL OR ROCK TO LOOK, PUT IT BACK EXACTLY WHERE YOU FOUND IT. HAPPY ROCKPOOLING & WATCH FOR BIG WAVES!

ROCKPOOLING



Tube worms



limpet

HOLD ON TIGHT

If you try to pull an abalone off a rock, you will find that it sticks tightly. Other animals, such as chitons and limpets, like abalone, eat algae and are very safe in their shells, sticking so tightly to the rocks. No wonder these animals don't get washed off when the tide comes in.



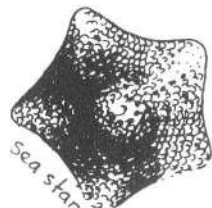
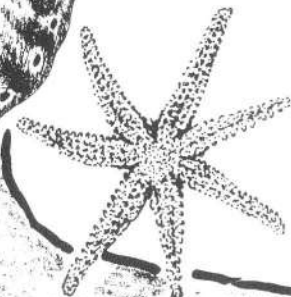
chiton



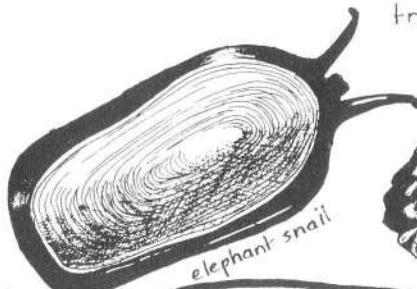
abalone

HOW MANY LEGS?

Have you ever looked underneath a sea star? There are several rows of tube feet radiating from the mouth. Don't you think we would have trouble moving all those feet at once to move in a certain direction?



sea star



elephant snail



top shell



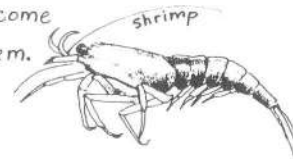
nerite



warren

IN HIDING

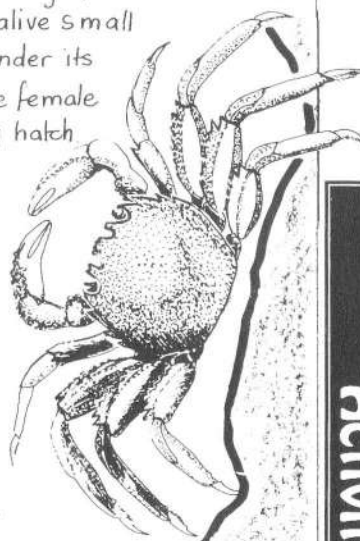
Can you see some hard white tubes attached to the rocks? Tubeworms live inside these. The worms come out and feed only when the water covers them.



shrimp

CRABS

Search amongst the seaweed or under rocks for crabs. The large front claws are used for catching and holding their prey of dead or alive small animals. Look underneath the crab at the "tail" tucked under its body. A male crab has a narrow triangular tail, while the female has a wide rounded tail, where she holds her eggs until they hatch.



COLOURS Some of these animals have beautifully coloured shells. Other have no outside shell but brightly coloured bodies. Colour the pictures here.

MYSTERY TRACKS



You may notice a fine layer of sand on the bottom of the rockpool. Look closely, can you see strange tracks? What makes the tracks, a limpet, a nerite, a top shell or something else? Time these animals for 2 minutes and see how far they have moved.

Activity Sheet 7

It is low tide in Andersons Inlet; the vast mudflats are exposed, and many wader and waterbirds are out for a feed.

MUDFLAT SMORGASBOARD GAME

To play the game, you take on the role of three different birds.

1. A RED-NECKED STINT, eating 3 small snails, @ in the "shore zone".
2. An EASTERN CURLEW eating 3 burrowing crabs,  in the "mudflat zone".
3. A ROYAL SPOONBILL eating 3 small fish,  in the "shallow water zone".

• Your birds must find and eat their food, which your opponent has marked on his/her grid!

• In the same game, Your opponent's birds must find and eat their food, which you have marked on your grid. example: YOUR GRID WITH OPPONENT'S FOOD MARKED

shore zone mudflat zone shallow water

animals should be put in adjoining squares.

Take it in turns to call out a grid reference. Each turn, tell your opponent if they have found an animal or missed. Cross out each animal as it is found. You will need to keep track of your food too.

- The first one to find and eat the the entire smorgasboard wins!

Red-Necked Stint

Eastern Curlew

Royal Spoonbill

shore zone

mudflat zone

shallow water zone

6

5

4

3

2

1

A

B

C

D

E

F

G

H

I

6

5

4

3

2

1

A BOARD GAME for TWO PLAYERS

LIMPET'S JOURNEY

YOU NEED:
a medium sized limpet shell
and a dice to play

You are a limpet, living in a rockpool at Flat Rocks, Inverloch. Your life is tough. Twice a day the tide goes out and you are left high and dry. Play the game and learn about some other adventures of a limpet.....

Now, after a few games, choose another rockpool animal such as a CRAB, a CHITON, an ANEMONE, or a STARFISH and make up your own board game.

finish

You need to throw the exact number to finish

Some school children visit and disturb you. You cling tightly to a rock, sensing possible danger. Go back to 12, where it is safe.

12

Whoops! That was a rock whelk, not a rock, and you're clinging on to him as he creeps back to 9. You go with him!

9

The tide is going out. You move on quickly to find a safe place to cling when your rockpool will be left with little water. Go to 12.

2

3

The tide is high. There is lots of yummy algae to nibble here.

4

Move to 6 where the tide's out.

5

6

7

A chiton is visiting your patch today! He's sharing his lunch so there's not as much for you. Go back to 7 where there is more to eat.

15

16

The tide has turned. The waves come crashing in on your pool. Hold tight or you'll be swept away. It's safer at 16. Back you go.

17

18

A bad storm. The sea's rough but you've found a safe little crack in the rocks to shelter at 19. On you go.

23

Danger alert! A Sooty Cystercatcher arrived for a feast. Must lie low and shelter at 20. Back you go.

20

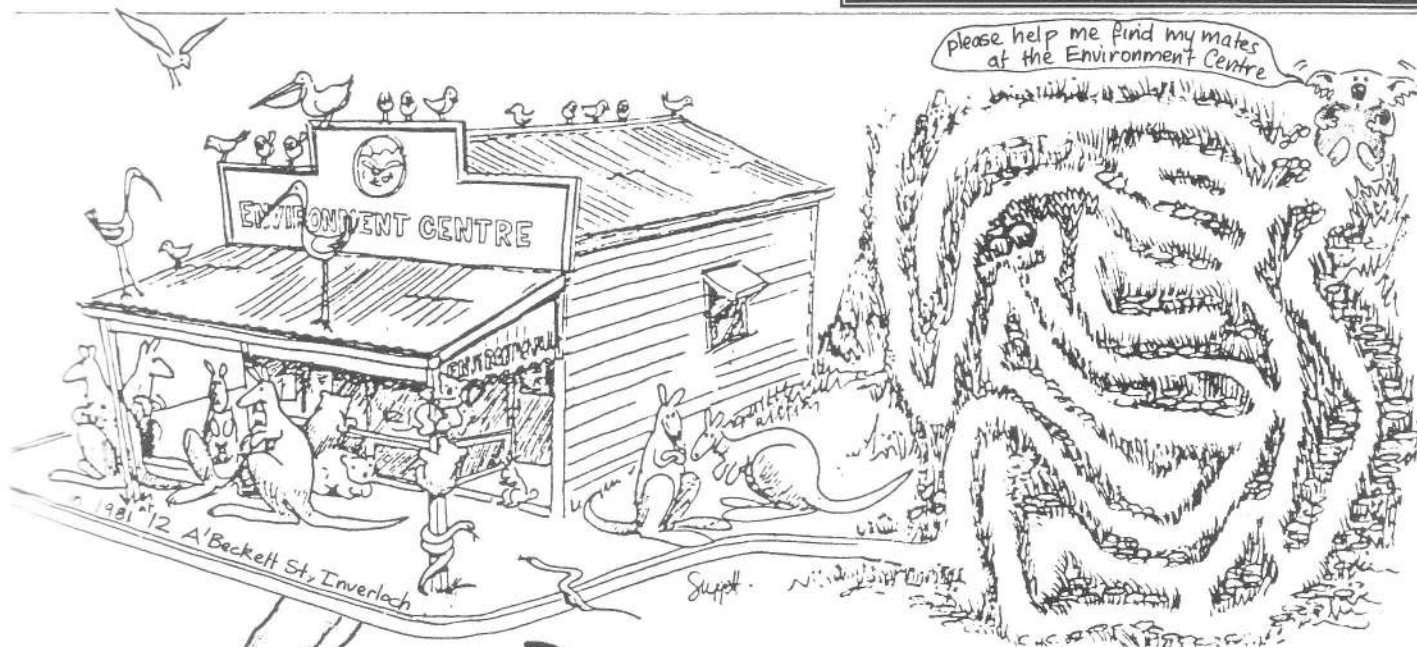
19

Another high tide and you can go off for a bite to eat. Move to delicious algae at 23.

Activity Sheet 9

Can you remember what you have seen at Inverloch's beaches? Can you remember the names of rockpool animals, plants, seaweeds and beachcombing finds?

Try to fill the "bubble" with at least one word beginning with the letter, but you can write as many as will fit.

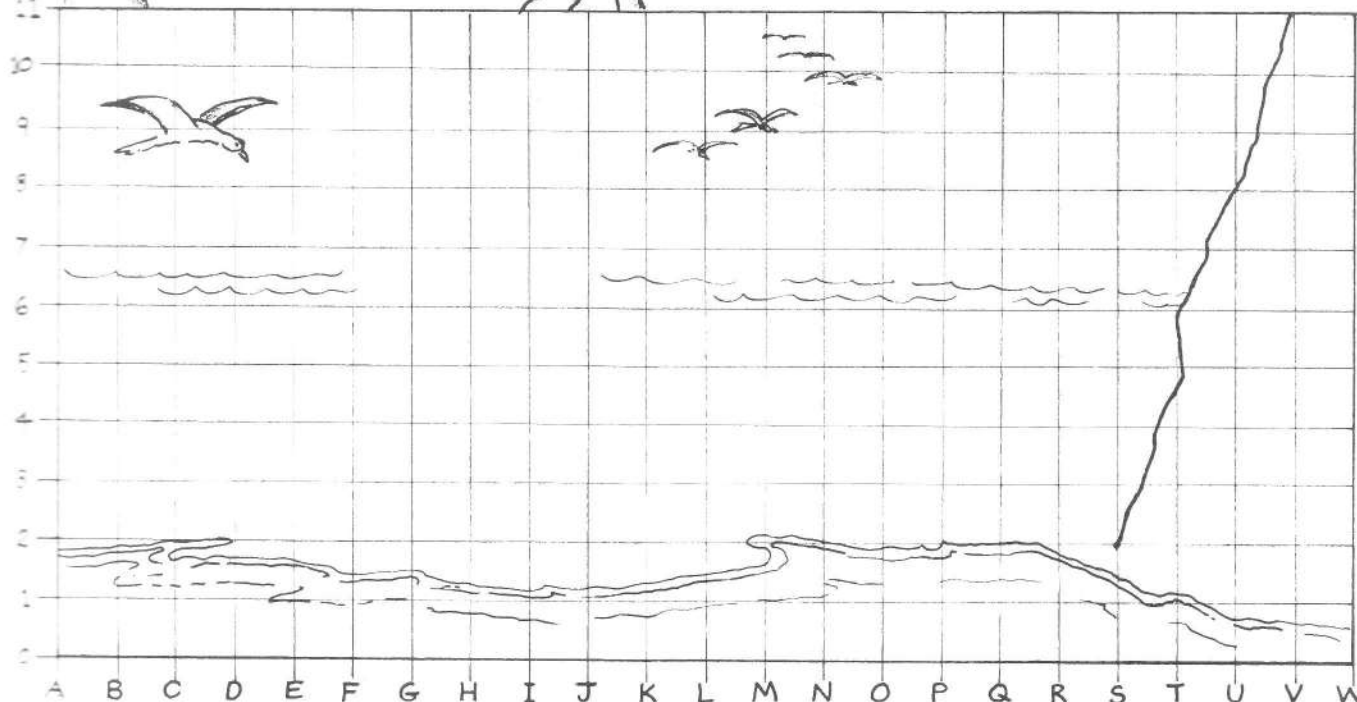


ACTIVITY 1.



1. I'm wearing the puzzle!
2. or I'm small & my relative is good in the compost.
3. I'm usually under the rock
4. I'm a brown seaweed called Neptune's
5. I'm cap shaped & stick tight to the rocks!
6. Watch out for me, a blue-ringed
7. I'm attached to the rock & wave my tentacles around to catch my food,
8. Some people love to eat me, others just love my shell!

ACTIVITY 2.



ACTIVITY 3.

Plot the points: A2, D3, E3, F5, G7, G10, H10, H7, I7, I9, J8, J6, K5, L4, L3, P2, S2.
Now, join the dots, in order, starting from the left hand side at A2.
What is the well known landmark of the Bunurong Marine Park that you have drawn?

SEASIDE FUN

WORDSEARCH

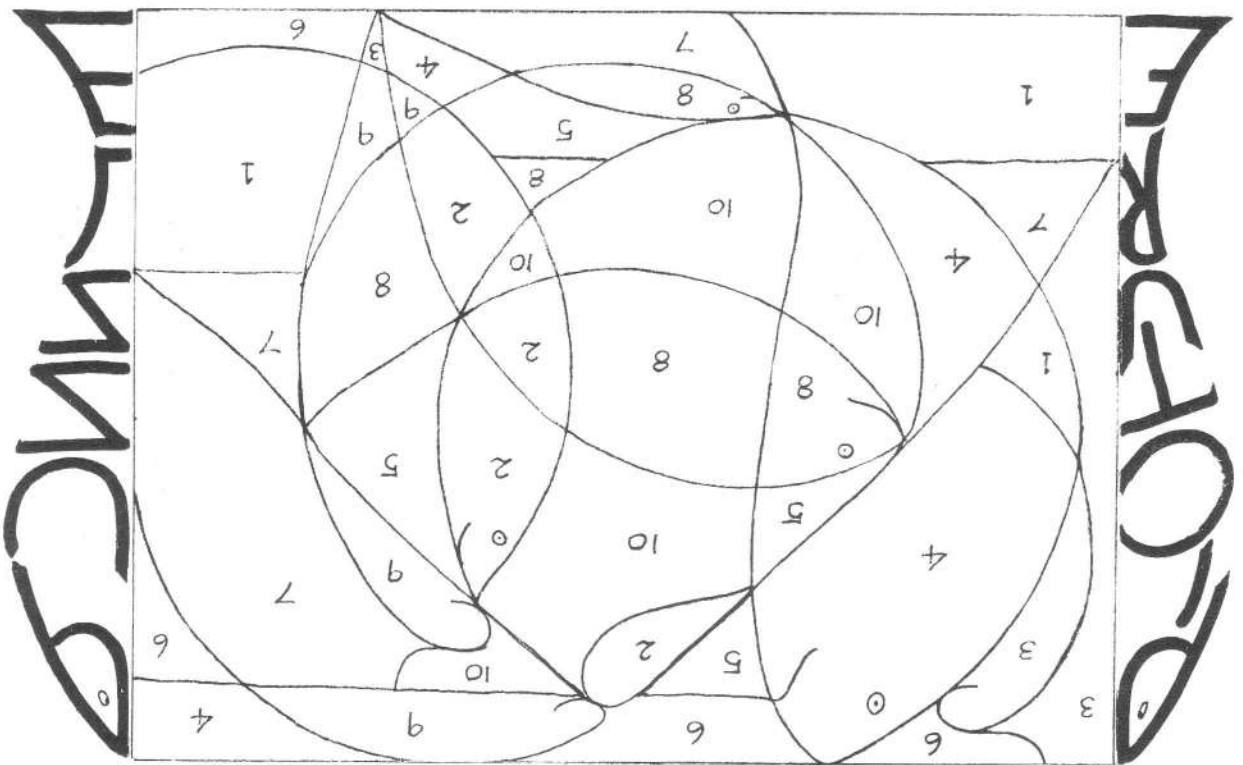
WITH MYSTERY MESSAGE



Find all the words listed below, the remaining letters, in order will spell the mystery message
 (the words may appear up or down, horizontal or diagonal, backwards & a letter used more than once)

AIR	FIN	MUDFLATS	SHELL
ALBATROSS	FISH	MANGROVE	SKATE
BEACH	FUN	NEPTUNE	SEA STAR
BOAT	GAME	OCTOPUS	SUN
BULL KELP	GOOSE BARNACLE	OYSTER	TIDE
CARE	HOLE	PIER	UNDERWATER
CRAB	HOLIDAY	PLANKTON	WATER
DAY OUT	INVERLOCH	RELAX	WHALE
DOTTREL	JELLYFISH	ROCKPOOL	WIND
EEL	LIMPET	SAND	ZEBRA FISH

Find out how much you know about the Bunurong Marine Park and Andersons Inlet, by completing the picture puzzle. Do you find a complete scallop shell, a broken shell or do you have scattered fragments?



Printed below are 10 statements. If the statement is:
TRUE - colour the corresponding number on the picture puzzle YELLOW
FALSE - colour the corresponding number on the picture puzzle BLUE

1. Our marine park is called "The Boonong".
2. You are not allowed to fish in the sanctuary zone of the Bunurong Marine Park.
3. You are allowed to take live shellfish from the Bunurong Marine Park.
4. Eagles nest is a cave on the Bunurong coast.
5. Shellfish Law protects live shellfish.
6. I can leave my rubbish on the beach because the sea washes it away.
7. You don't have to use the properly constructed or marked tracks to get to the beach, you can just find an opening anywhere in the foreshore.
8. Migratory birds visit Andersons Inlet from the Northern Hemisphere.
9. There is one high tide and one low tide each 24 hours.
10. The word "Bunurong" is the name of the Aboriginal tribe who lived in this area.

How many fish can you find in the picture puzzle????
(Clue: there are 4 eyes drawn, but there are more than 12 fish)

CROSSWORD CLUES

ACROSS

1. I need looking after, I cover two thirds of the planet.
4. The activity where we search the tide lines for the sea's "treasure".
8. Areas of land where native plants and animals are protected (2 words).
10. Seabirds, like gulls.
11. The opposite to a high tide.
12. The Bunurong is a _____ Park.
14. Plants need me for photosynthesis.
15. Should you wear thongs when rockpooling?
16. I live on the rocky shores and have a peculiar sideways way of moving.
17. The plants of the sea.
19. Animals that are caught by others for food are called their _____.
20. Decomposers in the food web eat _____ and decaying plants and animals.
22. Because the water in Screw Creek is affected by the tides it is called a _____ creek.
23. Another name for a starfish.
27. I'm black and lightweight and hold the young of some species of shark until they hatch.
30. Our rubbish, industrial waste and sewerage all _____ the marine environment.
32. A feral animal which is a danger to native animals and birds.
34. Inside my shell are beautiful colours. I'm "ear" shaped.
35. A slang term for a surfboard rider.
36. A tough, thick brown seaweed.
37. North east (abbreviation).

DOWN

2. A marine mammal sometimes found in our waters.
3. We live in the rockpools and our shells have eight sections.
4. The name of Inverloch's Marine Park.
5. The scientific name for an animal like a cuttlefish, squid or octopus.
6. I'm a bivalve and live attached to rocks in large clusters.
7. I hold a giant kelp onto the rock.
9. I look like a tiny volcano and live in great clusters fixed firmly to the rocks.
13. A town in South Gippsland at the mouth of Andersons Inlet.
14. I am well camouflaged amongst the seaweed and my closest relative is the sea horse.
16. I belong to a group of animals called Cephalopods and my internal shell is commonly found washed up on the beach.
18. Environmental Education (initials).
21. I uncover and cover the rockpools twice each 24 hours.
24. I am a common bivalve, sometimes tiny with pretty colours.
25. Another word for decay.
26. A fish, sometimes feared but here at Inverloch, our types are only 1 metre long and friendly.
28. If it weren't for me a fish couldn't breathe!
29. The abalone will _____ any waste products through the holes in its shell.
30. A sunken part in the rock platform makes an ideal rock _____.
31. Recedes (as in the tide going out).
33. The complex feeding patterns of a group of animals is called a food _____.



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	
16	1			2		3		4			5				6					16
15																				15
14	7		8															9		14
13															10					13
12	11									12			13							12
11				14																11
10								15								16				10
9	17				18						19									9
8				20						21										8
7									22											7
6		23				24		25												6
5	26									27	28							29		5
4			30						31							32				4
3														33						3
2								34								35				2
1	36					37														1
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	

USE THE GRID BORDER TO DECODE THE HIDDEN MESSAGE BELOW

E9, R4, P8, F14, D3, M5, A7, F2, L2, M2

Q16, A5

P4, C2, D7, K15, M10, B1, L12

PRESSING SEAWEED

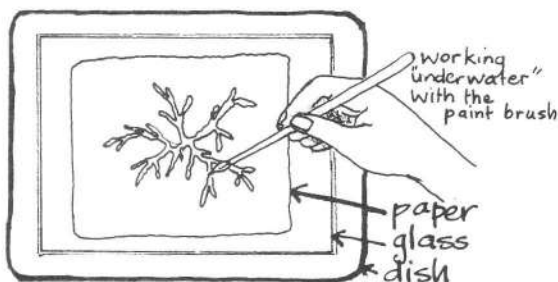
Small delicate seaweeds are the best to press and mount, like the beautiful pink and red ones washed up on the beaches from the ocean depths. Don't use thick ones with fleshy parts. Coralline algae will often break up when it is dry.

YOU WILL NEED

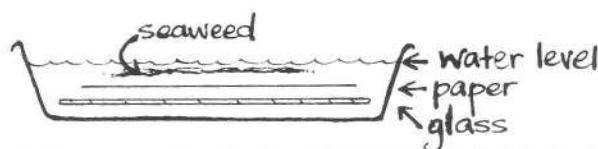
- freshly collected seaweed
- thick paper or card
- a shallow dish or tray
- small paint brush
- scissors
- gauze or nylon
- sheet of thick glass (optional)
- lots and lots of newspaper
- heavy books or bricks

1. Use only freshly collected seaweed.
 - Rinse off any sand
 - Cut away any thick or tangled parts.

3. Arrange your seaweed by spreading it out with a small paint brush. You may need to remove a little water to stop your seaweed from floating away!

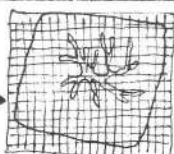


2. Fill the dish with water and put in the glass and paper. If you don't have glass, use heavy card.
 - Now, "float" the seaweed on top.

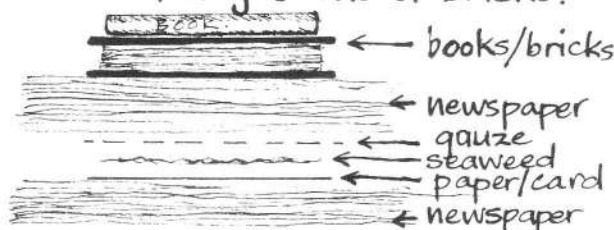


4. Now slowly lift the glass, paper and seaweed out of the water. Keep it steady and horizontal until the seaweed is safely "clinging" to the paper.
 - Tilt it slightly to remove any excess water.

5. Cover the seaweed with a piece of nylon or gauze.
 - Slip the paper holding the seaweed and gauze away from the glass.
 - Now to make a "seaweed sandwich". Put lots and lots of newspaper under and on top.



6. Weight your "seaweed sandwich" with heavy books or bricks.
 - Change the newspaper each day until the seaweed is COMPLETELY DRY.



A green seaweed - SEA LETTUCE



A brown seaweed, NEPTUNE'S NECKLACE



Red seaweed CORALLINE RED ALGAE from the rockpools



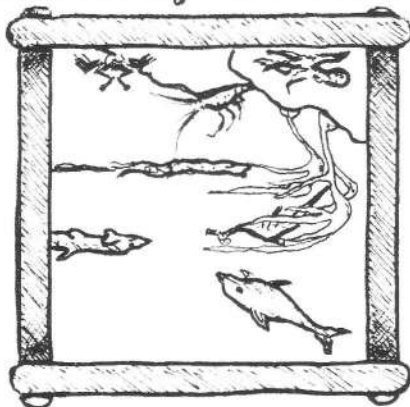
a red algae from the deep ocean



Open Ocean in 3-D

What is life like in the open ocean underwater world? Use your imagination to create your own 3-D picture.

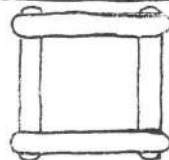
* Your 3-D picture will measure approx. 11cm x 11cm x 4cm.



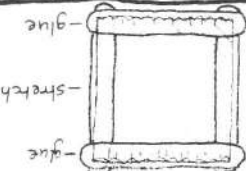
- You will need:
- 36 paddle pop sticks
 - wood glue
 - paper glue
 - small scissors
 - blue cellophane

HOW TO MAKE YOUR 'OPEN OCEAN' in 3-D

1. Glue 4 paddle pop sticks to make 4 frames like this:



2. Glue a piece of blue cellophane onto three of the frames. stretch - glue



3. Lay out your three frames and label them:

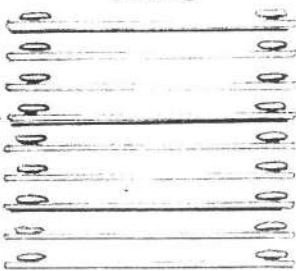
- F (for furthest away)
- M (for mid way)
- C (for closest)

Always keep them in this position, with the horizontal stick on top.



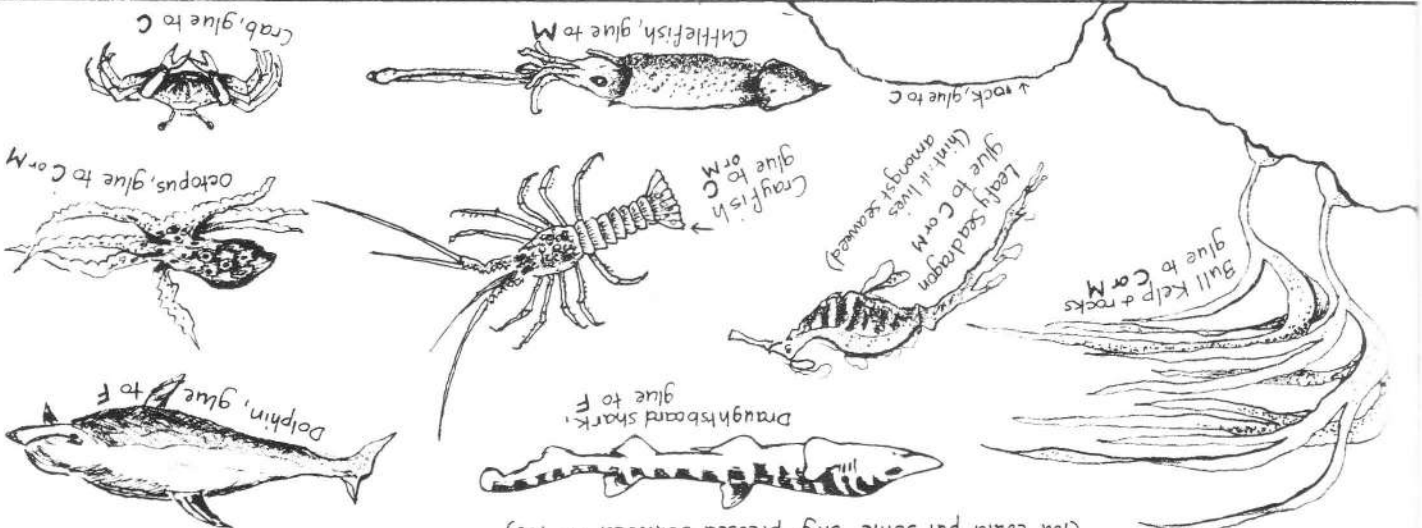
4. Arrange your underwater marine pictures onto the blue cellophane. Remember that 1cm. around the edge will be out of view. Glue the pictures onto the cellophane.

5. To make your 3-D picture, layer your frames, gluing each one to the next. Make sure the horizontal stick is always on top. those would sit exactly on each other



6. Finally, glue a piece of blue cellophane on the top. It is best if you hang your 3-D picture to capture some light.

Here are some plants & animals you could find in the open ocean off Inverloch. Cut these out & use them in your 'OPEN OCEAN' in 3-D picture. You can colour them & arrange them how you want. Or you could draw your own! Remember, the animals furthest away should appear smaller. (You could put some dry pressed seaweed in too)



INVERLOCH

Community Newspaper

MARCH 24, 1992

News

50c

PH. 74 1416

Dear Editor,

Once again we listen to the Shire of Woorayl via the Town Planner attempt to justify the unjustifiable removal of yet more vegetation.

This time its what was the Melaleuca and Eucalypt section of the Aye Creek drainage/open creek reserve. Will the Shire be satisfied only when it has modified every square millimetre of Inverloch in the name of progress?

Complete regeneration of a destroyed area of bushland takes longer than our lifetimes even with the best intentions. What happens to all of the life displaced by its removal? It doesn't just move into the next bit, that is chock-a-block with fiercely competitive and territorial creatures already stressed by reduced habitat. A look at an aerial photo of Inverloch taken a few years ago shows the rapidly diminishing area of natural bushland with most of the remainder presently under threat from either subdivision or clearance 'to get a better view of the water'.

We are all shocked, or ought to be, that the Helmeted Honeyeater, Gorilla, Panda, Elephant etc etc are under threat of extinction due to habitat loss but how many less obvious creatures have already or soon will become only pictures in books or even disappear without our knowing of their existence. We don't know because that takes a specialist knowledge of our environment which very few people care to acquire let alone organisations like the Shire of Woorayl which seem to revel in an arrogant ignorance and indifference.

Like Julian Lennon 'salt water wells in my eyes'.

Letters to the editor

Reproduced with permission from the authors of the letters and the 'Inverloch News'

To the editor,
I think that this bulldozing land business is pathetic. We don't like paying money just so men can bulldoze land. I don't think that the council is cruel just very ignorant. Please other kids write letters to the paper or to the council itself about how important it is to let the bush grow naturally. The environment in Inverloch is lovely and we shouldn't spoil it.

Here are two letters written to the "Inverloch News" after some residents were very angry about natural bush that was bulldozed to make way for a drain. One letter was written by a 9 year old child, the other by an adult. The illustration says as much as the words!



WHAT CAN YOU DO?

Here is something you could read in a local paper

NEW TOURIST FACILITIES- FORESHORE TO BE CLEARED

A new carpark and playground is proposed for the Inverloch foreshore only minutes from the busy shopping centre. Natural bush, including teatree and banksia trees will be cleared from the foreshore next to the 'Glade'. "This is great", said a local resident. "Not only do we get more carpark, clearing the foreshore will give us a great view of the beach from the town centre". The area is looked after by the local Department of Conservation and Environment. An Inverloch Ranger said, "I don't want to see the land cleared, but if Inverloch wants these new facilities I suppose that is that".

- THINK DO DISCUSS
- Visit the area so you know what you are talking about.
 - Do we need the new carpark? Do we need another playground?
 - If yes, is there somewhere else they can be sited?
 - Should we be saving the bush? Why?
 - Do other people agree with you? What are your differences?

After you have made a decision about what you think, WRITE A LETTER "To the Editor" or DRAW A POSTER to give your views.

Further Suggestions for Activities

The possibilities of creating your own environmentally related activities are endless. Children love treasure hunts and many variations of dice games could be made. There are numerous craft ideas which could be adapted using material that children have seen or collected on their outdoor activities. However, if you need some ideas, here are some from us.

Craft Activities

Making shell jewellery This can be done by simply threading shells onto thread or buying the clasps for earrings and pendants from craft supply centres.

Sand pictures These can be created on stiff card using a craft glue. The sand is sprinkled over the wet glue and the excess shaken off when dry.

Colouring Hare's Tail Grass (also known as "pussey tails") This common grass on our foreshore is not a native plant. They can be dipped into coloured inks or vegetable dyes.

Shell Decorative Containers Shells can be arranged into decorative patterns and glued on to tins or wooden boxes. It is best to use a tile cement.

Kite Making Using the shapes and forms of marine animals.

Mobiles Make marine animals such as jellyfish, fish, crabs from coloured paper, cellophane, wool etc and hang on a thread from a wire coat hanger.

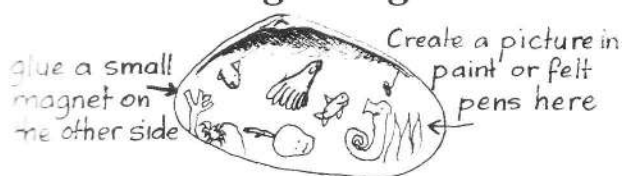
Seaweed Craft Make cards and pictures with pressed dried seaweed.

Weaving Using a small wooden frame with nails at each end, the warp can be prepared in commercial string or wool, but the rest can be done in natural materials including dried seaweed and sticks.

Nut and Shell Creatures There are a huge variety of shells and banksia cones are plentiful on the foreshore. Use tile cement for shells and wood glue for woody cones. Small plastic "eyes" can be bought in bulk from craft stores.

Remember: Collect only what you will need and any unused natural material should be returned.

'Fridge Magnet



use pipi shells left on the beach by fishermen who use the shellfish for bait

Games

Crab Walk Races

Miming Choose a habitat and children are required to mime an animal from it e.g. a rockpool. You could mime a crab, fish, anemone.

Who am I? Twenty questions. One child thinks of an animal. Other children may ask questions e.g. Do you live in a rock pool? Do you eat algae? To which the child can only answer "Yes" or "No". After twenty questions hopefully everyone knows who you are.

Memory Game "At the beach today I saw" and each child adds another, after reciting all the previous words.

Feely Boxes Place an object in a coloured box. A small hole is cut so that a child can put their hands in and feel the object. Its also good to be able to shake the box and smell it. Children could make their own and classmates would have to guess what is inside.

Board Games Children are great at devising their own board games with a given theme. They can be given a large sheet with a grid drawn on to get them started.

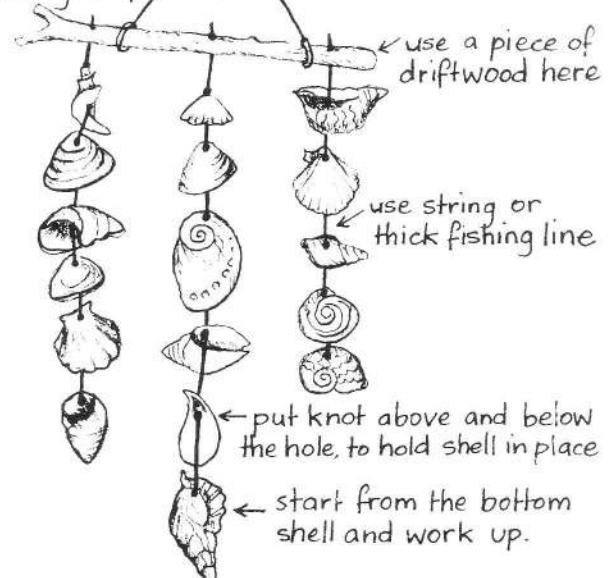
Shell Wind Chime

Use shells with "ready made holes"

Use broken and worn shells

or drill your own holes.....

Use a hand drill and a fine drill bit. Drill, carefully and slowly as many shells break easily. It is best to work in pairs, with one person drilling and the other holding the shell firmly in position.



Notes on Activity Sheets (For Teachers & Leaders)

Bunurong Beachcombing Treasure Hunt

Activity sheets 1 and 2, page 40,41.

Children love treasure hunts. Two sheets have been prepared to reduce competition for the same objects and to yield a more diverse collection if you wish to have a display later on. Only one example of each object should be collected except of course for rubbish which should all be removed from the beach. The treasure hunts are designed for use at the ocean beaches (Point Norman to Cape Paterson). Remember: no collection in the Sanctuary Zone of the Bunurong Marine Park.

Inverloch Litter Survey

Activity sheet 3, page 42.

This activity uses the skills of data collection and categorising objects. The terms biodegradable, recyclable and non-recyclable will need defining. Highlight the difference between animal and plant materials breaking down to be returned to the ecosystem as opposed to many of our manufactured products which will not breakdown, or if they do, may pollute. The illustrations suggest other hazards. Care should be taken when collecting litter. Bags of rubbish can be deposited in the bins provided on the foreshore, or if large quantities are collected, including recyclable materials, they can be left at the Rangers Office.

Bunurong Detective

Activity sheet 4, page 43.

The pictures of the animals and the objects to match are not in correct proportion. Answers can be found in the S.G.C.S. pamphlet, *Beachcombing Guide for South Gippsland Coastal Areas*.

Different Habitats

Activity sheet 5, page 44.

This sheet introduces the concepts of habitats and ecosystems and basic scientific data collection. It will encourage the user to observe the differences at many levels between different habitats. For young children it is best to compare two very different places e.g. Thompson Estate Bushland and a beach habitat such as the rockpools. For older children two more similar habitats can be compared e.g. mangroves and saltmarsh.

Rockpooling

Activity sheet 6, page 45.

This activity is designed as an adults directed

“lesson” to rockpooling. It is looking at species diversity and animal behaviour. It is a different approach to merely looking and identifying plants and animals.

Mudflat Smorgasboard Game

Activity sheet 7, page 46.

Using three of our common waterbirds and their feeding habits in Andersons Inlet, this game is a variation of the well known “Battleships and Cruisers” played by two people, which many older children will be familiar with. For younger children, use the grid, ask them to fill in “their food” for each of the birds and then call grid references, as in calling numbers for “Bingo”. If a pencil is used the grid can be reused. Perhaps after a visit to observe the birds in Andersons Inlet, children could create their own game, role playing other bird species.

Limpets Journey

Activity sheet 8, page 47.

This game explores the behaviour of a limpet within a rockpool ecosystem. Children are great at making up their own board games. They could do this, by choosing any animal in any habitat and exploring its behaviour and relationships to its surroundings to determine the moves of the game.

Alphabet Beach Gander

Activity sheet 9, page 48.

As simple or difficult as you choose. For older children encourage them to recall some species names or environmental studies terminology.

Activity sheet 10, page 49.

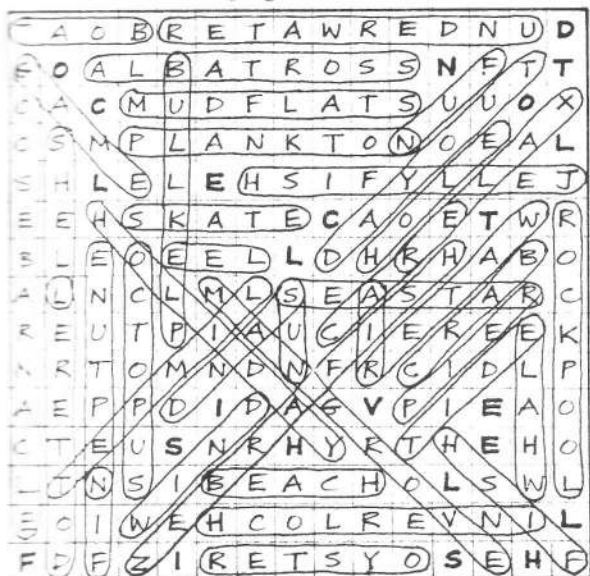
The Environment Centre is shown here in its original premises. For five years the Centre occupied an old butcher shop in A'Beckett Street, which has since been demolished. It featured a wonderful painted mural above the verandah and always had seagulls lined up on its roof!

Solution:

	C	R	A	B					
	W	O	R	M					
			C	H	I	T	O	N	
	N	E	C	K	L	A	C	E	
	L	I	M	P	E	T			
			O	C	T	O	P	U	S
A	N	E	M	O	N	E			
	A	B	A	L	O	N	E		

Seaside Fun - Word Search

Activity sheet 11, page 50.



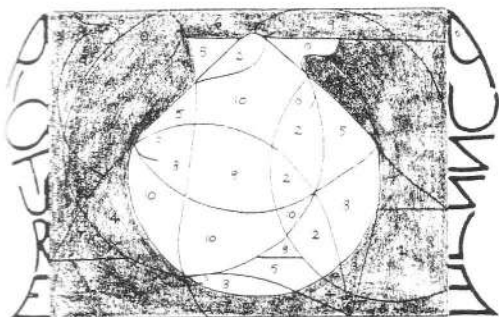
Solution:

Mystery Message: "Don't collect live shellfish."

Picture Puzzle

Activity sheet 12, page 51.

Solution:



Crossword and Hidden Message

Activity sheet 13, pages 52,53.

Solution:



Hidden Message: "Extinction is forever."

Pressing Seaweed

Activity sheet 14, page 54.

The use of the word "seaweed" is generally accepted as the common name for macro marine algae. Algae can be microscopic or as big as the giant kelps. Some algae are freshwater, some marine and others live in damp places. The three main groups of algae which we know as the "seaweeds" from the beach are red algae, green algae and brown algae.

When pressing seaweed be aware that smaller and thinner seaweeds will take a lot less time to dry out than large thick seaweeds. Some fleshy seaweeds could take weeks and weeks of changing the paper daily! Many seaweeds after drying will stick to the paper they were arranged on. Thicker seaweeds tend to lift off when dry and have to be glued in place. Seaweed can also be preserved, for classroom display by soaking in a solution of 7 parts glycerine: 3 parts sea water (+ small amount of disinfectant to stop mould growth). Leave it soaking for about a week and then hang or arrange flat to dry. It will look "fresh" for years.

Open Ocean in 3-D

Activity sheet 15, page 55.

Discuss relevant animal behaviour before commencing this activity. For example, the octopus, crab and crayfish would all be living near the rock, the sea dragon near the kelp. If the objects drawn are too small for children to cut out, they can draw their own. There are some Open Ocean in 3-D, constructed by young children on display in the Environment Centre.

What can you do?

Activity sheet 16, page 56.

For any age group, this activity will stimulate children to think about an issue and to consider the environmental impact of human needs and desires. The place, "The Glade" at Inverloch (Map I, G13) is real, but the issue is purely hypothetical!

Further Information & Contacts

South Gippsland Conservation Society Inc. Environment Centre

Cnr Ramsay Boulevard and the Esplanade
P O Box 60
Inverloch 3996

The Environment Centre, operated and staffed by volunteers only, has a range of static displays and regular changing displays suitable for children. Voluntary helpers who have excellent local natural history knowledge are sometimes available to give talks to primary school groups. The Centre stocks an excellent range of books, posters and charts, as well as cards and gift items. Underwater viewers are available for hire.

*Open to the public - weekends, public holidays
and school holidays*

10 a.m. to 4 p.m.

*Open to schools and groups on weekdays by
appointment*

Phone John Simpson (056) 742 671

Department of Conservation and Environment - Victoria

•DCE Inverloch

Inverloch Foreshore
Eastern Camping Area
The Esplanade
P O Box 21
Inverloch 3996

Phone (056) 741 236

*The Ranger's Office is open 11 a.m. - 12 p.m.
daily.*

•Yarram Regional Office

310 Commercial Road (South Gippsland
Highway)
Yarram 3971
Phone (051) 825 155

•Dandenong Regional Office

205 Thomas Street
Dandenong 3175
Phone (03) 706 7000

The DCE is responsible for National Parks and Marine Parks as well as the management of all other public lands. They should be contacted for information on permits and regulations. They have limited interpretive services available for the Inverloch area.

Inverloch Information Centre and Shell Museum

In 1980 the Inverloch community purchased the *Jack Lewis* shell collection after the death of this local resident. Over the years the collection has been added to by purchases and donations of other notable collections.

These displays were combined to become the Inverloch Shell Museum, which has always been displayed publicly in conjunction with the operation of an Information Centre. The display is acknowledged as being one of the best in the world.

For more than a decade the museum and information centre was operated by volunteers. In 1992 the shell collections were transferred to the Shire of Woorayl who then employed an information officer and curator of the museum.

Open to the public 10 a.m. to 4 p.m. daily.

It is advisable for schools and groups to ring for an appointment.

For further information contact

Shire of Woorayl (056) 629 200 or
the Information Centre (056) 742 706.

Gould League of Victoria

67 High Street
Box 446
Prahran 3181
Phone (03) 51 1701 or 51 4109

Victorian Institute of Marine Sciences

Weeroona Pde
Queenscliff 3225
Phone (052) 52 0375

The Institute operates two Marine Studies Centres, one at Queenscliff and one at Tooradin. Both centres run a wide range of programs for primary, secondary and tertiary students. There is some excellent printed material available.

Bike Hire

Bunurong Bicycle Hire

Bicycles available all year. Phone (056) 741 980

Camping and holiday facilities for groups

- Uniting Church Camp (Map I, G 9)
- DCE Foreshore camping (Map I, I 18)
- Private parks and holiday units.

Books

Gould League Publications

- *Shellfish Survival. Caring for the Coast.*
- *Coastal Wildlife.*
- Plus a good range of activity materials, survey charts and booklets in the survival series.

South Gippsland Conservation Society Publications

- *Rockpooling Around the Bunurong*
- *Andersons Inlet: Waders and Waterbirds*

Victorian Institute of Marine Sciences Publications

VIMS has published an excellent *Marine Life Resources Kit* for use in mid-upper primary school. It contains teachers guide booklets, student booklets, information sheets and work sheets on a wide range of marine topics. It is a comprehensive kit and is highly recommended as a purchase by schools. It is suitable for use in the Inverloch area.

Posters

Gould League Publications

- *Beachcombing*
- *Common Shells*
- *Rockpool Life*
- *Common Seabirds*
- *Common Farmland Birds*

South Gippsland Conservation Society Publications

- *Eagles Nest, Bunurong Coast*

Charts

South Gippsland Conservation Society Publications

- *A Guide to Inverloch*
- *Shells of the Inverloch Area*
- *Beachcombing Guide for South Gippsland Coastal Areas*

History of the Inverloch Area

Woorayl Historical Society Publications

- *Inverloch, A Patchwork of Historical Stories*
- *Looking Back at Inverloch*

Most of the books, charts and posters listed here are available at the Environment Centre, Inverloch, either for sale or on loan from the Centre's library. South Gippsland Conservation Society publications are available for purchase at the Environment Centre or by mailing an order to S.G.C.S. Inc, Environment Centre, P O Box 60, Inverloch, 3996. (These publications are described in the introduction of this book.)

Books

Environmental Activities Around Inverloch...	\$9.80
Bunurong Coastal Reserve.....	\$2.00
Andersons Inlet: Waders and Waterbirds ...	\$4.80
Rockpooling Around the Bunurong.....	\$2.00

Charts

A guide to Inverloch.....	50c
Shells of the Inverloch Area.....	80c
Beachcombing Guide for South Gippsland Coastal Areas	80c

Poster

Eagles Nest, Bunurong Coast.....	\$2.80
(Laminated).....	\$6.80

Prices June, 1992. Add 20% for postage and handling.

General References

Bennett, I. *The Fringe of the Sea*
Coleman, N. *The Australian Beachcomber*
Costermans, L. *Native Trees and Shrubs of South Eastern Australia*
Dakin, W.J. *Australian Seashores*
Fuhrer, B., et al. *Seaweeds of Australia*
George, D. & J. *Marine Life*
Lane, B. *Shorebirds in Australia*
MacPherson, J.H., and Gabriel, D.J. *Marine Molluscs of Victoria*
Marine Research Group of Victoria. *Coastal Invertebrates of Victoria*

Biology for the Non Biologist

Scientific language can be confusing for those who have not studied biology or environmental science past junior high school level. So here are a few simple lessons. Its a good idea to introduce some scientifically correct terms and concepts to young children so their later studies can build on the knowledge you impart now.

Scientific Classification and Nomenclature (naming)

You might want to know a little about the animal from the beautiful Paper Nautilus shell you have found. You look up "Paper Nautilus" in a reference book and this is what you get:

"*Argonauta nodosa*, like other Cephalopods, is a carnivore, preying on other molluscs."

Great stuff if you knew what they were talking about and yet this is the sort of information you get in any basic marine biology book. Well in layman's terms that sentence might read:

"The Paper Nautilus, like animals such as squids and octopuses is a carnivore, preying on other animals that are quite like it in that they have a soft body, sometimes with a shell, and have a well developed digestive, circulatory and nervous system, animals like slugs, snails, abalone, sea hares, chitons."

Our comprehension can be assisted if we know a little about scientific classification and nomenclature.

All known plants and animals have a **scientific name** which is derived from its place in the **scientific classification**. It is a bit like a family tree with close relatives and distant relatives. The classification works like this.

All living things are classified into phyla (plural of phylum). The phyla are further divided into classes. Further divisions then give us orders, families, genera (plural of genus) and species (Fig. 1.)

Therefore two animals in the same genus are very closely related, but two animals in the same phylum but different classes are only distantly related. Generally when we say related we mean structural characteristics they have in common, and evolutionary links. Animals in different phyla have little in common.

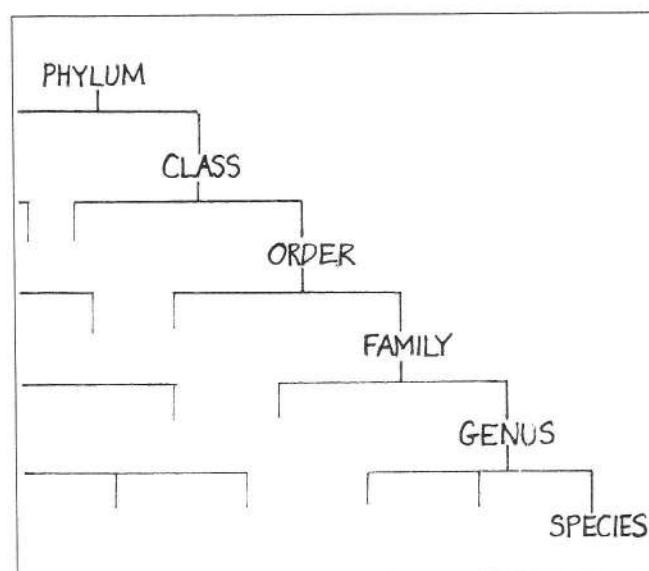


Fig. 1

Scientific nomenclature (naming) is essential for scientists to communicate. Everything has a name within the scientific classification which automatically tells us a lot about the animal just from the two words making up its name.

Each living thing has a generic name (i.e. the genus, to which it belongs) and a specific name (i.e. the species, to which it belongs)

For example: *Argonauta nodosa*

generic name (use upper case "A") specific name (use lower case "n")

This animal is what we commonly call a "Paper Nautilus", but it is lucky as many species do not even have a common name.

Lets put the animal in the scientific classification:

Phylum	Mollusca (Molluscs)
Class	Cephalopoda (Cephalopods)
Order	Octopoda (Octopuses)
Family	Argonautidae (Argonauts)
Genus	<i>Argonauta</i>
Species	<i>nodosa</i>

So you can see here that the Paper Nautilus can also be loosely called an octopus, a cephalopod or a mollusc.

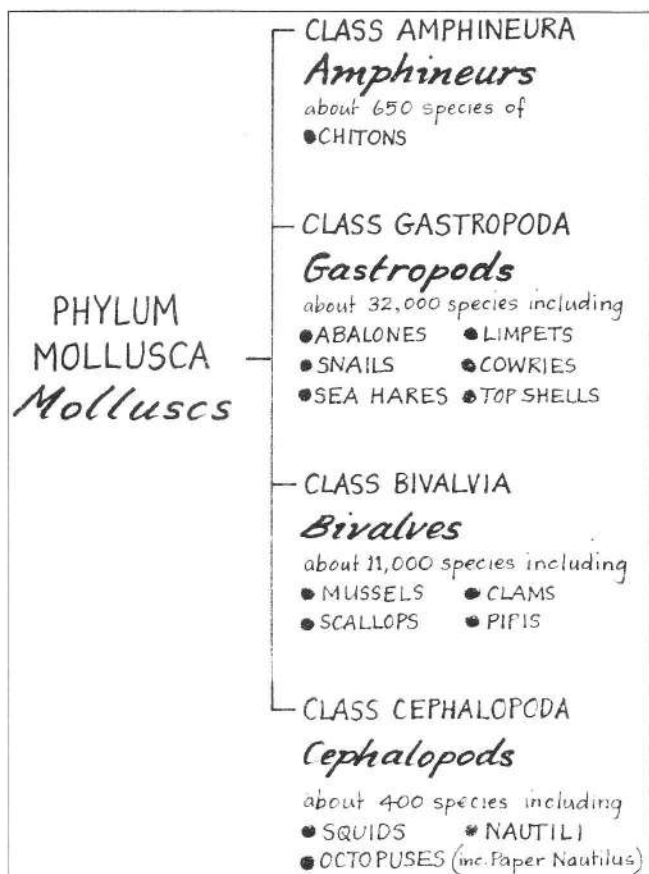


Fig. 2

Many of the familiar sea animals living close to our shores like limpets and mussels are also molluscs. By looking at the division of Phylum Mollusca into classes (Fig. 2) you will see that the Paper Nautilus is more closely related to the squids than to limpets or mussels.

The division of some other phyla into different classes (Fig. 3, page 64) shows where other animals fit into the scientific classification. We've put *Homo sapiens* in too. Which marine animal are we most like, a starfish or a sea squirt?

Habitat and Communities

You can look at an animal, you can look at where it lives and where it gets its food or where it shelters from predators. This is called the animal's **habitat**. But the animal is not alone, it usually has many neighbours, many animals and plants living around it, that it interacts with in many ways. This is the **community**.

We can relate this to the studies in this book.

The organism: A Chiton
Its habitat: Rock Platform
Its community: All the other animals and plants living in the rockpools.

Ecology and Ecosystems

The word ecology is derived from a Greek word meaning "a study of the home". In ecology we study organisms and their surroundings, both living (biotic) and non-living (abiotic). **Biotic** surrounds are all the plants and animals, essentially the community. **Abiotic** surrounds include things such as air, water, light and temperature. We can also substitute the word **environment** for surroundings.

An ecosystem can be described as a community of living organisms, in a particular habitat and their interactions with each other and their abiotic environment.

Nature can sometimes appear to be quite static. A rockpool you visit this year may look much the same next year. And yet individuals in that community have lived and died, and food and wastes have been cycled while the ecosystem maintains a delicate balance.

Food webs trace the various feeding relationships within a community. Because they are capable of making their own food, plants hold a special place in any ecosystem. They are called **producers**, manufacturing organic compounds (food) from inorganic compounds, such as carbon dioxide, water and inorganic ions. Most use the energy from sunlight to do this (photosynthesis), a few use sulphur or iron (chemosynthesis). All other organisms depend on producers, directly or indirectly, for the food they need, to grow and develop.

These organisms called **consumers**, obtain their food by either eating producer organisms directly (herbivores) or eating other consumers, dead or alive (carnivores) or both (omnivores). Another group of organisms called **decomposers**, are so called because most of what they eat is broken down into simpler substances and released back into the environment.

The Gould League publication *Coastal Wildlife* describes and illustrates the concepts of ecology and food webs. Also, the Victorian Institute of Marine Sciences *Marine Life Resource Kit* covers most marine education topics.

PHYLUM PORIFERA *Sponges*

About 5,000 species including:

- SEA SPONGES (INCLUDING COLOURFUL ENCRUSTING SPONGES)

PHYLUM BRYOZOA *Sea Mats and Sea Mosses*

About 3,500 species including:

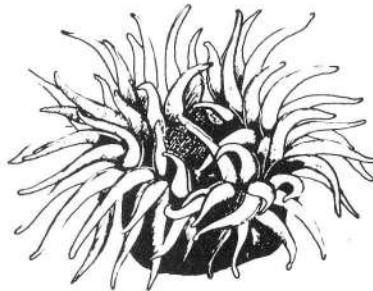
- LACE CORALS*
- ENCRUSTING BRYOZOA

ALSO CALLED PHYLUM CNIDARIA

PHYLUM COELENTERATA *Coelenterates*

About 10,000 species including:

- CLASS SCYPHOZOA
Jellyfish
- CLASS HYDROZOA
 - PORTUGUESE MAN-O'-WAR
 - BY-THE-WIND SAILOR
- CLASS ANTHOZOA
 - CORALS
 - SEA ANEMONES



PHYLUM MOLLUSCA *Molluscs*

About 45,000 species including:

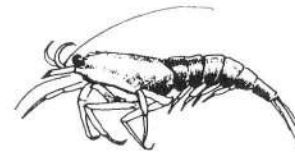
- CLASS AMPHINEURA
Amphineurs
 - CHITONS
- CLASS GASTROPODA
Gastropods
 - SNAILS (LAND & SEA)
 - ABALONES
 - COWRIES
- CLASS BIVALVIA
Bivalves
 - CLAMS
 - MUSSELS
 - SCALLOPS
- CLASS CEPHALOPODA
Cephalopods
 - OCTOPUS
 - SQUIDS
 - NAUTILI



PHYLUM ARTHROPODA *Arthropods*

About 810,000 species including:

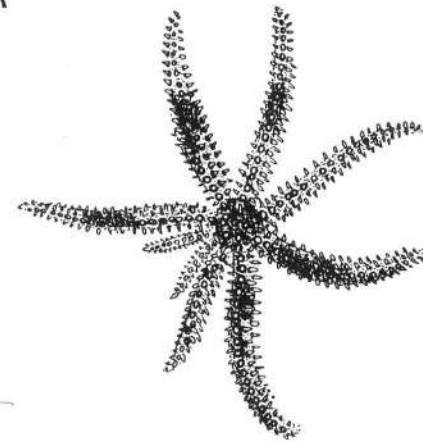
- CLASS CRUSTACEA
Crustaceans
 - CRAYFISH
 - SHRIMP
 - BARNACLES
 - CRABS
 - SAND HOPPERS
- CLASS ARACHNIDA
Arachnids
 - SPIDERS
 - SCORPIONS
- CLASS DIPLOPODA
Millipedes
- CLASS INSECTA
Insects
 - GRASSHOPPERS
 - WASPS
 - BUTTERFLIES



PHYLUM ECHINODERMATA *Echinoderms*

About 5,000 species including:

- CLASS ASTEROIDEA
STAR FISH (SEASTARS)
- CLASS CRINOIDEA
SEA LILIES
- CLASS OPHIUROIDEA
BRITTLE STARS
- CLASS ECHINOIDEA
SEA URCHINS
- CLASS HOLOTHUROIDEA
SEA CUCUMBERS



PHYLUM CHORDATA *Chordates*

About 46,000 species including:

- SUB PHYLUM UROCHORDATA
 - SEATULIPS
 - SEA SQUIRTS
- SUB PHYLUM VERTEBRATA
Vertebrates
 - CLASS CHONDRICHTHYES
Cartilaginous Fish
 - SHARKS
 - STINGRAYS
 - CLASS OSTEICHTHYES
Bony Fish
 - SEA HORSES
 - PUFFER FISH
 - CLASS AMPHIBIA
Amphibians
 - CLASS REPTILIA
Reptiles
 - CLASS AVES
Birds
 - CLASS MAMMALIA
Mammals
 - MONOTREMES
 - MARSUPIALS
 - WHALES/DOLPHINS/SEALS
 - HUMANS - *Homo sapiens* (there are about 4,500 species of mammals)

OTHER PHyla

Worm and Worm-Like Animals

Over 25,000 species including:

- FLATWORMS
- TUBE WORMS
- SAND WORMS
- EARTHWORMS

WORM AND WORM-LIKE ANIMALS ARE CLASSIFIED INTO SEVERAL DIFFERENT PHyla, WHICH ARE NOT NAMED IN THIS CHART

Fig. 3



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