
What is It?

Level

4-8+

Key question

Can I describe a species without referring to colour, size or precise location?

Key outcome

Use characteristics of animals and plants to describe them in their habitats.

Adapted from Dr Gee Chapman, University of Sydney.

This is a short introductory activity to attract the attention of students before commencing a detailed study of the platform.

What you need

A rocky shore

What you do

Work in pairs and spread out across the rock platform. Look around you.

Each of you finds an animal or plant on the rock or in a pool. One of you has to describe the specimen without showing the other what it is. You may not refer to colour, size or precise habitat, as these may vary as the specimen grows older.

You may refer to up to five parameters: shape, whether it has a lid or 'door', presence or absence of hard shell, whether in or out of water, presence of holes.

Once you have described your specimen, can your partner guess what it is. And where it will be found.

Swap over and try with the other partner.

Consider these questions

Is it difficult to describe something on the rock platform if you can't use characteristics associated with colour or size?

- Where did most of your species live?
- Were most of the items described animals or plants?
- Could you identify anything that would change markedly as it grew older?

Now, proceed with a rock platform study, transect, or one of the field methods described.

Boulder Investigations

Level

8+

Key question

How do we use hypothesis testing to find out about habitats?

Key outcomes

Compare the factors affecting the survival of plants and animals in their natural habitats.

Undertake a scientific investigation into boulder habitats on a rocky shore and use the data collected.

Boulders which accumulate on a shore often provide a habitat for numerous plants and animals, particularly those which are sessile (not moving). If the boulders are turned over, the animals living under them are exposed to light and drying conditions, so it is very important to return the boulders carefully to their original position.

What you need

- A rocky shore with numerous boulders
- Field guides to major species
- Magnifying glasses
- Field sheets and pens for each pair

What you do

Students can be grouped into pairs. Each pair selects three boulders at random over the area. These can be marked on a rough sketch map of the area. Pairs then carry out the following observations.

1. Record the species on the top of each boulder.
 - Note the coverage of algae – is one species dominant?
 - Is the entire top covered in some type of algae?
 - Are most foliose (leafy) or encrusting?
 - Make a sketch of the top of the boulder looking down, and show the coverage of main species.
2. Carefully lift the boulder up and turn it over. Quickly note if any animal moves away or hides. Then examine the underneath of the boulder carefully. Typical species will include worms, bryozoans (colonies of individuals living in very small, hard skeletal boxes), sponges, sea-squirts, anemones and hydroids. Identify the most numerous species; note the dominant colouring visible. Are all the species sessile or are some moving?
3. Now examine the area under the boulder, referring if necessary to observations initially made when the boulder was turned over. Note the material on which the boulder rests. Is the area wet? Is sediment present? Mobile animals are likely to be chitons (which move very slowly), snails, limpets and crabs.

The animals, plants and patterns will vary depending on the location of the boulder-field. Some areas may be dominated by barnacles, others by mussels and algae. *Cunjevoi* are more

Adapted from Underwood and Chapman by Kylie Butler & Michele Hollaway, University of Queensland; and Lin Fairlie, Brisbane Girls Grammar, & Jan Oliver, Queensland Department of Environment..

Boulder Investigations

likely on warmer temperate shores.

4. A comparison can be made now between the three boulders. Can a model be developed based on the predictions/hypotheses – see accompanying information sheet.

The whole class group can be reassembled and all recordings made of the sample boulders compared. Use these questions as a guide:

- Are there noticeable differences between boulders in any area?
- Is there more life on top, under, or on the ground below a boulder?
- Do some boulders lack visible life?
- Where are the boulders with the most life visible on top?
- Where are the boulders with the most life clinging to the underside?

Can you provide an explanation for the distribution you have found. As it is based on your field observations, it is most likely to be true, so your model will be true.

Other hypotheses can be tested in the field and further explanations suggested. For example:

- The boulders closest to the water and the most smooth, contain most life on top.
- The boulders are evenly scattered across the slope.
- The boulders are largest closer to the cliff.
- The boulders in the middle area between the cliff and the high tide mark have the most life immediately under them.

A fuller analysis of the observations can be made back in the classroom.

Extension

Do Field Activity 51, *Homing Chitons?* in *Project ReefEd*. Apply the model to the ‘Beach, Water and Cliff’ activities.

Reference

Underwood, A.J. and Chapman, M.G. (eds.) 1995, *Coastal Marine Ecology of Temperate Australia*, University of NSW Press, Sydney.

Boulder Investigation

Information sheet on Scientific Method

The method described here is scientific and can be used by any person. Even young children can make observations and draw conclusions using these procedures.

The method, called *falsificationism*, is described in Underwood and Chapman 1995, pp. 5-13. It is used to demonstrate that possible explanations (models) for particular things observed in nature might be wrong by testing predictions which are made from these explanations or models (use Figure 1 to follow this argument).

1. Propose a model predicting what is happening in the boulder field. Further test this explanation/model by altering one of the circumstances affecting the boulders. For example, a proposed model states that competition for space explains the pattern of distribution of two species on a boulder. Is this correct when one of the species is removed?
2. Use field experiments and test if the prediction about the distribution is true or false.
3. If true, then the model is correct. If false, then the model is incorrect and a new model or explanation should be developed and tested.

Field experiments can be set up to test the prediction of the model under a variety of conditions. An area where the conditions remain unchanged forms the 'control'. The experiments should be able to be repeated to verify the findings. In a fragile coastal area, it may not be advisable to set up too many experiments requiring manipulation of animals and plants, so some of the hypothesis testing may have to be done by observation. Some experiments will take some time (e.g. removal of one species to allow another to spread further) and long term observation posts may be needed.

Boulders provide a useful testing ground as there are usually so many of them that valid comparisons based on observation alone can be made without having to remove animals, nor relocate these on to other boulders.

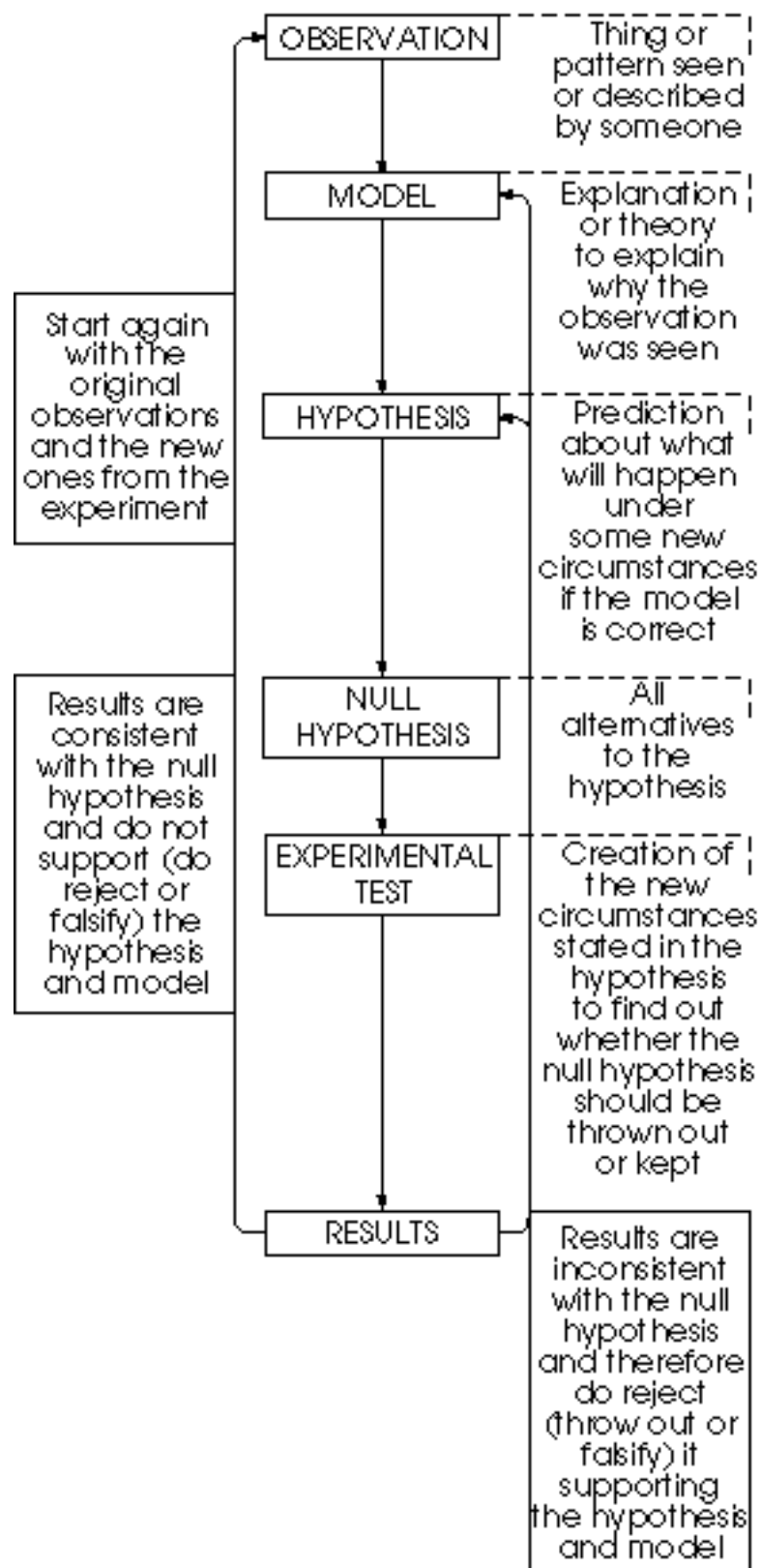
The following statements can be tested in a boulder-field to see if each is true and if the proposed model applies.

Boulders provide three different habitats for inter-tidal species:

- The top of the boulder may have algae, often ungrazed because wave action dislodges any snails or sea urchins.
- The undersurface of the rock, occupied by sessile and juvenile species.
- The dark, shady area of shore covered by the boulder. This may consist of sand or rock or small pebbles and provides shelter for some mobile animals such as brittle stars, small crabs, limpets.

Boulder Investigations

Figure 1. Method used to examine predictions about particular things observed in nature (from Underwood & Chapman, p. 5).



Crab Surveys

Level

5-8

Key question

What crab is that?

Key outcome

Develop techniques including initial site inspection, identification of specimens and writing keys, survey techniques, pre-visit activities, working in the field and analysing data.

by Harry & Jane Breidahl,
Nautilus Education,
Frankston, Victoria.

What you need

Field sheets
Clipboard, pencil, ruler
A field guide to crabs
Plastic bucket
Hand lens
Watch or timer

What you do

The teacher should make an initial site inspection.

Ideally a relatively broad rock platform with a surface cover of loose boulders that can be easily 'rolled' is required. This is usually an ideal habitat for inter-tidal crabs.

The initial site inspection should:

- Locate a suitable survey site, one with a supply of easily accessible crabs.
- Collect (if this is legal or if an appropriate permit is held) and begin to identify all crabs present.
- Start to plan the survey program.

Writing species identification keys

In a new area identification of all crabs is a critical step and may require a number of visits to the area.

The 'look-book' method of identification is recommended. In other words, go hunting for crabs (look), collect a few if possible, then work through field guides (book) until the teacher becomes familiar with the crabs in the area. Another secret of success is to search for scientific publications or previous surveys that list the species in the chosen area.

If there is a range of species in the area, say 10 or more different species, it is worth writing an identification guide. Keys are an excellent way of achieving this and have the added bonus of really testing knowledge of the distinguishing features of each species. See an example of a simplified Crab ID Key on following pages. For further identification, refer to a standard field guide.

Working in the field

- Always aim for the lowest (spring) tide possible and double check the tides.

Crab Surveys

- Be prepared for bad weather.
- Review safety warnings and procedures before venturing onto the rock platform.
- Have plenty of spare survey sheets, pencils, buckets and rulers.
- Allow students to do their own group organisation rather than provide a formal routine.

Pre-visit activities

Dried crab specimens can be used for a ‘classroom’ based introduction to identification and keys. If collection is difficult or illegal, photographs or illustrations may be used.

Survey techniques and recording methods are also thoroughly reviewed in the classroom prior to the actual survey. Slides of the area to be surveyed and of a previous group’s survey work are most useful (Figure 1).

Also, thoroughly address safety issues in the classroom before the survey.

Developing survey techniques in the field

Students should work in small groups, using the equipment listed above.

Females

small
nippers



wide abdomen

Males

big
nippers



narrow abdomen



Ovigerous female
(with eggs)

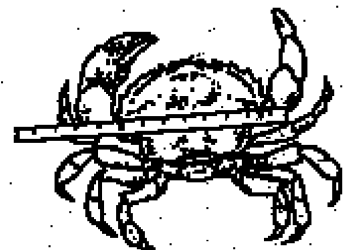


Figure 1. Illustration of size differences related to sex

Crab Surveys

General survey

This is a simple survey that involves collecting crabs, identifying them, and determining their sex, recording this information, and then releasing them.

Collecting should take 15-20 minutes. Organise the group with one person lifting rocks while the others pick up crabs and put them into the container. Move from rock to rock catching crabs as quickly as possible. Check that a large crab does not then eat a smaller one!

Record and release

When collecting is finished, the group should sit close to their collecting area and complete the General Survey Data Sheet. One person in the group should act as a data recorder while the others pick crabs out of the container to identify them and determine their sex. Great care is needed so as not to damage the crabs. The data recorder then enters this information on the data sheet. Once a crab has been recorded, it should be released at the collection site to find its own way home.

General survey data Sheet

Record the following information:

Habitat Information _____

Location: _____

Rock type: _____

High tide time: _____

Survey time- start: _____

Group members: _____

Date: _____

Tidal conditions: _____

Low tide time: _____

Survey time-finish: _____

Crab species

Male																			
Total																			
Female																			
Total																			

Crab Surveys

Back at school

- The whole class could combine its results on one data sheet.
- Compare the crab populations at different places in the survey area.
- Use bar graphs or pie diagrams to compare the populations of the crabs found. This can be done with the results from each group or with the combined class results.

Species surveys

This activity involves a more detailed study of a single species of crab. Any area where crabs are common would be suitable for this survey, but if working on tidal flats special care should be taken to avoid damage to the area.

Collecting should take 15-20 minutes. Organise the group with one person lifting rocks while the others pick up crabs and put them into the container. Move from rock to rock catching crabs as quickly as possible. Record and release. Use the same method as above to identify species.

One person in the group should act as a data recorder while the others pick crabs out of the container. They should identify each crab, relating crabs that are not of the species being surveyed. Crabs of the appropriate species should have their sex determined, then be measured and checked for eggs and soft bodies. Once these details have been recorded, the crab should be released close to the collection site.

Species survey data sheet

Habitat information	
Location	
Rock type	
High tide time	
Survey time – start	
Crab species being surveyed	
Group members	
Date	
Tidal conditions	
Low tide time	
Survey time – finish	

Crab Surveys

Crab	
Sex	
Size	
Eggs	
Soft	

It is best to select the species of crab being surveyed before going on the field trip. It is possible for one group to survey more than one species, or for different groups to survey different species.

Back at school




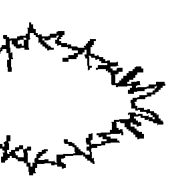








The whole class could combine its results on one data sheet. Use these results to graph numbers in each size range against size.

Extension

Using available field guides, develop a key for crab species found in the area.

The Crab ID Key

This is a two-way key. Go to No. 1, look at your crab and make your first choice. Then obey the instructions that follow. Because the shape of a crab's shell (carapace) is used in identification, most diagrams leave out legs and nippers and only show the shape of the carapace and the number of notches on its sides. Never count eye sockets as notches.

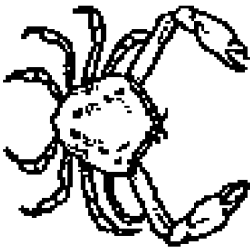
<p>1 Four pairs of walking legs, one pair of nippers — Go to 3 Two or three pairs of walking legs, one pair of nippers — Go to 2</p>		<p>7 Eyes on stalks, two notches along side — Sentinel crab Not like this — Go to 8</p>	
<p>2 Living in shells, soft abdomen — Hermit Crab Three pairs of walking legs, hairy — Hairy Stone-crab</p>		<p>8 Seaweed-covered, spiky and hairy — Seaweed crab Not like this — Go to 9</p>	
<p>3 Paddle-shaped last walking leg — Go to 4 Last walking leg pointed — Go to 7</p>		<p>9 Four notches each side, one large nipper — Reef Crab Less than four pairs of notches — Go to 10</p>	
<p>4 Two dark spots at rear of carapace — Surf crab No Spots — Go to 5</p>		<p>10 Three pairs of notches — Go to 11 Notches less than three — Go to 13</p>	
<p>5 Four pairs of notches, bumps between the eyes — Edible crab Carapace with three pairs of notches — Go to 6</p>		<p>11 Purple, fine hairs, "V" groove between eyes — Smooth-handed crab Not like this — Go to 12</p>	
<p>6 Pimplly carapace, small notch between eyes — Rough rock-crab Smooth carapace, no notch — Rock crab</p>		<p>12 Three big notches, two grooves between eyes, large, covered with fine hairs — Cleft-fronted shore-crab Small, dark, large white spots, three notches — Little shore-crab (if grooved go to 19)</p>	

The Crab ID key

- 13 Two small notches on each side — **Go to 14**
 Less than two pairs of notches — **Go to 15**
- 14 Yellow-brown, brown spots, fine hairs on front of walking legs — **Spotted shore crab**
 Square carapace, purple-red, mottled white, one wide groove between eyes — **Mottled shore-crab**
- 15 One small notch on each side — **Go to 16**
 No notches or very small notches — **Go to 17**
- 16 Yellow, fine brown spots, shallow notch between eyes — **Notched shore crab**
 Orange, thin legs, vaulted body — **Mud crab**
- 17 Fine ridges on carapace, two or three fine notches — **Go to 18**
 Not like this — **Go to 20**



- 18 Square green carapace, fine ridges on top and sides, end of nippers red — **Red-fingered crab**
 Not like this — **Go to 19**
- 19 Round carapace, 2 grooves on top, 2-3 small notches each side, purple underneath — **Burrowing shore crab**
 Round carapace, many ridges, 2-3 small notches each side, blue underneath — **Common shore crab**
- 20 Round carapace, shell and long legs and nippers grey-blue — **Smooth pebble-crab**
 Not like this — **Go to 21**
- 21 Oval-shaped blue body, 2 big bumps on top, small yellow legs and nippers, burrows — **Soldier crab**
 Not like this — **Go to 22**
- 22 Pink or orange-red carapace, no mottling, tufts of hairs at base of legs — **Smooth shore crab**
 Purple-red carapace mottled white, no hairs at base of legs — **Purple-mottled shore crab**



Flotsam and Jetsam Activity

Level

Any

Key questions

What is flotsam and jetsam?

What are the environmental concerns associated with it?

Key Outcomes

Describe and identify the material washed up on a beach as flotsam or jetsam.

Understand the difference between flotsam and jetsam in traditional and modern usage.

Develop environmental awareness on how far flotsam and jetsam can be carried.

Adapted from *Tropical Topics*, March 1995 (Queensland Department of Environment Far Northern Region, Cairns), Moroney et al, Coastal Activities for Primary Schools, and the Gould League of Victoria.

Beachcombing and Beach Find Bingo

Flotsam used to refer to rubbish thrown overboard from a ship. Jetsam was the luggage, furniture and fittings thrown overboard to lighten the ship when it was being shipwrecked! Nowadays, both terms refer to the debris which is washed up on our shorelines, and may mean litter of both natural and human origin.

What you need

Identification sheets of flotsam (see accompanying key)

Gloves, bags (if beachcombing)

Field guides

What you do

Students can work in pairs or as individuals. Make sure you know about the hazards of touching piles of seaweeds or rubbish on the beach.

Beachcombing

Collect items found along the high tide line of a beach area. Include both natural and human made items.

Warning: Never handle needles or pick up seaweed without shaking it first to dislodge crabs or human rubbish.

Identify as many items as possible. A guide is included for the most commonly found items.

Beach Find Bingo

Use the accompanying sheet as a guide for students to find items matching the description along the shore.

Class discussion

Following a visit to the seashore, discuss ways of reducing litter finding its way onto the beach; and ways of collecting the litter and disposing of it in an environmentally friendly way.

References

Gould League Poster on Beachcombing

Dakin, W.J., 1980, *Australian Seashores*, Angus and Robertson

'Sources of Coastal Shoreline Litter Near Three Australian Cities', 1993, Victorian Institute of Marine Sciences.

Jones, M., 1994, *Fishing Debris ... What is Washing up?* Australian Fisheries.

Flotsam and Jetsam Activity

Guide to Identification of Common Flotsam and Jetsam

Animal Flotsam

1. Solid calcite skeletons of sea urchins. They usually are in small pieces and without the spines of the living creature.
2. Operculums. These can be thin and horn-like but some are heavy and calcareous. Attached to the foot of some gastropods
3. *Spirula* shells are delicate white coils with separate internal chambers. They come from a squid-like creature with ten arms bunched together at the head end and a cylinder-like body that is found swimming at depths of 200 - 2 000 m.
4. Dead sponges of varying forms.
5. Cuttlebones. Internal skeleton of cuttlefish.
6. Sand dollars. Sea urchins with a flattened body shape.
7. Crab parts. Occasionally whole carapaces can be found, if there is no sign of damage and the top lifts off like a lid, it is likely to be a moulted shell.
8. Goose barnacles. Attach themselves to driftwood or any other floating thing.
9. Bryozoans. Some flotsam is encrusted with delicate, cellular mats; these are colonial animals which may grow over rocks and plants or as erect branching forms.
10. *Sargassum* seaweed. Characterised by lots of tiny ball-like floats along the stems.

Plant Flotsam

Many plants which grow by the shore rely on the sea to disperse their seeds so their fruits are found regularly as flotsam.

1. The grey-green flesh of the fruit of Alexandrian laurel (*Calophyllum inophyllum*) becomes brown and wrinkled and is lost in the sea. When found this fruit resembles a light brown golf ball with a pointed end, often with fibrous strands still attached.
2. Brown matchbox beans belong to a vine, *Entada phaseoloides*.
3. The large pineapple-like fruit of pandanus species breaks up into wedge-shaped segments, each with knobs on the broad end and a tuft of fibres on the other. The fibres may be worn away in the surf, leaving a woody segment with empty holes which once contained the seeds.
4. The box fruit (*Barringtonia asiatica*) is the largest flotsam fruit next to the coconut. It can float for up to two years.
5. On the tree fruits of the beach almond (*Terminalia catappa*) are encased in a fleshy layer. Below is a fibrous layer which is gradually eroded in the surf to reveal a brown almond-shaped seed.
6. Coastal she-oaks (*Casuarina equisetifolia*) drop small spiky cones into the water, and these are often found in the flotsam.

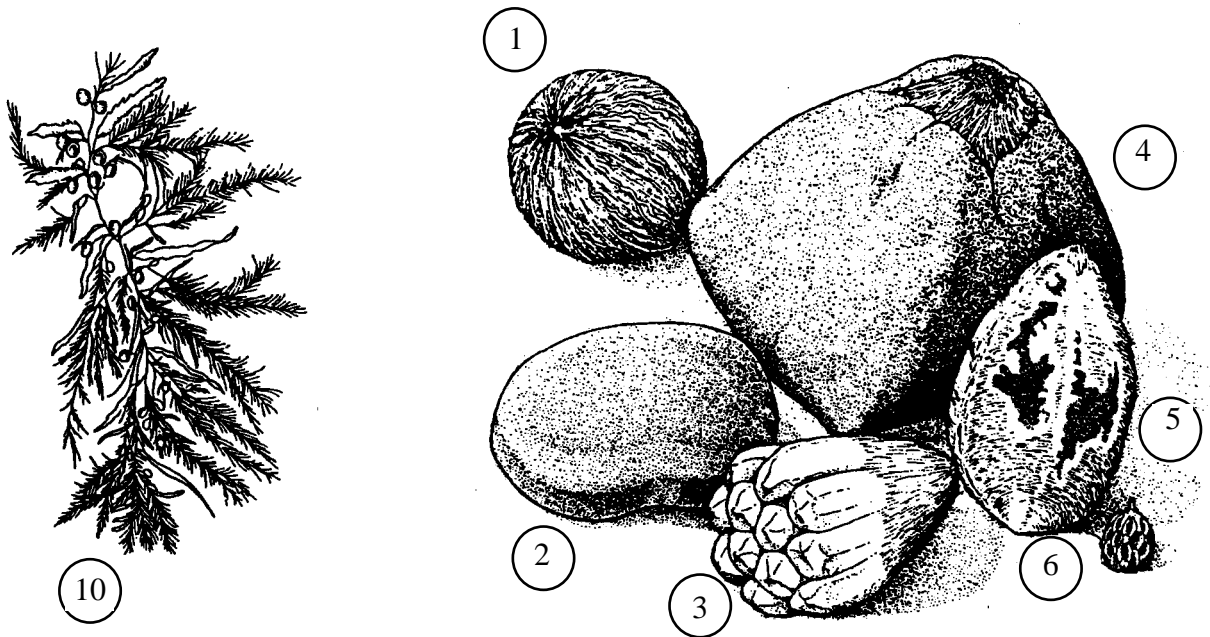
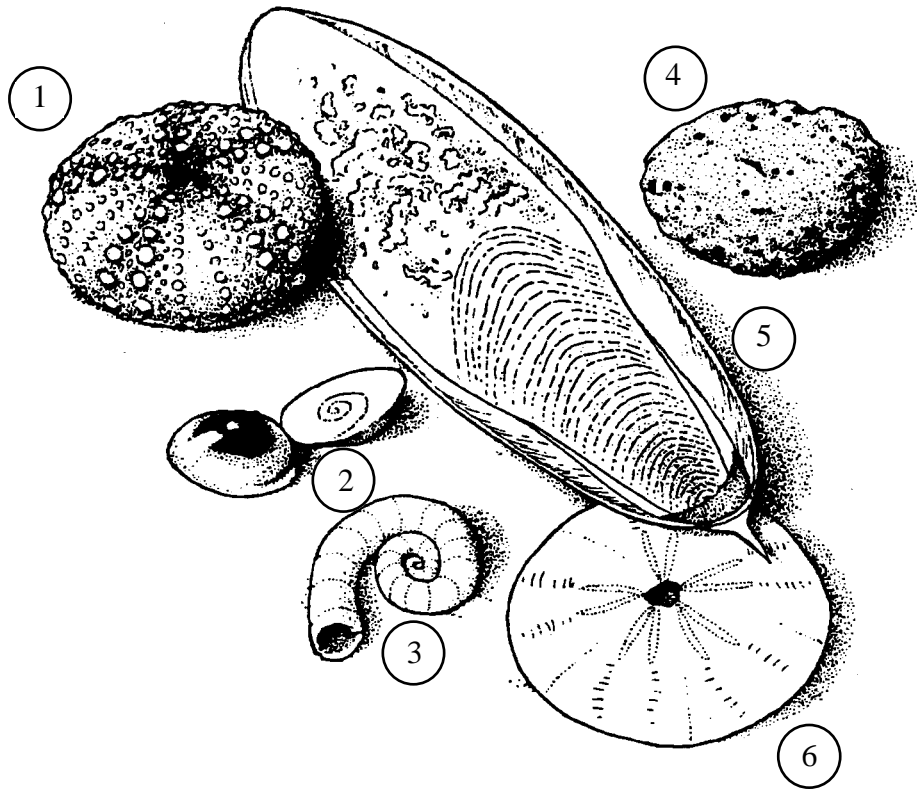
Lethal jetsam

Not only is garbage on the beach unsightly, it also poses a very real threat to wildlife. The worst offenders are plastics which generally make up about 60% of rubbish.

The disposal of plastics into the sea is prohibited under the International Convention for the Prevention of Pollution from Ships (MARPOL). The disposal of all other types of garbage (including metals, glass and food) is prohibited within 12 nautical miles of the nearest land including most of the Great Barrier Reef region. The law provides for fines of up to \$1 million for companies and \$200 000 for individuals illegally discharging garbage at sea.

While much of the litter on remote islands and beaches comes from marine sources, a survey of shoreline litter around Brisbane, Adelaide and Melbourne found that at least half of it came from the land. While some had been left by careless people on the beach, much had originated as street litter and been washed down to the sea along stormwater drains.

Flotsam and Jetsam Activity



Beach Find Bingo

Find something that is described in these boxes. Draw or list your example.

light

complicated

dry

soft

moving

round

flexible

closed

flaky

see through

hard

hollow

Future Thinking about Beaches

Questioning

Do your feelings and understanding of this beach change if you write a question mark after every statement in a description of the scene (taken from a tourist brochure or text about the area).

- The region lies in an overlap between two climatic zones?
- The range of habitats found is also diverse?
- The forms and process of erosion of the landscape can be easily observed?
- The spectacular coastal cliffs show mainly erosion?
- The cliff faces display layered beds of sandstone, conglomerate and siltstone which were at the bottom of a marine environment 280-225 million years ago?
- The vegetation cover forms a varied, complex mosaic of plant community types?

Discuss

What methods of field investigation could you use to provide the answers to these questions.

A shadow	A shape	A contrast
A curve	A line	A pattern

Observing nature as art

Find a place where you can sit quietly and observe a scene. Record examples of the features of the scene in the spaces provided. Record each observation with a sketch or a description.

Future Thinking about Beaches

Now consider the recorded observations.

- Can you link all of the features in one artistic presentation?
- Has the activity affected your perception of this environment?

Be an ecological detective

You are an ecological detective looking closely at the beach. You are looking for (but don't need to collect):

- a living thing that is growing
- something that was once alive
- something that has undergone change
- something that is impossible to count
- something you can't photograph
- a thing that doesn't form a necessary part of the ecosystem
- a natural thing which could be used as a tool.
- thing that might be food for plants and animals
- something that won't be here in 100 years.

Be a poet

View a scene or natural object by yourself and write a cinquain poem of five lines – no rhyming is necessary!

the first line is one word as a title

the second line has two words describing the title

the third line has three words expressing some action

the fourth line has four words telling about some feeling you have about the subject

the fifth line has one word to sum up.

Compare your results with others – did you all write about the same subject?

Contrasts

Contrast what IS with what WAS or MIGHT BE at this spot.

Discuss with your group the following 'scenarios'.

- what happens here if the sea level rises
- if the temperature rises
- if the use of the adjacent area changes
- if the quality of its management increases
- if the quality of its management decreases.

Marine Trailing

Level

1-8+

Key question

How do I feel about the marine environment?

Key outcomes

Develop positive attitudes about the marine environment.

Develop serial thinking and continuous application – that is, to apply what one sees/hears/smells/feels to enable evaluation or assessment of an area.

Adapted from Jan Oliver,
Field Notes for Seaweek 1996
on Lamb Island.

A trail, according to the Macquarie Dictionary, is a path or track across a wild region, along which one follows as if drawn along. Trails should provide such experiences that the other meanings of the word 'trail' should not apply – that is, to go wearily, lazily or straggle or fall behind the leaders! Trails can be used in any subject area, and at any level of schooling.

What you need

Pencil

Note pad

Blindfolds, magnifying glasses, tags and labels

What you do

Various spots in the landscape can be tagged or marked with numbers on plastic or card sheets and the trail then becomes a self-guided one. Equipment such as blindfolds, magnifying glasses, and extra information can be provided at certain spots. If the whole group is trailing together, and the area is unknown or cannot be pre-marked, the leader can indicate where various activities should occur. Or students may wander along doing the activities at what they consider appropriate sites. Dominant features in a landscape may be useful meeting spots, but at the same time, care should be taken to ensure that the little things, the non-dominant, unknown features also receive attention.

It is advisable to warn trailers about handling dangerous marine organisms or marine debris, and in tidal zones, to watch for tide changes.

Any site can be used for most of the activities. Selection of activity and site may depend on the age of the participants. Activities can be on notices at each site, or provided on field sheets, or read out by a leader at each site.

Suggested Activities at Sites

1. List/think about ways in which this area is beautiful, safe, healthy. Compare it with another area with which you are familiar.
2. List the valuable things provided at this spot – these are nature's assets. Could some of them cause people problems?

Marine Trailing

3. What sounds can you hear at this spot – what do you like or dislike? Can you identify the sources?

4. Look around at the various features of this landscape, including the shore line, rocks etc. Consider the dominant shapes. Are these shapes rectangles, globes, shelves, or slopes? Contrast the sizes and proportions of pieces; what are the dominant lines? — vertical, horizontal, round, oblique, curving, straight, soft, thin, flat.

5. How do these shapes and lines in the sea and along it differ from people-made objects in city and suburban landscapes?

6. Contrast what IS with what WAS or MIGHT BE at this spot.

For example:

- what happens here if the sea level rises
- if the temperature rises
- if human use of this area increases
- if human area of this area decreases
- if human use of adjacent areas changes.

7. Carefully examine a mangrove tree. Mangroves play a very important role in sheltering animals, providing nutrients, holding sand and mud, and in stabilising the wetlands. What you see is the mangrove's 'public face', the outside. What would the view be like if you were inside the mangrove looking out? How would the view differ?

8. How would you explain the design of mangrove trees and their roots if you are a member of a tribe with very strong beliefs and myths in a supreme Creator? Can you create a mythical story about how mangroves got to look like they do?

9. At this site, observe and possibly draw, the spaces here, for example gutters, alleys, burrows holes. Are these spaces enclosed, divided, pierced, defined, joined or separate? What is using those spaces?

10. Select a large or dominant object in or out of the water but far away. 'Home in' on it from a distance; that is, start concentrating on it excluding all other objects. Record the changes you see as you get closer. You can also 'steeple chase', that is, observe a landmark from different points and at different directions. How does it look at different places? Why?

Marine Trailing

11. Write a cinquain (five line) poem about the scene at this point.

- write one word to name something
- write two words to describe it
- write three words of action about the subject
- write four words in a phrase about the subject
- write one word to sum it all up.

12. Imagine you are a ship-wrecked sailor at this point. You could decide to be a modern day sailor, or perhaps one in the 1700s or earlier. It is blowing a gale, pouring rain, and getting dark. There are no other people around.

- How would you feel?
- What would you do?
- Where would you go?

13. Sit down at this point. Feel the ground. Let the mud, water, sand trickle through your fingers. Pick some up.

- Is it wet, cold, warm, gritty, smooth, smelly, full of bits and pieces, or all of the one thing?
- When you drop it, what happens?
- Is there anything living in it? When you put it back, what will happen?

Extension

Students can be asked to write up their experiences, or do a collage or group wall painting, or compare notes in an open discussion. However, a lot of the value of doing a trail is in keeping the feelings and experiences to oneself – but knowing the experiences can be called upon when discussing the conservation and management issues of the marine environment.