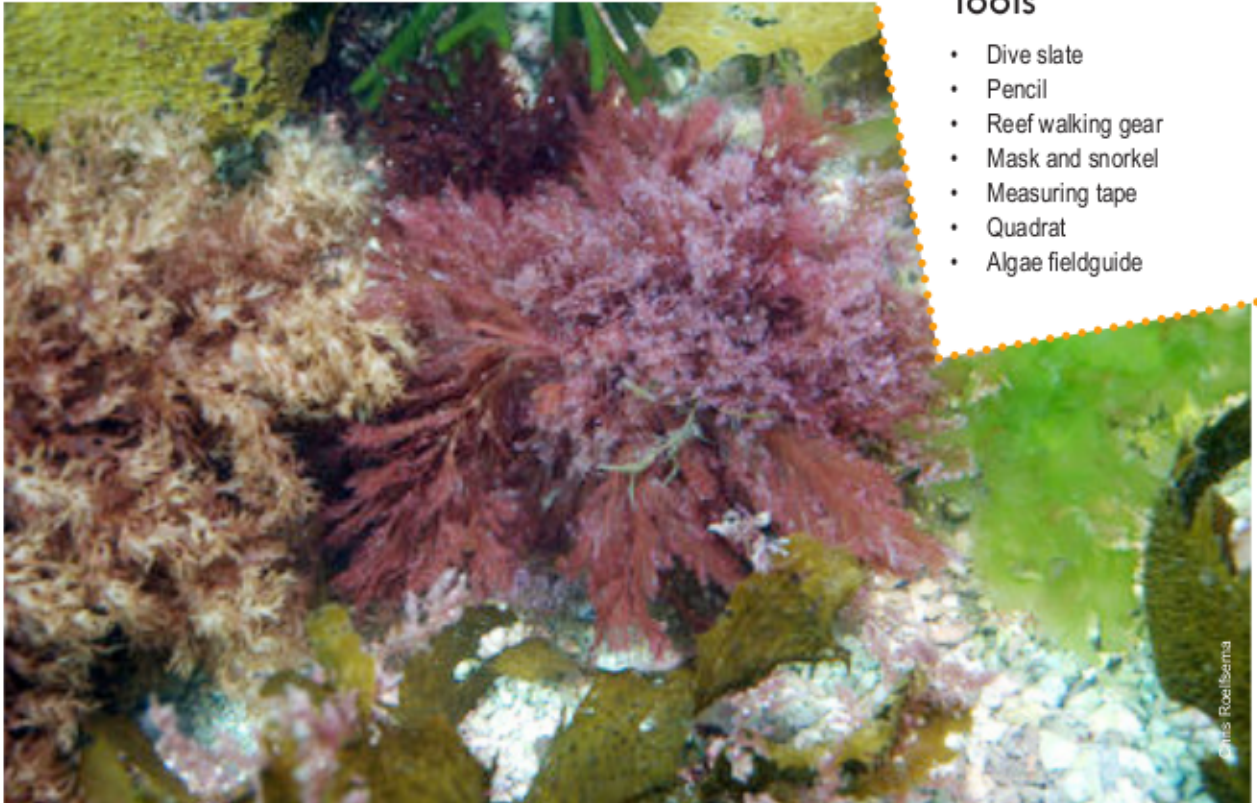




The aim of this activity is to investigate algal distribution in an area of the reef. You will experiment in the field recording the types and amount of algae and substrate in different reef zones. Exploring the relationship between algal cover, substrate and other species will improve your understanding of species' adaptations and processes maintaining a diversity of algae in equilibrium on healthy reefs.

Time

Three hours (reef walking at low tide or snorkelling at high tide)



Tools

- Dive slate
- Pencil
- Reef walking gear
- Mask and snorkel
- Measuring tape
- Quadrat
- Algae fieldguide

Background

Algae (also termed seaweeds) are mostly aquatic plants which contain chlorophyll, lack defined leaves, roots and stems and typically reproduce via spores. They are grouped by characteristic pigments or colours and, on reefs, range in size from single-cells to some species 3-4m in length. They grow in various forms either as turf, crustose (crust-forming), upright macro algae or as single-cells living in sediments in the water column or in close association (symbiosis) with other organisms.

The bright-green chlorophyll pigment is not masked by additional colours in green algae. Some common reef species include eye-catching tufts of green hair scattered about the reef termed 'turtle weed' and the 'sailor's eyeball', *Ventricaria venticosa*, a giant single-celled algae growing under coral boulders. Common brown algae on reefs include *Sargassum*, the leafy fronds for which the Sargasso Sea is named and *Turbinaria*, a bunch of rigid spiky branchlets often found on reef flats and lagoons. Bright red *Hypnea*, growing at depth, or *Gracillaria*, found in the shaded branches of coral, are easily identified red algae, as are the pink, crust-forming coralline algae, prevalent on reef crests where upright algae are swept away by crashing waves. However, many red algae often do not appear to be red. Primitive blue green algae (*Cyanobacteria*) are often the first to colonise open space on a reef as a fine hairy mat. Their additional pigments lend a blue tinge to some species, but many also appear red, brown or black. *Cyanobacteria*, dinoflagellates and other phytoplankton can rapidly multiply in the right conditions to create potentially toxic 'red tides', some so dense that early explorers mistook wind-streaked surface blooms of *Trichodesmium erythraeum*, 'sawdust of the sea', as uncharted reefs.





Field activity

This is a small group activity which should be conducted on the reef flat at low tide.

1. Transfer the 'algae mapping results table' onto a dive slate.
2. Select an area of the reef flat where you suspect algae to be present.
3. Decide upon the distance at which your group will be conducting your survey.
4. Measure out the required distance.
5. Place the quadrat at your chosen distance ensuring that you minimize the disturbance of the surrounding environment.
6. Record the following information: distance, substrate (sand, coral rubble, dead coral, live coral), reef zone, % algal cover, algae shape and algae colour. Repeat this at each chosen distance.
7. When you get back to shore transfer your data to the results sheet.
8. Collate the results for the entire reef flat by sharing the data between groups on the 'group algae mapping table'.

Teacher Hint

Laminate 'Common groups of algae' to take in the field.

Algae mapping results table

Observer(s): _____

Location: _____

Date: _____

Time: _____

Weather conditions: windy / calm / cloudy / sunny _____

Distance (m)	Substrate (tick appropriate box)				Reef zone (tick appropriate box)			% Algal cover	Shape sketch	Colour
	Sand	Coral rubble	Dead coral	Live coral	Inner reef	Mid reef	Algal ridge			





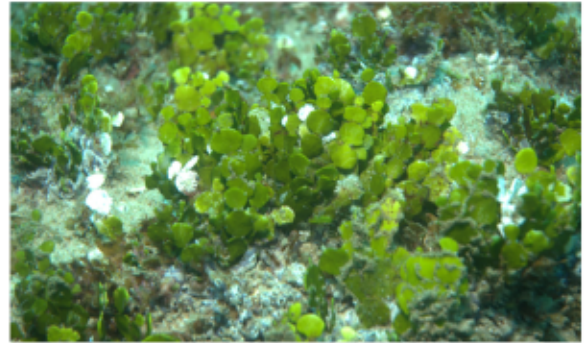
Common groups of algae

Green algae

Caulerpa, *Chlorodesmis*, *Dictyosphaeria*, *Halimeda*, *Ostreobium*, *Udotea*, *Ulva*, *Ventricaria*



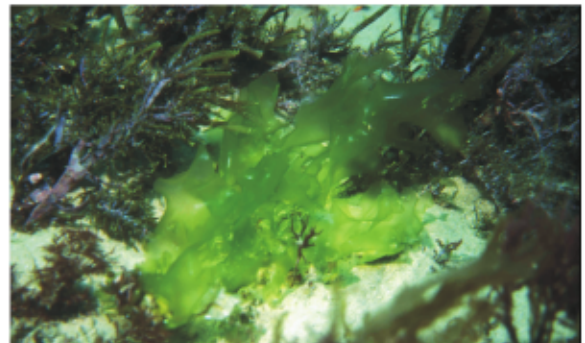
Chlorodesmus



Halimeda



Caulerpa



Ulva

Brown algae

Dictyota, *Chnoospora*, *Colpomonina*, *Hincksia*, *Hormophysa*, *Hydroclathrus*, *Lobophora*, *Padina*, *Sargassum*, *Sphacelaira*, *Turbinaria*



Sargassum



Padina



Dilophus



Lobophora

photos: Chris Roelfsema





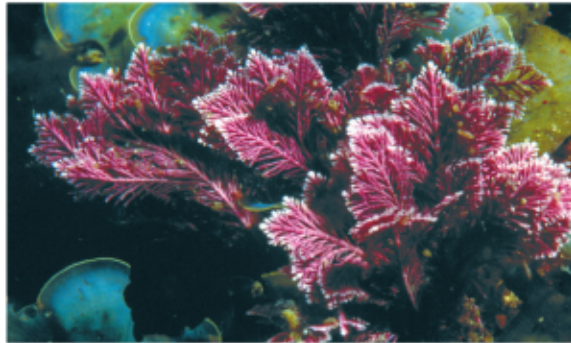
Common groups of algae

Red algae

Amphiroa, Asparagopsis, Corallophila, Eucheuma, Galaxaura, Hypnea, Jania, Laurencia, Melanamansia, Peyssonnelia, Porolithon, Polysiphonia



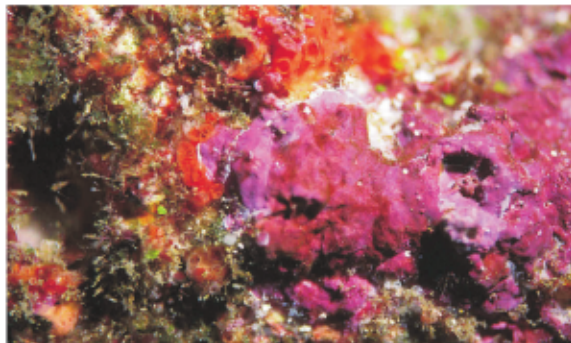
Asparagopsis



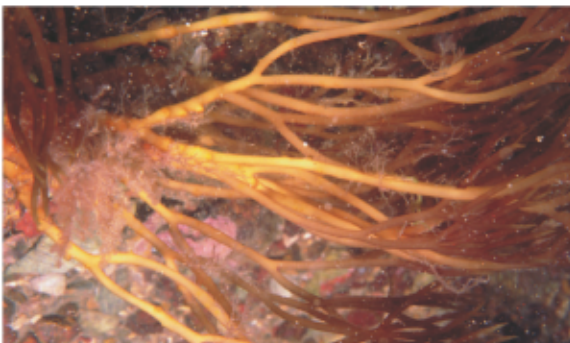
Halimtilon



Hypnea



Coralline algae



Sarconema



Gracilaria

Blue green algae

Trichodesmium, Lyngbya, Symploca



Lyngbya (Mermaids hair or fireweed)



Trichodesmium erythraeum (Sea sawdust)

photos: Chris Rodd/Seaema

Group algae mapping table

Observer(s): _____

Location: _____ Date: _____ Time: _____

Weather conditions: windy / calm / cloudy / sunny

[illegible]



Questions

1. What are the different colours of algae present?
2. What was the dominant type of algae?
3. Can you associate different types of algae with the different types of substrate?
4. What are the factors that determine this relationship?
5. Was there any evidence of coralline algae on the reef flat? Why is this type of algae important?
6. On which section of the reef flat was this dominant?
7. Are there any organisms that can be associated with the algae?
8. What are the functions of algae on the reef?
9. Algae grow at a much faster rate than corals. Why then is the reef not dominated by algae?
10. Why would scientists be interested in mapping algal cover on a reef?

Research projects

1. Propose how we could study the effects of a population shift from a coral reef community to an algal-dominated community.
2. Conduct a detailed quadrant survey on an area that is coral dominated, as well as an area that is algal dominated. Compare and discuss your results.

References

- Reid et al. (2009) Coral Reefs and Climate Change: The guide for education and awareness. CoralWatch, The University of Queensland, Brisbane. (See Colourful Algae page 114)
- Hutchings PA, Kingsford M, Hoegh-Guldberg O, Australian Coral Reef Society (2008) The Great Barrier Reef: Biology, Environment and Management. CSIRO Publishing
- Cribb AB (1996) Seaweeds of Queensland, A Naturalist Guide. The Queensland Naturalist Club, Brisbane
- Census of Coral Reef Ecosystems (CReefs); www.creefs.org

