

This educational support material is provided to enhance teaching and learning for educators and students.

Life on the Edge DOWN UNDER provides brilliant opportunities for understanding more about Australia's ecosystems, scientific investigation and how we make informed decisions that affect our environment.





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Authored and designed by the Western Australian Museum Education and Learning Department based on the research conducted by the WA Museums Department of Aquatic Zoology.

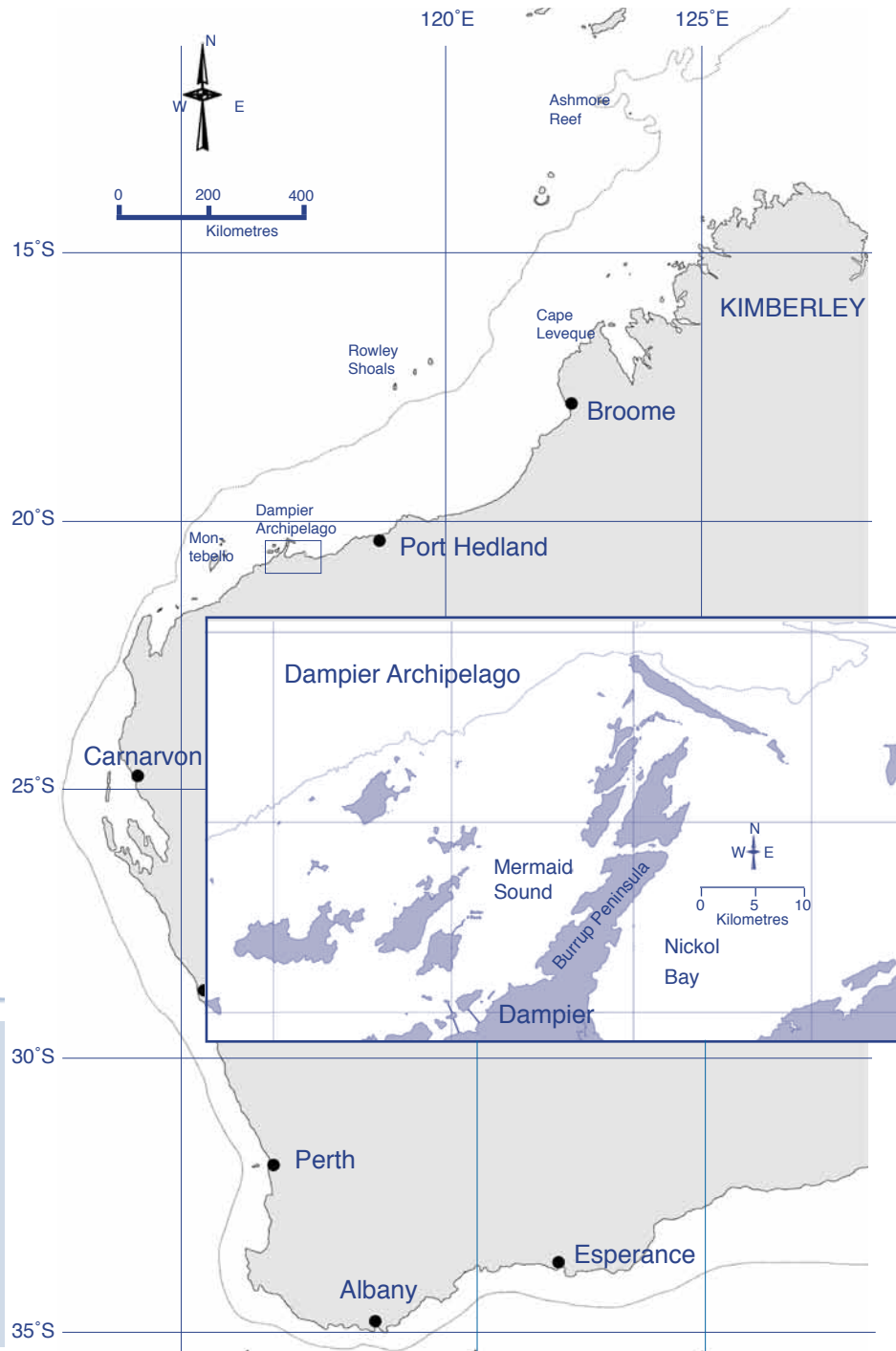
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Table of Contents		ARTS	ENGLISH	HEALTH & PHYSICAL EDUCATION	LANGUAGES OTHER THAN ENGLISH	MATHEMATICS	SCIENCE	SOCIETY & ENVIRONMENT	TECHNOLOGY & ENTERPRISE
1.	The Dampier Archipelago								
2.	Coral Reef								
3.	The Sea at Night								
4.	Soft Sediment								
5.	Intertidal Zone								
6.	Mangrove Forests								
7.	Sponge Garden								
8.	Industrialised Shore								
9.	Further Research								
10.	References								

Finding out what animals live in the Dampier Archipelago, and how their lives interact, is the first step in understanding the pressures humanity is putting on the environment.



Key Words

Community	Marine	Survey
Biologists	Environment	Industrialisation

The Dampier Archipelago lies off the north coast of Western Australia. Its forty-two islands are low and flat, covered in sparse vegetation. There are no fresh water springs, but the rainfall is enough to support isolated populations of mammals, including wallabies and kangaroos.

In 1699, William Dampier, on board his small ship the *Roebuck*, sailed into the islands. He was a complex character, part cutlass-wielding pirate, part explorer and a devoted student of natural history. He kept copious notes, which were published to an enthusiastic reception back in England.

In geological terms the shoreline is relatively new. It was formed about seven thousand years ago, when a minor episode of global warming caused the sea level to rise, flooding the coastal valleys. Only hills and ridges remained above the surface.

Between the islands, the seabed has taken on a wide range of forms, from **coral reefs** and **soft, silty plains** to **sponge gardens** in deeper water. The encroaching sea worked away at the new islands, creating a wide variety of habitats: **rocky shores** in some places, **sandy beaches** in others, and even **mangrove forests** in sheltered bays and inlets.

Why are research scientists currently conducting research in this location? What is it they are trying to measure?

How have recent technological advances enabled the research these scientists are conducting? What traditional forms of technology are still in use?

What techniques do the scientists use to survey the biodiversity of the region? What are the limitations to these techniques?





Key Words

Coral Biodiversity Interdependence
 Mollusc Filter Taxonomy

There is a vast range of food here, and an equally huge number of habitats, so that the reef can support a truly enormous number of different animals. This is biodiversity on a grand scale. Many biologists say that coral reefs have a greater biodiversity than rainforests.

In an area that is so dense with different forms of living things, interesting relationships have developed.

Suggest the basis for the various relationships between the following animals... can you suggest another example of interdependence in this habitat?

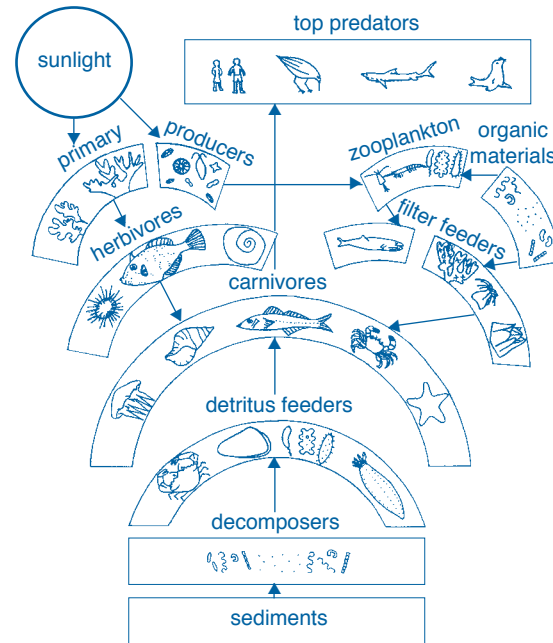
Life Form 1	Life Form 2	Relationship Description
Shrimp	Anemone	
Shrimp	Fish	
Manta Ray	Remora	
<i>Hyotissa</i> Giant Oyster	Shrimps	
Manta Rays	Plankton	
Trapeziid Crabs	Crown of Thorns Sea Star	
Your Example		

Key Words

Nocturnal Diurnal Algae
 Competition Food Chain Sample

Night time brings rest for the team, but for many of the animals of Dampier's archipelago it is the start of a period of intense activity. The boat's light attracts plankton - and the animals that feed on it. These in turn attract larger predators.

Tiny organic particles and bacteria provide food for animals that filter seawater, or sieve their food from sediment. Phytoplankton (microscopic floating plants), algae and the zooxanthellae (microscopic plants) in corals absorb light energy and photosynthesise. These plants and animals provide food for other animals such as molluscs, crustacea and echinoderms. At the top of these "food chains" are large predators such as fish. Animals and plants in different food chains form links and complicated "food webs" result.



Select an organism from the food web and suggest how it might affect other living things if it moved away from the environment or became extinct?

Why do the scientists dive at night as well as during the day?

What specialised equipment do they need when working at night and how do they adapt to their conditions?





Key Words

Silt	Mucus	Camouflage
Predator	Prey	Bottom-dwellers

The most extensive underwater habitats - and the most interesting to the expedition - are not the beautiful coral reefs, but the much less photogenic areas of sand, silt and mud, known collectively as the soft sediment habitat. To look at, they are barren and rather boring, yet they are home to an amazing wealth of animal life.

Unlike the Coral Reef habitat, the Soft Sediment habitat does not offer nooks and crannies for creatures to hide in. As a result the various forms of life that inhabit the Soft Sediment habitat have developed a range of unique mechanisms as protection against predators.

In the video section on the Soft Sediment habitat five different mechanisms for escaping predators are depicted. Can you describe at least three of these techniques as well as the animals that demonstrate them? What structures do the animals require to produce this behaviour and how do they use their habitat to their advantage?

Explain how changing one aspect of the environment may affect the organisms living in this habitat.



Key Words

Tidy	Salinity	Temperature
Adapt	Venom	Scavengers

As the light grows, they move inshore to where the falling tide is exposing one of the harshest environments on earth.

It's the frontier, the place where people meet the challenges of the sea head-on and where the sea first bears the brunt of human activities. For the animals that live here, nature provides quite enough pressure. Any additional human pressure might well be the last straw.

Why is this environment described as one of the harshest for living things?

What changes does this environment regularly undergo? Why do these changes make the environment a challenge for creatures to inhabit it?

Describe some of the adaptive features and behaviours developed by living things in the Intertidal Zone that increase their chance of survival.



Key Words

Sediment Aerial Roots Erosion
 Nurseries Vulnerable Shelter

The mangrove forests around the sheltered parts of the shore are very different from the open beach. The roots of the trees slow the flow of the tide, trapping sediment from the water. Mangroves are nature's land reclamation scheme.

What features do the Mangroves possess that enable them to live in an environment which most other plants would find impossible to inhabit?

Describe how the Mangroves assist in protecting the shoreline from erosion.

Explain other important influences that the Mangrove Forest has on the living things in this environment.



Key Words

Sponge Toxin Glands
 Sea Slug Tidal current Carnivorous

It looks like a garden full of plants, but a sponge garden contains only animals. There's not a plant to be seen: the lack of light and the scouring sand from the current make it impossible for plants to grow.

What features of sponges give them a plant like resemblance? How do these features enable sponges to thrive in this habitat?

Explain why diving in a Sponge Garden is particularly treacherous for the marine biologists. How do animals other than sponges survive in this habitat?

During this field program sponges were collected in the Dampier Archipelago for the first time, with 251 sponge species being recorded by Scientist, Jane Fromont. Previously only 14 sponge species were recorded from this region.

With further research construct a table based on the one below that compares four different sponges.

Sponge Name	Size	Shape	Colour	Significant Features	Feeding Mechanism
1.					
2.					
3.					
4.					

Make up a common name for the sponges you have described.

Common names are like nicknames. They are used because they are easier to say and remember than scientific names. They are often used amongst colleagues in the field. If someone from overseas asked what the five most common sponges at Dampier are, you would use the scientific names, you wouldn't say the elephant ear sponge, the golfball sponge etc, you would say *lanthella basta*, *Tethya robusta* etc.



Key Words

Infrastructure Wharves Man-made Reef
 Fauna Defend Monitoring

Here, there is people pressure, ranging from recreational fishermen to industry. Vast industrial complexes line the shore, together with wharves and jetties, and the other infrastructure that supports them.

Building such objects in such a beautiful place might seem like an assault on nature, but the construction work also provides nature herself with new opportunities.

Describe the observable effects the construction of wharves and the pipeline has had on the marine habitats.

Materials Used	Observable Negative Effect on Marine Habitat	Observable Positive Effect on Marine Habitat
Wharf Piles		
Underwater Pipeline		

Keywords

Crustacean Taxonomy Research
 Echinoderm Mollusc Coelenterate

1. Select an animal that you've observed on the video for further, more detailed research.

Write a report on your research. Include information that you find on the animal's habitat, its place in the food chain, associations and relationships with other living things. Consider the influence of light and temperature on the animal. What are its unique features? Can you find any details on how it takes in food, oxygen, resists disease and survives in a competitive environment?

2. Find out more about William Dampier and his travels aboard the Roebuck. What was the main reason for his exploration? Do you think it is appropriate that the Dampier Archipelago is named after him? Why?
3. Research in more detail the techniques that scientists use to estimate the diversity and abundance of populations of living things within a habitat. Include your ideas on why this information is important to research.
4. Research and explain the impact of the tidal movement, time and seasons on marine habitats.



Most of these books and the CD Rom are available for viewing at the Western Australian Museum Discovery Centre. Also consider your local libraries and the Museum Shop.

Videos

Western Australian Museum, 2001, *Life on the Edge – Down Under*, Ronin Films.

BBC, 2001, *The Blue Planet*, BBC Worldwide

Exhibitions

Western Australian Museum – *Dampier Marine Gallery* – Perth Cultural Centre, W.A.

AQWA – *Aquarium of Western Australia* – Hillarys Boat Harbour, Perth, W.A.

CD ROM

CALM/WAM CD ROM *Marine Life in Western Australia*, CALM W.A.

Websites

www.museum.wa.gov.au/

www.qmuseum.qld.gov.au/organisation/sections/SessileMarineInvertebrates

www.aqwa.com.au/main.html

www.bbc.co.uk/nature/blueplanet/

www.woodside.com.au

Books

Allen, G.R. & Steene, R. 1994, *Indo-Pacific Coral Reef Field Guide*. Western Australian Museum. Perth, W.A.

Allen, G. & Swainston, R. 1997, *Marine Fishes of Tropical Australia and South-East Asia*. Western Australian Museum. Perth, W.A.

Allen, G. 1985, *Fishes of Western Australia*. Western Australian Museum. Perth, W.A.

Byatt, A. 2001, *The Blue Planet – A Natural History of The Oceans*. BBC Books, U.K.

Fautin, D. & Allen, G. 1992, *Field Guide to Anemone Fishes and Their Host Sea Anemones*. Western Australian Museum. Perth, W.A.

Jones, D. & Morgan, G. 2002, *A Field Guide to Crustaceans of Australian Waters*. Reed New Holland. Sydney, N.S.W.

Marchant, L.R. 1988, *An Island Unto Itself, William Dampier*. New Holland Press, N.S.W.

Randall, J., Allen, G. & Steene R., 1997, *Fishes of the Great Barrier Reef and Coral Sea*. Crawford House Press. N.S.W.

Storrie, A. & Morrison, S., 1988, *The Marine Life of Ningaloo Marine Park and Coral Bay*. Department of Conservation and Land Management. Perth, W.A.

Wells, F. E. & Bryce, C.W. 2000, *Sea Slugs of Western Australia*. Western Australian Museum. Perth

Wells, F. E. & Bryce, C.W. 2000, *Seashells of Western Australia*. Western Australian Museum. Perth

