Our Backyard

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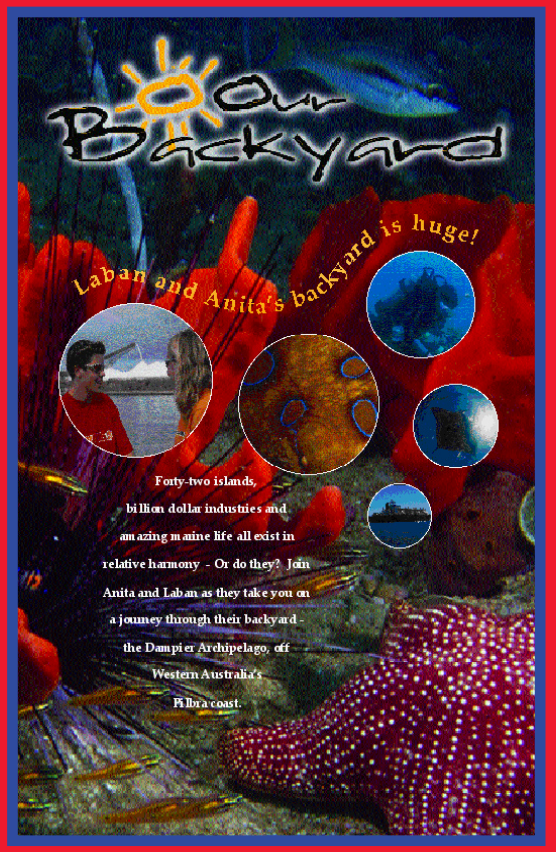

This educational support material is provided to enhance teaching and learning for educators and students.

Our Backyard provides brilliant opportunities for understanding more about Australia's ecosystems, scientific investigation and how we make informed decisions that affect our environment.

Government of Western Australia

WOODSIDE AUSTRALIAN ENERGY
Making A Difference For Young Australians

DAMPIER SALT

WESTERN AUSTRALIAN museum

Acknowledgements

A component of the Woodside Energy and Western Australian Museum Dampier Archipelago Project. Authored and designed by the Western Australian Museum Education and Learning Department based on work conducted by the Western Australian Museum Aquatic Zoology Department. Produced with assistance from the Western Australian Museum Foundation.
URL: www.museum.wa.gov.au

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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.

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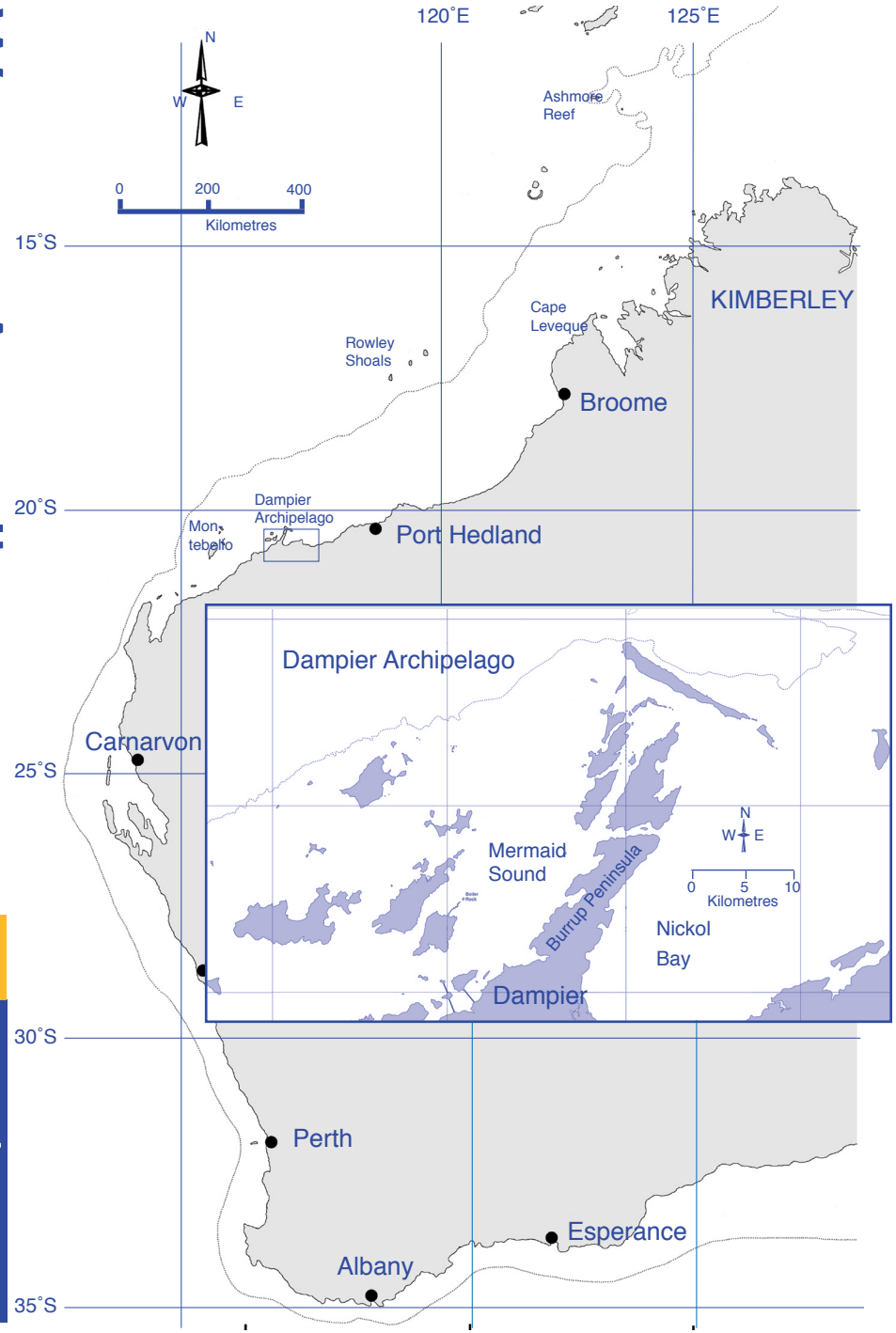
Western Australia



CORAL REEF		
00:25:38	Spanish Dancer	*Hexabranchus sanguineus*
00:25:51	Sea Slugs mating	*Aphelodoris sp.*
00:26:04	Golden Headed Sea Snake	*Aipysurus laevis*
00:26:57	Giant Oyster	*Hyotissa hyotis*
00:27:07	Commensal Shrimp	*Conchodytes sp.*
00:27:45	Trapeziid Crab	*Trapezia sp.*
00:27:33	Crown of Thorns Sea Star	*Acanthaster planci*
MAN-MADE HABITATS		
00:29:36	Yellow-edged Moray	*Gymnothorax flavimarginatus*
00:29:41	Narrow-barred Spanish Mackerel	*Scomberomorus commerson*
00:30:15	Red Firefish	*Pterois volitans*
00:30:22	Sailfin Catfish	*Paraplotosus butleri*

**Octopus* sp. is a proper name: Octopus is a genus name and sp. signifies it has yet to have a specific name allocated - it is unnamed.

The sponge fauna of the Dampier Archipelago is species rich with 275 species now reported from this area. Prior to the fieldwork beginning in the Dampier Archipelago in October 1998, the documented sponge fauna of the region amounted to 14 species. The Dampier Archipelago project has increased by almost 20 times the known sponge diversity of the region.

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INTERTIDAL		
00:14:24	Rosette Octopus	*Octopus* sp.
00:14:45	Blue Ring Octopus	*Hapalochlaena lunulata*
00:15:22	Estuarine Stonefish	*Synanceia horrida*
00:15:49	Volute	*Cymbiola oblita*
00:16:00	Dog Whelk – large species	*Nassarius dorsatus*
00:16:21	Comb Sea Star	*Astropecten polyacanthus*
MANGROVES		
00:17:29	Mudskipper	*Periophthalmus argentilineatus*
00:17:58	Fiddler Crab	*Uca flammula*
00:18:34	Elegant Fiddler Crab	*Uca elegans*
00:19:11	Mangrove Jack	*Lutjanus argentimaculatus*
00:20:00	Jellyfish	Unknown
00:20:07	Green Turtle	*Chelonia mydas*
00:20:19	Yellowfin Bream	*Acanthopagrus latus*
00:21:02	Sea Perch	*Lutjanus lutjanus*
00:21:06	Grey Reef Shark	*Carcharhinus amblyrhynchos*
00:21:10	Manta Ray	*Manta birostris*
00:21:22	Clark's Anemonefish	*Amphiprion clarkii*
00:21:24	Threadfin Pearl Perch	*Glaucosoma magnificum*
00:22:05	Hermit Crab	*Dardanus imbricat*
SOFT SEDIMENTS		
00:22:48	Reticulate Stingray	*Himantura uarnak*
00:23:15	Burrowing Sea Cucumber	*Neothyonidium magnum*
00:23:25	Glass Shrimp	*Periclimenes sp.*
00:23:37	Shame Faced Crab	*Matuta* sp.
00:23:51	Dartfish	*Ptereleotris monoptera*
00:24:26	Snapping Shrimp	*Alpheid* sp.
00:24:27	Shrimp Goby	*Cryptocentrus cinctus*

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Key Words

Geological	Sea Level	Global Warming
Craton	Minerals	Erosion

The Dampier Archipelago lies off the north coast of the Pilbara region of Western Australia.

A significant geological feature of this area is the Pilbara Craton. The continental crust in Western Australia contains rocks that have been dated to about 3,730 million years old. These are among the oldest rocks on Earth.

In contrast, the shoreline is relatively new. It was formed about 7,000 years ago, when an episode of global warming at the end of the last great ice-age caused the sea level to rise, flooding the coastal valleys.

The Pilbara block in Western Australia is currently being studied by scientists in an attempt to understand the processes that formed this early part of the Earth's crust. What does this tell us about the Australian continent?

Find out about the mineral resources that make this region commercially attractive?

What types of geological features are associated with these mineral resources?

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Key Words

Survey	Vegetation	Population
Exploration	Publish	Resources

The islands that make up the Dampier Archipelago are covered in sparse vegetation. There are no fresh water springs. The rainfall is enough to support isolated populations of mammals, including wallabies and kangaroos.

Ancient campsites, large shell middens and rock art indicate that Aboriginal people have lived in the area for at least 20,000 years. Injibandi is the dominant language group and cultural influence today. There are also many Ngaluma, Banjima and Gurrama speakers.

In 1699, William Dampier, on board the Roebuck, sailed into the islands. He was a complex character, part cutlass-wielding pirate, part explorer and a devoted student of natural history. Dampier kept detailed notes, which were very popular reading when published back in England.

In 1966 the iron ore company, Hamersley Iron Pty Ltd constructed the town of Dampier, overlooking Hampton Harbour. The town was originally built to house the company's employees working at the port facilities.

Find out more about the indigenous people living around Dampier. Make a short illustrated dictionary using Injibandi words.

What do you think Dampier and his crew were mainly looking for on this coastline? Do you think they found it? Why or why not?

At a later point in his career, Dampier was court martialled, fined all of his pay and banned from future command of any of Her Majesty's ships. What do you think has contributed to the recognition of William Dampier today?

Dampier is a recently constructed town in Western Australia. What do you think are the advantages and disadvantages of being able to plan a modern town?

Only specimens that are filmed for a significant duration are included in this species list. Time codes are approximate.

Video Time Code	Species Common Name	Scientific Name
00:05:55	Humpback Whale	*Megaptera novaeangliae*
SPONGE GARDEN		
00:07:10	Orange Fan Sponge	*Axinella cf. aruensis*
00:07:18	Elephant Ear Sponge	*Lanthella labyrinthus*
00:07:19	Orange Finger Sponge	*Trikentrion flabelliforme*
00:07:37	Brittle Star	*Ophiuroid ophiotrichidae*
00:07:45	Spotted Sea Cucumber	*Synapta maculata*
00:08:06	Sea Slug	*Chromodoris* sp. (*tinctoria* complex)
00:08:04	Sea Slug	*Risbecia* sp.
00:08:13	Bullock's Sea Slug	Hypselodoris bullocki
00:08:23	Anemone Shrimp	*Periclimenes* sp.
00:08:35	Stars and stripes Sea Cucumber	*Pseudocolochirus violaceus*
00:09:08	Freckled Moray	*Gymnothorax fuscomaculatus*
NIGHT TIME		
00:10:58	Tropical Garfish	*Hyporhamphus affinis*
00:12:00	Octopus	*Octopus* sp.
00:12:45	Green Turtle	*Chelonia mydas*
00:12:53	Long-spined Porcupine fish	*Tragulichthys jaculiferus*
00:13:08	Smith's Cuttlefish(?)	*Sepia* cf. *smithi*
00:13:12	Spiny-headed Flounder	*Engyprosopon grandisquama*
00:13:18 00:13:20	Velvet Swimmer Crab Stomatopod	*Charybdis natator* *Carinosquilla* sp.

Most books and 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, 2002, Our Backyard, Ronin Films.

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.

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Key Words

Sustainable	Commodities	Evaporation
Mining	Environment	Industry

Some of the earliest mineral discoveries in Western Australia were made in the west Pilbara. Copper and lead were discovered in 1872 and gold in 1877.

The largest mining operation is Dampier Salt, which mines salt using solar evaporation of seawater. Commodities quarried on Dampier have included sand and gravel for road and other construction.

The Northwest Shelf Gas Project is the largest resource project ever undertaken in Australia. Gas is drilled at an offshore platform 130 km north of Dampier and piped to the onshore treatment plant on the Burrup Peninsula. From here the gas is carried in a 1,450 km pipeline to domestic and industrial gas users in the south of the State.

The port of Dampier is the biggest tonnage port in the country. In 1993 the port loaded in excess of 60 million tonnes, with over 1,500 vessels calling at the port. Iron ore is the principal output, large shipments of Liquified Natural Gas, salt, and condensate also pass through the huge harbour. The port contributes significantly to the export income of Australia.

Draw a table that looks at the advantages and disadvantages of the industry in the Dampier region.

What do you think the impact of this industry is on the natural environment in the Dampier Archipelago? Is it important to preserve this environment? Why or why not?

Research the meaning of sustainability. Can you apply the concepts to the situation in the Dampier Archipelago?

What do you think should be done to promote a sustainable result in Dampier?

Key Words

Hypotheses	Biota	Endemic
Identify	Temperate	Marine Biologist

Scientists examine evidence and develop hypotheses that contributed to our understanding of the patterns and processes that have crafted the living world as we see it today.

Western Australia has a coastline of 14,000 km, divided into three major regions: a tropical north coast, a temperate south coast, and the west coast, where the tropical and temperate biotas overlap. A significant proportion of the biota, up to 25% of the shallow water marine species, is endemic to the State and occurs nowhere else. There are fewer than 100 marine biologists working in this vast area, almost all of whom are located in Perth. Until relatively recently, much of the coastline had been largely unexplored by scientists. Even now, the presence of some groups of marine species in Western Australia is unknown.

The Western Australian Museum's research in the Dampier Archipelago to date has identified 260 new species of living things. More results continue to occur as scientists carry on the study of samples taken from the initial survey. The work may also help establish a marine park to protect the area.

What do you think are some of the challenges for the research scientists?

Why do you think this research is considered important?

What are some of the techniques the scientists use for their studies and what forms of technology do they require?

Key Words

Landscapes	Nutrient	Geology
Species	Research	Taxonomy

1. Research the geology of coastal landscapes. How do waves and wind interact with the shore? What types of weathering occurs? How are stacks and headlands formed? Describe the impact of currents and sand movement.

2. Do some further study on the different relationships between living things. Find out more about antagonistic, commensal, parasitic and mutualistic relationships.

3. The loss of species from a habitat affects much more than the other animals that share the habitat. All living things and non-living things are connected in some way. All organisms are made up mainly of six major elements hydrogen, oxygen, carbon, nitrogen, phosphorus, and sulphur. Research some of the different nutrient cycles, such as the carbon, nitrogen or water cycle. Discuss as a class, the links between living and non-living things.

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

   Write a report including 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?

6. Research the techniques that scientists use to estimate the diversity and abundance of populations of living things within a habitat. Include your ideas on why these studies are important.

Key Words

Interdependence	Pressure	Temperature
Ecosystem	Cycle	Extinction

For the animals that live here, nature provides quite enough pressure. Any additional human pressure might well be the last straw.

What are the environmental pressures on the living things in the different Dampier Archipelago habitats?

Describe some of the adaptations different animals have developed to survive the impact of environmental pressures such as wave action, changes in temperature and moisture levels.

Interactions between different species create intricate webs of relationships as different organisms evolve together. The interaction between different living things and their environment is called an **ecosystem**. The flow of energy and the cycling of nutrients through ecosystems is dependent on the diversity of life, or what we call 'biodiversity'.

Explain how an ecosystem in one of the Dampier Archipelago habitats may be affected if some species became extinct. Consider the relationships between prey and predators and the food web.

Key Words

Habitat	Range	Tidal Currents
Fauna	Features	Sediment

The forty-two islands that make up the Dampier Archipelago are low and flat. Between the islands the waters are interspersed with giant ships servicing the Port of Dampier. Since the Port of Dampier has been established new **man-made habitats** have formed.

Between the islands that form the Dampier Archipelago, the seabed has taken on a wide range of forms, from **coral reefs** and **soft, silty plains** to **sponge gardens** in deeper water. The sea works away at the islands, creating a range of habitats including **rocky shores**, **sandy beaches** and **mangrove forests**.

Make a table distinguishing the features of each of the habitats described in the Dampier Archipelago. Compare the conditions of the habitats, food sources, water turbulence, oxygen content, salinity, tidal impact, light and spaces for creatures to hide in.

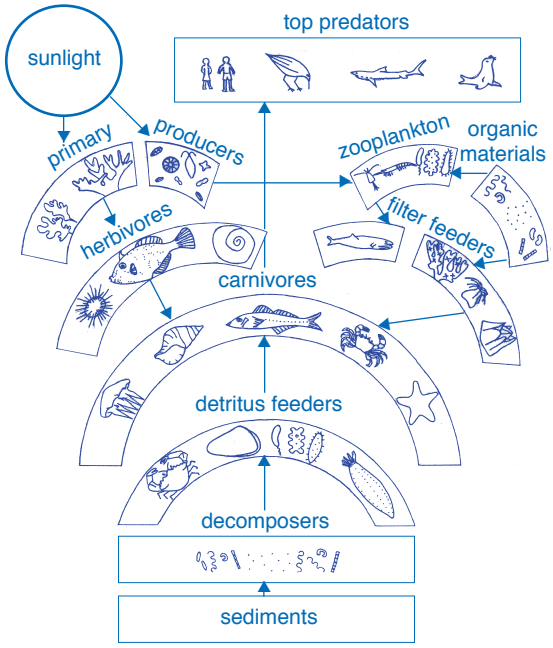
Habitats	Food Sources	Water Turbulence	Oxygen Content (high, medium, low)	Salinity (high, medium, low, constant or changing)	Tidal Impact	Light	Secure Spaces
Coral Reef							
Soft Sediments							
Sponge Garden							
Rocky Shores							
Sandy Beaches							
Mangrove Forests							
Man-made							

Key Words

Biodiversity	Food Chain	Photosynthesis
Algae	Plankton	Support

There is a vast range of food here, and an equally huge number of habitats, so that the reef can support an enormous number of different animals. This is biodiversity on a grand scale.

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 are connected, the result is a complicated 'food web'.



Illustrate a food web from one of the Dampier habitats. As a class compare different food webs developed in different habitats. Use the above general food web for ideas.

Key Words

Predator	Adaptation	Camouflage
Filter	Scavengers	Toxin

In marine environments if you're not being eaten yourself then you're probably about to eat someone else. Some habitats offer more protection than others, coral reefs have cracks to hide in, but silty soft sediment habitats offer little protection from predators. Different living things have developed many ways of protecting themselves from being eaten.

List the defence mechanisms used by some of the animals pictured in the video. What structures do the animals need for their protective behaviour and how do they use their habitat to their advantage?

Develop a definition for the word 'adaptations'.

Describe the adaptations some of the predators have developed to increase their chances of capturing food.

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? What advantages do these features have for the sponges?