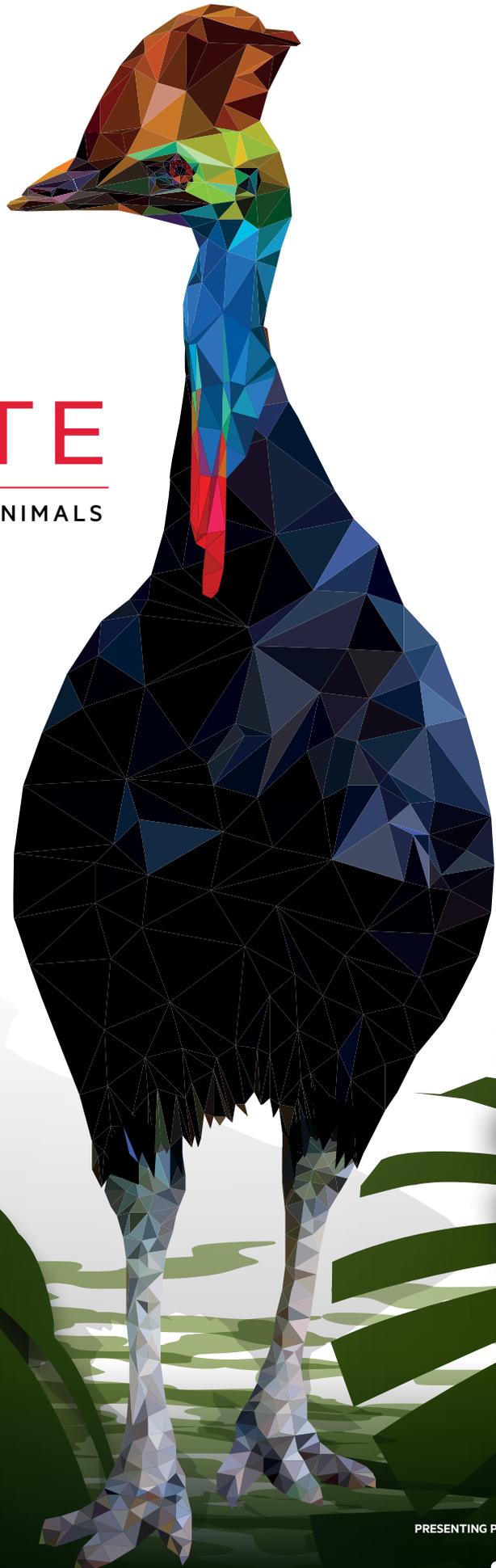




QUEENSLAND
MUSEUM



WILD STATE

CELEBRATING QUEENSLAND'S UNIQUE ANIMALS
AND THEIR HABITATS

TEACHER RESOURCE



The Exhibition

Australia is one of only 17 countries in the world that is megadiverse that is, together these countries contain 70% of the world's biodiversity.

Queensland is the most biodiverse state of Australia, with 70% of Australia's mammal species, 80% of Australia's birds, and 50% of Australia's reptiles and frogs. Queensland Museum has been a vital authority on the investigation, documentation and conservation of Queensland's faunal biodiversity for over 153 years.

Wild State explores why Queensland has such a big diversity of animals. As you enter the exhibition, on show are the five major types of habitats in Queensland: Arid Outback, Open Forest, Rainforest, Coastal and Marine. These habitats are shaped by a number of forces, with the availability and movement of water being the pivotal force. To survive, Australian animals have adapted to these diverse habitats which has given rise to the huge biodiversity in Queensland.

The following questions may be useful in stimulating learning discussions:

- How have animals adapted in their habitat to survive?
- How do humans impact on these habitats and ultimately the animals?
- What is the role of water in shaping these habitats?
- What is the role of scientists in looking after our natural world and how can you as an individual and as a community help?

This exhibition is presented by Queensland Museum to increase our understanding and valuing of Queensland's unique animals and habitats, encouraging all of us to take action to support a sustainable future.

Group excursions must be booked.

Web: [Online Booking Form](#)

Phone: (07) 3840 7608
Monday – Friday
8:15am to 3:30pm

Email: education@qm.qld.gov.au

Helpful hints

As you move through Wild State, make use of the interpretative panels and labels to assist your students understand the main themes of the exhibition.

Smaller groups work best with the layout of the exhibition. Queensland Museum suggests the following of adult to student ratios:

- Prep: 1 adult per 3 students.
- Primary: 1 adult per 5 students.
- High school (Yr.7– Yr. 10): 1 adult per 10 students.
- Seniors (Yr. 11-Yr.12): 1 adult per 15 students.

The exhibition will be a space that schools and groups share with other members of the public. Please ensure your students understand the importance of being considerate to other visitors.

A **glossary** can be found on page 9 for all terms highlighted in red.

Checklist for Teachers

This resource was developed by Queensland Museum for teachers planning a class visit to Wild State.

- Familiarize yourself with the five habitats and their characteristics – Arid Outback, Open Forest, Rainforest, Coastal and Marine habitats.
- In this document, each habitat is split into three distinct categories; animal adaptations, characteristic of the habitat and how water affects the habitat.
- Read the key teaching points and connect themes in the exhibition to your relevant curriculum. *Wild State* can be integrated into Science strands of the Australian Curriculum (F-10) and Biological Sciences, and Earth and Environmental Science and Geography learning areas in the Senior Secondary curriculum.
- Decide how your class will explore the exhibition. Don't forget to think about the pre and post visit resources like QM loans and online resources.
- For further information on booking a class visit, go to:
www.qm.qld.gov.au/Visit+Us/Schools+and+Groups/School+Group+Booking#.VmeLJk8w-70

Key teaching points

Arid Outback animal adaptations

Animals have incredible adaptations to survive the lack of water in a rapidly changing and often harsh habitat.

What adaptations ensure survival in a habitat that has very little water?

All living things have a variety of observable features and adaptations that help them to survive in their environment. Animal survival in the arid environment relies on two crucial factors in withstanding long periods without water and little available water for most of the year. They are:

How animals source water

- From food (for example the fat-tailed dunnart and the cinnamon quail thrush)
- Found in the environment (for example the golden perch and crimson chat)

Reduce water loss

- Producing concentrated urine and dry faeces (such as the fawn hopping mouse)
- Thermoregulation – this includes nocturnal activity (such as the desert scorpion, wolf spider), burrowing/burying (such as the holy cross frog and fawn hopping mouse) and **torpor** (such as snakes and microbats).
- Having skin that reduces **permeability** (such as the water-holding frog)

Animals living in the arid habitat are constantly exposed to intermittent rain or flooding. How have they adapted to survive in these extreme conditions?

Living things depend on each other and the environment to survive **boom & bust cycles**. This cycle occurs when a sudden downpour of rain (boom period) cause rapid breeding in insects, aquatic life and fish. These increases in food resource attract other predators, such as pelicans, raptors, owls and hawks to migrate in and breed. Lifecycles of some animals such as moths and flies are also interlinked with the boom cycles, laying eggs which lay dormant until the next boom period.

Key Teaching Points: Characteristics of the Arid Environment

- The arid outback is diverse, vegetated and not necessarily barren.
- The diversity of animals is high but their abundance is low.
- The arid outback has minimal vegetation, extreme heat during summer days to extreme cold on winter nights, long periods without water and sudden downpours and flooding.

How does water affect the arid outback environment?

Water availability in arid habitats is an “all or nothing” affair; animals living/ surviving in these environments have therefore adapted to an extreme lack of water for most of the time, with temporary, sporadic and sudden flooding and/or isolated pockets of permanent water.

Key teaching points

Open Forest animal adaption

Animals have adapted to live in an environment where resources such as food and water are spread widely throughout the habitat and are available sporadically at different times of the year.

Generally speaking, open forests in Australia has nutrient poor soils and in some areas this, coupled with limited rainfall, cannot support large numbers of trees, this creates large and open spaces. What kind of animals have adapted to survive in these conditions?

Food and water are spread out across large distances, or appear sporadically in the open forest so animals living here need to travel in order to eat and drink. Some animals, such as kangaroos, have developed novel ways of covering large distances quickly without using much energy. A kangaroo can get around quickly by jumping as it has elastic tension stored up in its legs, while animals such as raptors use heat rising from large rocks to ride and glide on the thermal current.

Many animals depend on Eucalyptus trees to survive. Why is this?

Eucalypt leaves provide a constant and abundant food source, however they have high levels of indigestible fibre, can be low in essential nutrients and contain toxic compounds to discourage browsing. Many forest animals including koalas have overcome these barriers and are now dependent on gum leaves.

Other animals depend on nectar from Eucalyptus trees. Along with other flowering plants, Eucalyptus hosts a number of mass flowering events. Low nutrient soils result in plants making more sugars than they can use to grow, and this surplus of sweet nectar is offered to animals in return for pollination. These sweet nectar filled flowers attract insects and birds by day and mammals by night. Highly sugary sap within Eucalyptus trees also feed many insects, which is a more constant source of food than fruit or nectar. Finally, hollows found in Eucalyptus tree trunks and branches are vital daily refuges and seasonal breeding nest sites for many species.

Key Teaching Points: Characteristics of Open Forest Environment

- Open forests cover at least half of Queensland and are characterized by widely spaced trees. They are dominated by **Eucalypts** and **Acacias**.
- Flowering Eucalypts are the **keystone** species in the open forest ecosystem.

How does water affect the open forest environment ?

Water is not a cyclic occurrence in open forests, rather the availability of water fluctuates in this environment. Animal adaptation and species survival is dependent on this fluctuation. For example during dry spells, the flowing water becomes muddy and sluggish – even stagnant at times. This leads to a significant drop in oxygen and impacts the ability for animals to move from pool to pool. Once the rain comes the rivers run clear and fast, producing oxygen and dispersing animals once again. Animals living in these waters have adapted ways to cope with such a rapidly changing environment.

Key teaching points

Rainforest animal adaptations

As climate changes rainforests retreat to mountain tops and animals are isolated in various microhabitats; they become specialized and can live nowhere else in the world.

Why do the rainforests of the Wet Tropics region of northern Queensland have such a high diversity of animals?

High rainfall enables prolific plant growth and more plants means more structural complexity in the rainforest. This creates more ecological **niches** which can be filled by a huge array of animals. The rainforests of the Wet Tropics are Queensland's largest and are made up of numerous high mountain ranges, often over 1000m above sea level. This complex **topography** creates a high diversity of animals and its associated food chains and webs.

How does climate affect the animals that live in those habitats?

There are many unique and vulnerable animals in rainforests due to the high number of specialist habitats created by the varying climate. As climate affects where organisms occur, species and plants change according to the differing elevation. When animals become adapted to such differing climates they become restricted to that particular area and can lead to **speciation**. This phenomenon supports a range of scientific theories including the theory of evolution by natural selection to explain the diversity of living things

Key Teaching Points: Characteristics of Rainforest Environment

- Rainforests are dependent on rain – in both high abundance and frequency.
- The rainforest environment can be split into three distinct habitats: lowland rainforest (vine-tangled lowlands with strong influence of the seasons), highland rainforest (misty and subtle seasons) and mountain tops (stable and cool climate which is often wet).
- Rainforests have experienced major fragmentation. As the continent dried so did the edges of the rainforests, shrinking into small fragments and creating isolated habitats. Rainforests are now confined to the moist mountainous regions close to the coast.
- Humans have also contributed to fragmentation and have had devastating effects on food webs and chains.

How does water affect the rainforest environment?

Since water is not limited in these environments, animals and plants do not need to spend energy conserving water. Instead it frees many species to invest in other life history strategies such as reproduction and social behaviours.



Key teaching points

Coastal and Intertidal animal adaptations

Queensland has a huge diversity of coastal habitats. Animals adapted to coastal and intertidal habitat are shaped by the dynamics of water.

There are many different habitats within the coastal and intertidal environment; think about the various animals living in the habitats below:

Mangroves

In Australia there are about 40 species of mangrove plants. Mangrove trunks and root systems provide vital feeding grounds and shelter for mud crabs, fish and a variety of prawns and small shrimps. Mangroves are also important for shore bird **rookeries** and nursery beds for many commercial fisheries.

Sandy Beaches

This habitat is fragile as life is under constant pressure from as erosion by storms and increased human activities. Hundreds of species inhabit sandy beaches but most of them are small (less than a few millimetres) and buried. They occupy **interstitial spaces** between sand grains. Larger animals that depend on sandy beaches (such as the green turtle) are also vulnerable and suffer from human impacts.

Rocky Shores

Rocky shores are constantly hammered by waves and tidal surges, and sequentially flooded by tides and exposed to the air. Living in this environment presents unique challenges to the animals and plants on rock platforms where there are very few places for creatures to burrow for protection. Animals live in different **zonations** and are impacted by these different zones, for example chitons reside in the surf zone while mobile molluscs are in the top zone. The growth and survival of living things in Coastal and Intertidal areas are affected by physical conditions of the coastal environment.

Key Teaching Points: Coastal and Intertidal Environment

- Coastal habitats have daily tidal changes and animals have adapted to these wet/dry, high energy/ low energy conditions.
- Coastal habitats are vulnerable because humans live in greatest numbers along the coastal strip and place increasing pressure on this habitat.

How does water affect the coastal and intertidal environment?

The energy of the water in the environment shapes the shores and determines what survives in this turbulent and diverse environment. The energy and force of water shape this habitat. Animals have to adapt to daily and seasonal tidal changes, as well as the energy and force of flowing water or pounding waves.



Key teaching points

Marine animal adaptations

Marine animals have developed a wide range of unique adaptations to live in the sea.

Animals living underwater have many different co-dependent relationships in order to survive. What sorts of relationships exist underwater in the Great Barrier Reef?

Some common relationships that can be found in the Great Barrier Reef include:

- Mutualism - where both animals in a relationship benefit from each other,
- Commensalism - where relationships between animals can benefit one and not affect the other, and
- Parasitism - where one animal benefits and the other animal loses.

Such interactions between organisms are all affected by the physical conditions of the underwater environment.

What are the major threats to the Great Barrier Reef?

The Great Barrier Reef is under consistent threat from various factors. They include:

Global:

- Climate change.
- Acidification.

Local:

- Sediment, nutrients and pesticide pollution from catchment run-off.
- Out-dated fishing practice.
- Industrialization.
- Coral bleaching through increased sea surface temperatures and global warming.
- The Crown-of-thorns starfish.
- Local weather events such as cyclones.

Key Teaching Points: Characteristics of the Marine Environment

- On Queensland's east coast there are two very different marine regions - South East Queensland marine biogeographic overlap zone and the Great Barrier Reef.
- Marine environments are fragile and we must act to ensure long term sustainability.

How does water affect the marine system?

It is the environment itself! The marine habitat is characterised by being immersed in salt water with complex diverse communities existing in a deceptively fragile ecosystem. The growth and survival of living things are affected by physical conditions of the complex marine environment.

Glossary

Acacias: a small tree or shrub belonging to the genus *Acacia*, of the *Mimosaceae* family, having clusters of small yellow flowers.

Boom & bust cycles: “boom” is characterized by rapid growth in a population which is followed by “bust” during which the population falls back to a minimal level.

Eucalypts: a diverse genus of flowering trees and shrubs in the myrtle family, *Myrtaceae*.

Interstitial spaces: a space between structures or objects.

Isolation: restriction or limitation of gene flow between distinct populations.

Keystone species: a species that has a disproportionately large effect on the communities in which it occurs.

Niches: role that an animal or plant species plays in the environment.

Permeability: something that allows liquids or gases to pass through it.

Rookery: nests or breeding place.

Speciation: formation of new and distinct species in the course of evolution.

Topography: arrangement of the natural and artificial physical features of an area.

Torpor: a state of decreased physiological activity in an animal, usually by a reduced body temperature and metabolic rate.

Zonation: the categorization of a major ecological community of organisms into zones based on their distribution or arrangement in a habitat as determined by environmental factors.

Exhibition Links to Scope and Sequence Science (F-10)

Science Understanding

	Foundation Year	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	
Science Understanding	Biological sciences	Living things have basic needs, including food and water	Living things have a variety of external features Living things live in different places where their needs are met	Living things grow, change and have offspring similar to themselves	Living things can be grouped on the basis of observable features and can be distinguished from non-living things	Living things have life cycles Living things, including plants and animals, depend on each other and the environment to survive	Living things have structural features and adaptations that help them to survive in their environment	The growth and survival of living things are affected by the physical conditions of their environment	There are differences within and between groups of organisms; classification helps organise this diversity Interactions between organisms can be described in terms of food chains and food webs; human activity can affect these interactions		Ecosystems consist of communities of interdependent organisms and abiotic components of the environment; matter and energy flow through these systems	The theory of evolution by natural selection explains the diversity of living things and is supported by a range of scientific evidence
	Earth and space sciences	Daily and seasonal changes in our environment, including the weather, affect everyday life		Earth's resources, including water, are used in a variety of ways			Sudden geological changes or extreme weather conditions can affect Earth's surface	Some of Earth's resources are renewable, but others are non-renewable Water is an important resource that cycles through the environment				

Exhibition Links to Scope and Sequence Science (F-10)

Science as a Human Endeavour and Science Inquiry Skills

		Foundation Year	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Science as a Human Endeavour	Nature and development of science	Science involves exploring and observing the world using the senses	Science involves asking questions about, and describing changes in, objects and events	Science involves making predictions and describing patterns and relationships	Science involves testing predictions by gathering data and using evidence to develop explanations of events and phenomena	Important contributions to the advancement of science have been made by people from a range of cultures	Scientific knowledge changes as new evidence becomes available, and some scientific discoveries have significantly changed people's understanding of the world	Scientific understanding, including models and theories, are contestable and are refined over time through a process of review by the scientific community				
	Use and influence of science		People use science in their daily lives, including when caring for their environment and living things	Science knowledge helps people to understand the effect of their actions	Scientific understandings, discoveries and inventions are used to solve problems that directly affect peoples' lives	Science and technology contribute to finding solutions to a range of contemporary issues; these solutions may impact on other areas of society and involve ethical considerations	Scientific knowledge is used to inform personal and community decisions	Science understanding influences the development of practices in areas of human activity such as industry, agriculture and marine and terrestrial resource management	Advances in scientific understanding often rely on developments in technology and technological advances are often linked to scientific discoveries	People can use scientific knowledge to evaluate whether they should accept claims, explanations or predictions	Advances in science and emerging sciences and technologies can significantly affect people's lives, including generating new career opportunities	The values and needs of contemporary society can influence the focus of scientific research
Science Inquiry Skills	Questioning and predicting	Respond to questions about familiar objects and events	Respond to and pose questions, and make predictions about familiar objects and events	With guidance, identify questions in familiar contexts that can be investigated scientifically and predict what might happen based on prior knowledge	With guidance, pose questions to clarify practical problems or inform a scientific investigation, and predict what the findings of an investigation might be							
	Planning and conducting	Explore and make observations by using the senses										
	Processing and analysing data and information	Engage in discussions about observations and use methods such as drawing to represent ideas										
	Evaluating		Compare observations with those of others								Critically analyse the validity of information in secondary sources and evaluate the approaches used to solve problems	
	Communicating	Share observations and ideas	Represent and communicate observations and ideas in a variety of ways such as oral and written language, drawing and role play	Represent and communicate ideas and findings in a variety of ways such as diagrams, physical representations and simple reports	Communicate ideas, explanations and processes in a variety of ways, including multi-modal texts	Communicate ideas, findings and solutions to problems using scientific language and representations using digital technologies as appropriate	Communicate scientific ideas and information for a particular purpose, including constructing evidence-based arguments and using appropriate scientific language, conventions and representations					

Information

Queensland Museum Loans Kits

You can borrow kits and sets of Museum specimens and artefacts from Queensland Museum Loans service to engage students in your classroom.

Visit www.qm.qld.gov.au/Learning+Resources/QM+Loans and search the online catalogue either by curriculum link, year or by topic.

Queensland Museum Contacts

Queensland Museum Loans service,

loans@qm.qld.gov.au

122 Gerler Road

Hendra Queensland 4011.

Open 9 am to 5 pm weekdays

(to 5:30 pm Monday and Friday).

Closed weekends and public holidays

Group Bookings

education@qm.qld.gov.au

tel: 07 3840 7608

Discovery Centre

tel: 07 3840 7555

Website:

www.qm.qld.gov.au

Contact us

PHOTOGRAPHY Queensland Museum© 2016

The Exhibition (page 2): Platypus, Photographer – Gary Cranitch

Helpful hints (page 3): Boondall Wetlands – Bruce Cowell

Key Learning Points (page 4): Arid Outback, Photographer – Gary Cranitch

Key Learning Points (page 5): Night time, early morning skyscape behind trees, Photographer – Jeff Wright

Key Learning Points (page 6): Strangler Fig, *Ficus* sp., Photographer – Gary Cranitch

Key Learning Points (page 7): A rocky beach on Lizard Island, Photographer – Gary Cranitch

Key Learning Points (page 8): Untitled, Photographer – Gary Cranitch

Glossary (page 9): Natural Bridge, Springbrook National Park, Photographer – Bruce Cowell

Information (page 12): Purple Cherry, Photographer – Gary Cranitch

W I L D S T A T E

CELEBRATING QUEENSLAND'S UNIQUE ANIMALS AND THEIR HABITATS



Welcome to *Wild State*.

For assistance and directions during your Museum visit, ask our Visitor Services Staff or Volunteers.

Schools and Groups entrance/bag store ... Level 0
Collectors Café Level 2
M & F Toilets Level 4, Level 2, Level 0
Accessible Toilets Level 2, Level 0
PLEASE NOTE: there are no toilets located within the exhibition.

Please recognise that some items are not permitted within this exhibition. This and other helpful information is available for Schools and Groups online.

[Planning Your Visit](#)

www.qm.qld.gov.au/Visit+Us/Schools+and+Groups/Planning+your+visit#.WCzicNV96UK