TEACHER NOTES

BIODIVERSITY
(SUPPLEMENTARY NOTES)

Terms 2-3, 2020
CELEBRATING WA’S AMAZING BIODIVERSITY through the camera lens

It’s easy to enter!
- DISCOVER: Find out about WA’s unique species, the threats they face and how people can help.
- PLAY: Grab a camera and spend some time developing your photography skills.
- EXPLORE: Get outside and capture the diversity of our state’s plants, animals and landscapes.
- SHARE: Compose a captivating caption that highlights the biodiversity story of your favourite photo.

Share in $25,000 in cash prizes for yourself and your school

Choose one or more of the following categories to FOCUS on:
- FOCUS on: WA’s native species.
- FOCUS on: WA’s habitats and ecosystems.
- FOCUS on: Sustainability in WA.

Entries will be awarded for each category in the following age groups: Years K-2, 3-6, 7-10 and 11-12.

Teacher notes, submission guidelines and competition rules can be found online at mediaeducation.com.au/competitions

The West Australian ED! media education
CONTENTS

CONTENTS .................................................................................................................................................. 2

INTRODUCTION ........................................................................................................................................ 4

Celebrating WA’s amazing biodiversity through the camera lens ................................................................ 4

WA’S NATIVE SPECIES ............................................................................................................................. 5

Animals – native or introduced? ............................................................................................................. 6
Animals – WA’s native species .................................................................................................................. 7
Plants ......................................................................................................................................................... 7

WA’S HABITATS AND ECOSYSTEMS ........................................................................................................ 10

Biodiversity Hotspot .................................................................................................................................. 10

SUSTAINABILITY IN WA ............................................................................................................................ 12

How can individuals become involved? .................................................................................................... 12
What organisations are involved? .............................................................................................................. 13

EXPLANATION OF TERMS ........................................................................................................................ 14

© Seven West Media Education 2020
All images are student submissions from the 2014-2019 Chevron Focus Environment competition, unless noted.
Celebrating WA’s amazing biodiversity through the camera lens

The Chevron Focus Environment competition encourages students to engage with WA’s biodiversity through the mediums of photography and caption writing.

It is hoped that through this competition, young people will be motivated to become involved in activities that will benefit WA’s environment.

These notes are designed to provide teachers with additional background information linked to the competition themes, as well as ideas for activities to help students explore the concept of biodiversity in the classroom.
WA’S NATIVE SPECIES

Before students can grasp the idea of ‘native to areas of WA’ (endemic), they need to appreciate ‘native to Western Australia’, ‘native to Australia’ and understand why this continent’s wildlife is so unique. Some plants and animals thriving in Australia today are introduced species, mostly since the arrival of the First Fleet in 1778.

The dingo is considered by many to be native to Australia because it has been here for so long. It has been suggested that it was brought here between 3000 and 4500 years ago by early visitors to the continent.

Native species are those that have evolved here over the millennia since the time of Pangaea. The separation of Pangaea provides a theory to explain why some species considered unique to Australia have been found in the Americas.

Before Australia was first visited by the Europeans in the early 17th century, native flora and fauna had evolved and thrived undisturbed for many thousands of years. Indigenous Australians were relatively few in number and they lived in harmony with their natural environment.

The most significant force of change brought to the continent with the arrival of the European colonists in the late 18th century, was introduced species.

Activities
- Study outline maps of Pangaea in the Permian period, Laurasia and Gondwanaland in the Triassic, Jurassic and Cretaceous periods, and the continents of the present day.

The changes occurred very slowly over millions of years and each image is just a snapshot of where the land would have been in that period.
- Arrange the maps in order from the past to the present.
- Describe the changes that have occurred.
- On a scaled timeline, indicate where each map would be located.
- How might the distribution of land across the globe have affected the plants and animals that lived there? How might this have changed over time?
- Encourage questions about the native wildlife on the Australian continent. How might it compare with that on any other continent? How might the separation of Pangaea account for Australia’s unique wildlife?
- Research the significance of ‘The Wallace Line’, the imaginary line that marks the separation of species between Australia and Asia.
Animals – native or introduced?
Many students are unaware that animals familiar to them do not belong naturally to the continent, their state or the local area. When they are made aware of the negative impact of introduced species, they may begin to feel a sense of protection towards native animals.

Activities
- Research to find when, how and why different animals were brought to Australia from Europe and other places with which Europeans traded; eg. south-east Asia. Assign each to one of three categories: Developing the Economy, Transport, Sport and Leisure.
- Some introduced animals are still important to people in Australia today. Present an argument to justify why each one should be allowed to remain in the country.
- List ways in which introduced predatory (eg. cats, foxes) and non-predatory (eg. sheep, cattle, camels, rabbits) species have impacted on native species; eg. competition for food, preying on them, competing for nesting/breeding sites.
- Discuss reasons why some introduced species have had such devastating consequences for many native animals. Prepare a script for a documentary about the effect of some introduced animals on the populations of native animals. Include examples of extinct and threatened species.
- Design a calendar with an image and fact file of one native Australian animal for each month.
- On an outline map of Australia, show where native animal species can be found now and where they could be found 50 years ago. Discuss the difference.
- Use images to present a classification display of a selection of native Australian vertebrates (amphibians, birds, fish, mammals and reptiles) and invertebrates (insects and arachnids).
Animals – WA’s native species

Having established a better understanding of animals native to Australia, and those that have been introduced, work towards an appreciation of those species native to Western Australia.

Activities

- Compile a list or find images of animals familiar to the students. Assign them to one of five categories:
  - Found only in certain part of WA; eg. Western Swamp Tortoise - **Endemic to south-west WA**
  - Found in various parts of WA and/or other parts of Australia; eg. Red kangaroo - **Native to WA**
  - Found elsewhere in Australia but not found in WA; eg. koala – **Not native to WA**
  - Found elsewhere in Australia, originally not found in WA, but exists here now; eg. kookaburra– **Introduced species**
  - Not native to Australia; eg. red fox – **Introduced species**

- Work through the main animal classification groups to find examples of those endemic or native to WA. On a large outline map of WA, create a montage of images of these animals.

- Choose one native animal to research (eg. kangaroo) and present information about its different species found in WA. Include a chart listing species found in other states/territories.

- Create a ‘What am I?’ game to help students learn more about WA species. For each one, students write some statements. These may relate to its classification, physical appearance, annual cycle, habitat, diet, predator/prey relationships, breeding patterns or conservation status.

- Prepare an identification chart to highlight the difference between similar animals or species of an animal. Make a collection of images of the different animals/species to test students’ identification skills.

- Determine which naturally occurring species can be found in the wild in the local area. Begin a ‘sighting’ diary in which students record where and when they have seen different species. Draw a large scale map of the area and identify locations where the animals have been seen.

- Which local species are at greatest risk from feral animals and adverse human activity? Design posters to highlight the plight of these native creatures.

- Make a sound recording of bird species in the local area. Identify them as native or invasive. Can you recognise birds by their call? Repeat for frogs and any other animals you can hear.

- Photograph or find images of locally occurring native birds. Highlight their individual colours and markings. Sketch a series of annotated drawings highlighting identification marks.

- Keep an observation diary in which to track sightings of native creatures and identify patterns of behaviour.
Plants
Over millions of years, plants have adapted to the different and changing climatic conditions of the planet. Seed dispersal by the wind, insects and other animals has been nature’s way of populating places with different plant species. If the new conditions suit, the plants thrive; if not, they don’t.

Since colonisation, different plant species have been introduced to Australia. With the First Fleet came crop seeds that would hopefully germinate and thrive, providing sustenance for the new colony. But when exotic plants are introduced to a new area, they can upset the balance of nature by competing for soil nutrients and water.

With their different climates and soil types, the diverse landscapes of WA support a huge number of plant species, some of which are unique to the State. Students may be familiar with a number of different plants but do they know which are native to Australia?
Activities

- Different species of palm tree are common in Western Australian gardens. How many species are there? Are any native to Australia? If so, to which area(s)?
- Research the red and green kangaroo paw. Present a cross-curricular report on this unique Western Australian icon.
- Research the grass tree. Present a cross-curricular report on this unique Australian icon.
- Look around the local area including parks and traffic islands. What type of trees and shrubs has the council planted and why?
- When streets of a new development are named, the names often follow a theme. Can you find anywhere in your local area where streets have been named after native plants?
- With the help of parents, students compile a list and take photographs of plants in home gardens. Determine which are most commonly used. Present information in a chart.
- Plan a native garden for the local area. Describe the soil type, how water drains through it and how local plants have adapted to it.
- On a map of WA’s climate zones, mark the local area. Devise questions to ask a plant expert about the local soil types; plants native to Western Australia; common exotic plants. Visit a local plant nursery to conduct your research.
- The genus Eucalyptus can be found all over Australia but some species are only found in certain areas of WA. What species are native to WA?
- What features have WA’s native plants evolved to help them cope with the different environmental conditions of our State?
- Study the life cycle of different native plants. Propagate plants from seed. Investigate the best soil types and why they work; eg. drainage, pH.
- Look at different physical features in the local area. What plant types are found at each? Do they belong there?
- Keep an observation diary to track cycles in the year of native plants; eg. when they blossom, die back, lose their bark.
- Research how invasive species can undermine the health of native plants.
- Find the Aboriginal names of native plants found in your area. In what way can native plants be useful to people?
- Look closely at examples of different native plant types. Represent them in sketches, paintings and other forms of visual arts.
- Assign each student to one native plant. Challenge him or her to discover the different native animals that use, or rely on that plant and how the plant benefits from them. Create a web of interdependence.
- Create an information board of native plants from across WA. Describe their features and how they have adapted to living in the conditions of that region.
- Create identification charts of locally occurring plant species. Include stems/trunk, leaf types and their patterns, seeds, flowers, fruit. Can you identify a native plant from just one of its parts?
Biodiversity refers to the range of different life forms. It includes the
- differences in the species of a plant or animal;
- variety of different species of plant and animal;
- variety of habitats and differences between their populations within different ecosystems.

WA is a massive state that stretches across five climate zones and encompasses diverse landforms; eg. the granite Porongorup Range of the south-west, the gorges of the Karijini National Park, the wetlands of the Kimberley and the red desert in the centre.

Together, the climate and landscape influence the level of biodiversity across the State. Soils of varying richness support plant life that has adapted to the environment and these support the native fauna.

**Biodiversity Hotspot**

The Australian Government Department of the Environment and Energy has identified 15 National Biodiversity Hotspots. Eight of these are in Western Australia.

- Fitzgerald River Ravensthorpe on the south coast
- Busselton Augusta in the south-west
- Central and Eastern Avon Wheatbelt east of Perth
- Mount Lesueur – Eneabba just north of Perth
- Geraldton to Shark Bay sand plains north of Perth
- Carnarvon Basin in the State’s far west
- Hamersley – Pilbara in the north-west
- North Kimberley in the far north

In addition to these national hotspots, the area to the west of the line drawn between Shark Bay and Esperance, which includes five of the above locations, is considered one of the world’s primary biodiversity hotspots.
Activities

- Use examples of native West Australian species to describe the difference between a habitat (the environment which provides a single species with all its needs) and an ecosystem (the interaction between a number of species within their habitats, and their non-living environment).
- Research the biodiversity hotspots of WA and locate them on an outline map of climate regions. Research the plant and animal life native to that area. How is it thriving? Is it at risk? Choose one species of plant and one species of animal, describe their natural habitats.
- Investigate a local ecosystem; eg. Jarrah forest, Karri forest, Banksia scrubland. What species of plant and animal are evident? What physical features of the ecosystem support the habitats of the individual species? How do the different species within the ecosystem relate to each other? Investigate ways to determine and record the populations within the ecosystem. Design and create a realistic model of the ecosystem.
- Create an explosion chart of different physical environments or biomes of different regions of Western Australia; eg. ocean, mangrove swamp, river estuary, forest floor, forest canopy, desert. Investigate the landforms that exist there and the native plant and animal species that exist in one environment. Suggest a realistic ecosystem that might be found in it. Create an interdependence web to show the relationship between species.
- Choose a native West Australian species from each of the main animal classification groups. For each, draw up a wish list of features it might request for its ideal habitat with reasons for each wish.
- To attract native birds, insects and other animals into a garden, native plants are required. For a number of locally occurring native animals, identify the plants they prefer.
- Investigate the important role of insects in any ecosystem; eg. breaking down organic matter and returning nutrients to the soil, pollination.
- Investigate the impact on species and changes to the soil composition caused by land clearance.
SUSTAINABILITY IN WA

There are many ways for individuals to conserve and preserve the environment and so ensure the stability of WA’s biodiversity.

In Western Australia, there are many organisations whose primary role is to care for the environment. Some are local or state based. Others are linked to national and international bodies. But however big or small these organisations are, the cooperation of individuals is essential if their strategies are to succeed.

For the competition, judges want to see photographic evidence that people care and they are prepared to do something about it.

**How can individuals become involved?**
These are some examples of how individuals can and do care for the environment. The list is not exhaustive.

- **designing gardens with native plants that attract native species of birds, frogs, insects and other animals and require little or no watering**
  
  - Find out which native birds are particularly attracted to different native trees. Find images of the trees and birds and create a native garden collage.

- **mulching gardens to reduce watering needs**
  
  - What is mulch and how does it reduce watering needs? Find out!

- **erecting nesting boxes in gardens to attract native birds and bats**
  
  - Write a procedure for making and erecting a nesting box. Find some ornithological tips to offer a first-time nesting box builder.

- **joining volunteer organisations to clean-up or revegetate areas of natural bushland, dune restoration to prevent erosion, erecting boardwalks to reduce the impact of human activity**
  
  - Find out about such volunteer groups in the local area. Design a poster to inform people about the organisation and encourage them to volunteer.

- **fundraising for environmental causes**
  
  - Research different environmental agencies for plants and for animals. Outline the objectives of each and discuss which would be a worthy recipient of funds raised by the school.

- **keeping cats in at night**
  
  - Explain why cats are particularly harmful to native animals.

- **encouraging ecological gardening**
  
  - Investigate the environmental advantages of ecological gardening. Compile a list of pros and cons that family members might cite if it was suggested that the garden was to be turned into an ecological garden.

- **through school incursions and excursions**
  
  - Find out about organisations that communicate with the students to teach them about WA’s native species.
What organisations are involved?

Students may have a general idea that environmental agencies do exist, but they may not realise just how many there are and the diverse roles they play in the protection of the environment.

- Research a selection of environmental departments and organisations (eg. Australian Government Department of Environment and Energy; WA Department of Biodiversity, Conservation and Attractions; Environmental Protection Authority)
  - Prepare a brief report as a spokesperson for one organisation and give an oral presentation outlining the objectives of your organisation and how it benefits the environment.
- Research a selection of not-for-profit conservation organisations that are helping to protect local species and habitats (eg. Project Numbat, Kaarakin Black Cockatoo Conservation Centre, Conservation Volunteers, Kanyana Wildlife Rehabilitation Centre). Discover how these organisations are helping to protect local plants, animals and their habitats. Choose how to present a report on each organisation.
- Take a real or virtual visit to Perth Zoo and discover how they are helping endangered local species.
- Discover how sand dunes are created. What species are planted in sand dunes and why is it necessary to do this? Why is it important to keep off planted sand dunes? Design a poster to inform the school community about sand dunes.
- Log on to the Landcare Australia website. Read through some case studies from Western Australia. Choose one to summarise and share with the class.
- Find out what’s happening around WA with Greening Australia WA.
- Log on to the Cape to Cape Catchments Group. From the website, choose a subject to summarise impacts on biodiversity, invasive species and feral animals.
- Youth environmental organisations such as Millennium Kids.

It is not necessary to travel far to find examples that would be suitable subjects for the competition. Even in the more densely populated suburbs of Perth’s metro area, there is evidence of WA’s unique wildlife and what people are doing to help.
EXPLANATION OF TERMS

For students to fully engage in the competition and develop a deep understanding of its environmental focus, it is essential that they understand all the terminology.

Biodiversity — the range of different life forms in an area. A great biodiversity refers to an area which supports many different species of plant and animal; eg. a tropical rainforest. In a region of low biodiversity, far fewer life forms are in evidence; eg. the tundra.

Sustainability — the ability to maintain a balance between Earth’s natural resources and our use of them.

Conservation — the sensitive balance between the natural resources available and those used; actions taken to ensure the balance is maintained; eg. planting saplings when mature trees are felled.

Preservation — steps taken to keep a region untouched by human activity so that the natural order may be maintained or re-established.

Ecological footprint — the impact of human activity on the natural environment. All human activity uses natural resources and produces waste. The extent of each is a determining factor of the activity’s ecological footprint.

Natural environment — the extent of plant and animal life without evidence of human activity.

Habitat — the area in which a species makes its natural home because it provides all elements required for survival; i.e. food, water, shelter and protection from the elements and predators.

Ecosystem — the interaction between species and their physical environment.

Flora — plants (in this competition, plants native to WA).

Fauna — animals (in this competition, animals native to WA).

Endemic — belonging exclusively to a particular place.

Introduced — non-native species brought to a region for a particular purpose.

Invasive — non-native species that have spread beyond the area to which they had initially been brought.

Feral — non-native animals that have escaped or been released into the wild as they are no longer required for the purposes for which they were initially introduced.

Climate — cycle of weather patterns specific to an area, experienced over the course of a year and determined over a number of years. Many physical features specific to an area affect climate; eg. proximity to the coast, altitude.

Weather — meteorological elements experienced at any moment in time; eg. rain, wind, sunshine, fog, snow.