



Enviro-Stories

Education Program

Biodiversity of the Murray Catchment Education Kit



River Murray Online



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Murray



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Using this education kit

The *Biodiversity of the Murray Catchment Education Kit* has been developed to encourage student investigations into the biodiversity of the Murray catchment. This new found knowledge will support students' narrative writing and illustration skills for the 2012 Enviro-Stories Education Program "Biodiversity of the Murray Catchment".

The kit consists of Information Sheets, Teacher's Notes and Activity Sheets that can be used in the classroom.

Enviro-Stories Education Program

The Enviro-Stories Education Program, established by Peekdesigns in 2008, involves students learning about and developing a "sense of place" within their local environment and natural resources. They do this through research, reflection and creative storytelling. Their stories are then published for electronic and hardcopy distribution.

www.envirostories.com.au

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A place with a whole lot of life!

Everywhere on our planet there is life. From the polar-ice caps and deepest oceans to the highest mountain peaks, life has found a way to exist. In fact, on Earth, there are so many different living things that we are yet to discover and identify them all.

Biodiversity (**biological diversity**) is a term that is used to describe the variety of living things on Earth. The biodiversity of our planet encompasses all life from the smallest microorganism to the largest mammal.

There are considered to be three basic levels of Biodiversity:

1. The number and kinds of species.
2. The Earth's ecosystems (habitats); it's savannas, rainforests, oceans, forests, plains, marshes, deserts and all the other environments.
3. The genetic diversity; all the different genetic variations between species.

The biodiversity of our planet and local areas are extremely important for us to look after. Humans have been the overwhelming cause of the destruction and alteration of the natural ecosystems of creatures we share the planet with. We have a responsibility to try and protect and preserve these environments for future generations to enjoy.

Further information

If you wish to learn more about biodiversity a great site to check out is the World Wildlife Fund's "Biodiversity 911" page at:

www.biodiversity911.org/default.html

Biodiversity of the Murray Catchment

The diverse landscapes of the NSW Murray catchment support a significant array of natural biodiversity, including many terrestrial and aquatic threatened plants and animals, some of which are not found anywhere else in Australia.

The region's biodiversity is under considerable pressure from a range of threats including clearing of native vegetation, overgrazing, pest plants and animals and removal of fallen timber. Many of its species, populations and ecological communities are in decline. The Murray catchment has 7 endangered ecological vegetation communities and over 110 threatened plants and animals.



A place with a whole lot of life!

The Murray catchment contains a vast range of plants and animals. The following lists just a small example of the bountiful biodiversity that exists within the Murray catchment.

Plants

Overstorey

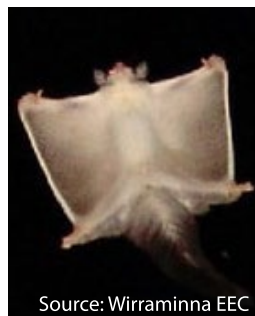
Snow Gums, Black Sallee, Alpine Ash, Red Stringy Bark, River Red Gum, Grey Box, White Cypress Pine, Buloke, Black Box and Pointed Mallee.

Understorey

Saltbush, Silver Wattle, Tussock Sedge, Kangaroo Grass, Golden Wattle, Chocolate Lily, Wire Grass, Emu Bush, Native Cherry and River Cooba.

Mammals

Western and Eastern Grey Kangaroos, Red Kangaroo, Black Wallaby, Sugar Glider, Squirrel Glider (see right), Feather-tailed Glider, Common Wombat, Yellow-footed Antechinus, Mountain Pygmy Possum, Spotted-tailed Quoll, Platypus, Echidna, Gould's Wattled Bat, Lesser Long-Eared Bat, Southern Forest Bat and the Inland Freetail Bat.



Source: Wirraminna EEC

Birds

Emu, Laughing Kookaburra, White-bellied Sea-eagle, Whistling Kite, Sulphur-crested Cockatoo, Tawny Frogmouth, Azure Kingfisher, Red Wattlebird, Brolga, Yellow-billed Spoonbill and the Bush Stone-curlew.

Fish

Murray Cod, Yellow Belly (Golden Perch), Trout Cod, Silver Perch, Eel-tailed Catfish, Australian Smelt and the Western Carp Gudgeon.

Reptiles

Freshwater turtles

Broad-shelled Turtle, Long-necked Turtle and the Murray River Turtle.

Lizards

Eastern Spiny-tailed Gecko, Tree Dtella, Thick-tailed Gecko, Beaked Gecko, Olive Legless Lizard, Eastern Hooded Scaly-foot, Sand Monitor, Lace Monitor, Eastern Blue-tongue Lizard, Shingleback, Copper-tailed Skink, Garden Skink, Cunningham's Skink, Jacky Lizard, Nobbi Dragon and the Eastern Bearded Dragon (right).

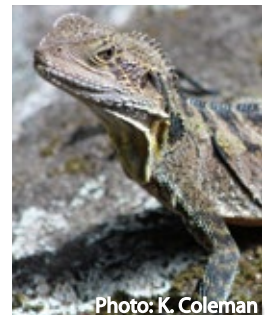


Photo: K. Coleman

Snakes

Prong-snouted Blind Snake, Woodland Blind Snake, Murray-Darling Carpet Python (Inland Carpet Python), Common Death Adder, Yellow-faced Whipsnake, White-lipped Snake, Red-naped Snake, Eastern Tiger Snake, Red-bellied Black Snake, Western Brown Snake, Eastern Brown Snake and the Eastern Bandy Bandy.

Source: "Reptiles of the Murray Catchment"

Amphibians

Corroboree Frog, Eastern Pobblebonk, Spotted Marsh Frog, Striped Marsh Frog, Booroolong Frog, Southern Bell Frog, Peron's Tree Frog, Barking Marsh Frog, Bibron's Toadlet, Sloane's Froglet, Cruifix Frog and the Common Froglet.

Crustaceans

Murray River Crayfish, Broad-clawed Yabbies, Common Yabbies, Large-clawed Macrobrachium Shrimp and the Paratya Shrimp.

Observing Nature

Have you ever stopped to observe what's happening in the natural world around you?

Did you hear that bird call, see that butterfly or notice the smell of the trees after rain?

You are tasked with finding a quiet spot in your school grounds, local bush patch, backyard or other natural area. Be very quiet while you listen, look and record the nature around you.

Location:

Date: Weather Conditions: Wet / Dry Hot / Cold Cloudy / Sunny

Living thing	How many?	What was it doing? What did you notice?	What does it look like?	Did you see, hear, smell or touch it?

Habitat for all

The term **habitat** describes the environment in which an organism lives. When we look at an organism's habitat we look at shelter, food and water.

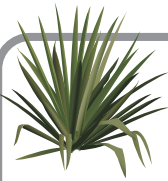
You need to identify three species of animals that live near you. Include 1 mammal, 1 reptile and 1 bird. In the diagram below, write down where these animals live, places they might visit, where they find their food, the types of food they eat and where they get their water.

I am a...

Mammal

Reptile

Bird



Places I visit

Mammal


.....

Reptile

.....

Bird

.....



Sources of food

Mammal

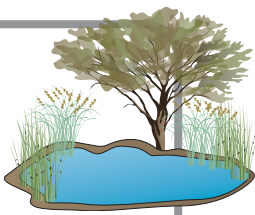
.....

Reptile

.....

Bird

.....



Sources of water

Mammal


.....

Reptile

.....

Bird

.....



Types of food

Mammal


.....

Reptile

.....

Bird

.....



Shelter

Mammal

.....

Reptile

.....

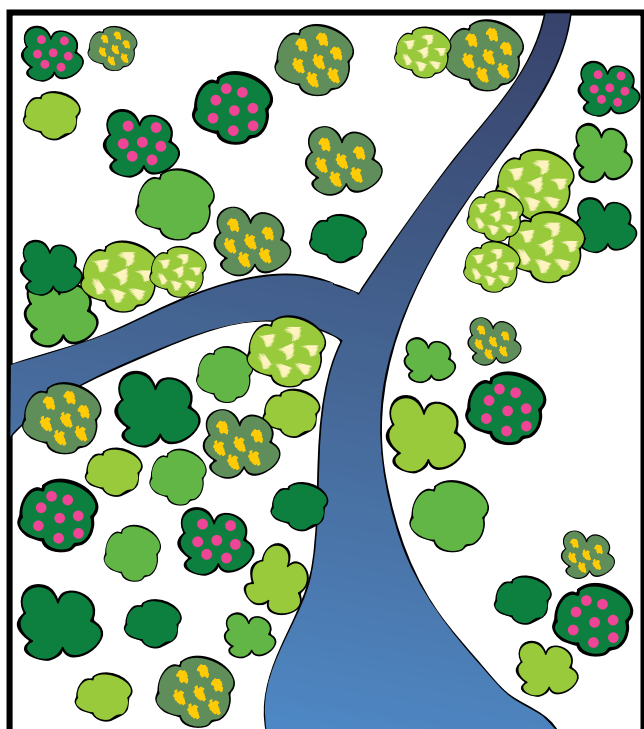
Bird




.....

Habitat for all

Our native wildlife relies on woodlands, rivers and forests for food and shelter. Humans have impacted on the supply of food and the availability of suitable shelter through development and changes in land use. This has caused the loss of natural food sources, increased predation from introduced animals, weeds compete with native vegetation and there is a loss of suitable shelter.

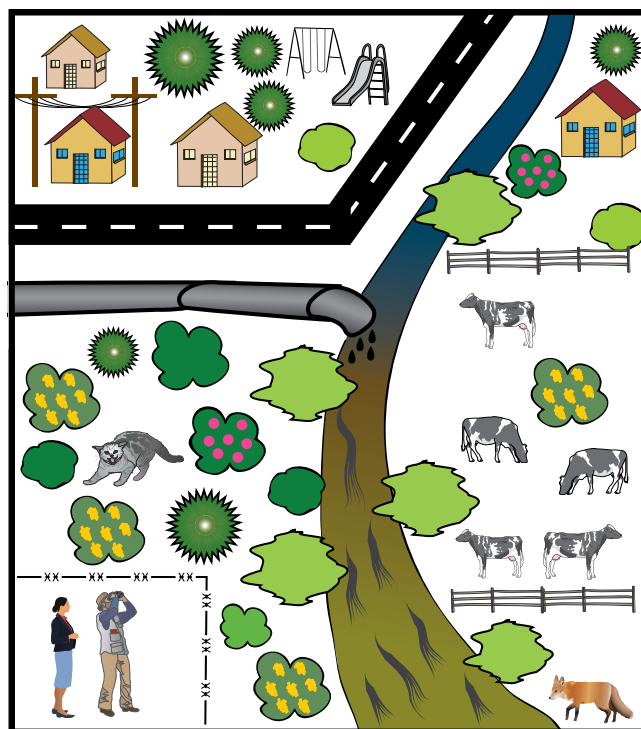
Pre-European settlement







-  Eucalypt trees
-  Melaleuca trees
-  Wattle trees

Enough native woodlands and forests exists that wildlife can spread out across the landscape. They have enough shelter, food and clean water.

Today



-  Eucalypt trees
-  Melaleuca trees
-  Willows
-  Pine Trees

Many wildlife species can only exist in 'islands' of vegetation amongst urban development or agricultural landscapes. This can lead to great stress on populations. Many species either move or die out due to the stress caused by competition with other native and feral species.

Habitat for all

In pairs or small groups, discuss what is happening in the habitat diagrams of pre-European settlement and today. Fill in the table and answer the questions below.

	Differences	Similarities
Food		
Water		
Shelter		

1. What other threats have humans introduced to the Murray catchment?

.....

.....

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.....

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2. How can we help native wildlife survive alongside humans?

.....

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.....

What's in a name?

The Murray catchment has a wide range of animals with strange sounding names. Use the library or the internet to find out a bit more about the following animals.

Animal	What type of animal is it?	Where does it live?	What does it look like?	What does it eat?	How does it move?
Yellow-footed Antechinus					
Pobblebonk					
Great crested Grebe					
Tawny Frogmouth					
Shingleback					
Lace Monitor					
Feathertail Glider					
Golden Perch					

Wildlife Corridors

Many of our native wildlife need to be able to move around to find food, water, shelter and prospective mates if they are to survive.

The Murray catchment of NSW is a community that relies on farming. As a result, we have changed much of the natural landscape. By making these changes we have created a giant maze for native creatures to try and find their way around.

We can help our wildlife by creating pathways through the landscape by:

- maintaining or creating corridors of vegetation (trees, shrubs and grasses),
- looking after the health of our waterways,
- revegetation
- providing safe places for wildlife to cross roads (like special wildlife culverts/tunnels under the road) and
- asking people to watch out for wildlife when driving.

If we do not provide pathways, or wildlife corridors, for native wildlife then we could be harming their chance of survival.

Further information

Go to the Murray CMA website:

www.murray.cma.nsw.gov.au

Sammy's Maze

This activity supports learning about the importance of wildlife corridors in the landscape. Go through with your students some of the man-made features in the landscape that can hinder the natural movement of animals to find food, water and shelter. This activity can be followed up with discussion on what we can do to help our wildlife move through the landscape.

What you will need:

- Butchers paper
- Scissors
- Pens, Pencils, Crayons or textas
- Activity sheet images

Instructions

Help your students create a maze on a large piece of butcher's paper to help Sammy Squirrel Glider find his way from the Benambra State Forest to Woomargama National Park. Draw the two parks at opposite ends of the paper.

Have students use the images on the activity sheet to place obstacles in Sammy's way. Students can also draw natural cover, like roadside vegetation, around the paper; this is where Sammy will find refuge on his journey.

Wildlife Corridors

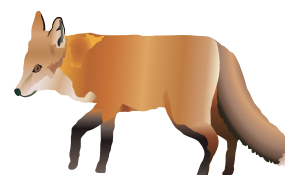
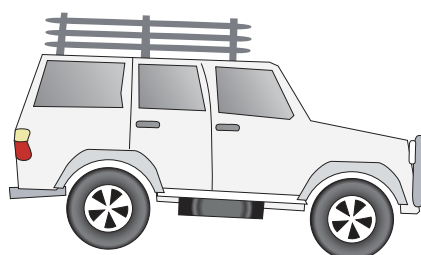
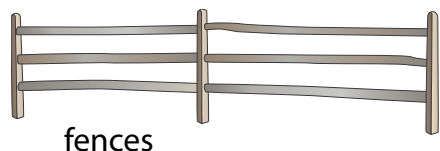
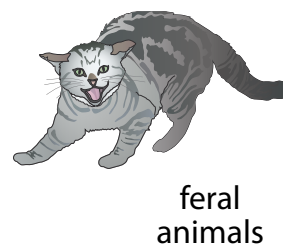
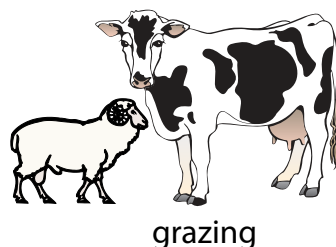
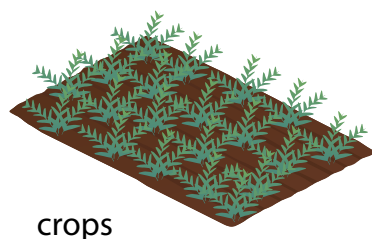
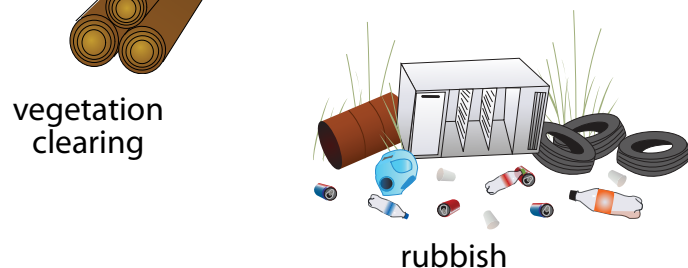
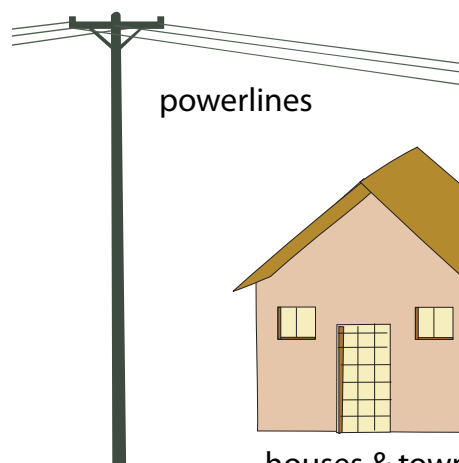
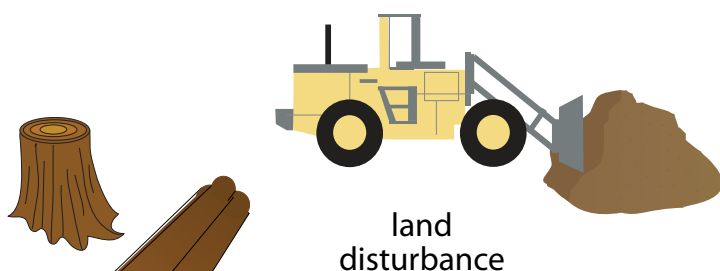
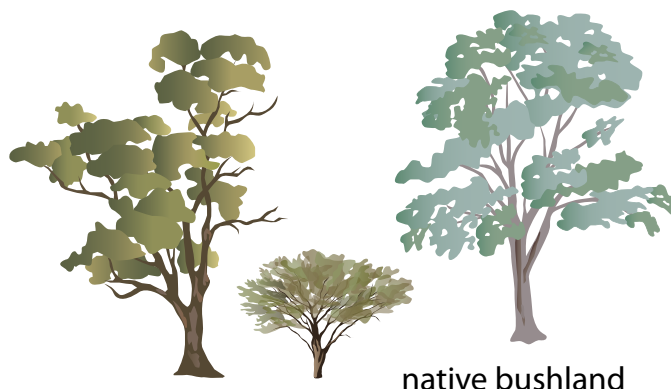
Sammy's Maze

Sammy the Squirrel Glider is a small glider that spends his days in the hollows of large trees. He loves his home in the Benambra State Forest.

Unfortunately Sammy and his family are having trouble finding enough food, water and shelter. He decides that they will have to move to the Woomargama National Park if his family is to survive.

Design a maze that shows how Sammy and his family can move across the landscape. Use the images below to show possible obstacles they may face along the way.

Use the native trees and shrubs to help create your bushland corridors.



Under threat in the Murray

What is a threatened species?

Australia has been separated from the other continents for millions of years and it has developed a unique biodiversity. There are many species here that cannot be found anywhere else in the world.

Unfortunately, some these species numbers have dropped to a point where they are struggling to flourish or survive at all. These species are called "Threatened Species".

Some reasons that plant and animal species become threatened are:

- Loss or destruction of habitat
- Alteration of habitat
- Fragmentation of habitat
- Predation and competition from invasive plants and animals
- Disease
- Food shortage
- Pollution
- Competition from human processes
- Competition from competing species

Levels of threat

The Australian bush has many plants and animals that have so few numbers they are considered a threatened species.

When we talk about threatened species they can be put into a range of different categories depending on the severity of their situation.

Vulnerable Species

A species numbers have dropped significantly but it is not yet classed as endangered.

Endangered Species

A species numbers are so low that it is severely threatened.

Critically Endangered Species

A species numbers are so low that it is very close to becoming extinct.

Extinct in the wild

There are no more of a species left in their native habitats but there are some in captivity.

Extinct

There are no more of a species left anywhere in the world.

How can we help?

If we all make an effort we can help preserve the biodiversity of our local environment and save many species from becoming extinct. Some ways to help are:

- Conserve/protect existing habitat
- Control introduced plants and animals
- Do not dump weeds or pets in the bush
- Control cats

- Reuse or recycle whatever you can
- Make compost
- Help provide wildlife corridors

Further information

Green Kids Guide to Threatened Species: 9 Ways You Can Help

www.environment.gov.au/biodiversity/threatened/publications/kids.html

Under threat in the Murray

The Murray region has a number of rare and threatened species throughout it.

Below is a list of some of the plants and animals found in our region. See if you can put them into the correct balloon containing the types of species.

If you are unsure about any of these species then ask your teacher or research them in the library or on the internet.

Mammals = 8
Reptiles = 4
Fish = 1

Birds = 8
Amphibians = 3
Plants = 8

Alpine She-oak Skink

Anemone Buttercup

Australasian Bittern

Boland Yellow Gum

Booroolong Frog

Broad-toothed Rat

Brolga

Bush Stone-Curlew

Corroboree Frog

Crimson Spider-Orchid

Eastern Bent-wing Bat

Flame Robin

Floating Swamp
Wallaby Grass

Freckled Duck

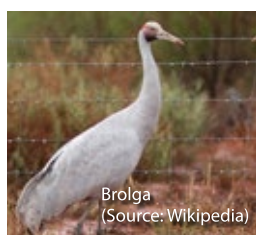
Koala

Lanky Buttons

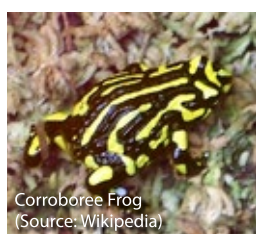
Little Pied Bat



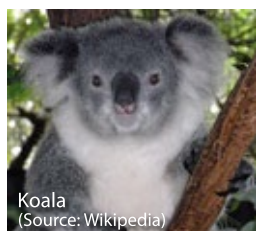
Alpine She-oak Skink
(Source: Jordan de Jong)



Brolga
(Source: Wikipedia)



Corroboree Frog
(Source: Wikipedia)



Koala
(Source: Wikipedia)



Lanky Buttons
(Source: John Elcher)

Masked Owl

Mountain Pygmy
Possum

Oaklands Diuris

Pink-tailed Legless
Lizard

Rosenberg's Goanna

Sandhill Spider-Orchid

Small Scurf-pea

Southern Bell Frog

Southern Myotis

Spotted Harrier

Squirrel Glider

Striped Legless Lizard

Swift Parrot

Trout Cod

Yellow-bellied Glider



Mountain Pygmy Possum
(Source: The Age)



Rosenberg's Goanna
(Source: Museum Victoria)



Sandhill Spider-Orchid
(Source: RetiredAussies.com)



Southern Myotis
(Les Hall)



Yellow-bellied Glider
(Joel Winter)

Under threat in the Murray

Reptiles

Birds

Plants

Mammals

Fish

Amphibians

Ferals in the Murray

Introduced animals (ferals) can have a devastating effect on our native species. Australia has been separated from the other continents for millions of years and its fauna has developed around these isolated conditions. Many species have been introduced into Australia since European settlement. These introduced species have flourished in our environment having an immense effect on native wildlife which struggles to defend itself.

The two main ways introduced species have an effect on our native wildlife are:

1. Predation - they hunt and eat native species (cats, foxes, dogs etc).
2. Competition - they compete with native species for food or damage food sources (rabbits, deer, European carp, pigs, goats).

The Murray catchment has a large number of small native mammals, marsupials, birds and reptiles that are particularly susceptible to feral animals. These precious creatures are extremely vulnerable to the Murray biodiversity and therefore must be protected.



Lock up your cat

While foxes were introduced to Australia for recreational hunters in the early 1870's, feral cats are the direct result of runaway or dumped pets. Even your current pet cats spend the days and nights hunting wildlife if they are not restrained. Some things you can do to help this problem are:

- Keep your cat inside, especially at night.
- Always make sure your cat is wearing bells on their collar (to warn animals they are coming).
- Have your cat de-sexed (this stops it breeding and can help it stop wandering).
- Have an outside caged cat run (restricts cats movements when outside so they can't wander).



Have a think about what your cat might be doing to our environment!

Ferals in the Murray

People were recently asked to report sightings of foxes and cats around some of the Murray wilderness areas. The following data was reported at these parks:

Woomargama National Park	15 foxes	5 cats
Benambra State Forest	13 foxes	6 cats
Millewa National Park	22 foxes	3 cats
Banangalite State Forest	12 foxes	0 cats



We assume that each of these feral animals kills at least 1 native animal per night.

Complete the table below to find out how many native animals are killed over 1 night, 1 week, 1 year and 10 years. Find out the total of native animals killed for both 1 year and 10 years.

Murray wilderness areas	Total number of feral animals (Cats + Foxes = total number of animals killed per night)	Native species killed in 1 week (Animals killed in 1 night x 7)	Native species killed in 1 year (Animals killed in 1 night x 365)	Native species killed in 10 years (Animals killed in 1 year x 10)
<i>Example: Woomargama</i>	<i>15 foxes + 5 cats = 20</i>	<i>20 x 7 = 140</i>	<i>20 x 365 = 7,300</i>	<i>14,600 x 10 = 73,000</i>
Benambra				
Millewa				
Banangalite				
TOTAL				

Ferals in the Murray

From our theoretical exercise on cats and foxes we discover that 76 feral cats and foxes could kill 27,740 native animals in a year and 277,400 in ten years.



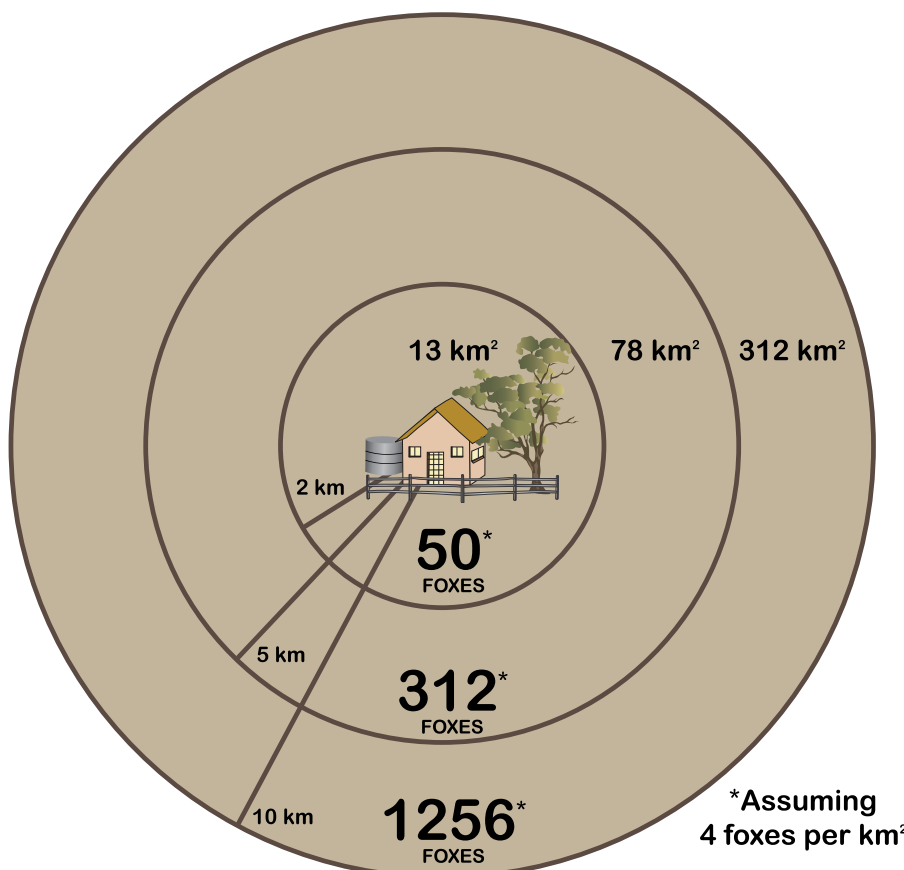
The truth is that the damage caused by these feral animals is much greater. The feral fox

and cat problem in Australia is of epidemic proportion and has caused many native animals to become threatened species or even extinct.

It is thought that in farming communities of Australia, foxes could have a density as great as 4 fox per 1 km².

Bringing it home

The Murray Catchment has an area over 35,000 km² so it may contain as many as 140,000 foxes. Using our previous example it means that these could kill over 51 million native animals in a year and 510 million in ten years.



Regenerating the Bush

What does it mean to regenerate?

For bushland to regenerate it means that in an area where the vegetation has disappeared or degraded, the plants will grow back again in their natural state.

There are two forms of regeneration - natural and assisted.

Natural regeneration

Natural regeneration of bushland can occur after years of cultivation, grazing or other disturbance. This is largely due to the supply of seed that can be stored in the soil.

Australian plants have evolved to endure the harsh conditions of our often unpredictable climate. This means that seeds either have hard outer coats for protection, can be produced in large quantities, or are attractive to animals for dispersal.

Fire - Many Australian plants cannot reproduce without the assistance of fire. The combination of heat and stress put on the host plant can break the dormancy.

Floods - Trees like River Red Gums need regular floods to regenerate effectively. River Red Gum forests along the Murray River are under threat from the reduced flooding.

Pollination - All plants need to be able to pollinate their flowers for seeds to form. Animals like birds and insects are well known pollinators. Other animals like flying foxes and pygmy possums are important pollinators too.

Seed Dispersal - Seeds can be dispersed by wind, water and transported by animals. Seeds need to be dispersed to allow for genetic variability and survival of the species.

Assisted regeneration

Assisted regeneration involves re-creating the natural environment, or removing the threatening processes to allow of natural regeneration to occur.

Tree Planting - This is a popular activity undertaken across the world for various reasons. To assist natural regeneration, seedlings need to be the same as those species that naturally occur in the area that is being assisted.

Invasive Plant Control - Weed control is vitally important for regeneration. Weeds compete with the native species for water and nutrients. Weed removal should be done in such a way as to reduce the impact to existing native species.

Invasive Animal Control - Feral animals can destroy young seedlings as they are eaten or trampled. Feral animals are large culprits for the spreading of weed seeds. Control methods include shooting, trapping and poisoning under controlled conditions.

Bush block protection - Many areas of bush have been threatened by agricultural practices like grazing. An area fenced off from stock can naturally regenerate without further assistance within a few years. However, weed control may be required to avoid competition.

Do you know of any assisted regeneration happening near you?

Find out by contacting a local Landcare group. To find a Landcare group near you, contact:

Stacey Staunton-Latimer, Education Officer

Tel: 02 6029 3253

Email: stacey.staunton-latimer1@det.nsw.edu.au

Important Pollinators

This story is about a little girl who was scared of flying foxes until she found out how important they were to our environment.

Read this as a class and discuss the following questions.

You can also read this book online at:
www.envirostories.com.au/es2011/es2011_CRC_Noises/index.html

Class discussion questions

Flying foxes are one of our biggest pollinators and seed dispersers.

What are some other pollinators and seed dispersers?

Are they active at night or during the day?

If we didn't have those animals, what would happen to our bushland, orchards and crops?

This story was written by Mya Theodore, a year 3 student from Moura State School, Queensland. This was her winning entry in the 2011 "An Aussie Bush Tale" Enviro-Stories Education Program sponsored by the Cotton Catchment Communities CRC.

Noises in the Night

by Mya Theodore

There once was a little girl who lived in the bush on a property with her grandfather. She especially enjoyed being able to ride her pony through the green grass and loved to stop for a snack and rest under a bush plum tree in the late afternoon.

She sat under the bush plum tree most afternoons. She enjoyed listening to the song of the birds while she nibbled on a crunchy apple from the orchard. It was her favourite thing to do.



At dusk she always made sure she was indoors. She did not like the large black shadows that glided in the evening sky. They would land in the tall palm tree outside her window and their noise frightened her.

She did not dare go near the window to take a look at them. Instead she lay in bed with her pillow over her head to silence their eerie shrieking.

She had never liked the bats and they gave her nightmares. Each night grandfather found her with her pillow over her head, so instead of a storybook one evening he told her a different story.

Important Pollinators

Grandfather explained to the little girl she shouldn't fear bats as they were very important to the land and in fact made her life better. The little girl could not imagine that this was true.

He told her the many beautiful gums, figs and palm trees on their property grew there because bats ate their fruit and then spread the seed all over the place. Even her favourite bush plum tree probably grew there from a seed a bat had dropped long ago.



He also explained that bats lived in large colonies, or families and they were noisy when they ate. They were nocturnal foragers, or night feeders. The sounds the little girl heard at night were only the bats eating their dinner.

The little girl listened and came to realise that bats weren't terrifying. The bats were hard workers for the environment by fertilising plants and carrying seeds long distances. It was because of bats that plants were able to grow in areas they had never grown before.



As a surprise grandfather planned a special trip away for the little girl. It would take them several hours to drive there from their property and the little girl was very excited. Grandfather told her she would soon know where they were going to. He told her to go to sleep as they had a long trip the next day. They were going to leave very early the next morning.

After many hours on the road they arrived at their destination. The little girl had always wanted to go to Australia Zoo.

Grandfather told her she no longer needed to be afraid of bats and their noise and how they looked. There were some animals that looked frightening and made unusual noises, and some that were very cute but all of them in some way were important in nature.

At the bat enclosure the little girl found she wasn't afraid at all as she watched the zoo keepers feed and handle the bats without any fear. It made her feel silly that she had found them so frightening.

After spending the whole day wandering the zoo patting, feeding and watching the many animals the little girl was exhausted but very happy. As an extra treat Grandfather allowed her to choose a gift from the zoo shop.

Grandfather was delighted to see the little girl that night fast asleep, happily cuddling her soft bat toy, without a pillow over her head.



Plant propagation

Introduction

Propagating plants by seed is one of the easiest ways to generate new plants, particularly vegetables and some native species. You can also propagate by cuttings.

It is recommended to start this lesson off by doing the seed collection activity, however you can use packets of seed for vegetable gardens if you do not have time.

When starting the plant propagation activity, go through the activity sheet on the following page. This will provide a background to plant propagation. Follow this up with the practical activity of propagating seeds.

Materials

- potting/seed raising mix
- rinsed used milk/yoghurt containers (or other available container)
- scissors
- seeds
- tidy/tote trays

Seed collection activity

Most schools have a bottlebrush tree. These are great plants to collect seed from. These are generally good germinators and they produce thousands of seeds. On the bottlebrush plant where the flower-brush was, the fruit or seed carrier will form. This will now be a brush of fruits/seed carriers. Inside the fruit will be the seeds. The fruit-brush can be collected once they are brown.

Experiment with collection from different plant species. Even let some of the best veggies, from your veggie garden, go to seed and collect from these for next years planting. This reduces the cost of buying veggie seeds next year.

Take the class to a plant that has flowered previously, check if the fruits are brown. If so, take the fruits from the tree and place them in a scrap paper bag. The following week check to see if the seeds have fallen from the fruits.

Once the seeds have fallen from the fruit they will need to be stored and labelled; preferably use an air-tight jar or zip-lock lunch bag where the excess air can be squeezed out.

Propagation activity

Cut a reused milk/yoghurt container to a depth of approximately 7 cm, place a drainage hole in the bottom, and fill most of the container with potting/seed raising mix.

Place seeds in the soil to a depth of the size of the seed and firm over with more soil. Place only 1 seed per container if it is a large seed (e.g. pumpkin seeds), or if they are fine seeds (e.g. bottlebrush seeds) then sprinkle a small pinch of them across the surface.

The pots must be kept moist (but not too wet) and you do this by placing the pots into a tidy/tote tray and place water in the tray.

Once the seedlings get to a suitable size you can pot them in to larger containers, or plant in the school grounds.



Plant propagation

The two most common methods of plant propagation are from seed or from cuttings.

Most plants can be propagated by one or both of these methods. We are going to focus on propagating from seed.

Propagation from seed

How to propagate from seed

Sprinkle a small amount of seed on the surface of a free-draining seed mix in a punnet. Bury the seed to the same depth as the size of the seed and cover lightly.

Water the punnet carefully and place it in a warm spot. Do not allow the mixture to dry out.

Advantages

Some seed can be collected and stored for long periods of time and still be capable of germinating. Many plants can be produced from seed.

Disadvantages

Many plants can be difficult to grow from seed. Some species, like the Wattle, may need special treatment to help germination. There are a number of plants which we cannot germinate from seed. This is probably because we do not know the special conditions they need to grow.

SOURCE: Australian National Botanic Gardens
www.anbg.gov.au/PROPAGATE/plant01.htm

What are the two type of ways you can propagate plants?

a.

b.

What shouldn't you do to your newly sowed seeds?

.....

.....

How deep should you plant your seeds?

☐ twice the width of the seed

☐ the width of the seed

☐ lay them on the surface

Name one advantage and one disadvantage of propagating plants from seed.

Advantage:

.....

Disadvantage:

.....

What plant are you going to try and propagate from seed?

.....

Where would you like that plant to grow?

.....



Our small crusaders

Insects are not all bad

When people think of insects they instantly think of them as pests. Most insects provide a good service to our environment, whether they are in the bush, on the farm or in your garden. They do this by:

- breaking down organic (plant or animal) matter which in-turn provides nutrients to plants
- aerating the soil so that plant roots can get air and water
- pollinating flowers so that plants can reproduce
- being a food source for many other animals
- controlling the pest insects that can damage plants and other animals

Adapting for survival

Insects are generally near the bottom of a food chain. They are food for a wide variety of different species. For protection, they have developed a variety of different adaptations that protect them against being eaten, catch prey and enable them to survive.

Rhinoceros Beetle

The Rhinoceros Beetle has a very hard shell and large horn to protect itself against predators and it can carry 85 times its own weight! This would be like you carrying 85 other people.

Ants

Ants and termites are incredibly strong, and can carry many times their own weight. Ants have mandibles (pincers) that are their primary weapon. Ants can be very aggressive and will often attack and bite creatures much larger than themselves.

Bees

Bees have a stinger that they use for defense against a threat - like your foot! Their stinger is located on a flexible tail that detaches with a poison gland when it is attacked. Unfortunately for the bee, they die soon after this stinger is used. Wasps however, have a similar feature, but their stinger does not detach.



Worms

Worms can lose their back half (tail) to a predator and keep living. A worm can grow a new tail as long as the front half from the collar up is intact.

Design the “Ultimate Bug”

Now it's your turn to design an insect.

Use the ideas in the list below or invent your own to draw an insect that you think has the best defence and attack ability. Write a short description about what makes your insect the “Ultimate Bug”, if it is a good or pest insect, what it eats and what eats it.

Stings, pincers, claws, legs, disposable limbs, body casing, armor, strength, horns, antenna, sensitive hairs (to detect trouble), eyes, teeth, mandibles, claws, speed, body segments, venom, poison, size.

A Cultural Story

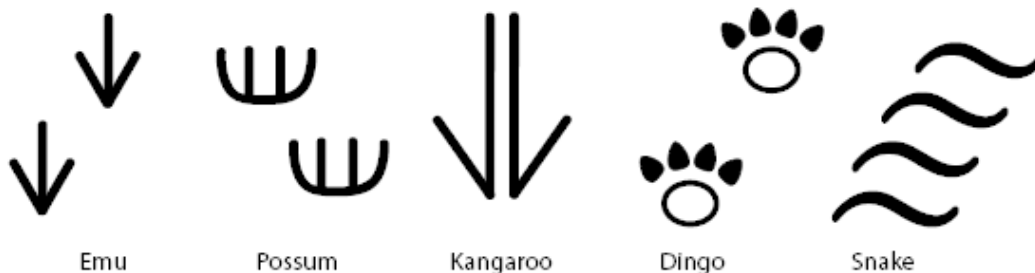
Aboriginal symbols are used to tell stories about a local area, person or item. Use these symbols to create an Aboriginal story of a creek near your school, what can be found there, what can be eaten etc. and write an explanation of your artwork's story. Use these websites to find more information and inspiration.

www.indigenoustralia.info/food.html

www.aboriginalartstore.com.au/aboriginal-art-culture/aboriginal-food.php

www.aboriginalartstore.com.au/aboriginal-art-culture/aboriginal-symbols-glossary/

Animal Signs



Emu

Possum

Kangaroo

Dingo

Snake

Environmental Signs



Rain



River/Creek/Smoke/Fire



Waterhole/Campsite/Fireplace



Sun/Star



Water connecting two waterholes



Rainbow/Cloud/Cliff/
Sand dune

Human Occupation Signs



Man/Woman Sitting



Sitting around a campfire

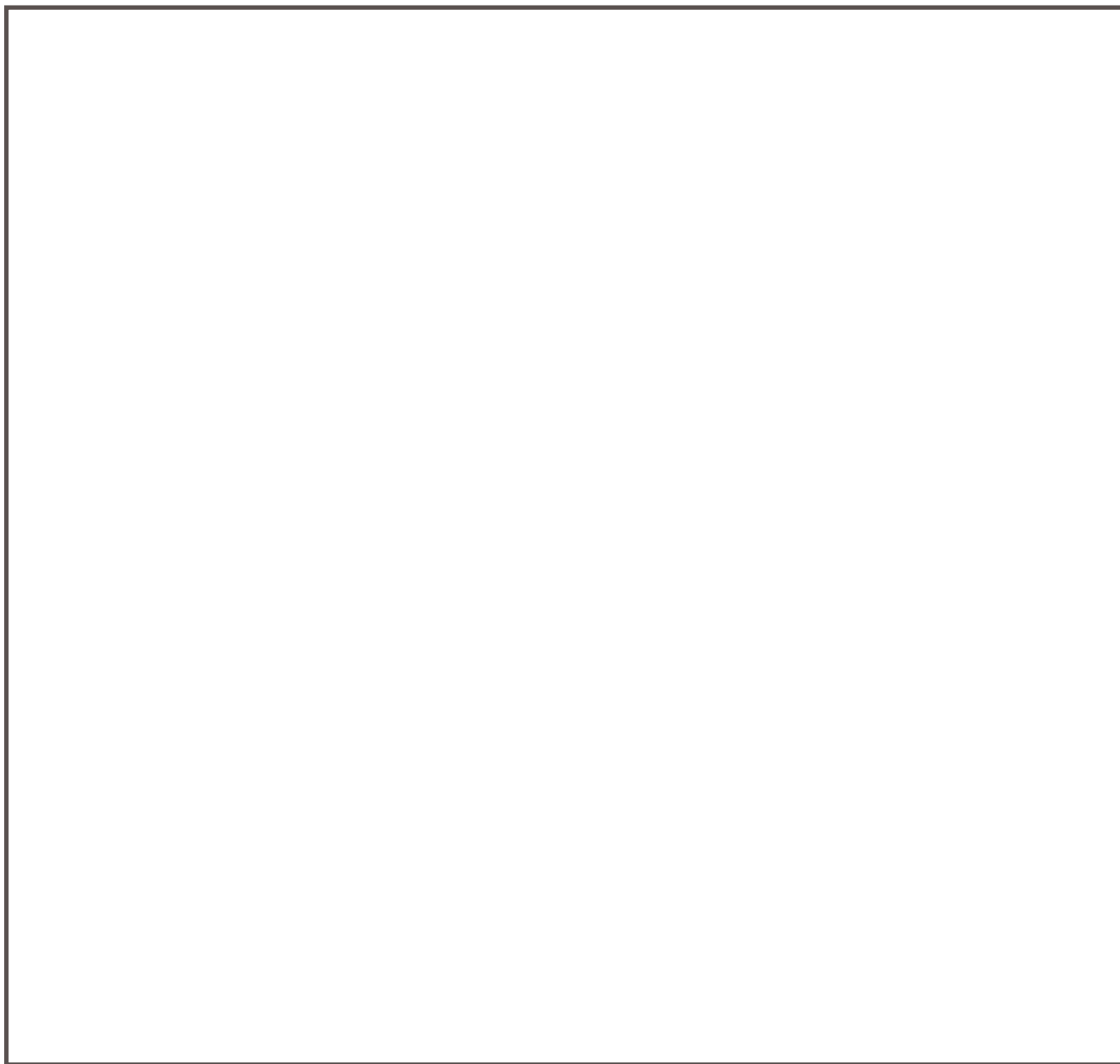


Travelling Tracks



Travelling sign with circles
as resting place

A Cultural Story



My image represents:

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.....

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.....

.....

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