Blackwood Basin Group

# Landcare Activity Pack

# Landcare Activity Packs

## Background

This activity pack has been developed by the Blackwood Basin Group, with funding from the Western Australian Government's State NRM Program, to help integrate Landcare activities and learning into schools and to provide a practical resource to be used by Natural Resource Management Officers when working with groups of children.

The packs aim to:

- Encourage young people in the Blackwood region to understand, respect and care for their local environment;
- Provide fun, hands-on and educational activities to engage youth in landcare;

The pack addresses issues that are relevant to the Blackwood Basin, but can be adapted to suit other catchments and issues. This will ensure that the pack can be utilised by other landcare groups who interact with young participants or deliver education workshops, or tailored to meet any specific requirements of participating groups and schools.

## About the Blackwood Basin Group

The Blackwood Basin Group (BBG) is a non-profit, community-based organisation that coordinates environmental management within the Blackwood River Catchment in direct collaboration with community groups and landholders. The Blackwood River catchment is located in the south-west of Western Australia and covers approximately 22,000 square kilometres.

The BBG is the only Australian winner of the coveted Thiess International Riverprize, and has received many other National and State awards recognising the valuable contribution to landcare that it has facilitated over the last 25 years.

Our mission is to inspire and support communities to manage the Blackwood Basin's natural resources for a sustainable and resilient future.

*This project is supported by funding from the Western Australian Government's State NRM Program*

# Contents



# Curriculum Links

The activities within this pack are aimed at four key age groups and can be related to several learning areas of the Western Australian Curriculum. The general areas that can be connected to the activities in the pack are outlined below in the key areas of General Capabilities, Cross-Curriculum Priorities and learning outcomes in the Syllabus.

| General Capabilities | |
|---|---|
| Literacy: | Literacy involves students in listening to, reading, viewing, speaking, writing and creating oral, print, visual and digital texts, and using and modifying language for different purposes in a range of contexts. |
| Numeracy: | Students in recognising and understanding the role of mathematics in the world and having the dispositions and capacities to use mathematical knowledge and skills purposefully. |
| Personal and Social Capability: | The capability involves students in a range of practices including recognising and regulating emotions, developing empathy for others and understanding relationships, establishing and building positive relationships, making responsible decisions, working effectively in teams, handling challenging situations constructively and developing leadership skills. |
| Critical and Creative thinking: | Students develop capability in critical and creative thinking as they learn to generate and evaluate knowledge, clarify concepts and ideas, seek possibilities, consider alternatives and solve problems. Critical and creative thinking are integral to activities that require students to think broadly and deeply using skills, behaviours and dispositions such as reason, logic, resourcefulness, imagination and innovation in all learning areas at school and in their lives beyond school. |

| Cross – Curriculum Priorities | |
|---|---|
| Aboriginal and Torres Strait Islander histories | Students will understand that contemporary Aboriginal and Torres Strait Islander communities are strong, resilient, rich and diverse. The knowledge and understanding gained through this priority will enhance the ability of young people to participate positively in the ongoing development of Australia. |
| Asia and Australia's engagement with Asia | Students develop an appreciation for the place of Australia within the Asian region. |
| Sustainability: | Students appreciate that science provides the basis for decision making in many areas of society and that these decisions can impact on the Earth system. They understand the importance of using science to predict possible effects of human and other activity and to develop management plans or alternative technologies that minimise these effects. The overall aim is to develop the knowledge, skills, values and world views necessary for students to act in ways that contribute to more sustainable patterns of living. |
| **Syllabus Outcomes** | |
| English: | **Vocabulary**<br>Meanings of words including everyday and specialist meanings and how words take their meanings from the context of the text |
| Maths: | **Using units of measurement**<br>Compare and order several shapes and objects based on length, area, volume and capacity using appropriate uniform informal units.<br>Use scaled instruments to measure and compare lengths, masses, capacities and temperatures. |
| Science: | **Investigating** - students conduct investigations to answer questions about the natural and technological world using reflection and analysis to prepare a plan; collect, process and interpret data; communicate conclusions; and evaluate their plan, procedure and findings.<br>**Communicating Scientifically** – Students communicate scientific information to different audiences for a range of purposes.<br>**Life and Living** – Students understand their own biology and that of other living things and recognise the interdependence of life.<br>**Biology** - Living things have structural features and adaptations that help them to survive in their environment; and The growth and survival of living things are affected by the physical conditions of their environment. |
| The Arts | Exploring ideas and improvising with ways to represent ideas |

# Key Topics

There are four key topics in this pack. As with everything in nature, topics are inter-connected and can be extended or adapted according to any specific group requirements. Highlighting these links to students is useful in developing an understanding of how difference elements interact in the environment.

## LAND:

Learn about the land you live on. From our forests and productive farm land to how it is managed.
Activities include forests, fire, dieback, weeds and clearing.

## WATER:

Water is vital to all aspects of our health and our environment. Learn about water health and how a catchment works.
Activities include catchment activities, testing water quality and flow.

## SOIL:

More than mud! The soils we live on are alive and are important for bush health and farming productivity.
Topics include salinity, erosion and microbial activity.

## ANIMALS:

Discover the different species that are unique to our area and how you can ensure their survival. Explore the impact that feral animals have and why.

# LAND

Learn about the land you live on.
From our forests and productive farm land to how it is managed.
Topics include forests, fire, dieback, and clearing.

Nature Hunt and Colouring In (K/PP)

Look at Bark (K/PP)

A Taste of Salt (Yr 1-3)

Noongar Animals (Yr 1-3)

A Tree is a Home (Yr 1-3)

Plan the Farm - Soil Science Australia workbook (Yr 4-6)

Discover Your Catchment (Yr 4-6, Yr 7-10)

Noongar Seasons (Yr 4-6)

Nyungar Fire Management (Yr 7-10)

# Nature Hunt

## Concept:

Kids will collect and compare different natural items. This can lead into a discussion about what it means to be alive.

## Aim:

Learn that some things in nature are alive, such as trees, and others like rocks are not.

## Materials:

- Bucket or bag to collect items

## What to Do:

Go for a walk around a small area of bush, school grounds or park and collect six natural items. Try to find things that have different sizes or textures. Find a shady spot and spread out your findings.

Ask the children to consider these questions:

1. Do they know what the item is and where it has come from? i.e a feather from a bird, a rock or a leaf from a wattle tree.
2. Does it move or grow or change?
3. If so, is it alive? Talk about the key aspects of living and non-living things.
4. Ask what other things may fit into the living and non-living categories.

Non-living: Things that don't breathe, eat, grow or reproduce. i.e rocks, cars, crayons.
Living: Things that breathe, eat, grow or reproduce.
Some things, like fossils, were once living but are now non-living.

## Other activity:

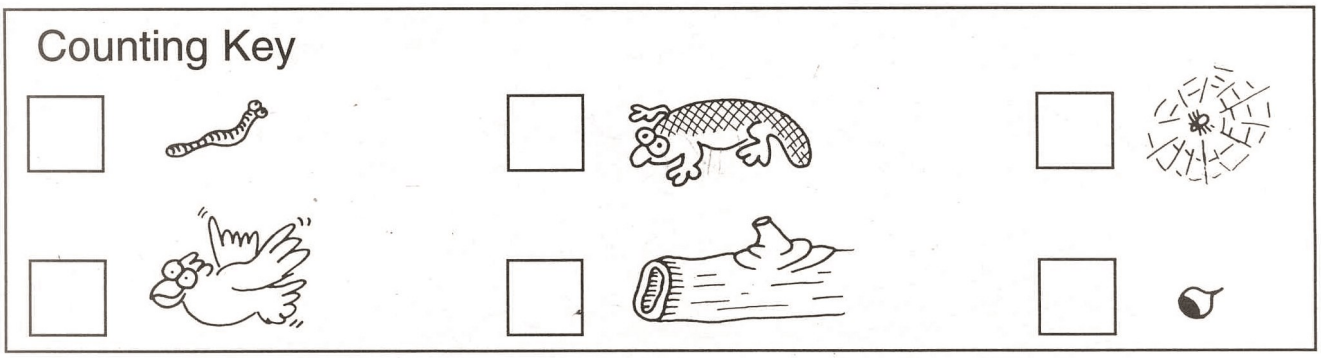
Colour in the picture and see if you can find which things are living and non-living.

*Reference: Forest Packs: A forest is a very busy place, for Kindergarten to Year Two (1997) Department of Conservation and Land Management*

# Many Trees Make a Forest

See if you can find and count all the things in this picture.

Counting Key



*Reference: Forest Packs: A forest is a very busy place, for Kindergarten to Year Two (1997) Department of Conservation and Land Management*

# Look at Bark

## Concept:

Kids will explore and compare the appearance and texture of bark from different trees. This can lead into a discussion about the role of tree bark.

## Aim:

Learn that bark has an important role and is different on each tree.

## Materials:

- White paper
- Brown crayons

## What to Do:

Use the side of a crayon and some paper to copy bark patterns. Hold the paper up against the bark and rub the crayon up and down the page in the same direction as the bark's pattern.

After finishing their bark rubbings, ask the children to consider these questions:

1. What happens to you when you have a cut or scratch on your skin?
2. Can you find a place on some bark where the tree's 'skin' has been cut or damaged?
3. What has happened? How would they feel if they were the tree?

## Other activity:

Look at Leaves

Go for a walk and collect a handful of different leaves that have fallen to the ground. They can be different colours, shapes and sizes.

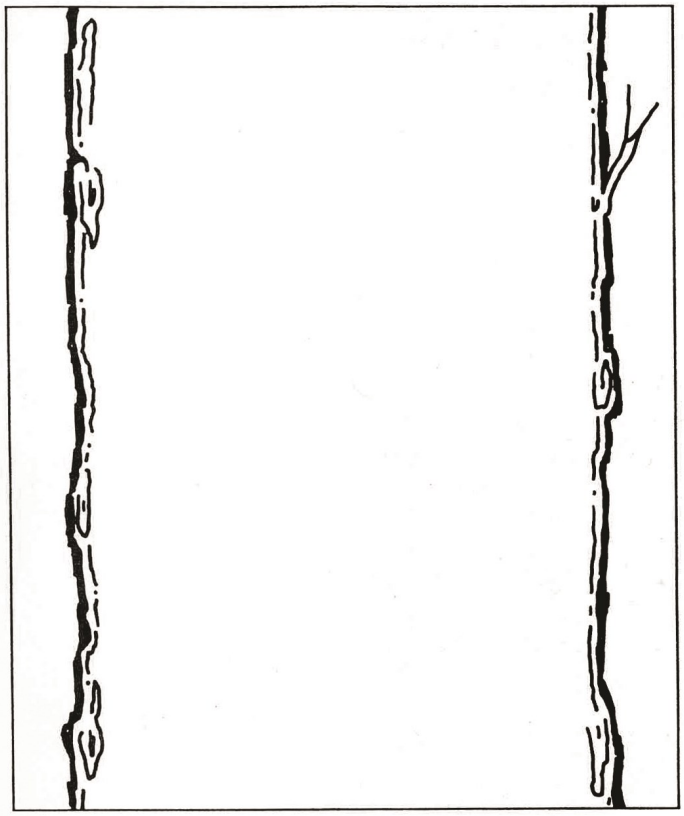
- Try sorting them into different groups by their shape, colour, size, smell or texture.
- Use a darning needle and some thread to make natural jewellery.
- Make leaf rubbings to add to your bark rubbing and create a collage.

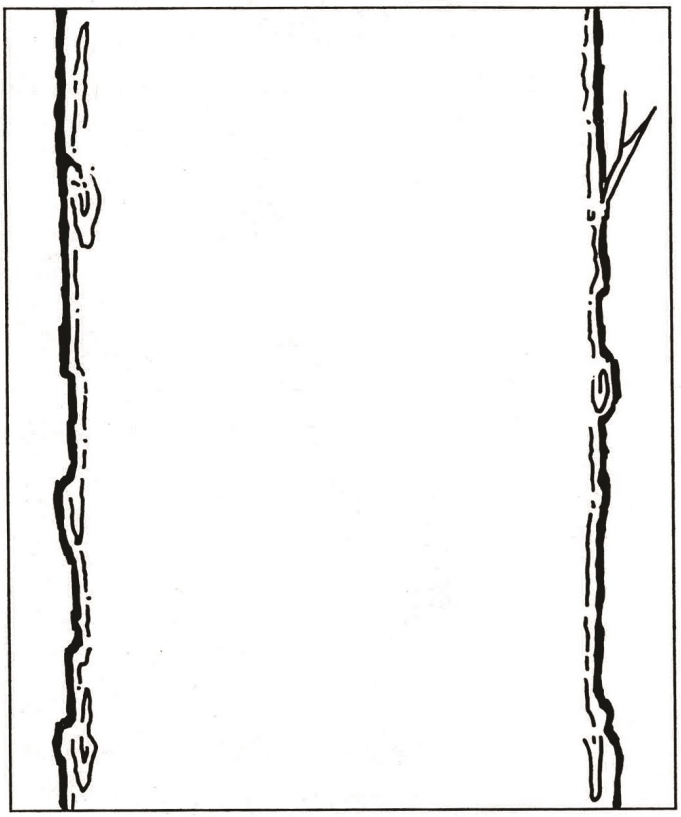
*Reference: Forest Packs: A forest is a very busy place, for Kindergarten to Year Two (1997) Department of Conservation and Land Management*

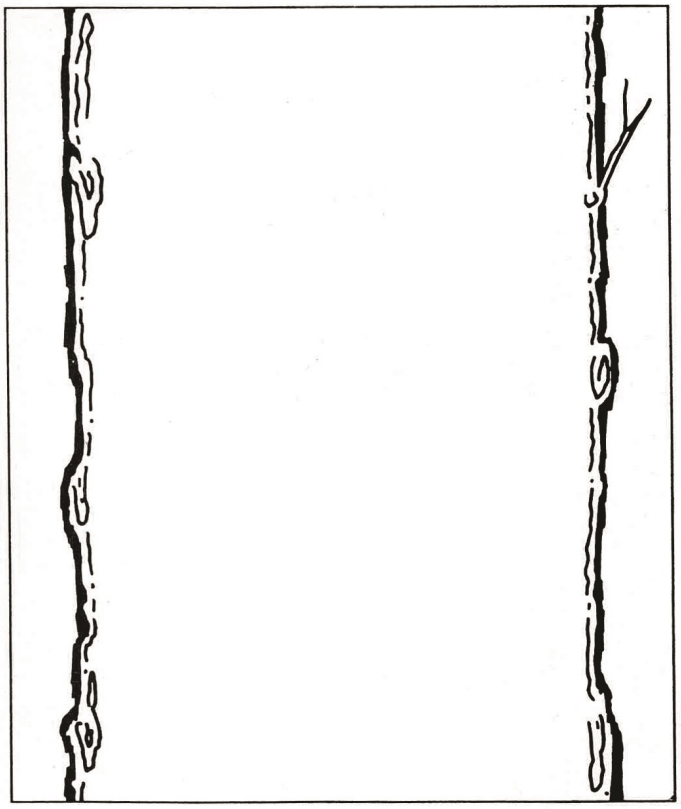
# Look at Bark

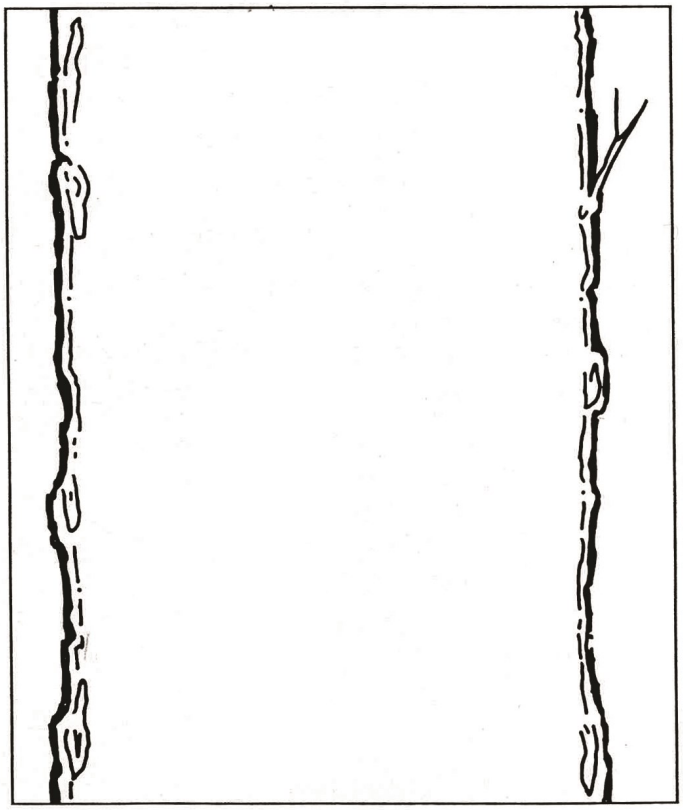
Bark is like the tree's skin. It helps protect the tree from the effects of fire, water and animals.

Can you find 4 different types of bark and make a rubbing of each one in the spaces below?









# A Taste of Salt

## Concept:

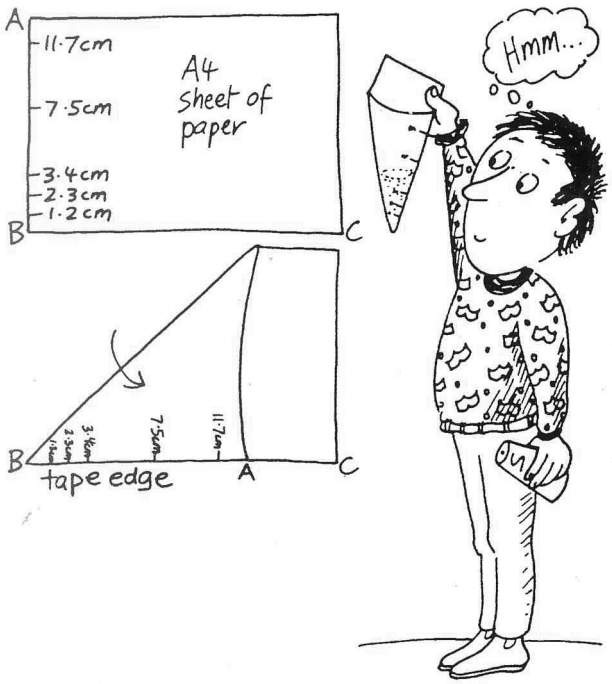
Salinity - students will experience the taste of different concentrations of salt.

## Aim:

It is ok for people to have salt on fish and chips or on the odd baked potato, but in soils it is a real problem. This is because salt kills plants by reducing their ability to take up water. And when salt gets into our water supply catchments we really start to notice the problem. In this activity you will taste water with different concentrations of salt.

## Materials:

- 6 litres of distilled water
- Table salt
- 5 x 1 litre containers
- Cotton wool buds (6 per student)
- One sheet of A4 paper
- Ruler and pencil
- Adhesive tape




## What to Do:

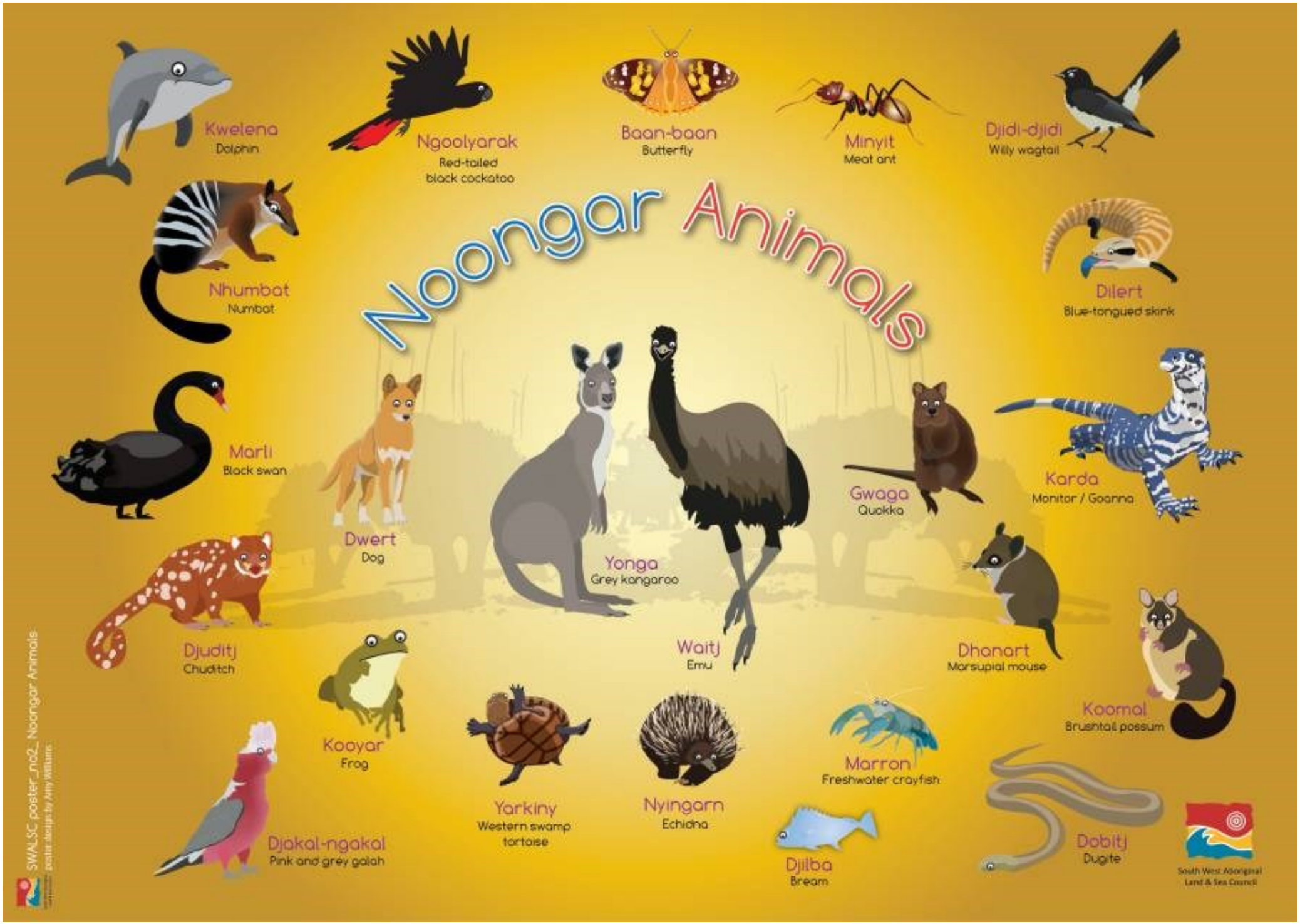
1. Prepare the paper cone for salt measurement:
   a) On an A4 sheet of paper label the corners A, B anc C as shown on the diagram.
   b) Use a ruler to measure the following graduations on the AB edge (corner B is zero):

      1.2cm = 0.15g (fresh water)
      2.3cm = 1.00g (marginal water)
      3.4cm = 3.00g (brackish water)
      7.5cm = 35.00g (sea water)
      11.7cm = 130.00g (Barr Creek - a tributary of the Murray River)

   c) Turn the paper over and trace the graduations and mark on the grams again.
   d) Make up the cone by bring the A corner to the BC edge and securing with adhesive tape. (Do not overlap the edges)
2. Use the paper coneto measure salt quantities for each solution. Pour in salt to required graduation holding cone up to the light, to match with the line.
3. Prepare the six salt solutions by filling the 1 litre containers with distilled water and adding the measure quantities of salt.

   Taste each of the solutions by dipping cotton buds and placing them on your tongue.

*Reference: Catchment Carer's Trail. A Cleaner Glass of H20. (Department of Environment and Conservation EcoEducation Series)*




*Reference: SWALSC South West Aboriginal Land and Sea Council www.noongar.org.au*

# A Tree is a Home

## Concept:

Kids will investigate what insects and bugs live in and around trees.

## Aim:

Learn that trees provide habitat (homes) for many different animals.

## What to Do:

Getting outside to look for bugs is fascinating for young children. It may take a while to find some of the animals so allow plenty of time. Each child should have a copy of the activity sheet and a pencil.

As a group, go for a walk around a small area of bush, school grounds or park. Look for bugs and animals in, on and around the trees.

After observing and recording the information, you can ask what other animals might live in or around trees that you didn't find today. Ask why you didn't see those animals – were they nocturnal (night-time animals) or very good at hiding?

## Other activity:

Create a tally or graph to compile all the information you collected.

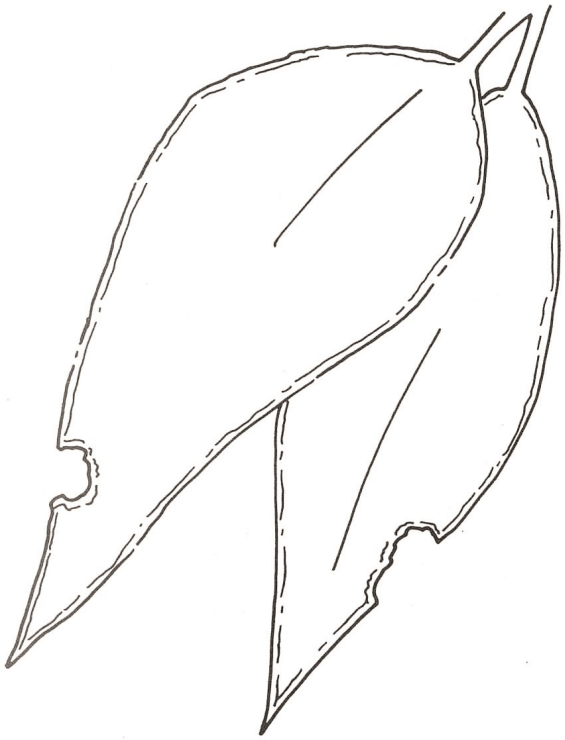
Example of Tally Sheet

| Animals | Leaves | Bark | Branch | Around the tree |
|---|---|---|---|---|
| Ants | I | I | | III |
| Caterpillar | II | | I | |
| Moth | | IIII | | |

*Reference: Forest Packs: A forest is a very busy place, for Kindergarten to Year Two (1997) Department of Conservation and Land Management*

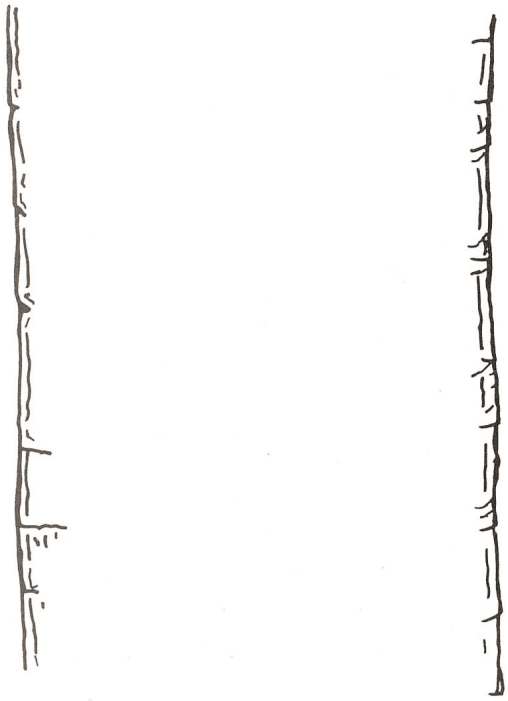
# A Tree is a Home

Find yourself a tree. Draw any animals you see on it.



On the leaves

On a branch



On the bark

Around the tree

What animals were the most interesting?
Find out more!

# Plan the Farm - Managing Your Soil

## Concept:

Use a fun activity to manage soils on an agricultural landscape.

## Aim:

Understand that different activities can have different impacts on the soils.

## Materials:

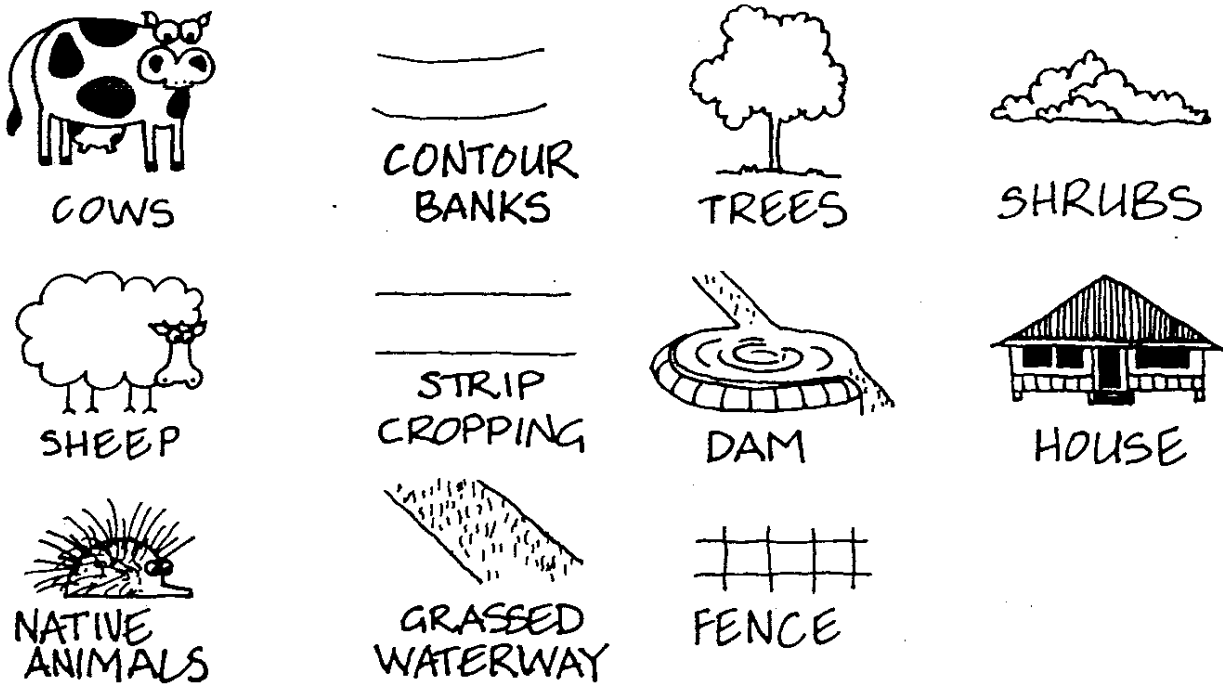
- Scissors and glue
- Photocopies of the activity sheet and symbols

## What to Do:

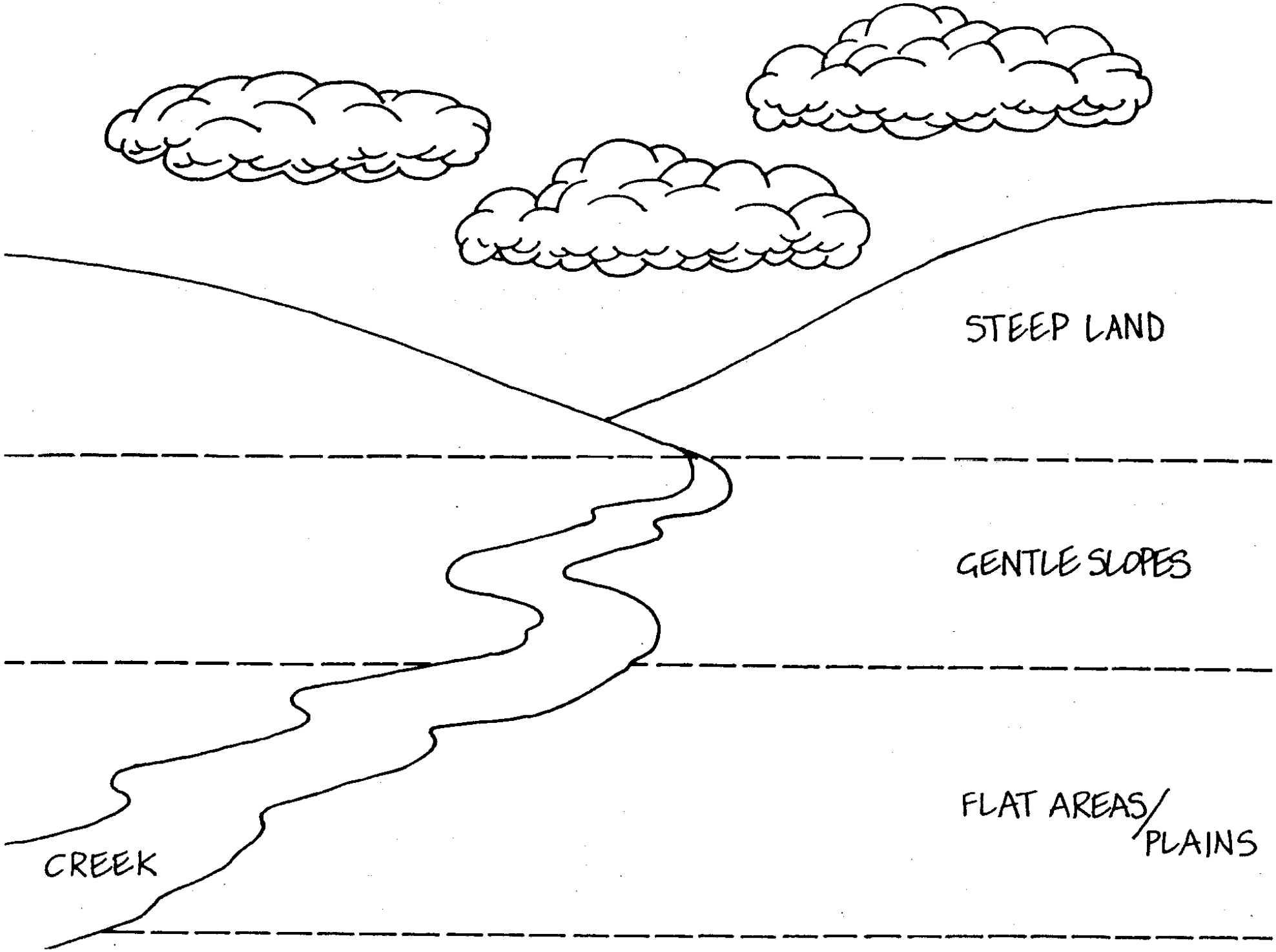
1. Cut out the symbols provided and use them to plan your farm on the activity sheet.
2. Think about what different activities might do to the soil:
   - What will happen if you don't have any trees or vegetation on steep slopes – will big rainfall events wash away your soil?
   - Should your cows and sheep (stock) be allowed in the creek or will they erode the banks and make the water mucky?
   - Is the best place for a dam at the top or bottom of the hill? Why?
   - Contour banks are useful for slowing down water runoff and helping to slow down erosion – where should they go?
   - Strip cropping should go across the slope so that nutrients and water soak into the soil rather than running off down the hill.
   - What other activities would you like to do or see on your farm?

Discuss the need for a balance between agricultural production and the environment. If we look after our soils and land, then they will be more productive for us into the future.

Cut out the symbols below to plan your farm:




*Reference: Working with Soil (1993) Department of Primary Industries QLD*


STEEP LAND
GENTLE SLOPES
FLAT AREAS/PLAINS
CREEK

# Discover Your Catchment

## Concept:

Kids will explore the school ground or activity area to understand the boundaries of a catchment.

## Aim:

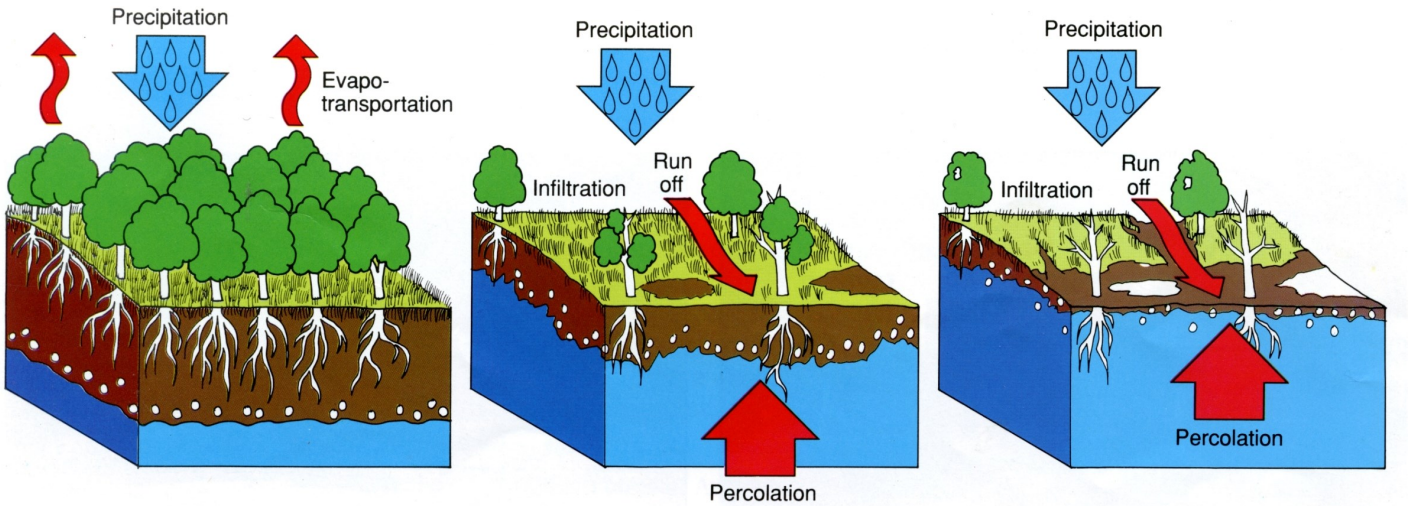
Understand that everyone lives in a catchment, and how the concept of water catchment works.

## What to Do:

1. What happens to the water in your school ground or activity area when it rains?
2. Draw a map of the school grounds. Include the following on your map:
   - Boundary and buildings,
   - High and low areas,
   - Any areas that would act as miniature rivers in a heavy rain, and
   - Any areas where you think the water will pool.

   Follow a rolling ball to help get an idea of where the water will flow.

3. How does your mapped area form a catchment?
   - Mark on your map any small catchments or sub-catchments within the larger school catchment?
   - How do you think that slope affects the water as it flows?
   - What will happen to an area of bare soil on a slope as water flows over it?
4. Are there areas that drain into surrounding properties or areas?
   - What would happen if rubbish covered the area before a storm? Where would it end up?
5. Are there other properties that drain into the school grounds or activity area?
   - What would happen if, just before a storm, the landholder sprayed the lawn with weedkiller? Whose lawns could die and why?




**Before clearing**
Most water is used where it falls. The system is in balance.

**After clearing**
Saline groundwater rises and is concentrated at the surface by evaporation. Vegetation growth is affected.

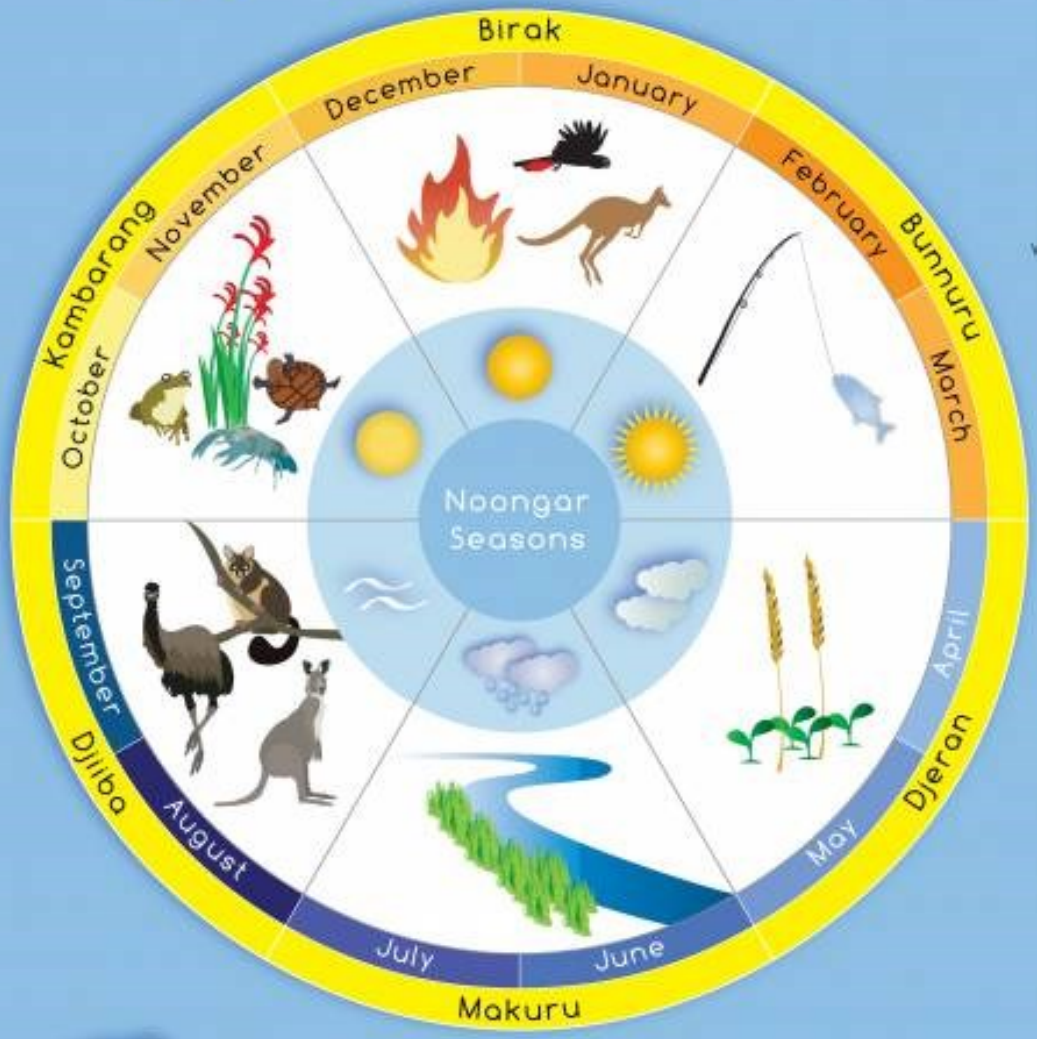
**Later**
Accumulation of salt at the surface kills protective plant cover. The land is open to erosion.

*Reference: Catchment Carer's Trail. A Cleaner Glass of H20. (Department of Environment and Conservation EcoEducation Series)*

# Noongar Seasons

**Dry and hot.** Noongars **burned** sections of scrubland to force game into the open for easier hunting.

A **warming** period. The height of the **wildflower** season. The Noongars moved closer to the coast where **frogs, tortoises** and **freshwater crayfish** were caught.




**Hottest** part of the year, with sparse rainfall throughout. Noongar people moved to the estuaries for **fishing.**

Often the **coldest** part of the year, with clear, cold nights and days, or warmer, windier periods. Roots were collected, and **emus, possums** and **kangaroos** were hunted.

**Cooler** weather begins. Fishing continued and **bulbs** and **seeds** were collected for food.

Usually the **wettest** part of the year. Noongars moved inland to hunt once the rains had replenished inland **water resources.**

South West Aboriginal Land & Sea Council

SWALSC_poster_no1_Noongar Seasons

*Reference: SWALSC South West Aboriginal Land and Sea Council www.noongar.org.au*

*Traditional burning*
*Photo © Parks and Wildlife*

# Traditional Aboriginal Burning

*Published: 12 June 2013*

Before Aboriginal people populated the Australian continent some 40,000 to 60,000 years ago, the major cause of fires would have been lightning.

Aboriginal people learnt to harness the naturally recurring fire caused by lightning and other sources to their advantage, which resulted in skilful burning of landscapes for many different purposes.

Fire was used to:

- make access easier through thick and prickly vegetation
- maintain a pattern of vegetation to encourage new growth and attract game for hunting
- encourage the development of useful food plants, for cooking, warmth, signalling and spiritual reasons.

Early European explorers and settlers commented on the Aboriginal people's familiarity with fire, and the presence of fire in the landscape continually throughout the year. Most of the fires were relatively low intensity and did not burn large areas.

This constant use of fire by Aboriginal people as they went about their daily lives most likely resulted in a fine grained mosaic of different vegetation and fuel ages across the landscape. As a result, large intense bushfires were uncommon.

Fire is a significant part of Aboriginal culture and the knowledge of its use has been retained by many Aboriginal families as their culture and values are shared between generations. Karla Wongi – Fire Talk is an interesting article that provides additional information.

The plants and animals themselves provide clues to the ubiquitous presence of fire.

## Fire fact

**Fossil records and charcoal deposits indicate that fire has been present for at least 30 million years in the Australian landscape in response to periods of aridity.**

## Dating fire from balga stems

*Dating from grasstree fire rings. Photo © Parks and Wildlife*

Western Australian grass tree or balga (Xanthorrhoea preissii) occurs across the south-west of WA in forests, heaths and woodlands. Balga grow up to five metres high and are long lived - 200 year old specimens are common. A one metre tall balga can be 50 to 100 years old.

As the needle-like leaves die, they are laid down as a highly flammable thatch around the stem. Under the charcoal on the stems, the old leaf remnants lie in repetitive coloured rings. Light and dark brown rings represent annual growth. Studies suggest that black rings represent green needles that have been killed by fire and can provide a record of fire occurrence dating back several centuries. Scientific opinions differ as to the accuracy of this technique for reconstructing fire history (refer to reading list below).

Fire histories inferred from balga stems are consistent with other sources of evidence suggesting that burning by Aboriginal people in the south-west of WA was quite frequent. Understorey plants in the northern jarrah forests reach flowering age three to four years after fire, and most native animals recover to pre-fire levels within three or four years of a low intensity fire.

*Further reading:*


- *Abbott I and Burrows (2003) Fire in Ecosystems of South West Western Australia: Impacts and Management. Backhuys Publishers, Leyden, The Netherlands.*
- *Miller BP, Walshe T, Enright NJ and Lamont BB (2007) Error in the inference of fire history from grasstrees. Austral Ecology, 32: 908-916.*
- *Ward DJ (2009) Bushfire history from grasstrees at Eneabba, Western Australia. Journal of the Royal Society of Western Australia 92: 261-268*


*Reference: https://www.dpaw.wa.gov.au/management/fire/fire-and-the-environment/41-traditional-aboriginal-burning - Parks & Wildlife Service, Dept Biodiversity, Conservation and Attractions*

# WATER

**Water is vital to all aspects of our region,
from the natural bush to farming.
Learn about water health and how a catchment works.**

Water in our Bodies (K/PP)

Water Sharing Game (Yr 1-3)

Measuring Stream Flow (Yr 7-10)

Making Rain Clouds (Yr 4-6)

EC Testing (Yr 7-10)

# Water in our Bodies

## Concept:

Understand that good quality water is important to all living things.

## Aim:

Students will be aware that drinking enough water is important to stay hydrated and healthy.

## Materials:

- Some fresh fruit and its dried equivalent, ie grapes and sultanas or a banana and a banana chip
- Kitchen sponge and water
- Paper and pencils

## What to Do:

**1. Hydration:** Show or discuss the fresh and dried fruits. Discuss the difference between them and lead on to the word HYDRATION.

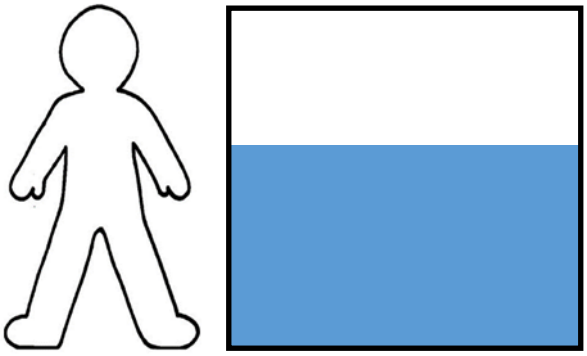
Discuss the meaning of hydration and how we as humans can become dehydrated easily. What factors can contribute to dehydration?

- Every part of your body needs water. In fact, water makes up 60 percent of body weight.
- Dehydration happens when there is not enough water in your body.
- Mild dehydration can cause headaches, nausea and tiredness. You may need more water in hot temperatures or if you sweat a lot.
- If you're getting enough water you'll rarely feel thirsty. Your urine will also be clear or slightly yellow. Dark yellow urine is a sign of dehydration.

**2. Water in our bodies:**

Ask the kids to draw an outline of their bodies and colour in just over half (60%) to show how much of our bodies are made up of water.

It is important to note that our bodies are not like a jug of water that fills up, more like a sponge that can absorb water. Use the sponge and a 1L jug to illustrate the point.



**Water Quality:**

Ask the young people if they think it would be a good idea to give small children, animals, or plants pop or a sports/energy drink? What would happen to them if they did? Possible answers include: sick, tired, wouldn't grow normally or may even die.

Ask the same question with salty or dirty water. Discuss with the group how poor water quality can impact the environment.

*Reference: Health Powered Kids, Allina Health website (www.healthpoweredkids.org)*

# Water Sharing Game

## Concept:
Understand that water must be shared across a catchment.

## Aim:
Students will see the diverse uses and needs for water through-out a catchment.

## Materials:
- Clear plastic cups or glasses
- A label or sticker for each cup
- Water (use a jug)
- Permanent pen

## What to Do:
This game works best with groups of about 10 participants to start. You can increase the number of kids and the complexity as you progress.

Set up for the game by attaching a label to or writing on each cup. Labels should include the different aspects of your catchment that require water: Dam, Native Fish, Farm, Wetland, Town, and Recreation. You can use pictures for younger groups. You may wish to add a small mark, part of the way up the cup small enough to go unnoticed but large enough to be seen when pointed out.

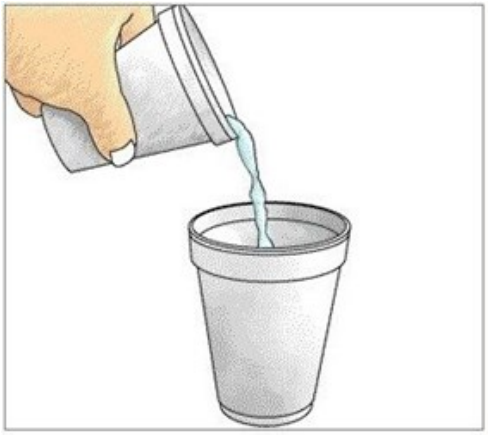
How to play: Line 10 or so students up and give each an empty cup. The first student should have a cup labelled 'dam'. The last student should have a cup labelled 'wetland'. All other students receive cups in any order. Explain the labels before you start to make sure everyone understands the cup they hold. Fill the cup labelled 'dam' approximately 2/3 full. Dams are rarely at capacity, this is a typical amount for a good year.

**Basic version**: Each player should keep an amount of water for themselves, and pass the rest on. Make sure everyone understands that once they give the water away they can't get it back, and no more is coming from the dam. Also make sure they know if the water doesn't get to the end of the system, the birds and fish in the wetland may die. (You may also choose to mention that salt can build up at the mouth of the river if it is not flushed out to sea which will kill native trees and fish, as well as damage farm lands). Once complete you can vary the game as many times as you like.

**Other versions:**

1. **Optimum amount of water** Ask students to look for the black mark on each cup. This is the amount of water ideal for them to do everything they need or would like to do. Students then try to fill cups to the mark.

**2. Drought** As normal but start off with 1/2 the usual amount of water in the dam. Ask students who should go without in an extended dry season.



*Reference: Murray Darling Basin Authority, education@MDVBA website (www.mdba.gov.au/education)*

# Measuring Stream Flow

## Concept:

Kids will measure stream flow and volume.

## Aim:

To measure streamflow and understand how increased flows can affect movement of nutrients and salt and increase erosion.

Streams moving at a high speed can carry larger sizes of sediment and cause erosion, while slow moving streams deposit sediments that can cause excessive build up. Stream flow is an important factor in the stream ecosystem and is responsible for many of the physical characteristics of a stream. Aquatic plants and animals depend upon stream flow to bring vital food and nutrients from upstream, or remove wastes downstream.

## Materials:

- 30m tape measure
- A long, depth-measuring pole with graduations marked on it in 10cm intervals up to 1m. This can be made easily with a broom handle or bamboo pole and measurements marked in pen.
- A ping pong or tennis ball.
- Stopwatch
- Pen and paper to record your measurements
- Net to catch your ping pong ball!

## What to Do:

1. An approximate section is taken at a culvert or bridge structure. You will need to take three measurements (width, depth and flow rate) to calculate stream flow.
2. Measure and record the width of the waterway in metres with a measuring tape.
3. With the depth-measuring pole establish the water depth at three or more points and record the average value.
   a. Calculate the average depth by adding together all 3 measurements and then divide by 3 to get your average depth. Eg; Sum of all depths divided by total number of depths taken.
4. Measure the flow rate by using a stop watch to time a floating object (ping pong or tennis ball) over a measured distance.
   a. To do this safely, measure your distance (at least 1-2m) along the bank and place half the group upstream and half downstream. The downstream group should have a net ready to scoop and retrieve the ping pong ball.
   b. Time the object several times to get an average time. Make sure you record how fast the object travels in the middle and at the edges of the waterway to get a good sample of the whole stream.
   c. If the waterway is too wide or unsafe to retrieve an floating ball, simply use floating material found in the natural environment. i.e a sturdy twig, bark or foliage.
   d. Make a note of what floating material was used for future comparisons.
   e. Flow rate (m/sec) = Distance the object travelled ÷ Time it took to travel.
5. To calculate the volume of water moving past a particular point (flow volume), use the following formula:

**Volume (litres/sec) = (width x depth x flow) x velocity correction***

*Velocity Correction: The speed that something travels on the surface of the water (velocity) will always be faster than the average velocity of the water over the cross-section of the stream. It is important to allow for this; for example a broad, shallow stream with a rough bottom may have an average velocity of less than half the surface velocity or speed. Deep, narrow streams may have a closer average and surface water speed. So multiply your measured value by 0.7 or 0.8 to get the average velocity of flow for the stream.

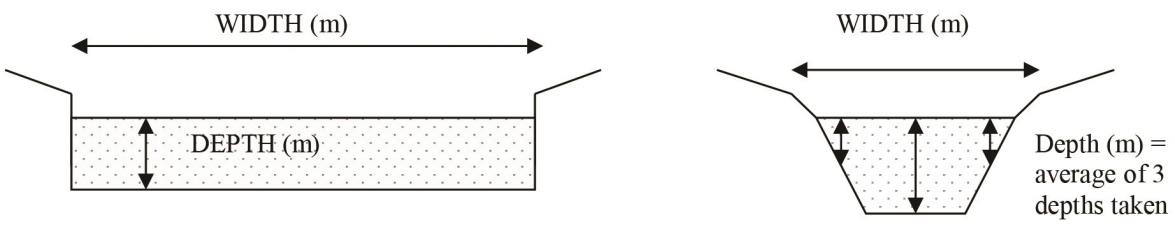



Figure 1: Measuring the depth and width of your stream channels

# Making Rain Clouds

## Concept:

Raindrops on soil cause erosion.

## Aim:

Students discover the effect that rain has on different types of soil.

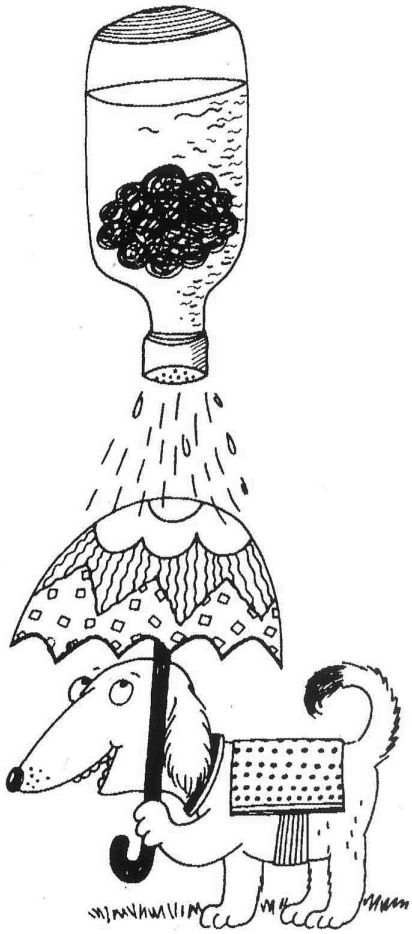
## Materials:

- Plastic drink bottle with screw lid
- Nails
- Felt Pen (oil based)
- Water

## What to Do:

1. Remove the cap and carefully make several holes in it, using a nail.
2. Turn the bottle upside down and use felt pens to draw a cloud shape.
3. Fill the bottle with water and replace the cap.
4. Go outside and test your cloud by turning it upside down and shaking it so that rain begins to fall.
5. Find as many different types of bare soil as possible around the school grounds.
6. In pairs, investigate one soil type with your clouds and record the effect on the surface. If possible, take photos or detailed field sketches before and after the 'rain' event.
7. Report to the class through an oral report or poster.

- Find out about different cloud types. Try to identify the clouds in the sky.
- Which clouds are rain clouds?
- Find out how sailors and farmers can forecast the weather by reading the skies. Do you know of any other ways of predicting rain?



*Reference: Vic Dept of Conservation and Natural Resource, Our Land: Landcare Activities for Upper Primary*

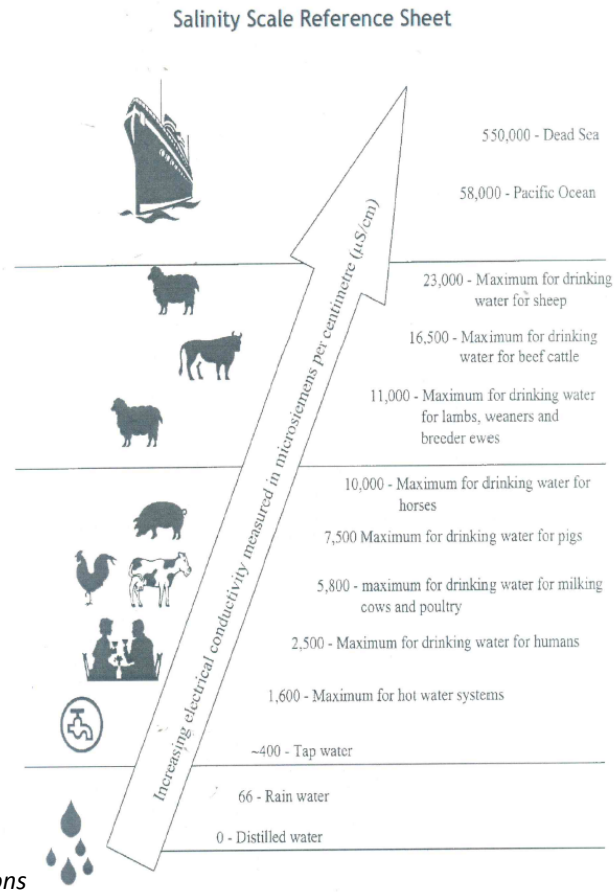
# EC Testing

## Concept:
Understand techniques for testing salinity levels in water.

## Aim:
Students will learn to test and record salinity levels and understand the results.

## Materials:
- Water samples from various sources, or with difference salt concentrations. These should be clearly labelled with the source, ie House Dam, Blackwood River at Jayes Bridge, Soak.
- Clean sample jars
- Salinity meter and calibration solutions
- Pen and paper to record results

## What to Do:
- Calibrate your salinity (EC) meter as per the instrument's instructions and with appropriate calibration solutions.
- Fill two clean jars, labelled "Rinse 1" and "Rinse 2", with 4-5cms of de-ionised distilled water. Rinse the EC meter at a depth of **1-2 cm**.
- Line up your water samples so that their labels can be clearly read.
- Handling the sample containers carefully to prevent disturbing any sediment. Turn the stick instrument power on, make sure the cap is removed and insert into the sample to a depth of **1-2cms**. Gently stir until the reading stabilises.
- Do not immerse the stick above the colour band. The EC meter compensates for solution temperature.
- Once the reading has stabilised, record the EC level. Then rinse the meter by putting it first in the "Rinse 1" jar then in the "Rinse 2" jar.
- Test your remaining samples by repeating the steps above, recording the results.
- Remember to check whether the meter is reading in mS/cm or *u*S/cm. You may need to convert your results to see where your water samples sit on the fraph.




### Definitions:
EC - Electronic conductivity
mS/cm - millisemen per centimetre
*u*S/cm - microsemen per centimetre

### Conversions:
*u*S/cm ÷ 10 = mS/m
mS/cm x 100 = mS/m

See your salinity meter instructions for use.

*Reference: Land Management Society Farm Monitoring Kit Instructions*

# SOIL

More than mud!
The soils we live on are alive and are important for bush health and farming productivity.
Topics include salinity, erosion and microbial activity.

What lives in the Soil? (K/PP)

Clay Ribbon Test (Yr 1-3, Yr 4-6)

Erosion Ball Game (Yr 1-3, Yr 4-6)

Travelling with Salt (Yr 4-6)

Measuring Soil pH (Yr 7-10)

# What lives in the Soil?

## Concept:

Learn about animals in the soil and how they are important

## Aim:

Explore some of the soils in your environment to see what you can discover.

Many animals live in our soils. Earthworms, bacteria and fungi are just a few of the organisms or animals that live in the soil and feed on the organic matter and decay or recycle plant nutrients. The organic matter in the soil comes from the decay of dead plants and animals.

All of the organisms that live in the soil are such an important part of the continuous, natural process of decomposing organic materials and preparing the soil for future plant growth, that we cannot talk about soil without including all of the living things.

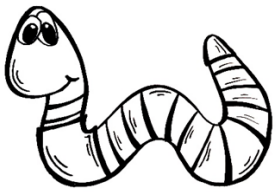
Earthworms, mites, centipedes, millipedes and spiders also live in the soil. In addition, there are many organisms living in the soil that are so small that they cannot be seen without a microscope.

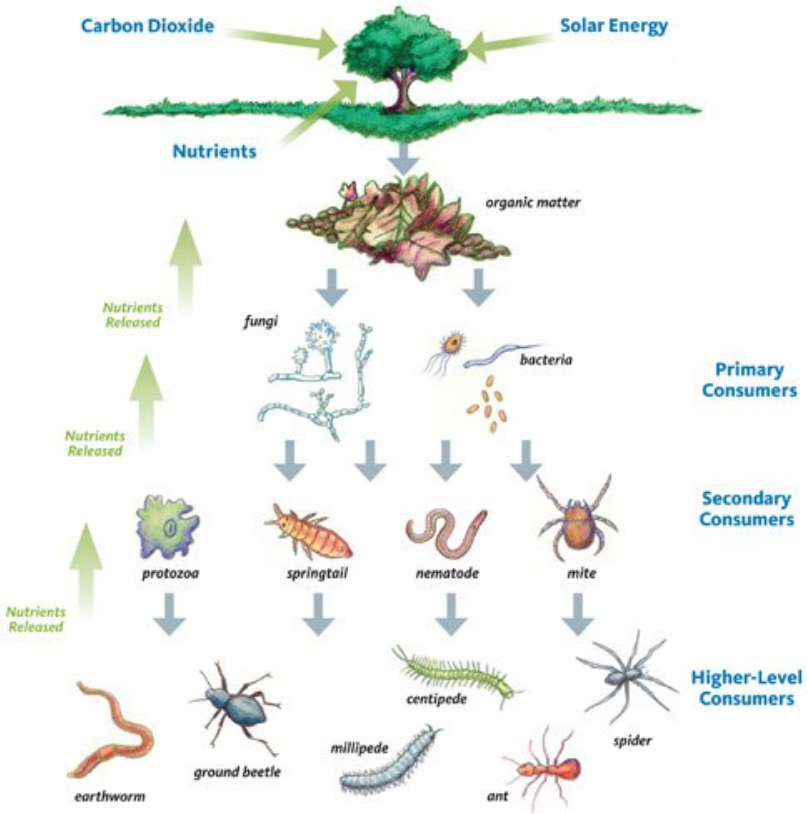
## Materials:

- Shallow trays for sifting through soil samples
- Small trowels, gloves and buckets or containers to collect soil
- Magnifying glasses or utilise the BBG microscope that can connect to a laptop to magnify any interesting finds.
- If necessary, have some soil samples ready to investigate – it will make it more interesting for the kids if you can ensure there are some common creepy crawlies in there such as earthworms, beetles, mealie worms or centipedes.

## What to Do:

- Divide into groups of 3 or 4. Give each group a tray and a sample of soil to investigate.
- Using hands, or trowels if preferred, carefully sift through the dirt to find what is living there.
- What kind of soil is it? Gravelly, sandy or muddy?
- How many different animals can you find?
- Can you name the animals you've found?
- Make sure everyone washes their hands well after the activity





# Clay Ribbon Test

## Concept:
Use a quick and dirty test for soil texture.

## Aim:
Understand the different types of soil.

## Materials:
- Soil samples from different soil types
- Water

## What to Do:
1. Take a small handful of the soil and moisten with water.
2. Attempt to squeeze out a ribbon of soil between your thumb and forefinger.
3. Depending on the soil type, you will be able to make a long or short ribbon or none at all.
4. The longer and thinner the ribbon, the higher the amount of clay.

Clay and silt soils feel smooth.
Sandy soils feel gritty and won't form ribbons.
Loam, silt and silty clay loam soil will make ribbons less than 2.5cm
Sandy clay loam clay loam ribbons form between 2.5 – 5cm
Sandy clay or clay soil ribbons will be more than 5cm.

Discuss how soil types change what happens in the catchment and environment?

Can you make a dam out of sandy soils? Will water drain away easily through a hard clay?

How should different soil types be managed? i.e the use of fertilisers on sandy soils near waterways.

# Erosion Ball Game

## Concept:

Through a fun game, kids will get an idea of how ground cover can affect rainfall run off or erosion.

## Aim:

Understand the effect of decreasing the number of trees on a slope and the effect on runoff. Trees have an important role in intercepting rainfall and reducing the amount of runoff that occurs. By slowing the rainfall as it hits the ground, more water can soak into the ground.

## Materials:

- Lots of tennis balls.
- An area with a slight slope or gully.

## What to Do:

Divide the group into two teams, with one third of participants in Group A and two third in Group B.

### Game 1 – Tree Clearing

- Group B stands on the slope, scattered randomly, like trees in a forest. They are the trees.
- Group A stands at the top of the slope with several balls for each person. Group A are the rain clouds, and the balls are the raindrops.
- The rain clouds gently throw the balls up into the air one at a time so that land among the trees. The Trees have to catch as many balls as they can while standing still, the can not bend down and pick them up off the ground. The balls that are not caught are the runoff.
- Now take some of the trees away and do the exercise again. What happened and why? There should be more runoff with fewer trees.
- Take even more trees away so that only a few students remain and do the exercise again. What happened and why? There will be even more runoff and the trees won't be able to prevent the rain from hitting the ground.

Conclusion: The participants will be able to see the 'raindrops' running down the slope without being slowed or stopped by the trees. By removing trees, they will be able to observe more runoff.

### Game 2 – Stormy Weather

- Repeat the set-up as for Game 1. You can change the groups so that everyone has a chance to throw or catch.
- This time, the rain clouds gently throw all their balls up into the air at once so they land among the trees like a storm or sudden downpour. The trees have to catch as many balls as they can while standing still. They can not bend down and pick them up off the ground. The balls that aren't caught are the runoff.
- How was this different from Game 1? Was there a difference in the runoff? Why?
- Now take some of the trees away and repeat the exercise. What happened and why? There will be even more runoff and the trees won't be able to prevent the rain from hitting the ground.

Conclusion: The participants will be able to visually see that storms produce more runoff than normal rain. Removing the trees only makes the situation worse.

## Other Activities:

Get the participants to redesign the participant numbers to represent a rainforest or desert. Ask them to explain why they made the changes and what they predict the results will be.

*Reference: Activity adapted from EcoEducation Catchment Carers' Trail – A Cleaner Glass of Water. Department of Environment and Conservation, Bentley. W.A.*

# Travelling with Salt

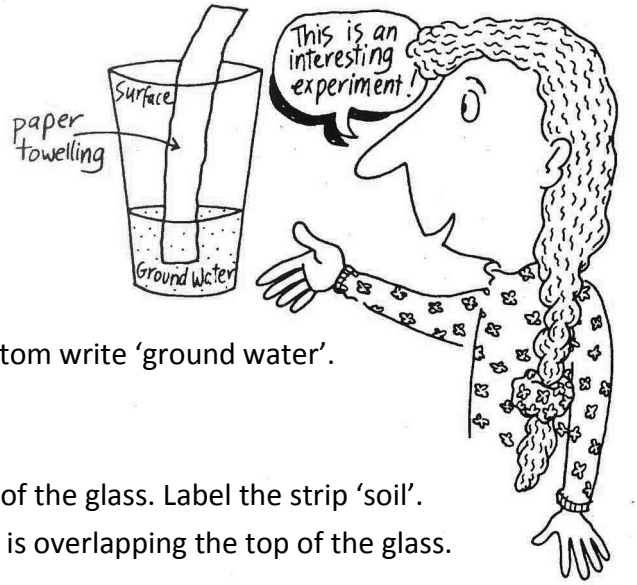
## Concept:

Showing how salt can move through the environment.

## Aim:

When Europeans arrived in Australia they did not understand the Australian environment. They used farming methods that worked well in Europe but created disasters for Australian soils. The landscape, sois and climate are very different. The early settlers tried to make a living off the land the only way they knew - by clearing vegetation including deep-rooted native trees and grasses. These activities have caused our water tables to rise, bringing salt to the surface in lots of areas.

This experiment will show you how salt rises to the surface and take you one step closer to understanding salinity.




## Materials:

- Tall drinking glass
- Paper towel
- Water
- Salt

## What to Do:

1. Near the top of the glass write 'surface' and on the bottom write 'ground water'.
2. Fill one third of the glass with water.
3. Dissolve two teaspoons of salt into the water.
4. Cut a paper towelling strip a bit longer than the length of the glass. Label the strip 'soil'.
5. Place the paper towel strip in the glass so that one end is overlapping the top of the glass.
6. Observe what happens.
7. Tear off a small piece of the wet paper from the end of the strip and place it on your tongue. What can you taste?
8. Remove the paper from the water and place it in a warm position. Observe the surface after the water has evaporated.

How does this help to explain how salt moves in a catchment?

*Reference: Catchment Carer's Trail. A Cleaner Glass of H20. (Department of Environment and Conservation EcoEducation Series)*

# Measuring Soil pH

## Concept:
Measuring the pH of soils.

## Aim:
Understand the different types of soil and the effect of pH.

Soils can be naturally acid or alkaline, and this can be measured by testing the pH value of the soil. Having the correct pH is very important for healthy plant growth, so it is important to understand more about soil pH, and to be aware of the long-term effects of different soil management practices on soil pH. Research has demonstrated that some agricultural practices significantly alter soil pH values.

## Materials:
- Soil samples from different soil types
- pH meter or test kit
- Calibration solutions

## What to Do:
- Using your dried soil samples, and following the instructions of your pH meter or kit, test each sample.
- Record the results, including which soil sample it was, the pH result and the method used to test pH.

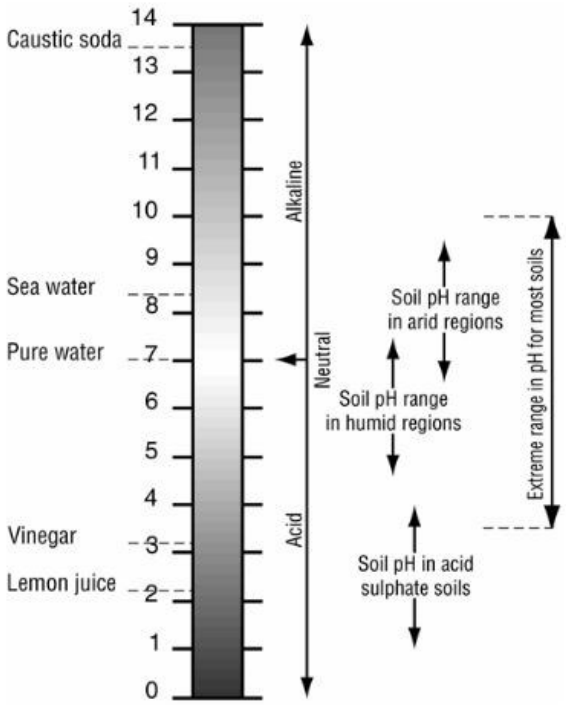



**Figure 1. The range of pH values found in soils**

Discuss how soil pH might affect agricultural crops?
What pH would you expect to find under natural bush vegetation?

*Reference:*
*Land Series Facts – Understand Soil pH. Department of Natural Resources and Water, QLD.*

# ANIMALS

Discover the different species that are unique to our area and how you can ensure their survival.
Explore the impact that feral animals have and why.

Animal Tracks (K/PP)

Possum Magic (K/PP)

Animal Colouring In (K/PP)

Friend or Feral Word Search (Yr 1-3)

Design an Animal (Yr 1-3, Yr 4-6)

Tracks and Traces (Yr 1-3, Yr 4-6)

Friend or Feral Word Search (Yr 4-6)

Sand Pads (Yr 7-10)

# Animal Tracks

## Concept:

Kids will explore how animals leave different tracks and traces.

## Aim:

Learn that different animals leave different footprints.

## Materials:

- Playdough – darker colours will show prints better
- Plastic animals – ones with different sized feet or number of legs work best. ie a dinosaur, a cow, a chicken. Footprint templates can also be cut out of potatoes if no plastic animals are available.

## What to Do:

1. Flatten out small amounts of playdough and use the plastic animals to leave tracks across.
2. Examine the different shapes left by different animals. Discuss whether you could tell if an animal had two or four legs, if it had claws or if it was an adult or juvenile.
3. Discuss what might happen to the prints in mud, dry sand or on concrete.

## Other Activities:

A similar activity can be done using the plastic animals, paint and paper. Use different colour paints on the feet of each animal, press the feet into the paper to leave tracks.

# Possum Magic

## Concept:
Learn about native Australian animals.

## Aim:
Students will be engaged in learning about native animals through craft.

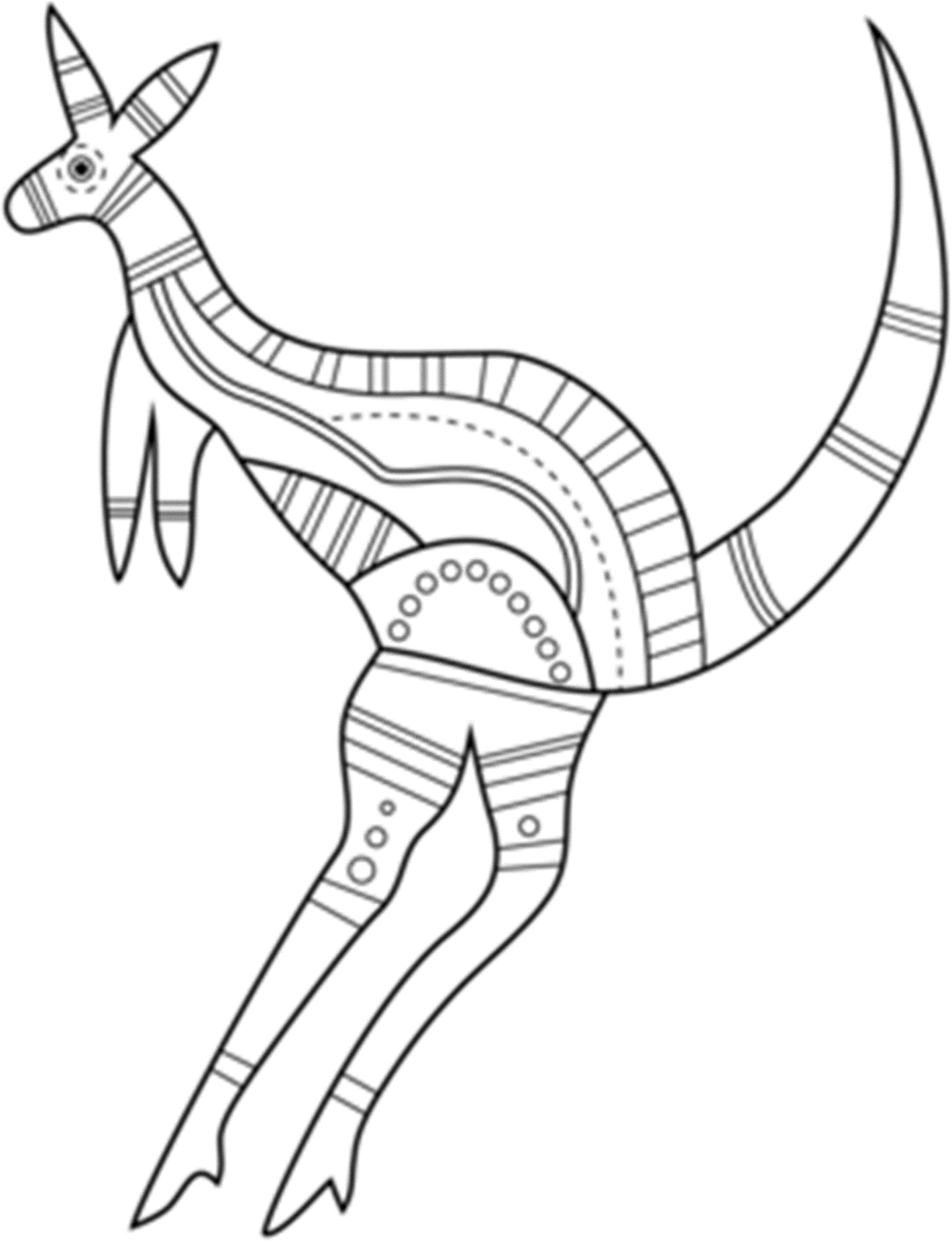
## Materials:
- Paper plates
- Glue, sticky tape or stapler with supervision
- Paper and pencils

## What to Do::
Ask the group which native animals they know. If any non-natives are suggested, you can discuss the concept of 'introduced' animals.
Use the templates below to guide the group in making their own native animal, choosing from either a possum or emu.

**Possum:**
- Colour then cut around each shape and glue or sticky tape onto a coloured paper plate.
- To make the tail, cut a curly or long piece of paper and attach to the plate. Pipe cleaners can also be used to create a tail to hang the possum from.

**Emu:**
- Cut a paper plate in half and decorate with pencils or coloured paper.
- Colour then cut around the emu head template and glue or sticky tape onto one round end of the paper plate.
- Pipe cleaners can be used for fun legs or cut two long strips of paper and fold in a concertina pattern then attach to the plate.

## Other Activities:
Read Possum Magic by Mem Fox or Edwina the Emu by Sheena Knowles.
Encourage the kids to get creative and make a possum mask with the paper plates, and making ears from paper to attach.



YONGA (Kangaroo)

# Friend or Feral Word Search

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| z | u | c | r | e | d | j | d | l | j | h | h | f | y | g |
| y | h | q | n | j | u | h | a | f | h | a | d | g | v | l |
| z | x | h | z | r | c | n | m | m | k | b | l | t | u | k |
| e | y | m | o | w | r | l | o | a | w | i | p | z | t | m |
| q | h | a | z | u | c | o | c | k | a | t | o | o | i | l |
| a | l | b | t | m | u | s | s | o | p | a | k | v | b | d |
| v | d | c | t | p | u | y | s | n | q | t | r | y | b | w |
| s | o | i | n | a | n | u | l | x | o | u | g | j | a | s |
| n | d | e | u | a | b | w | p | p | o | u | c | m | r | a |
| h | u | v | t | r | z | m | t | v | a | v | e | y | n | s |
| j | y | i | y | o | n | y | u | f | o | x | d | t | c | g |
| q | v | d | v | x | e | a | d | n | o | y | a | v | a | h |
| e | r | z | c | c | r | b | l | t | j | c | f | p | u | s |
| b | u | n | z | e | v | k | n | f | f | z | p | s | n | v |
| i | b | a | x | p | f | d | e | g | a | o | l | u | r | e |

Cat
Cockatoo
Diurnal
Fox
Habitat
Native
Nocturnal
Numbat
Possum
Rabbit

# Design an Animal

## Concept:

Learn about native Australian animals and how they have adapted to their environment

## Aim:

Create an imaginary animal, thinking about its habitat, diet and behaviours

## Materials:

- Paper and pencils

## What to Do:

Animals are well adapted for the habitat they live in. They possess certain attributes which allow them to survive and thrive in some of the harshest of environments. Your challenge is to create an animal thinking about the characteristics it would require to survive in a habitat of your choosing.

Discuss with the group the special adaptations that Australian native animals have. Depending on the age of your group you can talk about the following concepts:

- Nocturnal or diurnal
- Herbivorous, carnivorous or omnivorous
- What types of habitat they live in
- Any special camouflage or features they have to survive
- How the animal moves or communicates

Ask each student to create an animal. They need to consider all the concepts that you've discussed and write down or draw out their animal.

Some examples to use of unique animals include:

- Numbat – eats only termites and is diurnal. Has stripes and spots for camouflage
- Kangaroo – large back legs for jumping, carries young in its pouch
- Snakes – use camouflage and can open their jaws very wide to strike or eat prey

*Reference: Welsh Mountain Zoo – Create your own animal worksheet*

Draw and annotate your animal below or write a description

# Tracks and Traces

## Concept:

Learn about different tracks and markings that animals can leave

## Aim:

Discover how tracks change under different conditions

## Materials:

- Areas of sand, concrete, grass and mud to leave tracks in
- Paper and pencils

## What to Do:

As many of our native animals are shy, their tracks and traces are the only signs that they are around. They aren't difficult to find but can look very different depending on where they are left and how the animal was behaving at the time.

Discuss with the group the difference that might be seen between tracks in wet sand or mud, and those in dry sand or on thick leaf litter.

What other signs might we see? Scratchings on a tree trunk, scats, diggings, feathers or fur.

- Working in pairs or in small groups, get one person to walk barefoot across different materials such as grass, sand, mud and concrete (wet your feet first to leave a temporary mark for the concrete).
- Draw the pattern of the track that was left behind.
- Now ask the person to jog over the test areas, and in a third trial to run across.
- Note the different spacings, imprints and number of tracks left at different speeds.
- How did the tracks differ between test areas?
- Was there a difference between people? Size, the imprint or the spacing between steps?
- How might weather conditions affect tracks?

*Reference: B.Triggs (2006) Tracks, Scats and Other Traces. A field guide to Australian Mammals revised edition*

# Friend or Feral Word Search

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| h | h | l | n | m | r | g | f | r | z | u | e | t | g | d |
| z | r | c | d | u | t | v | s | t | w | q | a | q | a | w |
| x | v | r | t | f | m | i | h | h | s | m | i | o | d | o |
| k | l | x | d | i | k | b | u | e | m | x | t | x | f | y |
| s | h | y | q | r | d | r | a | a | t | e | r | h | o | l |
| q | u | o | k | k | a | u | r | t | n | r | h | t | o | i |
| i | e | i | l | b | t | w | h | a | d | a | y | y | t | e |
| s | l | p | b | o | a | f | c | c | v | s | r | a | a | j |
| r | n | i | r | l | c | j | f | k | i | g | y | j | k | p |
| q | t | x | l | o | b | x | m | v | k | s | y | h | c | v |
| i | x | a | e | l | a | g | o | c | s | a | h | p | o | g |
| n | b | m | u | s | s | o | p | f | w | j | s | x | c | s |
| y | m | y | t | l | h | q | u | o | n | h | u | x | t | f |
| m | p | n | k | l | h | e | w | h | i | k | b | e | r | r |
| s | l | p | d | v | o | v | q | z | m | c | e | v | x | n |

| | |
|---|---|
| Cane toad | Phascogale |
| Cat | Possum |
| Chuditch | Quokka |
| Cockatoo | Rabbit |
| Fox | Tammar wallaby |
| Numbat | Woylie |

# Sand Pads

**Concept:**
Using tracks to identify animals, their size and their activity.

## Aim:
Learn how to set and read a sand pad.

## Materials:
- Rake
- Watering can and water
- Clean, sand free of weed seeds and debris (yellow bricklayers sand is ideal if none available locally)

## What to Do:
Finding out about the native birds and other animals who share your region can be fascinating. It can help show if efforts to maintain and enhance wildlife habitat are having the desired effect – that is, providing homes or food sources for native fauna. Techniques that rely on remote observation of animals or the many traces that they leave in their environment are easy to carry out and do not cause unnecessary stress to the animal. One of these techniques is the sand pad.


As an animal moves over a soft surface, it leaves footprints. These can be used to determine what types of animals passed by and, occasionally, something about their behaviour. Using tracks to identify the presence of various species of fauna is particularly useful for surveying reptiles and small, nocturnal or otherwise secretive and inconspicuous mammals, and can also be used to monitor fox and cat activity.

Reading tracks in the wild is not always easy, the soil has to be just right to hold an imprint. Footprints can often be observed in naturally occurring areas of sand, but it is even better to prepare a special surface to receive tracks - the sand pad.

Sand pads can laid in areas likely to be used by fauna, or by setting up square plots of sand and placing a bait or lure at the centre of each plot, animals are enticed onto it so that they leave identifiable tracks in the sand.

Tracks are most identifiable in clean, firm and slightly damp sand. Where this type of sand occurs naturally at a survey site, pads can be made simply by clearing and raking smooth a square plot at the desired locations. In other cases sand will have to be brought in specially to create the sand pads. The best sand to use is the yellow brick-layers' sand often used on building sites but it is very important that this sand is clean and certified free of weeds as well as known plant pathogens.

Sand for pads can be laid down directly on top of existing soil and leaf litter. Use a watering can to create a firm, damp consistency, then smooth with a flat rod, a stake or the back of a rake.

Sand plots containing baits are generally about one half to one square metre in size (1 m x 1 m), large enough to ensure that any animal coming to investigate the bait or lure cannot reach it without setting foot on the sand. The bait or lure can be a small cube of meat or a ball of universal bait (peanut butter, oats and sardines) placed either on top of the sand or buried (about 50mm) below the surface, or a small (1mL) drop of linseed oil placed on the surface.

Burying the bait is preferable as it prevents birds such as ravens and currawongs from removing it and also provides some protection from ants.

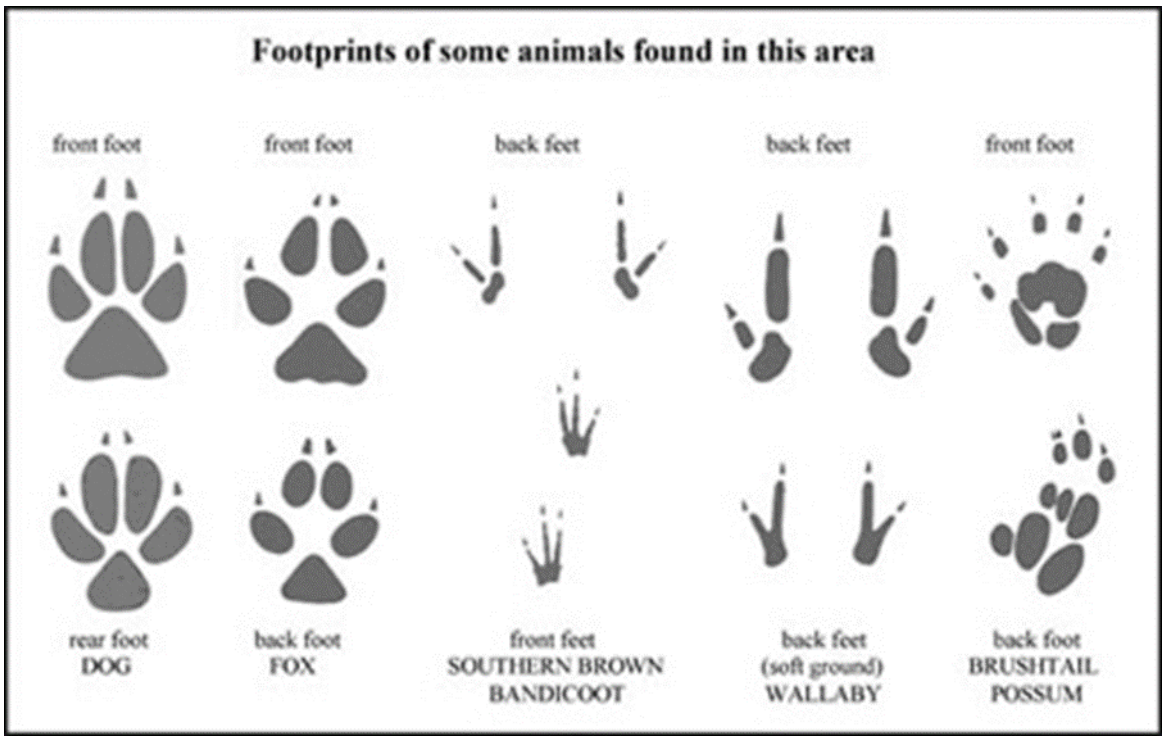
A single sand pad may be lucky enough to get some footprints, especially if placed in front of a hollow log where activity has been noted. But for a better survey, a number of sand pads will give more coverage. For small lizards and small mammals such as phascogales, dunnarts or rodents, sand plots can be as close as 50m. For medium-sized mammals (e.g. chuditch, quenda, woylies and possums) and as a general purpose survey, 200m is a better distance between sand plots. The sand plots can be split up into separate transects of 10-20 plots each to cover a wider area and range of habitats.

## Identifying the Tracks

Use a field guide to help identify the tracks. *Tracks, Scats and Other Traces: a Field guide to Australian Mammals* (1996) by Barbara Triggs (Oxford University Press, Melbourne) is readily available.

Also search the area for droppings or other signs which will help to identify the animals. Tracks are most identifiable in the early morning before the sand has dried and the wind has blurred them, and are more easily seen when the sun is still low in the sky. This is also a good time for photography as slanting shadows show up the outlines clearly.

Tracks can usually be identified to family or genus but often it is difficult to distinguish tracks of closely related species unless there is a marked difference in size and shape. There may also be differences in size of tracks between sexes and different age groups within a species. The use of other information such as known distributions and habitat preferences can help to narrow the identification to species level.




*Reference:*
*Adapted from WA Wildlife Note No 10 by P.Mawson and P.Orell, and Watching Wildlife – A Beginners Guide' Note 8 (2003) NSW National Parks & Wildlife Service.*

# Resources

| Organisation | Resource Name | Link / Reference |
|---|---|---|
| **Bird Life Australia** | Aussie Backyard Bird Count Lesson Plans | https://aussiebirdcount.org.au/teachers/ |
| **Marine Waters WA** | Teachers Education Resources & lesson plans | http://marinewaters.fish.wa.gov.au/processes/ |
| **Western Australian Museum** | Frog Watch Schools | Great teachers resources and information museum.wa.gov.au/explore/frog-watch-schools/frog-watch-schools-kit |
| **CSIRO** | Sustainable Futures Education Program – Carbon Kids | https://www.csiro.au/en/Education/Programs/Sustainable-Futures |
| **Soils for Life** | Build a Worm farm | |
| **ABC** | Teaching Resources | http://education.abc.net.au/home#!/resources |
| **ABC** | ABC Science – Catchment Detox Game | http://www.abc.net.au/science/catchmentdetox/files/home.htm |
| **Water Corporation** | WaterWise teaching resources | https://www.watercorporation.com.au/home/education |
| **Soil Quality** | Fact sheets on soil measurements and health | http://soilquality.org.au |
| **Dieback Working Group** | School education and information on Dieback | https://www.dwg.org.au/education |
| **Maroo Wildlife Refuge** | Kids Corner – Colouring and information | https://www.maroowildliferefuge.com/kids-corner |
| **Pestales** | Resources for Primary school teachers that highlights pest animal species in Australia | www.pestales.org.au |
| **Karla Wongi Fire Talk** | Article – a Nyungar Perspective on Forest Burning | https://www.dpaw.wa.gov.au/images/documents/fire/karla-wongi-fire-talk.pdf |
| **Government of WA – Dept. Biodiversity, Conservation and Attractions** | **Sharing the Dreaming App**: Aboriginal Culture education app | https://www.dbca.wa.gov.au/about-us/apps |
| **University of WA** | **Food Webb App –** specific to WA | https://itunes.apple.com/au/app/food-web/id565839214?mt=8 |
| | Field Guide to Pest Animals of Australia | https://itunes.apple.com/au/app/field-guide-to-pest-animals-of-australia/id634197149?mt=8 |
| **Western Australian Museum** | Field Guide to WA Fauna | http://museum.wa.gov.au/apps/wam-fieldguide |
| **Soil Science Australia** | Teacher's Guides to Soils – linked to curriculum | https://www.soilsinschools.com.au/projects |
| SWALSC | Aboriginal Culture and Information | http://www.noongar.org.au |

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