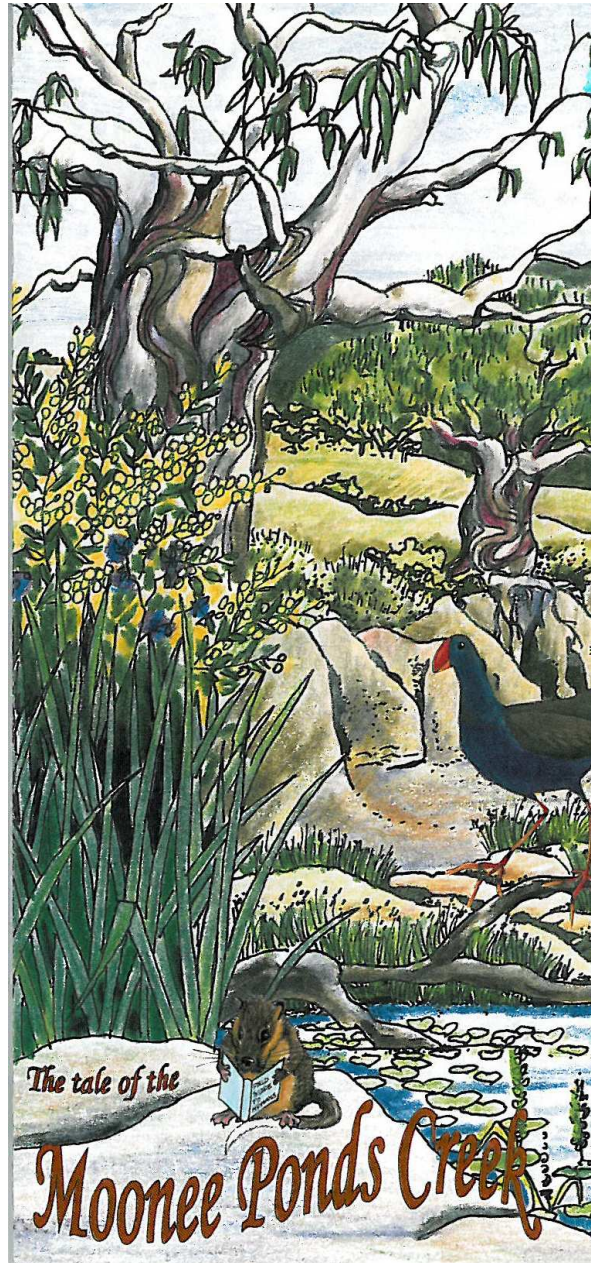


MOONEE PONDS CREEK CRUSADERS

Teachers Manual



Upper Primary School (Grade 5 - 6)
Water Education Program

Moonee Ponds Creek Crusaders



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Moonee Ponds Creek Crusaders



BACKGROUND INFORMATION

Moonee Ponds Creek Crusaders is a complete one year environmental education program, featuring different activities and topics for each school month.

The focus is on the Moonee Ponds Creek Catchment, the processes that can affect the creek and its environment and monitoring them.

It is a part of the larger Waterwatch program, which is free, fun and hands-on river health education program that supports community members, schools and businesses to be actively involved in monitoring and protecting the health of our rivers and creeks.

Each month or week we will test different parameters of the creek whilst learning about different issues, animals and environmental concepts.

Our education philosophy is to provide an engaging, interactive approach for maximum learning impact across the age levels.

This teacher's manual is a resource kit to run this year long program. Alternatively it can be run within a term or semester to compliment a particular unit of work.

It is designed for students in levels 3 - 4 of the Victorian Essential Learning Standards.

What is Waterwatch?

Waterwatch is a national community water monitoring program funded by the Commonwealth Government's Natural Heritage Trust. Waterwatch enables Australians to become involved in the monitoring and management of waterways in their catchment. The program aims to build community understanding of water quality issues, and to encourage monitoring groups to undertake constructive actions to rectify water quality problems.

Participants include primary and secondary schools and community groups . Along the Moonee Ponds Creek Waterwatch is sponsored Moonee Valley Council, Moreland Council and Hume Council as well as Melbourne Water and the National Heritage Trust. The Merri Creek Management Committee facilitates Melbourne Waterwatch in Merri and Moonee Ponds Creek.

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ENVIRONMENTAL PEDAGOGIES

Theme: *Explore connections between water, living things and creek; how pollution affects the health of the creek; understanding the value of water intrinsically (for its own sake) as well as for its utility value (as a resource). Reinforce knowledge through sensory and inquiry-based opportunities, discussion and reflection. Indicate societal value for the natural world through guardianship, advocacy and institutions.*

Key pedagogies to apply:

- Create opportunities for sharing student's knowledge and ideas
- Allow for interactions which reflect and build student curiosity
- Structure and provide activities that are sensory and hands-on
- Invite discovery by offering explorative, open-ended activities
- Indicate community role in the guardianship of natural areas
- Determine age-appropriate language and build eco-literacy during interactions
- Consider use of student input to design and structure interactions
- Cultivate positive attitudes and indicate appropriate behaviour towards nature

Key concepts and understandings

- Water is necessary for all life on earth. (Where there is water there is life.)
- Ecological adaptations to function in/on/around water
- Habitat relationships and waterways
- Point and non-point sources of pollution and effects on waterways
- Societal responses to nature through community actions and institutions.
- Eco-literacy – building the vocabulary of ecological processes and local natural assets

Skills

- Consider the process of protecting natural areas in urban environments
- Comprehend the structural, behavioural and material input that impacts on waterways
- Make and record field observations using freshwater macroinvertebrates and indigenous plants
- Undertake indicative habitat surveys
- Employ safe and responsible methods when working in outdoor and natural areas.
- Learn about biology and behaviour of local animals



Students in the field use various methods to build an understanding of natural areas and ecological processes. It is vital that they build an understanding of the societal and vocabulary of the environment.

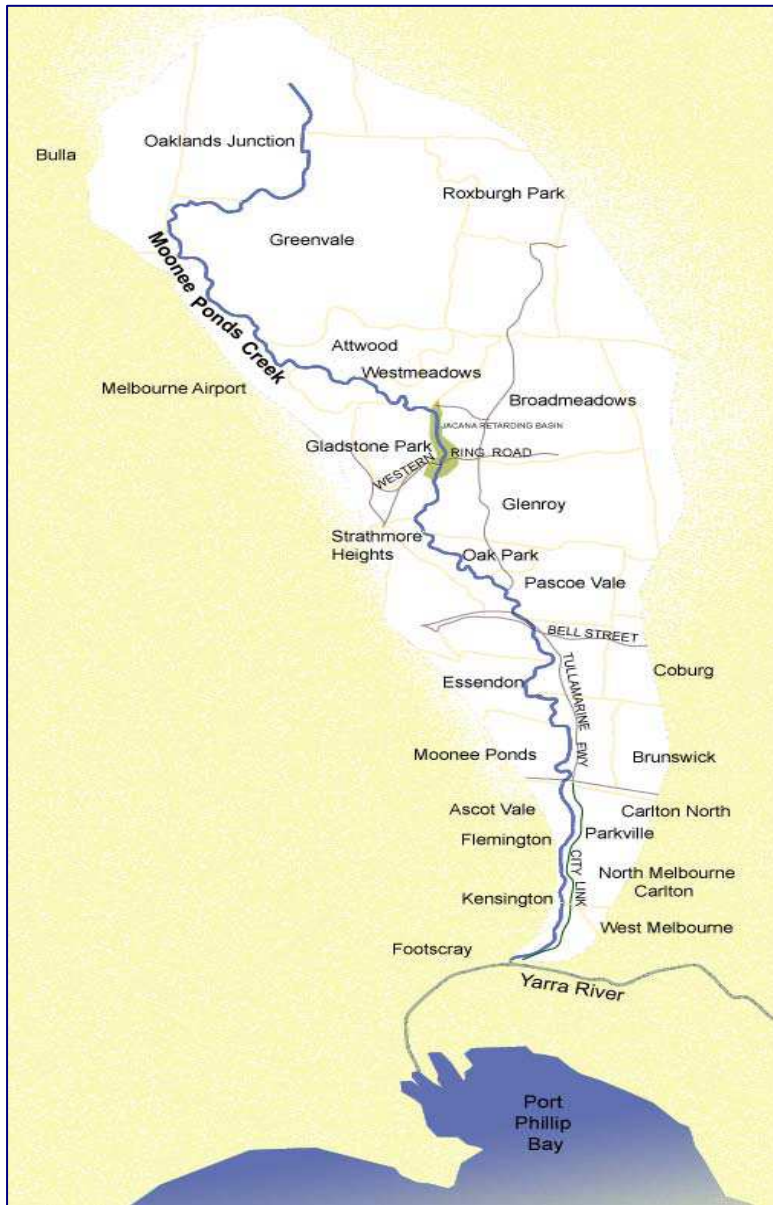
Moonee Ponds Creek Crusaders



I. MOONEE PONDS CREEK CATCHMENT

Theme: *What is a catchment?
*A closer look at the Moonee Ponds Creek

Background Information:



What is a catchment?

A **catchment** is an area of land from which all rain water runs into the same low point, creating a creek or river. Your school is in the **Moonee Ponds Creek catchment** (see map left and diagram on the following page).

Moonee Ponds Creek drains an area of approximately 145 square kilometres. The catchment extends from Gellibrand Hill Park and Attwood, through parts of Broadmeadows, Glenroy, Essendon and Moonee Ponds, before flowing southward into the Yarra River. The catchment is almost totally urbanised and housing developments continue to expand across the remaining pastoral land in the upper catchment.

Essendon Airport and approximately half of Tullamarine Airport are also located within the Moonee Ponds catchment.

Work during the 1950's to increase flood protection resulted in the removal of bank vegetation and in stream debris in conjunction with concrete lining of much of the lower reaches of the creek.

The construction of the Tullamarine Freeway in the late 1960's into the early 1970's saw large sections of the creek realigned and concreted to improve the stream flow capacity and to prevent

erosion.

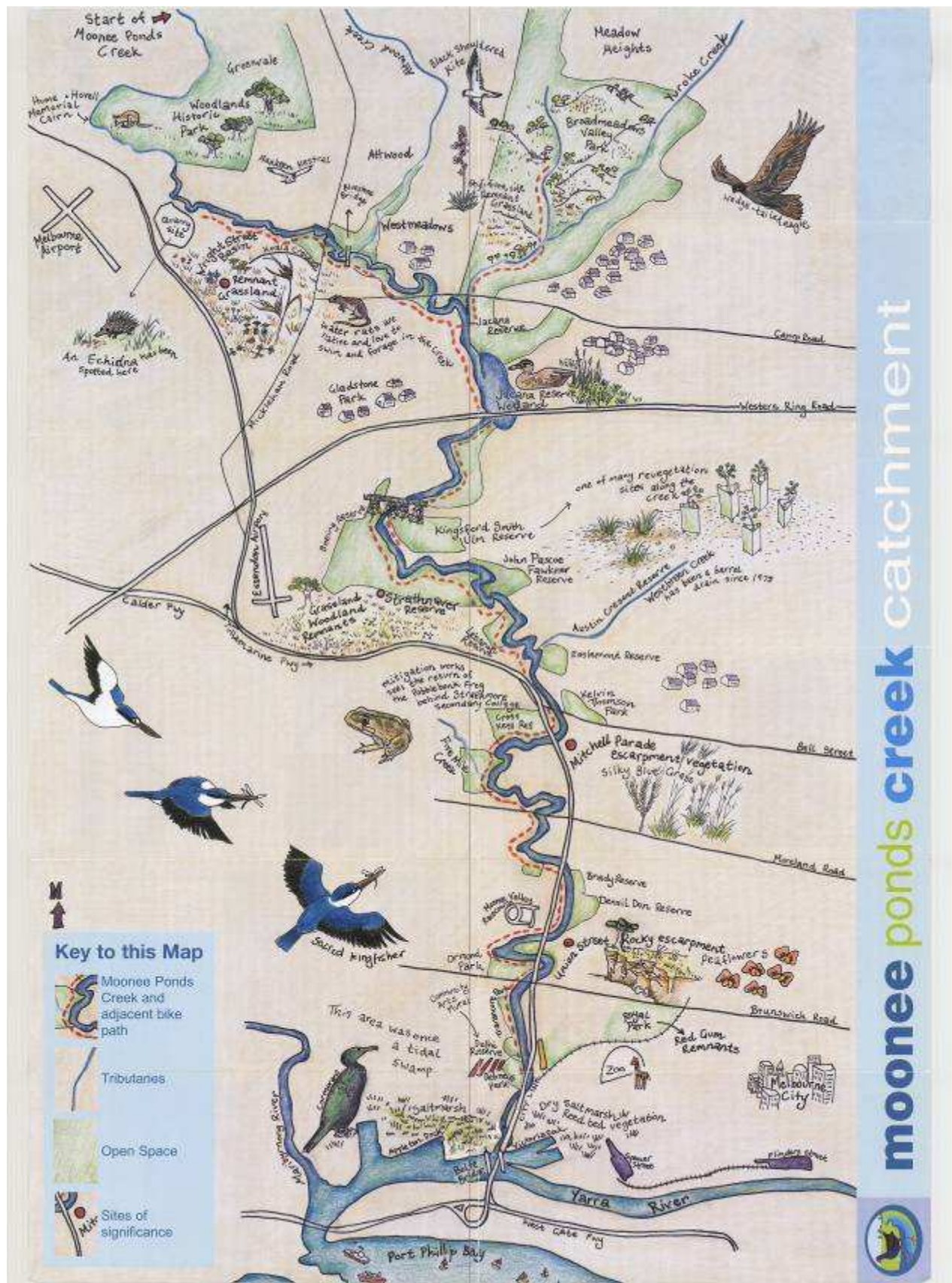
Although the overall condition of Moonee Ponds Creek is very poor, there are small areas in better condition. The creek through Woodlands Historic Park has the best examples of a comparatively natural waterway within the catchment. Risks to the creek include poor streamside vegetation and stormwater runoff.

Moonee Ponds Catchment Map:

The lighter area represents the Moonee Ponds Creek catchment. Rain that falls within this area will eventually drain into the Moonee Ponds Creek.

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Moonee Ponds Creek Crusaders

A Closer Look at the Moonee Ponds Creek

Taking a journey down the Moonee Ponds Creek, there is so much to discover along the way. In the upper reaches, through Woodlands Historic Park, it weaves its way passed the ancient River Red Gums that bear the scars of the **Gunung Willam Balluk** people who lived on this land.

The hills in Woodlands Historic Park retain their mixture of gum trees and Drooping Sheoak, in the remnant Grey Box, River Red Gum and Yellow Box woodland.

The Park also contains valuable remnants of grassy woodland open forest. Plants that grow on these basalt plains consist mainly of grasses and herbs, with mostly River Red Gum (*Eucalyptus camaldulensis*) trees. (www.parkweb.vic.gov.au) **Melways map 5**



Scar Tree at Woodlands Historic Park



Winding down to the lower part of the park, the creek pauses at majestic billabongs. After good rains, the billabongs fill and come alive with plants and animals.

The Billabongs at Woodlands Historic Park

Woodlands Historic homestead is a rare example of an early prefabricated building it was designed in Britain and shipped here. It was built in 1840, by the Greene family.

Magnolias at the Homestead are the oldest recorded garden plants in Victoria.

Woodlands Homestead and its outbuildings and gardens were extensively restored in 1983 and 1984.

The homestead is now leased by Living Legends. You can visit it and meet retired race horses in the park.



The park also contains the ruins of two other 19th century homesteads, Cumberland and Dun Donald.

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Hidden volcanic rock formations remind us of the ancient beginnings of the land. See if you can find them along the creek.

*Basalt rocks near the
Tullamarine landfill site*

South of Woodlands Park the creek flows through The Tarnuk. 'Tarnuk' literally means 'water bowl' (photo on right). These vessels were fashioned by the local Gullum Willam Balluk tribe, from gnarled growths on the River Red Gums that line the Moonee Ponds Creek.



The Tarnuk, Westmeadows

Surrounded by residential housing The Tarnuk is considered a site of plant and animal significance. Many of the original types and groups of plants still grow in this area. These are classed as grassy woodland, riparian woodland, riparian scrub and aquatic plants. However The Tarnuk is under threat from weeds and erosion.

Melways 5 H6, J6

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Now the creek winds through historic Westmeadows, under this stone bridge which was built in 1869. The bridge is registered by the National Trust, and is on the Australian and Victorian registers of historic sites.

Melways 6 A6

Bluestone and granite bridge in Westmeadows

This is the old police lockup, built in 1859, in Westmeadows. It was mostly used to lock drunken and disorderly people up overnight. See if you can find it in the Westmeadows village

Westmeadows old police lockup



*Moonee Ponds Creek in flood in 2004, at the junction with Yuroke Creek.
Gellibrand Hill is in the distance.*

Yuroke Creek drains parts of Broadmeadows, Coolaroo and Westmeadows. It enters Moonee Ponds Creek from the North at Westmeadows.

Melways 6 D8

Moonee Ponds Creek Crusaders



The flood water then flows down to **Jacana Wetlands**. Here, a barrier has been built to delay the flood water in its journey downstream.

The Jacana Wetlands were created by Melbourne Water in 2002. It now supports frog populations including the endangered Growling Grass Frog. It is used by many birds. Many unusual birds have been seen in these wetlands especially migrating birds that use it as a stopping point.

Melways 6 D9, D11



Above: Jacana Wetlands in the flood of 2004



Left: One year later in 2005. . Go and look at the wetlands now and see the difference five years of planting and growth have made.

The creek's journey now takes it south through **Gowanbrae**, and under the railway trestle bridge. Trains to the north and Sydney travel over this bridge. The bridge was constructed in 1929, but the railway line was a narrow gauge, and travellers to Sydney had to change trains at Broadmeadows. In 1962, a wider gauge line was installed next to the old tracks. Now passengers can travel from Melbourne to Sydney without changing trains.

Melways 16 C3



Planting at Boeing Reserve, above the creek, with the trestle bridge in the background

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Strathnaver Grassland sits alongside the Moonee Ponds Creek in Strathmore Heights. This small but significant site contains remnants of the vegetation that once grew in the area. Indigenous grass species grow over much of the site and amongst other wildflowers, a large population of common Everlasting (*Chrysocephalum apiculatum*) puts on a dazzling yellow display in spring.

Melways 16 E6

Left: In 2004 ABC's Gardening Australia show comes to Strathnaver Grasslands.

The site also contains a silcrete rock formation that would have been used by Gunung Willam Balluk as a quarry for tools.

These rocks provide nooks and crannies for Lichens and Mosses to grow on, and create important micro climates for other plants to germinate in.

Right: Lichen nestling in a rock crevice



At John Pascoe Fawkner Reserve, the creek flows between banks of lovely wattles and Tree Violets (*Melicytus dentata*).

Melways 16 F7

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Left: A riffle in the creek at John Pascoe Fawcner Reserve



South of **Oak Park**, the creek yields to the pressures of urbanisation and has become a concrete-lined drain. Houses press close to its banks but this does not stop work being done to create a green buffer and habitat for flora and fauna. **Melways 16 G8**

The creek near Margaret Street in Oak Park

Westbreen Creek flows into Moonee Ponds Creek in Pascoe Vale. This little creek is home to many bird and frog species, including the Growling Grass frog. The creek drains parts of the suburb of Pascoe Vale.

Melways 16 K9



At **Cross Keys Reserve**, in Essendon a section of the concrete lining has been removed and a natural meander is allowed in the creek.

Bends and meanders occur naturally in creeks and rivers as water flows to the lowest point in the landscape.

Melways 29 A1

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The CityLink Crossing – Indigenous reflections of the Moonee Ponds Creek were created by artists Mandy Nicholson (Wurundjeri), Treahna Hamm (Yorta Yorta) and Annette Sax (Taungurung). They were commissioned by CityLink to create artworks on the freeway sound wall and the bridge over the creek between Talbot Road and Wallace Crescent.

Melways 29 A1

*The CityLink Crossing –
Indigenous reflections
of the Moonee Ponds Creek*



The images reflect and recognise the traditional lands of the Kulin Nation and the concepts of *Country*, *Creation*, *Relationship* and *Connection*, as well as the *Past*, *Present* and *Future* life of the Moonee Ponds Creek.

The connection to *Country* (land) is represented by the contour design surrounding the Moonee Ponds Creek, and the Bogong Moth with two larvae. The Moonee Ponds Creek and the Bogong Moth were both important to the people of the Kulin Nation as a water and food source.

The concept of *Creation* is captured through the image of a Wedge-tail Eagle's wing. Bunjil, the Wedge-tail Eagle, is the Creator Spirit of the land, the people and their language. Two sky panels denote *Relationship*, (symbolised by a cockatoo feather) and *Connection*, (symbolised by the leaf) to the community of the Moonee Ponds Creek. The two water images depict the *Past* (spiral designs), *Present* and *Future* (wavy spiral designs) life of the Moonee Ponds

From the west, the **Five Mile Creek** joins Moonee Ponds Creek at Essendon.

Melways 28 J2

*Right: Junction of Moonee Ponds
Creek and Five Mile Creek*



South of Albion Road, the Tullamarine Freeway uses the corridor of the Moonee Ponds Creek. Despite the creek in many places being overshadowed by the freeway, at every opportunity, trees, shrubs, grasses and other plants have been established next it. This is one example of a pocket of urban forest next to the freeway.

Melways 29 B8

Urban forest created by Brunswick South-west Planters

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At **Union Street** in **Brunswick** the creek passes an interesting rocky outcrop. This is an example of a sedimentary rock as can be seen by the many layers. There are small hollows in this rock where European honey bees have made their nest. This section also has a small collection of remnant vegetation, where there are lots of plants of state and regional significance.

Melways 29 B9

Sedimentary rock outcrop at Union Street Brunswick



Nature quietly takes a hold where ever it can. River Red Gums naturally germinate along creeks and rivers after floods wash their seeds downstream. This one has got a foot hold in a crack in the concrete lining of the creek.

A River Red Gum sapling clinging to life in a crack in the concrete channel

As you travel along the Moonee Ponds Creek Trail, during planting season you may see active restoration being carried out by *Creek Crusaders*.

In **Delhi Reserve**, Travencore Park (Flemington), art panels hang on the concrete wall of the freeway sound barrier.

Melways 29 A8

Right: Creek Crusader volunteers hard at work in Delhi Reserve



The **CityLink Ornamental Pond** serves many purposes. It provides habitat, it is a slow point for the creek, enabling silt to settle out of the water, and creates a reflective surface for the red sculptural poles. Silt is cleaned out of the pond each year to make sure that the water quality is maintained. **Melways 29 C12**

Red sculptural poles reflected in the CityLink Ornamental Pond

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All the way along Moonee Ponds Creek, Creek Crusaders are out in force each year, for Clean Up Australia Day.

At **Flemington** in Debney Park, this day is a great opportunity to connect people who live and work along the creek. By sharing knowledge of the creek, food and music, we come together to celebrate our diverse community.

Melways 29 B12

*Creek Crusaders at work along the creek
for Clean Up Australia day*



*Above: Trin Warren Tam-boore, Royal Park Wetlands
with the Commonwealth Games Athletes' Village in
the background.*

At **Royal Park**, the creek is joined by water from the Royal Park Wetlands, called Trin Warren Tam-boore (Bellbird waterhole). These wetlands were created as part of the development of the 2006 Commonwealth Games Athletes' Village. Through the natural, biological action of native plants, stormwater from the village is treated and filtered before flowing into the creek. The plants, rocks and water form a home for birds, frogs, snakes and a wide range of aquatic animals.

Melways 29 D12

*Right: Water flows from the Royal Park
Drain into the Wetlands where it is
filtered before flowing into Moonee
Ponds Creek*



Moonee Ponds Creek Crusaders





Near **Macaulay station**, the concrete lining has been removed, allowing the creek to flow more naturally for the rest of its journey to the Yarra River. Here the creek broadens out and is influenced by tidal flows.

Melways 43 B3

Across the creek from Macaulay station

Creek Crusaders are working to restore the natural vegetation along the banks. The creek now flows amongst industrial sites, rail yards and the freeway. This area was once marshland.

Melways 43 A6

Creek Crusaders planting along the bank of the creek



Black Swans nest in this area. You may be lucky enough to see some sitting on a nest or cygnets (baby swans) with their parents in this stretch of the creek.

A black swan and cygnet below Dynon Road

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Just before the creek reaches its final destination, there is a site near **Footscray Road**, belonging to Mainco. Vic Track staff and their CEO spent a warm afternoon planting over 600 plants and trees on this site as part of the Keep Australia Beautiful Week. This group are enthusiastic Creek Crusaders, keen to restore a degraded industrial site along the Moonee Ponds Creek Trail.

Melways 43 B7

Vic-Track staff with one of the trees they planted

Moonee Ponds Creek reaches the Yarra River at Docklands.

Melways 42 J8



Moonee Ponds Creek in flood in 2004 where it reaches the Yarra at Docklands.

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Activities: To be run by the teacher

Making a Mini Catchment

Aim: This activity demonstrates how a catchment works

Equipment: Watering can or spray bottle filled with water
Tarpaulin
Books or block for the base
Bucket or basin to catch the water (acts as the bay)

Before the experiment:

Have a class discussion of all the features you will need in your catchment (mountains, creek, flat farming areas, housing areas, bay)

Steps:

1. Place books / blocks as a base
2. Place tarp over base creating an incline so water can run down the sides into a crevice creating a creek.
3. Place basin / bucket at the bottom of the creek to catch any water.
4. Spray water along the creek beds and banks.

Discussion:

1. Which way did the water flow? Why?
2. What happened to water sprayed over the creek area?
3. What happened to water in the flat areas?
4. How would different surfaces affect water movement – e.g. bushland, roads?

Catchment Land Uses

Aim: This activity covers different land uses and how they effect and are affected by the catchment

Equipment: Map of a catchment (Google map, melways or one of the above maps)
Books or internet access for research

Students break up into groups and research one of the following types of land use in the catchment:

- FARMING can cause erosion, through animals and loss of top soil
- INDUSTRIAL: Possible pollution through spills, increased runoff due to more hard surfaces
- URBAN / RESIDENTIAL: Weeds can spread from gardens, increased litter due to higher population and increased runoff due to more hard surfaces such as roads.
- NATURAL filters the water making it cleaner when it enter the creek, creates shade and habitat

On your chosen map students to mark where their land uses would be and create a key.

Discussion: What effects would the different land uses have on the catchment?
Can natural reserves make to reduce the effects of polluting land uses?
What is the expected effect on native animals through land use changes?

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How does your school impact on the Moonee Ponds Creek catchment?

Aim: Show the local impacts that individuals have on the catchment

As a class discussion, fill in the impacts that the students suggest in the left column (see example below) under the 3 headings.

Issues	Impact (Positive/ Negative)	Actions
Water Wasting • Dripping bubblers • Single flush toilet • Leaks • Water fights	Negative	• Start an environment group. • Put ice cream containers under taps. • Always use the half flush – put signs in the toilets to remind everybody.
Waste Management • Litter • Not recycling paper • Not composting food and green waste	Negative	• Bins with lids, more bins & clean it up, put it in the bin! • Picking up papers should not be punishment. • Set up a compost bin with groups taking turns to look after it • Waste free lunch events to raise awareness.
Creating Habitat • Planting indigenous plants	Positive	• Keep pulling out weeds • Infill planting

Discussion: What were the worst impacts we found?
Which actions can we realistically work on?

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2. STORMWATER POLLUTION

Theme:

- *How pollutants enter the water.*
- *Who pollutes and different kinds of pollution*
- *How we can monitor water quality for pollution*
- *How we can minimise our impact on our local creeks.*

Background Information:

In urban environments stormwater is the main cause of pollution in our creeks. After a rain event all the water finds its way into our waterways as it trickles downhill through valleys and slopes, through gutters and off roofs, along our streets, over hard concrete and bitumen surfaces and is

washed down the stormwater drains on the edge of the road.

The drains then lead directly to the local creek. But the water carries with it any pollution that it picks up an accumulation of pollutants on the way which it carries including sand and soil, animal faeces, oils, chemicals, detergents and litter.

Stormwater does not include sewage, as this is diverted through a different pipe system where it goes to a treatment facility. Sewage is water that flows down any of the drains inside our homes and businesses, whereas stormwater is water from outside.



Stormwater drain

Litter facts:

Different types of litter have a different effect on the Moonee Ponds Creek

- | | |
|---------------------------|--|
| Plastic Bags | <ul style="list-style-type: none"> - floats then sinks - suffocate animals - breaks up and ingested by fish, platypus. |
| Cigarette Butts of water. | <ul style="list-style-type: none"> - one butt contaminates 40 litres (8 buckets) - toxins leach into water within an hour - mistaken as food by wildlife - Dolphins can breathe them through breathing hole. |
| Garden waste | <ul style="list-style-type: none"> - spread weeds along creeks - adding excess nutrients to the water. |
| Dog Poo | <ul style="list-style-type: none"> - excessive e. coli and nutrient levels in water. - About 900,000 dogs in Victoria produce 90 tonnes of poo each day = approx weight of 80 medium cars. |



Litter trap

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Activity: To be run by the teacher

Litter survey of the school or site you are testing

Aim: To determine where and what types of litter are found in the school ground that may contribute to Stormwater pollution.

Equipment:

- Tongs or other implements to pick up litter
- Buckets or bags
- Graph paper/rulers/pencils/erasers
- Rubber gloves
- Tarp

Method:

Draw a map of the school yard marking in the following features. It may help to use graph paper:

Buildings	Grounds	Others
Classrooms	Asphalt	Trees
Toilets	Paths (concrete/dirt/gravel)	Fences
Library	Playground	Seats
Bike racks/sheds	Garden beds	Bins
Canteen	Oval	Creek/wetlands
Hall		
Verandahs/sheltered areas		

Teachers should allocate students to groups which will survey different areas of the school ground for presence of litter.

For 10 minutes each day for a week after lunch, students should collect litter using tongs, gloves, buckets and/or bags and then sort the litter by type as indicated on the results sheet.

Results:

Details	Day 1	Day 2	Day 3	Day 4	Day 5
Weather					
No. of students in area					
Was the canteen open?					

Record the number of items below:

Litter item	Day 1	Day 2	Day 3	Day 4	Day 5	Total	% of total
Plastic							
Milk/juice cartons							
Glass							
Paper/cardboard							
Food scraps							
Aluminium foil/							

Discuss the results

What was the most common form of litter?

Where was the most litter found?

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Activity: To be run by the teacher or Waterwatch Officer (depending on availability)

Stormwater Story for the Moonee Ponds Creek

Aim: How different types of pollution gets into the creek
What we can do to help keep the creek clean

Equipment:

Small containers (film canisters work well) filled with a makeshift pollutant to go with each character.

Sieve to remove waste

Large transparent container / fish tank (preferably see through)

Story Characters:

Hiker Harry

Fisherman Fred

Swimmer Susie

Farmer Joe

Heard of Cows/ sheep

River Bank (can multiply)

Trees

Mr. Maloney

Dog (can multiply)

Builder Bob

Sally Suds

People in cars

People in their homes

Smokers (can multiply)

School kids (can multiply)

Pollutants in canisters:

toilet paper sheets

fishing line or string

cordial (representing urine)

rock salt (representing fertiliser)

dirt and mud clumps (representing poo)

dirt

leaves

grass clippings

mud (representing dog poo)

sand/gravel

detergent

cooking oil or soy sauce (to represent car oil)

newspaper pieces

cigarette butts or rolled up yellow paper

rubbish (soft drink tops, chupa chup wrappers)



Introduction:

- Assign each student a character and corresponding film canister as outlined above (If you have more than 15 students, assign extra students to be dogs, city folk or school kids or make up more characters).
- Students to sit in a circle and place the large container/fish tank in the centre of the circle.
- Read the Story (either teacher to read or divide so students can read sections) then when each student hears the name of their character mentioned in the story they will empty the contents of their film canister into the container in the centre.
- The stormwater mixture should obviously look pretty disgusting by the end of the story!

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Story:

We will start our story just north of the Melbourne Airport. This is where the Moonee Ponds Creek begins its winding journey to where it meets the Yarra River at Docklands. The Yarra River then flows out into the ocean. The Moonee Ponds Creek starts its journey in the beautiful Woodlands Historic Park among the beautiful River Red Gum trees.

This region is the traditional land of the Wurundjeri- illam people.

It was a beautiful morning and the clear water of the Moonee Ponds Creek was shining in the sunlight as it bubbled over stones and pebbles. Many animals lived in the creek, such as frogs, fish and lots of tiny little water bugs. Because it was such a nice spot in the woodland, many people came to visit. Some people loved it so much that they would stay all day for picnics and bush walking. The Smith family was going on a hike along the creek. But soon, one of the children, who had had a big juice at lunch needed to go the toilet. There were no toilets around so **Hiker Harry** grabbed some toilet paper and went to go to the toilet behind a tree. But he forgot to bury his toilet paper after he'd finished with it. Soon it started to rain and Hiker Harry's used toilet paper was washed into the nearby creek. Uh-oh!

In this woodland, a Kookaburra starts laughing and a snake slivers through the grass. Eastern Grey Kangaroos jump around and echidnas use their big tongues to eat ants.

The creek continued to flow through the woodland. It soon reached a fisherman who was sitting on the banks of the stream trying to catch a fish. The fish didn't seem to be biting this morning and the rain was starting to get heavy so he packed up his gear and decided to go home. But he didn't realise that he left some fishing line sitting on a rock next to the water. So sure enough **Fisherman Freds** fishing line was soon washed into the creek by the rain. Uh-oh!

There was a section of the creek in Attwood where the local kids liked to go swimming. It wasn't that deep but they sat down, letting the water flow over their legs. But one of the kids, **Swimmer Susie**, was suddenly busting to go to the toilet. She was having too much fun swimming, so she thought 'who cares' & went right there in the water. Uh-oh!

The creek kept flowing through some farms. At the Jones farm, the farmer was putting some fertiliser on his plants to make them grow better. But **Farmer Joe** didn't realise that the rain washed the fertiliser into the creek. Uh-oh!

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Farmers had cows eating grass on the farm near the creek. The cows would walk through the creek, sometimes to get a drink, sometimes to get to the other side. The cows stomped the dirt on the River Bank. The dirt then fell into the creek.

The Cows also did many cow poo's near and in the creek.

Along the banks of the creek here at the Jones farm, somebody had chopped away all the big trees like River Red Gums and removed all the bushes and shrubs. So the dirt on the edge of the banks had no tree roots to hold onto. So when the rains came, the water washed heaps of dirt into the river. Uh-oh! This is called Erosion.

Moonee Ponds Creek soon passed through the farmland areas. It is looking a little dirty now, but still some little bugs liked to live in it. The creek was now at Broadmeadows where there were suddenly lots of houses around. There were at least some trees planted along the edge of the little stream, so that the animals in the river could have some shade. But they were the wrong trees! They weren't native trees that come from Australia, like gum trees, but strange trees from overseas. In autumn time, all the leaves fell off these trees and landed straight in the creek. Uh-oh!

The rain stopped for a little while so Mr. Maloney, whose house is right next to the creek, decided to mow his lawn. When he'd finished, he put all his grass clippings in a big pile at the back of his garden, because he didn't know what else to do with them. Just as he sat back down in front of the telly to watch the Saturday footy match, the rain started again and his grass clippings were washed over the ground and into Moonee Ponds Creek.

Uh-oh!

The creek then flowed through Royal Park where people liked to walk their dogs. It was a nice park, except there was dog poo all over the ground! So where do you think the dog poo was ending up on a rainy day like today? -In the creek. Uh-oh!

Down the road from the park, Builder Bob was building a new house. He was mixing up some cement, which was his favourite job! But today it was not so much fun, because the rain just wouldn't stop and he was getting very wet! But Builder Bob didn't realise the rain was washing his cement gravel down the front driveway and into the gutter on the side of the road. The cement gravel was then going down the drain and into the creek nearby. Uh-oh!

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The rain then stopped again so Sally Suds decided to wash her Dad's car to earn her pocket money for the week. She loved this job and really wanted the money because she was saving up for a bike. As she washed her Dad's car parked in their driveway, she watched as the soapy bubbles flowed down the driveway and into the drain in the gutter on the side of the road. She wondered where they were going to end up, but didn't realise that the soaps were flowing into the creek near her house. Uh-oh!

Once the river reached Flemington, it is not too healthy (as you can see). But here in the city, still more pollution was finding its way into the creek! People in cars didn't realise that the petrol and oil in their cars was sometimes leaking onto the road and that this is a problem when the rain washes it down the stormwater drains and into the creek.

Other people in their homes also didn't realise that the newspaper and other rubbish that had blown out of their recycling bins on bin night was now being washed by the rain down the same drains and into the creek. Uh-oh!

In their school yard some school children had finished their lunch so dropped the wrappers on the ground. Those wrappers were washed down the drain and into the creek.

Some smokers waiting at a tram stop were smoking and then dropped their cigarette butts on the ground. Cigarette butts are one of the worst types of litter as one butt pollutes eight buckets of water!!

Moonee Ponds Creek is now looking very sick. The polluted water flows into the Yarra River which has been through a similar journey and all the pollution from the Moonee Ponds Creek and the Yarra River ended up in the ocean!!!

Discussion:

What could the characters have done differently?
clean?

What can we do to help keep the creek

What other types of litter can you think of?

Post-activity:

Design an anti-litter campaign around your school. This could include:

- Creating anti-litter posters,
- Litter free lunch day,
- Present a performance at assembly on the evils of litter.

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2.1 WATER QUALITY TESTING

Theme:

- *A fundamental understanding of waterway health
- *How to measure the pollution caused by stormwater runoff
- *The effects different pollutants have on the water quality

Background Information:

There are a number of parameters we test the creek water for which tells us how healthy the creek is and the different types of pollutants which may have entered the water.

When testing the water quality it is really important to choose the same site(s) and time of day each time, to have consistency.

Each month you will test a new parameter. Here is information needed to conduct each test:

Temperature

Temperature is one of the most important things to measure. Many biological physical and chemical characteristics of a river such as the solubility of compounds and rates of chemical reactions are directly affected by temperature.

The temperature of freshwater creeks and rivers is naturally affected by the depth of water (generally the deeper the water the cooler the temperature) and the season and time of day. Temperature may also be influenced by industrial, agricultural and warm urban runoff from streets and footpaths, increased suspended sediments in the stream and by clearing of verge vegetation that shades the watercourse.

Effects of Temperature

The distribution and abundance of aquatic plants and animals changes as the temperature varies. Changes in temperature will alter the amount of oxygen dissolved in the water. It will also affect the rate of photosynthesis by algae and other plants. Increases in water temperature will cause an increase in the metabolic rate of organisms in the water. Increased metabolism increases the oxygen demand of fish, aquatic insects and bacteria. A short period of high temperatures each year can make the stream unsuitable for sensitive organisms even though the temperature is tolerable during the rest of the year. Some species have different temperature requirements at different stages of life. Fish larvae require a narrower range of temperature than do adult fish. Thermal stress can occur where the temperature changes more than 1 or 2°C in 24 hours.

Measuring Temperature

You will need a thermometer.

1. Press ON/OFF button on thermometer.
2. Record the temperature of the air (Note: the button on the back changes the reading between Celsius & Fahrenheit).
3. Take a water sample from midstream. (Preferable where the current is flowing)
4. Lower the thermometer into the water sample.
5. Leave the thermometer in the water for about one minute before taking the reading
6. Record the result in the result column of the Physical and Chemical Tests Record Sheet on page 31.



Using a thermometer

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Turbidity

Turbidity is the cloudiness of water that results from suspended material in the water. Suspended solids in the water decrease the ability of light to pass through the water column, which can limit plant growth. This in turn affects the fish and invertebrate communities that feed and live on the plants. The most common causes of turbidity in our waterways are sediment, algae and inorganic material from soil weathering and erosion, and stormwater.

Measuring Turbidity

1. Perform the test out of direct sunlight (remove sunglasses).
2. Hold the tube at arms length about the height of your belly button.
3. Shake sample vigorously.
4. Slowly pour the water sample into the water column while looking vertically down into the tube.
5. Stop pouring the water at the point where you can no longer distinguish between the black waves at the bottom of the tube while sighting the tube from above. (A white sheet of paper underneath the tube may help with accuracy).
6. Note the reading from the scale on the side of the turbidity tube.
7. Record the reading as NTU (nephelometric turbidity unit) on the results sheet
8. The scale is non linear (logarithmic) and there are gaps between the numbers. When the water level is between two numbers, record the value as less than the last number. If you can see the wavy lines when the water is at the top of the tube, record the result as <10 NTU.

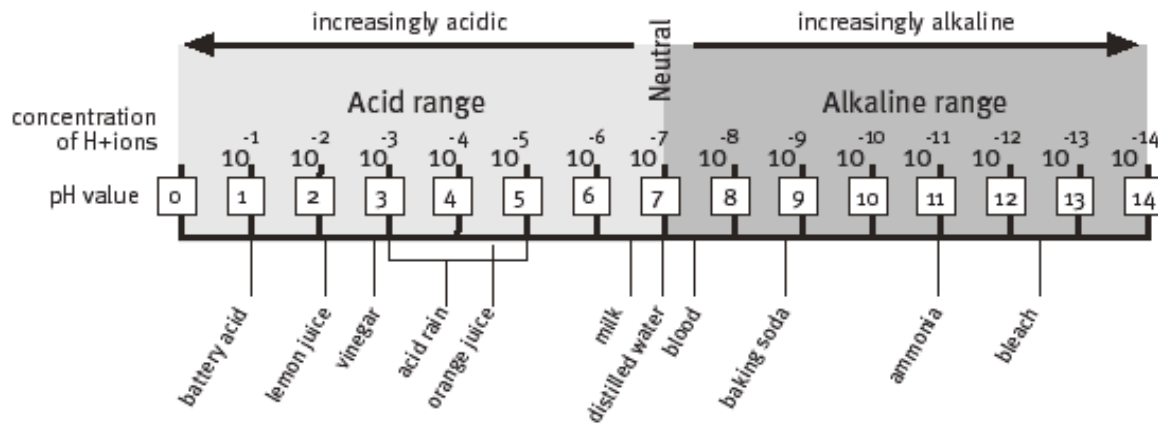


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pH

The pH of a stream is a measure of how acidic or alkaline (basic) the water is on a scale of 0 to 14. Pure distilled water has a neutral pH of 7. A pH measurement between 0 and 7 means that the water is acidic and a measurements from 7 to 14 indicate alkalinity.



pH scale and pH of selected liquids

The natural pH of a stream depends on the geology and soils of the catchment. Aquatic plants and animals are adapted to this natural Ph range of their stream habitat. Human activities, such as stormwater, industrial and agricultural runoff can alter the pH of a waterway and impact upon aquatic ecosystems. In general a pH range of 6.5-8.2 appears to provide protection for the life of fresh water fish and bottom dwelling macroinvertebrates (waterbugs).

Measuring pH

pH measurements should be made in the field, as the pH of a bottled sample will quickly change due to biological and chemical activity in the sample container. Meters should be calibrated daily to ensure quality assurance of data.

1. Press and hold the ON/OFF button to turn on.
2. Submerge the electrode in the solution to be tested while stirring gently.
3. Record the value when the reading stabilizes for 10-15 seconds.
4. Press the ON/OFF/MODE button to turn the meter off.
5. Rinse, dry and re-cap probe.

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Conductivity

Salinity is the amount of dissolved salts (ions) in the water. The types of salts may include chlorides, sulphates, carbonates, sodium, magnesium, calcium and potassium. These salts enter the waterway through run off from rocks and soils of a catchment. The soils and geology of the waterways catchment normally determine salinity, however human activities can drastically increase salinity levels. Salty water conducts electricity more readily than pure water; therefore salinity is measured as electrical conductivity (EC) and total dissolved solids (TDS).

Conductivity varies naturally with the depth of the water. Variations in conductivity may also be the result of the geology of the area, ground water seepage, industrial and agricultural effluent, stormwater runoff, land clearing and sewage effluent.

Salinity problems arise through the removal of deep-rooted vegetation and through poor irrigation practices. This results in more water infiltrating the soil, causing the water table to rise. This water can move towards the surface, bringing large amounts of salt from the underground storage. When the water evaporates it leaves behind the high concentration of salt, which eventually finds its way into the watercourses.

Measuring Conductivity

Conductivity is measured with a meter in micro siemens per centimetre ($\mu\text{S}/\text{cm}$). The natural conductivity of fresh water varies from very low values ($30 \mu\text{S}/\text{cm}$) to very high values ($2000 \mu\text{S}/\text{cm}$). To ensure accuracy, the meter should be calibrated on a regular basis. Metres should be calibrated daily to ensure accuracy of data.

Conductivity Testing

1. Remove the protective cap and switch unit on (ON/ OFF key).
2. Rinse the electrode with sample water before testing
3. Place the conductivity meter into the sample water collected (make sure sensor is fully covered. BUT make sure you do not go above the vertical notches as water could get into the meter and damage it).
4. Stir for a few seconds, then wait for the reading to stabilise (Automatic Temperature Compensation corrects for temperature changes) and then record your result.
5. Rinse, Dry and re-cap probe.

Please contact your Waterwatch Officer to conduct any of these tests with your class. Waterwatch is able to bring along all the equipment to conduct these tests.

The results will be recorded on the Physical/Chemical Record sheet on page 31.

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Activities: To be led by the teacher

Tongue Tasting

Aim: Tasting different sour and sweet substances, mapping how you taste them on the tongue and how they relate to pH.

Equipment:

1 cup of water + vinegar	1 cup baking soda + vinegar
1 cup of water + lemon	1 cup of water plus unsweetened cocoa
Cotton swabs/ cue tips	Masking tape
Textas and chalk	Blindfold

Before the experiment: Mix one tasting solution in each cup. Label the cups with appropriate letters, such as "B" for baking soda or "V" for vinegar. Put the cups in front of the class. Draw a picture of a tongue on the board, telling the students they will use their tongues to make a taste map. *Warn students not to taste unknown liquids normally.

Steps:

1. Blindfold one student and ask them to hold his nose. Dip a cotton swab into a solution and lightly touch it to various areas on the student's tongue. Ask the students to write a letter on the tongue diagram to show where he tasted the solution the most, such as a "B" for baking soda.
2. In pairs have students perform the above test using the solutions on different parts of their tongues, and labelling the tongue diagram as above. **Be sure to use a new swab each time.** Encourage the class to identify a pattern.

Discussion: The solutions used are acids or bases. The vinegar and citrus solutions are acids, which have a sour taste. The baking soda and unsweetened chocolate solutions are bases, which have a bitter taste.

The taste buds on both sides of the tongue have adapted to taste sour substances. The taste buds at the back of the tongue have adapted to taste bitter substances. Other receptors are specialized for tasting sweet and salty.

Discuss other types of acids and bases and that we will test the creek water for them.

Other Resources:

http://www.reefed.edu.au/home/students/web_quest/exploring_wetlands

By entering Virtual Wetland Field Trip you can conduct virtual water quality tests

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Physical/Chemical Record Sheet

Name of School:

Person(s) Conducting Tests:

Date of Tests:

Time of Tests:

Creek / Site Name:

Test	What it Measures	Results	Comments
Air Temperature	Temperature	°C	
Water Temperature	Temperature	°C	
Turbidity	Suspended Solids/Cloudiness	NTU	
pH	Acidity/Alkalinity		
Conductivity	Salinity/Salts	µS/cm	

Weather conditions at the time of sampling:

☐ Sunny ☐ Cloudy ☐ Overcast ☐ Raining ☐ Windy

Last Rainfall:

☐ < One Week ☐ > One Week ☐ During Last 24hrs ☐ Raining Now

Water Appearance:

☐ Clear ☐ Milky ☐ Foamy/Frothy ☐ Stained Green ☐ Other: _____

☐ Cloudy ☐ Oily ☐ Smelly ☐ Stained Brown

☐ Very Turbid/Muddy

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Here is a template for evaluating what your results mean:

PARAMETER	RATING				
	EXCELLENT	GOOD	FAIR	POOR	DEGRADED
CONDUCTIVITY ($\mu\text{S}/\text{cm}$)	 <100	100 - 250	 250 - 500	500 - 750	 >750
TURBIDITY (NTU)	 <15	15 - 17.5	 17.5 - 20	20 - 30	 >30
pH	 6 - 7	5.5 - 6 or 7 - 8	 8 - 8.5	5 - 5.5 or 8.5 - 9	 <5 or >9

(Source: Victorian SOE report)

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3. UNDERSTANDING BIODIVERSITY

Theme: **Making a connection to the local environment*
**The importance of preserving remnant and endangered species.*
**Understanding individual iconic species of the Moonee Ponds catchment and how they work as part of wider ecosystems.*

Topics: **3.1 WATERBUG DISCOVERY**



River Red Gum



Weed Herbarium



Kangaroo Apple

3.2 PRECIOUS PLANTS



Caddisfly



Damselfly



Freshwater Shrimp

3.3 FROGS AND KANGAROOS



Growling Grass Frog at Woodlands Jacana Wetlands



Bandicoot



Kangaroos at Reserve

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Background Information:

Biodiversity is the number and variety of life forms within a given ecosystem or area. Biodiversity is often used as a measure of the health of an **ecosystem**. Today earth's biodiversity consists of many millions of distinct biological species, which is the result of nearly 3.5 billion years of **evolution**.

Moonee Ponds Creek Catchment holds examples many examples of biodiversity. See below for three such sites.



Woodlands Historic Park: The Park contains valuable remnants of the most southerly Victorian extent of grassy woodland open forest. The basalt plains flora consists mainly of grasslands, herbs and tussocks with mostly River Red Gum (*Eucalyptus camaldulensis*) cover. In contrast, the higher areas have an unusual mixture of gum trees as well as Drooping Sheoke (*Allocasuarina verticillata*). The remnant Grey Box, River Red Gum and Yellow Box woodland character has, for the most part, been retained. (www.parkweb.vic.gov.au) Melways map 5

Jacana Wetlands: Created by Melbourne Water in 2002. Now supports frog populations including the endangered Growling Grass Frog. It is used by many birds including those migrating. **Melways map 6 D9, D11** (see aerial photo to left)

Wright Street Reserve: South of Woodlands Park surrounded by residential housing this reserve is considered a site of floral and faunal significance. It has an extensive stand of **remnant** vegetation along the creek, with the vegetation communities of grassy woodland, riparian woodland, riparian scrub and aquatic plants. However this site is under threat from weeds and erosion. **Melways map 5 H6, J6**



Geology: This rock formation is an example of **sedimentary rock**, and can be easily identified by their layering appearance. This type of rock is important in fossil preservation as they form at temperatures which do not destroy the fossil. This formation can be found at Union Street in Brunswick.

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3.1 WATERBUG DISCOVERY

Theme: *Macroinvertebrates (waterbugs) are an integral part of the creek food chain

*Discover how the water bugs move

*There is a high diversity of macroinvertebrates living in our local creeks

*Macroinvertebrates tell us how healthy the water is

Background Information:

An aquatic macroinvertebrate is a small animal without a backbone that lives in the water and can be seen with the naked eye, also known as a water bug. There are lots of different types of water bugs living in our waterways and they can tell us a lot about the quality of the water. Water bugs are very important to the waterway because most are food for bigger animals like fish, platypus, water rats and birds.

Macroinvertebrate surveys involve identifying the 'bugs' living in our waterways. Some macroinvertebrates are very sensitive to pollution which means they provide an excellent indicator of the health of our waterways. Generally sites with good quality water have many different kinds of water bugs (also known as having a high level of species diversity).

There are lots of different types of water bugs and each one needs specific environmental conditions, such as nutrients and enough oxygen in the water, in order to survive. Changes in water quality can lower the numbers of different types of water bugs and increase those bugs which are more tolerant to the conditions in the water. Bugs that can survive under polluted conditions usually increase in number because other types of bugs aren't competing with them for food.



Damselfly Nymph emerging from its aquatic casing to become an adult

- See Appendix 1 for a chart of the most common macroinvertebrates found in Moonee Ponds Creek, listed from very sensitive to tolerant.

- See Appendix 2 for a data sheet on how to calculate the bug score.

Please contact your Waterwatch Officer to conduct any of these tests with your class. Waterwatch is able to bring along all the equipment to conduct these tests.

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Activities: To be led by the teacher after the Waterwatch session

Waterbug Drama

Aim: To follow up on what the students noticed about the waterbugs shapes and movements



Steps: Students can work alone in pairs or small groups
They decide on a waterbug they will act out.
Give them a few minutes to coordinate how they will act out the movement of the bug.
In front of the class each group acts out their waterbug whilst the rest of the class guesses which bug they are.

Discussion: How did the waterbugs move?

Waterbug Art

Aim: To follow up on what the students noticed about the waterbugs features, shapes and movements

Equipment: Paper, pencils, modelling clay, goggle eyes, natural materials (sticks, leaves, seed pods)



Activity:

1. Students can draw their favourite waterbug looking at the number of legs, how big the eyes are and the shape of their body
2. Students can make their bugs using any variety of materials you would like to supply.

Discussion: What parts of the waterbugs did you consider when creating them?

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3.2 PRECIOUS PLANTS

- Theme:**
- *The difference between weeds, native and indigenous plants.
 - *Moonee Ponds Creek was a supermarket for the local indigenous people
 - *Exploring plants uses your senses
 - *What live in different parts of a River Red Gum

Background Information:

Plants are an important part of the land. Their roots help to hold the banks of rivers and creeks together and stop them from eroding. Plants also help to keep the watertable down, provide shelter for birds and animals as well as providing food for them.



Indigenous plants are local plants that are best suited to the soil and climate of their local area and provide the best habitat for local animals.
Picture left: The indigenous Kangaroo Grass (*Themeda triandra*) found in many local grasslands.

Native plants can come from anywhere in Australia and don't necessarily suit local soil types and climate.

Picture right: A Western Australian plant, such as the Kangaroo Paw pictured right would be classified as an introduced plant along the Moonee Ponds Creek.



Introduced plants are from other parts of the world, also known as weeds.

Picture left: Arum Lily, originally from South Africa found along a local creek.

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River Red Gums (*Eucalyptus camaldulensis*)

(**Kulin language – Biel**) is an iconic indigenous species of the Moonee Ponds catchment. Some individual trees found along the creek in Woodlands Historic Park are around 400 years old. These trees provide homes to possums, birds, owls and micro bats, as well as many different insects and invertebrates.



The River Red Gum has distinct fruiting capsules which look like cones. The leaves are often infested by insect larva called lerps which are sweet and were eaten by Indigenous people.

To the Indigenous people the River Red Gum is symbolic of the entire community and access to the land and its resources.



Yam Daisy (*Microseris lanceolata*)

(**Kulin language – Murnong**)

The non-starchy roots could be eaten raw or cooked.

Cooked in the earth ovens the roots produce a dark sweet juice called Minne.

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Austral Crane's Bill - (*Geranium solanderi*)
(**Kulin language – Terrat**)

A native herb; Indigenous people cooked and ate the starchy root. It was also used to treat diarrhoea.

Kangaroo Apple

(*Solanum aviculare*) can be found at various points along the creek.

The leaf shape looks like the footprint of a Kangaroo (see left photo).



The ripe red berries (photo above right) were eaten by the Indigenous people of the area.



Hop Goodenia - (*Goodenia ovata*)

When the leaves and twigs are infused together they are reported to have anti-diabetic capabilities

The plant was used to help children sleep on a long journey.

Silver Banksia - (*Banksia marginata*)

(**Kulin language – Woorike**)

The flowering cones were soaked in water in tarnuks to extract the sweet nectar to make drinks. The dry cones were also used as strainers.



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Mat rush - (*Lomandra longifolia*)
(Kulin language – Karawun)

The long leaves were used to make baskets and fibre was scraped out of the leaves to make string-bags (called Warrak/Belang). The roots were usually eaten roasted, seeds were collected and ground to make a type of flour, and the soft base of the leaves could be eaten as a snack while travelling.

Pig face - (*Carpobrotus modestus*)
(Kulin language – Keeng)

When the fruit is ripe in summer it can be eaten raw. The green leaves can also be eaten cooked or uncooked.



Drooping She-oak - (*Allocasuarina verticillata*)
(Kulin language – Wayetuck)

The young shoots and cones were eaten. The wood of the she-oak was used to make wonguims also known as 'boomerangs' and other implements.

Spreading Wattle (*Acacia genistifolia*)
(Kulin language – Burn nar look)

Many Acacia's had different uses. The gum (sap) would be collected and soaked in water to make a sweet drink. It was also used as glue.

The bark after being soaked in hot water was used to treat indigestion and for tanning. The seeds were ground to make flour, and the wood was used to make tools.



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Fungi

There are many types of fungi in the Australian landscape. Some can have beneficial relationships with other plants (mycorrhizal) and others decay the remains of other organisms (saprotrophic).



Water Plants



Water Ribbon (*Triglochin procerum*)

The tuberous roots were roasted and part of the stems were eaten like celery.

Cumbungi (*Typha domingensis*)

Baskets were made from the leaves. The roots were steamed in earth ovens then peeled, then chewed until the potato tasting starch was gone. The fibre which remained was used to make string.



Common Reed (*Phragmites australis*)

The roots were eaten. The stems were used to make light spears, woven baskets and necklaces.

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Nardoo - (*Marsilea drummondii*)

(**Kulin language – Dullum-Dullum**)

Nardoo grows in water and floodplains. Women roasted and ground the brown spore-cases, and the hard dark spores are separated from the whitish spores. The spores swell when in water and were made into a cake and cooked.



Reading Materials:

Gott B, Conran J, 1991, Victorian Koorie Plants, printed by Program Print, Hamilton Victoria Australia.
Lassak E.V, McCarthy T, 1987, Australian Medical Plants, published by Methuen Australia, North Ryde New South Wales Australia.

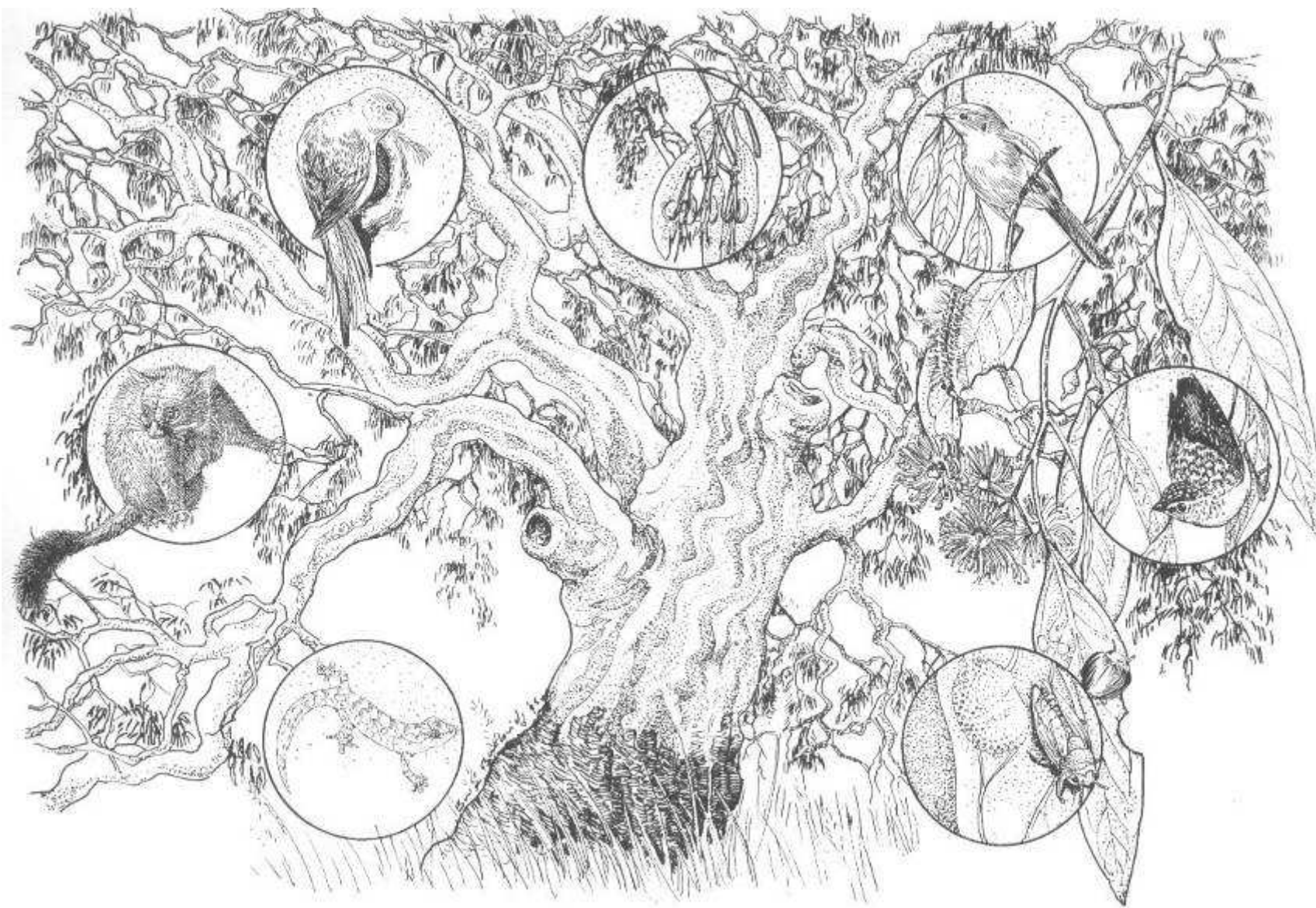
Leiper G, Howser J, 1985, Mutooroo Plant use by Australian Aboriginal People, printed by Assembly Press, Queensland Australia.

Royal Botanic Gardens Melbourne, *Education Service*, Teachers Kit - Aboriginal Resources Trail

Zola N, Gott B, 1996, Koorie Plants Koorie People - Traditional Aboriginal Food, Fibre and Healing Plants of Victoria, printed by Brown Prior Anderson, Melbourne Australia.

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Activities: to be run by the teacher

Habitat in a River Red Gum

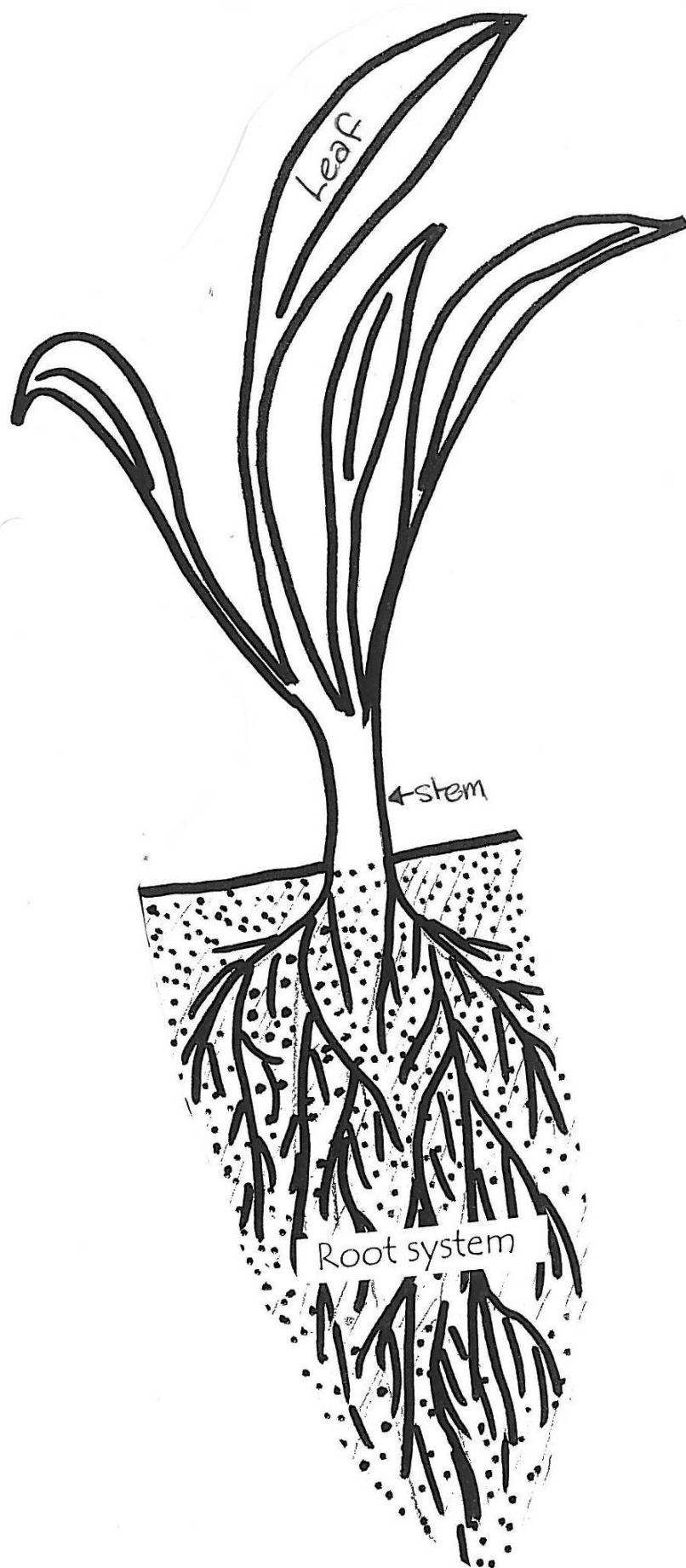
- Aim:** Look at all the different parts of the tree that are used by different animals.
Make observations about a tree in the school yard by looking at it.
- Equipment:** Illustration on page 43
- Discussion:** How many different types of animals can you see living in this River Red Gum?
What part of the tree would they live on – leaves, under bark, hollows, in the roots, sitting on a branch etc?

Botanical Drawing

- Aim:** Discover different plant shapes, sizes and textures
Learn the difference between weeds and native plants
- Equipment:** Plants (from nursery or collect from schools ground and along the creek)
Paper and pencils
Magnifying glasses (optional)
- Introduction:** Discuss the difference between weeds, native and indigenous plants (see *Precious Plants* background information).
Talk about the different parts of a plant and describe differences between them e.g leaf shape, furriness, pointy etc.
- Session:** Students to draw one of the plants in front of them looking at all of the parts, shapes and sizes (see next page for plant parts).
- Discussion:** What did they notice about the plants when they drew them? Pointy, rough, fluffy, etc.

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Activities: to be run by teacher or Waterwatch Officer (depending on availability)

Five Senses in the Field

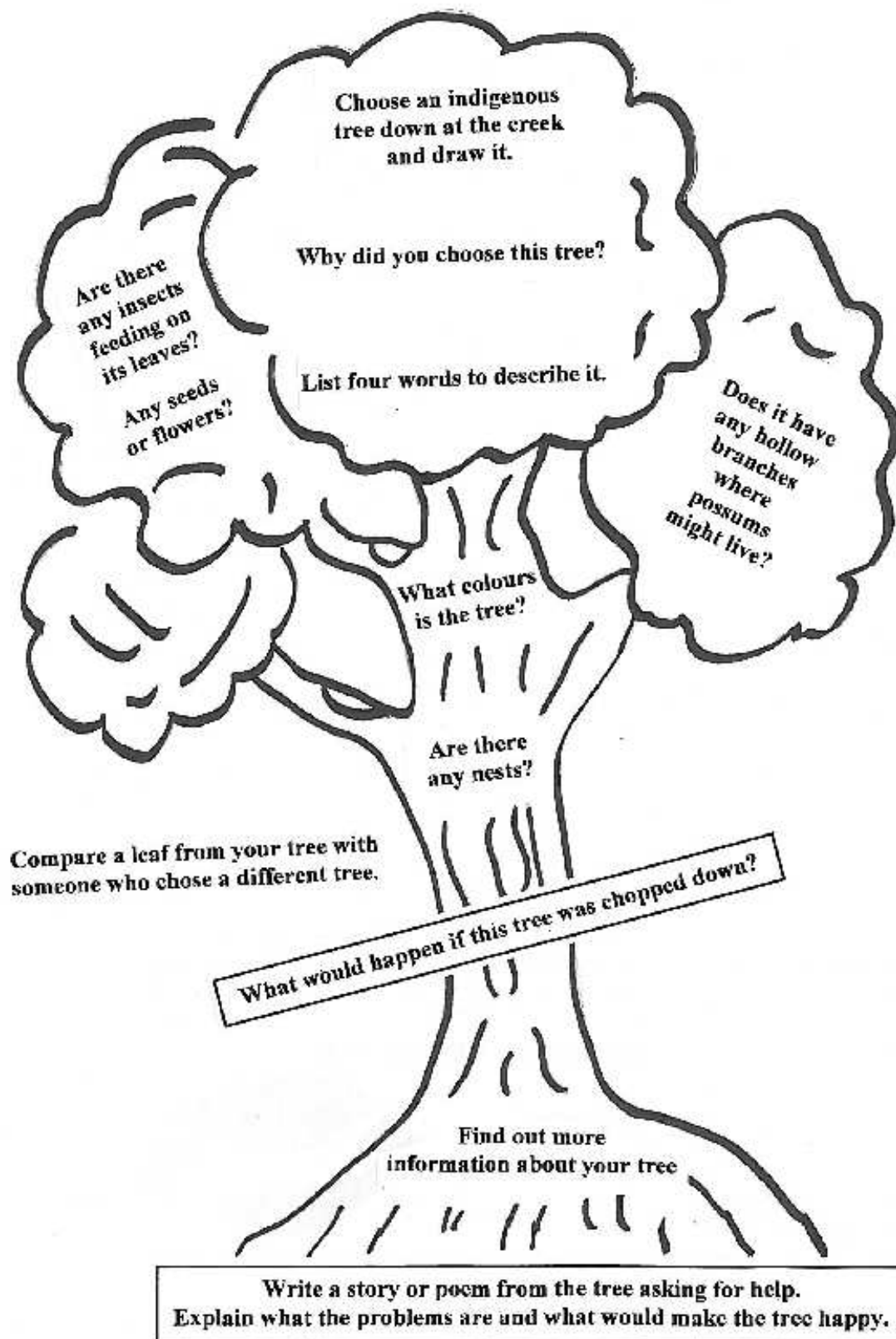
- Aim:** Students will use many of their senses to discover different ways of observing their surroundings. From magnified views of a leaf to viewing a canopy from underneath using a mirror.
- Equipment:**
- small mirrors
 - magnifying glasses
 - paper
 - 1 or 2 x feel boxes (with something natural to touch)
 - 1 or 2 x smell boxes (with something natural to smell)
 - textas
- Setup:** Collect natural materials for smell and feel boxes. E.g. Dirt, grass, gum leaves, flowers. Set up each box on a table with paper and a texta next to it. This session will need to be undertaken in a natural outside setting.
- Steps:**
- 1. Introduction** – Talk about how scientists use observation as a tool. How many types of observation are there? Discuss the 5 senses.
 - 2. Hearing** – Do circle of sound. Get the students to close their eyes and open their ears to listen. Then discuss the different sounds they heard.
 - 3. Touch and smell** – the student's line up behind one of the boxes and either smell or feel (depending on box) what is inside without looking. Then write a word to describe it on the paper. Try and get them to think outside the square. Once they have done one they should line up again and eventually do the rest. Then discuss the words they wrote and show them what was in the boxes.
 - 4. Sight** – Talk about how you can look at things differently. First get them to look around and tell you what they can see. Then hand out magnifying glasses so they can look closer at things. Then hand out mirrors saying that you can view things from different angles. Get them to hold them under a canopy, or walk with it at the side of their head.
- Discussion:** Discuss the observations the students made that they had not noticed before the activity.



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The tree with questions...



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3.3 FROGS & KANGAROOS

Theme: **Endangered species exist in the most unlikely areas*
 **These endangered and vulnerable species need our protection*
 **Connections within an ecosystems and how they all rely on each other.*

Background Information on Frogs:

- Frogs have been on the earth for 400 million years
- There are about 6,500 frogs world wide
- If frogs are removed from the wetland the water will get dirtier as the tadpoles eat the bacteria and nutrients and there will be many more insects as the frogs eat them
- Frogs eat insects including waterbugs, other frogs, algae, detritus (eaten by tadpoles)
- Only male frogs call as they are trying to attract a mate. Females only hear the call of their own species, except for Growling Grass Frogs which eat smaller frogs, so need to hear them.

Common Frogs of Moonee Ponds Creek



Name: Pobblebonk (*Limnodynastes dumerili*)

Size: 5-8 cm

Distribution: Common and widespread.

Description: A medium to large frog with 2 sub-species occurring around Melbourne. A distinctive characteristic of this species is a large oval gland on the tibia (top of rear leg). The gland produces chemical secretions that are either toxic, or at least distasteful, to a range of predators.

Habitat: Despite its reliance on large permanent bodies of water such as dams and large ponds, individuals have been found burrowed in gardens several kilometres away from breeding sites.

Call: Well known for its explosive single note advertisement call 'bonk'.

Breeding: Spring and early summer

Eggs: Females produce floating foam masses of up to 4,000 pigmented eggs.

Tadpoles: Are usually darkly pigmented and can obtain sizes in excess of 7 cm. If conditions are suitable metamorphosis can be delayed well over 12 months.



Name: Growling Grass Frog (*Litoria raniformis*)

Size: 6- 9 cm

Distribution: Once common around the waterways of Melbourne, this species has now become so rare that it has been classified as endangered. It is present at Jacana Wetlands.

Description: Large, with long back legs, this frog is easily recognised by its green and gold colouration and scattered warts. It is the only green frog

around Melbourne.

Habitat: Associated with large permanent water bodies such as dams and large grassy wetlands.

Call: Males produce a growl-like 'cra-wark cra-a-ak crok-crok'.

Breeding: Spring through to early Summer

Eggs: Several thousand eggs are laid in extensive mats, that eventually sink to the bottom.

Tadpoles: Can reach over 10cm in length making them the biggest around Melbourne.

For more information on frogs visit: www.frogs.org.au

- See Frogs of Melbourne poster in Appendix 3

Moonee Ponds Creek Crusaders

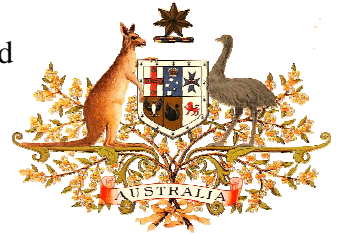


Background Information on Kangaroos:



"Fir0002/Flagstaffotos"

- The species found along Moonee Ponds Creek are the Eastern Grey Kangaroo, which is one of over 69 species of kangaroos and wallabies.
- A Kangaroo uses its tail for balance and steering whilst hopping at high speeds.
- The kangaroo is on the Australian coat of arms and the 50 cent coin. The Emu and the Kangaroo were selected as symbols of Australia to represent the progress of the country because forward and never move backwards.



- The babies are only the size of a jelly bean when they are first born. When they're about one year old they don't need mum's milk any more – but they stay close to her as they still have a lot to learn.
- Kangaroos are Australia's best known and largest marsupial. Kangaroos are herbivores. They eat only grasses and the shoots of small trees. As they do most of their feeding in the evening or at night they are nocturnal animals.
- Grasslands provide kangaroos with their main source of food, which is native grass. Eastern Grey Kangaroos have lost most of their grassland habitat through land use change. Less than 1% of the original grasslands that existed in Victoria 200 years ago remain today.

Photos

<http://en.wikipedia.org/wiki/Kangaroo>

Pre-activity: students to research an iconic animal of the Moonee Ponds Creek Catchment, such as a frog, bandicoot or kangaroo.

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Activity: to be led by the teacher

Food Webs

Aim: This is an interactive way of looking at how an ecosystem works. Each student becomes an animal or plant in the food web and we discuss and discover what lives where and who eats what. Find out what happens if something is removed from the food web, by such things as pollution, decline in habitat or an introduced predator.

Equipment:

Animal and plant cards (*see Appendix 4*)

String (optional)

Introduction: Talk about key concepts like **ecosystem, habitat, herbivore, carnivore, predator** and **prey**. (See glossary for definitions)

- The class will create its own food web and each student plays a part. Handout a card to each person, talk about the animal or plant as you hand them out and tell them to think about what their plant/animal would rely (food, shelter) and what would rely on them.
- Get them to move amongst each other and put their hand on the shoulder of something they rely on. This then creates a web (alternatively at this stage you can create connections with string)
- Go through the web and get the students to explain why they chose their connections.
- Introduce predators into the mix and remove any of the students the predator would kill. Then remove any that relied on those that were just killed etc.

Discussion: Talk about why there are so few remaining at the end. You can also introduce things like a pollution spill and see the effects that would have on the food web.

For an online food web activity visit:

www.gould.org.au/foodwebs/

Activity: led by the teacher or Waterwatch Officer (when available)

Frog Re-call

Aim: Learn some local frogs calls and that each species has a different call.

Equipment:

Frog cards - see *Appendix 5*

Frog call recording CD – see inside of back cover

Introduction:

Play the frog calls, looking at pictures and information of that frog that goes with them.

Students to think of a sound the frog call reminds them of and write it next to the frogs name on the board.

Break up into smaller groups

Session:

Lay the pictures of frogs (without the name) on the ground.

Play a call.

One member from each team stands around the frog card they think it is.

Then we see if they were correct or why it was easy to mistake for the other frog.

You can do as many rounds as you like.

Discussion:

What sort of things impact on a frog – pollution, loss of habitat, chytrid fungus

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Activity: to be led by the teacher

Adapting to Habitats

Aim: Animals and plants need to **adapt** to live in certain types of **habitats**

Equipment: Magazines, newspaper, scissors and glue

Introduction: Humans adapt in all sorts of ways:

A diver – needs flippers, oxygen tank, wet suit, goggles

Astronaut – need space suit, oxygen, and aircraft

Hiker – needs water, backpack, hiking books, sunhat, long pants and shirt (for protection)



Session: Use pictures from magazines etc. of people adapting to different activities and lifestyles and label how they have done that.

Discussion: Why humans dress up for these different lifestyles.
Then discuss how other animals such as Kangaroos adapt:

- The mother kangaroo spends most of her adult life pregnant, but in drought times she has the ability to indefinitely "freeze" the development of the young embryo until food sources are replenished.
- The mother can also produce two different types of milk to suit the needs of two different aged joeys. She might have a more mature joey that spends less time in the pouch, while a very young embryo has attached itself to a teat. Each joey has different milk requirements - which the mother is able to supply.
- Kangaroos are able to travel long distances at a high speed, expending very little energy. They are very energy-efficient, and this is linked directly to the physical action of bringing their hind legs up with each hop. Every hop literally refills the lungs.
- Kangaroos are strong swimmers. Many parts of Australia are subject to seasonal flooding rains, but the kangaroo's body shape does not prohibit it from swimming. In fact, kangaroos have been observed swimming to offshore islands off the southern coast.
- Kangaroos are more active in the cooler hours of the early morning and the late afternoon. During the heat of the day they are more sedentary, lying around quietly conserving their energy.

To be involved in the Melbourne Water Frog Census visit

<http://frogs.melbournewater.com.au/content/schools/schools.asp>

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4. PEOPLE & THE ENVIRONMENT

Theme: * Looking at the impacts that Indigenous and no-indigenous people have had on the Moonee Ponds Creek and surrounding environment, both positive and negative.
 *The cultural connection between people and the environment.
 *People taking responsibility for the environment.

Topics:

4.1 NOT SO LONG AGO



4.2 CREEK CRUSADERS



4.3 WATER CONSERVATION



VS



Moonee Ponds Creek Crusaders



4.1 NOT SO LONG AGO

Through what we now know as Melbourne's north-western suburbs, there once flowed a dynamic waterway. The physical landscape we see today is not what the Moonee Ponds Creek was originally



*Moonee Ponds Creek at
Woodlands Historic Park*



The Tarnuk Westmeadows

The Moonee Ponds Creek begins its journey from an intrusion in granite hills north of Woodlands Historic Park. It is one of the watercourses that drain into the Yarra River providing a corridor between the mountains and the bay, for both Aboriginal people and fauna. The creek had shallow ponds of water that formed a chain along the length of the watercourse, isolated in drier times of the year, and flowing in the wetter months after heavy rains.

The Creek and Woiworung – (Woy wur rung) – the Wurundjeri people

These environments would have provided a water source as well as abundant plant and wildlife resources. Eels and Murnong (Yam Daisy) appear to have been prominent resources along the creek. As well as these food resources, there were camp locations on the nutrient-rich floodplains that, at certain times of the year would have encouraged Aboriginal people to take advantage of its seasonal bounty. When Europeans first settled the Port Phillip region it was already occupied by five Aboriginal language groups. These groups spoke a related language and were part of the Kulin (Koolin) Nation of peoples.

These peoples were:

Eastern Kulin Language Group

Woiworung – (Woy wur rung) – the Wurundjeri people

Boonwurrong – (Boon er rong) – the Boonwurrong people

Taungurong – (Tung ger rong) – the Taungurong people

Dja Dja Wrung – (Jar Jar Wrung) – the Jaara people

Western Kulin Language Group

Wathaurung – (Wath er rong) – the Wathaurung people

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Each of these language groups consisted of up to six or more land-owning units, called clans that spoke a related language and were connected through cultural and mutual interests, totems, trading initiatives and marital ties. The local clan, the **Gunung Willam Balluk** (meaning 'creek dwelling people'), were connected to the Moonee Ponds Creek and other waterways in the area.

There is still evidence of Aboriginal occupation at Woodlands Historic Park. Scattered through the park are scarred trees and surface stone tool scatters; and an occupation site is also listed in the park. Other resources within the park which would have been used by the Aborigines include kangaroos and possums, birdlife such as water fowl, and plant foods including Yam Daisy, tubers and gum resins. (1)

In 1840 Lady Mary Greene Stawell described the native inhabitants in her diary: '*When we first took up our abode at Woodlands, a tribe of Aborigines used to camp on the creek (Moonee Ponds Creek) that ran through our property. Their colour was a rich dark brown, their figures slight and graceful; they had fine eyes and splendid teeth, and thick black hair. They were very intelligent soon learning to understand English, and laughing heartily at anything that amused them... They were wonderfully athletic and agile, and it was a fine sight to see them throw their spears and boomerangs. In their games they used light reed spears, and it was remarkable how, with almost imperceptible movements, they avoided an opponent's spear. They danced in their corrobarees at night, and it was picturesque to see these dark figures with the light from the large fires playing round them. Their only shelter from the weather were the "miamias" – mere windbreaks, made of branches of trees or, in winter, of bark; they lived a really open-air life and a most healthy one it was. They were different then from what they became afterwards, when they had learnt to drink, smoke and wear European clothes*'. (2)

European Settlement

In December 1824, after some 36 years of settlement at Botany Bay/Port Jackson, the first white men came overland to the Port Phillip area from New South Wales, a party led by Hamilton Hume and William Hilton Hovell.

In June 1835 John Batman brought a party from Van Diemen's Land (Tasmania). He appears to have crossed the district from the west to the east; his route most probably took him closer than Hume and Hovell to the Broadmeadows area as he travelled over the plains. Through treaties with the local Aborigines, he laid claim to a vast area of land to the north and west of Port Phillip Bay, some 240,000 ha, on behalf of the Port Phillip Association. Batman chose for himself an area extending from Deep Creek (Maribyrnong River) to the Merri Creek, incorporating most of the Broadmeadows area. On 2 September 1835, the Governor of the Colony of NSW (which then incorporated Port Phillip) repudiated Batman's and others' claims, and proclaimed the treaties void and the settlers to be trespassers. The region was taken under formal government control. (1)

In July-August 1835, an advance party sent by John Pascoe Fawcner from Van Diemen's Land also arrived in the Port Phillip area. (2) The Government Surveyor, Richard Hoddle, began surveying the Port Phillip area, dividing it into parishes each of approximately 65 square km, which were further subdivided. Hoddle's parishes in the Broadmeadows area included Jika Jika (taking in the area south of Rhodes Parade, Glenroy and east of the Moonee Ponds Creek); Doutta Galla (which included the Strathmore area); Will Will Rook (north of Rhodes Parade to north of Barry Road, and east-west from the Merri Creek to the Moonee Ponds Creek); and Tullamarine. The names were derived from Aboriginal names. (2)

The first land sales in the area of Strathmore on Moonee Ponds Creek were made in 1843 and 1845.

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Early Development of the Lower Reaches of the Creek

Near its entry to the Yarra River, the creek formed a series of marshy ponds on the flood plain, with extensive salt marshes known as Batman's lagoon. With rapid development of Melbourne due to the Victorian gold rush in the 1850s, the swamp quickly became a receptacle for waste waters from Flemington, North Melbourne and Parkville.

In 1879 Batman lagoon was drained and filled to make way for the North Melbourne railway yards at its northern end. In the southern area, the filled-in marshes were called Dudley Flats, where, during the 1930s depression, impoverished people scrounged building material from the land-fill tip to build shelters and huts.

In the 1890s the lower Moonee Ponds Creek was used as a canal access for coal for railway locomotives.

The creek becomes a drain

Between 1940 and the 1980s the Melbourne Metropolitan Board of Works, now called Melbourne Water, realigned and concreted the creek from Strathmore to Flemington Road, in an attempt to stop periodical flooding. The modifications were part of extensive urban development of the lower floodplain. For much of its length through the northern suburbs it is now characterised as a concrete stormwater drain that parallels the Tullamarine Freeway.



The Creek in flood in 2005

- (1) Lemon, A., 1982, Broadmeadows: a Forgotten History; Hargreen Publishing Company.
- (2) Lennon, J., 1993, Red Gums and Riders: a History of Gellibrand Hill Park, Dept. of Conservation and Natural Resources.
- (3) Hunt, A., 1993, Broadmeadows: A Concise History, Broadmeadows Historical Society.

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Moonee Ponds – The Name

There are many different theories of the origins of the name 'Moonee Ponds'. Nobody really knows.

According to the Argus newspaper on 1st September 1934, Moonee Ponds was first known as Moonee Moonee Ponds which meant plenty of small flats. The same paper quoted Marl I. Meagher as saying the name derived from John Long Moonee, a British soldier who was a Crown grantee of allotments in and around Moonee Valley.

It is also claimed that Moonee Moonee was an Aborigine attached to the mounted police. Moonee Moonee, or Mooney Mooney was headman of the Balluk willam clan arrested at the same time as Tullamareena, (see the story below).

The 1918 Victoria railways list of stations and names supports this derivation.

Another source says the Moonee Ponds area of Essendon almost certainly derived its name from a corruption of the name of Captain Mooney, who was a large land holder in the area.

It is considered most likely that the name was derived from the Aboriginal name for the Moonee Ponds creek rather than the name of any of the early European settlers. A form of the name first appeared in the surveyor Robert Hoddle's Field Book in 1837 when he referred to the "Mone Mone Chain of Ponds". This reference is very early in the Settlement of the Port Phillip area.

Subsequent maps of the period show the name of the creek as "Moonee Moonee Chain of Ponds". The use of double word construction "Moonee Moonee" in the name is also typical of Aboriginal names as adopted by the European colonists.

(Source: www.enet.org.au/historyonline/suburb/suburbnames.htm)

Tullamarine derives from the Indigenous name Tullamareena

Tullamareena was a Woi wurrung man who escaped from the first Melbourne jail by burning it down, in a dramatic act of resistance to the imposition of White authority.

The background to the incident reveals much about how the white intruders overtaxed the hospitality of the Kulin peoples. By early 1838, Europeans had already taken over the best country around Melbourne, and sheep were spreading up and down the river valleys in plague proportions. Displaced from their traditional food-gathering areas, many Kulin took refuge in the town. Others came from far away, curious to see the strange new settlement.

At first, the only provision made for them in town was the Government Mission, near the present site of the Botanic Gardens, but it could not cope with the hundreds who flocked in. Tullamareena was a regular visitor there, and George Langhorne, the missionary, described him as 'a steady, industrious man'. He would have needed to be, given the regime at the mission, where people were expected to work long hours in the fields for very little return. When supplies at the mission ran short, the Kulin turned to other sources of food, among them a potato field beside the Yarra owned by one John Gardiner. One night in April 1838 a watchman saw a party of Aboriginal men, including Tullameerna, digging up potatoes. When he accosted them, a man pointed a gun at him.

Moonee Ponds Creek Crusaders



The threat of violence was averted by Tullamareena, who persuaded his companion to lower his weapon. For a moment, this seemed to resolve the issue. The watchman and the potato-diggers shook hands, and the terrified watchman said he would not tell Gardiner they were there.

Then, as soon as their backs were turned, he ran home to raise the alarm. Gardiner's men rushed out, brandishing their weapons, and the potato-diggers fled. Most swam across the Yarra to safety, but Tullamareena was knocked down with the butt of a rifle, tied up, forced into a boat and taken to the jail, along with another man known to the Europeans as Jin Jin.

When news of the incident reached the mission, there was a panic. The residents crowded around the missionary's house, asking what would happen to Tullamareena and Jin Jin. Then, fearing retribution, all but 30 of the people headed for the hills.

Tullamareena soon followed them, much to the authorities' surprise. His method of escape was ingenious. The jail was a crude structure with wooden walls and a thatched roof. Tullamareena pulled a long straw from the thatch and worked it through a chink in the wall into the guard room, where he held it over a candle until it caught alight. He then used the burning straw to set fire to the roof and escaped in the ensuing confusion.

In May 1839 the Assistant Protector William Thomas recorded the death of Tullamareena's wife, who was among the many Kulin to succumb to diseases introduced by the white settlers. She was buried next to her husband, who had died some six months earlier.

Further reading: Alastair Campbell, *John Batman and the Aborigines*, Kibble Press, 1987, p. 208; *Historical Records of Victoria*. Volume 2A: 'The Aborigines of Port Phillip, 1835-1839', pp. 213ff

Moonee Ponds Creek Crusaders



4.2 CREEK CRUSADERS

All along the creek there are people who have devoted their time and energy to the creek. They have formed great friendships while participating in the restoration of the creek and its environs for all to enjoy. In trying to undo some of the damage humans have done to this waterway, they have contributed to retaining sites of remnant vegetation and restoring habitats for the wild life that once inhabited the area. Thanks to their efforts birds such as the New Holland Honeyeater and Reed Warbler, and animals such as the Rakali, (Water Rat) that had become rare in the area, can now be seen or heard in many parts of the creek.

Here are some of the people who form the Creek Crusaders and what they like about the creek.



Kelvin Thompson MP

Kelvin spent his childhood playing along the creek with his brother, and has many memories of the adventures of a wild open space and untamed creek. These experiences spurred him on to protect the creek he loved. For the past 21 years he has campaigned for the creek.

He established the Moonee Ponds Creek Association, which became the Friends of Moonee Ponds Creek in 1989. Kelvin still actively participates in and chairs the Friends of Moonee Ponds Creek, despite many other demands on his time as a Federal Member of Parliament for Wills.

'The thing I like most is riding my bike along the creek and being able to see the results of the work of many committed volunteers such as the Jacana Wetlands, the Strathnaver Grasslands, and

Five-Mile Creek.'

John Hughes

John has lived alongside the creek since he was about 12 (26 years) in various locations from Essendon to Gowanbrae.

He plants trees, removes rubbish and weeds, and more than anything he encourages the students and families at his school to get involved in the creek and appreciate it as a great place to play, rest, exercise or contemplate.

'I like the idea of improving the surrounds for the residents, making the place more inviting for birds and other local creatures, and hopefully doing something towards returning the creek to its former glory.

I used to love watching the water rats swimming around near the bridge at Cross Keys Reserve, but perhaps the most amazing thing I ever saw in the creek was the massive flood back about 5 years ago. Seeing the Jacana wetlands and all the surrounding areas full like that was amazing. The houses along the creek in Gowanbrae were all sandbagging their houses – just amazing'



Moonee Ponds Creek Crusaders





Nina Eason

Nina has lived along the creek for 27 years. As a child she lived in a house that backed on to the creek, and for the last 15 years she has lived in a house that faces the creek.

Nina has been involved with the creek as a volunteer for about six years, and she really likes seeing how the creek has improved over the years

Nina and her family love to go to the rocks near Nursery Corner, where the kids play on the rocks while the dog sits in the water.

'I have fond memories of the creek near Strathnaver Reserve. As a child, the grass was so

long it was almost above our heads. One of us kids would hold our dog and all the kids in the neighbourhood would hide in the grass. We would then release the dog and it would have to find all the kids all by sniffing its way through the long grass. We would spend hours down the creek, it was great fun.'

Kaye Oddie

Kaye's involvement with the Moonee Ponds Creek started in 1999 after the construction of City Link had left the lower section of the creek between Macaulay Road and Dynon Road denuded and the rehabilitation revegetation plantings had predominantly failed.

After two years, Transurban organised with Greening Australia, the MPCCC and local residents for the replanting of the banks on the western, Kensington side of the creek. To continue the activities in this area, Kaye was instrumental in the formation of the Friends of Lower Moonee Ponds Creek and she very much enjoys working together with the wider community to green the lower Moonee Ponds Creek.

'What has been most rewarding is seeing the replanted banks of the creek grow so they provide habitat for the birds and create a pleasant open space area for local residents to enjoy, as well as a nice view for cyclists using the bike path on the opposite side of the Creek. It's good too, to know that our small sections of reveg are part of the wider objective to create a green (habitat) corridor the full length of the creek, from its source above Woodlands to where it joins the Yarra River.'



Moonee Ponds Creek Crusaders



Elissa Simmons

Elissa has been involved with the creek since she was 15 when she used to "hang out" in the Westmeadows region of the creek with her pals. Since 1996 she has been employed as a horticulturalist working with community on the revegetation of the creek. In 2006 she became a volunteer on the creek, as have members of her family (Matt and the kids - Jack & Tahlia).

She likes many things about working on the creek – the satisfaction of seeing revegetated areas flourish and function as wildlife habitats.

'I especially treasure the bonds and friendships formed with other creek community members and past MPCCC staff. Although I know most parts of the creek, I love the upper regions with the River red gums the best. As Glenroy locals my family and I enjoy our Jacana Wetlands section - the birdlife is fantastic! I have fond memories of sitting under a yellow gum nursing my baby daughter and listening to the pobblebunks and a growling grass frog. But there are also sad times like when an arsonist set fire to the Friends of Upper Moonee Ponds Creek planting area - even though it was devastating, the Friends group folk have never given up.'



Here are some other Creek Crusaders from planting events along the creek. They bring together corporate groups, community groups, scouts, conservation groups, students from schools and colleges.



Moonee Ponds Creek Crusaders



4.3 WATER CONSERVATION

Theme: **The distribution of different water types over the earth*
 **The different groups that use/need water*

Background Information:

- 70% of the Earth's surface is covered with water.
- Over 97% of the Earth's water is salt water in the oceans.
- 2% of the Earth's water is frozen in glaciers and ice caps.
- Leaving only 1% of the Earth's water available to supply our daily needs. Our freshwater supplies are stored underground or in lakes, reservoirs, rivers and streams on the Earth's surface.

Water trading

Environmental flows

Activities: to be led by the teacher

Earth's Water

Aim: This activity demonstrates how much of the Earth's water is freshwater and that only a small percentage is available for our use.

Equipment: 2 litre plastic bottle blue food colouring
 salt cooking oil

Steps:

- Put a couple of drops of blue food colouring into the bottom of the 2 litre plastic bottle.
- Pour water into the container up to where the bottle tapers in.
- Add 3 teaspoons of salt to the blue water. This water represents ocean water, which is salty and cannot be used to drink, water plants or what else? (discussion)
- Slowly pour 40 mL of cooking oil on top of the salt water in the 2 litre bottle. The oil represents the 2% of frozen freshwater in the form of ice and snow.
- Pour another 20 mL of oil in the bottle to represent the freshwater available on Earth for the environment, agriculture, drinking, plant use and all of our other freshwater needs.
- What percentage does the 20 mL represent?

Discussion:

Freshwater makes up such a small percentage of the earth's water?

Do we use all the freshwater?

Some freshwater is not easy to access; it may be trapped under the ground or flow quickly out to sea.

What might happen if we don't care for our water? The water will be too polluted to use.

If people use all the available water what would happen to the environment, including rivers, plants and animals?

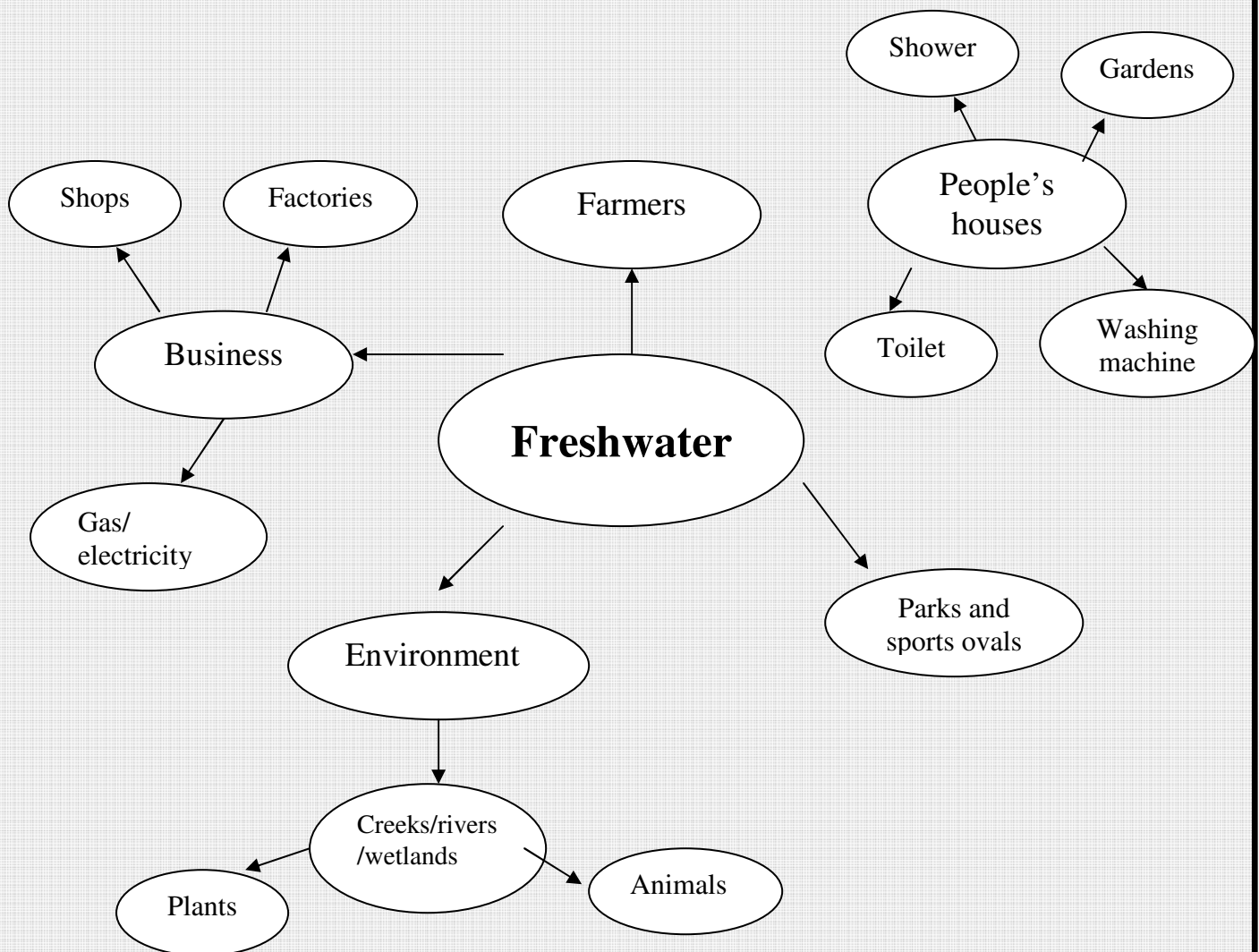
Moonee Ponds Creek Crusaders



Water – who needs it?

Aim: Discover all the parties that use freshwater.

Steps: Create a mind map of water use, by putting water in the middle and students say what or who uses it. See below for an example



Discussion:

- In Melbourne approximately 60% of water is used by households, 30% by industry and 10% for fire fighting, leaks and stolen water.
- Of water use at home 20% is in the garden, 30% in the shower and 50% used for toilet flushing, washing clothes and dishes and tap flows.
- What effect has the drought had on the distribution of water?

Moonee Ponds Creek Crusaders



- Waterways need a water flowing down them. This is called **environmental flow**. The flow will fluctuate seasonally and it can be natural to dry up at times. However if too much water is taken from the streams they will not recover.

School Water Audit

<u>Aim:</u>	Conduct a water audit of the school
<u>Equipment:</u>	Buckets or ice-cream containers
<u>Before the experiment:</u>	Students identify different types of taps in the school
<u>Steps:</u>	Measure the flow rate of each type of tap during a 15 second time period, by putting a bucket under the tap, running it for 15 seconds and measure the volume of water in the bucket. With this information, students will work out how much water would be wasted if a tap was left running for one minute, one hour, one day, one week etc.
<u>Discussion:</u>	How many water wise features, devices and options you can think of to turn this school into a water wise school.

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VICTORIAN ESSENTIAL LEARNING STANDARDS

Activities	VEL S Level 4	Health & Physical Education	Interpersonal Development	Personal Learning	Civics & Citizenship	The Arts	English	Humanities	LOTE	Mathematics	Science	Communication	Design, Creativity Technology	ICT	Thinking Processes
MP Creek Catchment															
Stormwater Pollution															
Water Quality Tests															
Waterbug Discovery															
Precious Plants															
Frogs & Kangaroos															
Not So Long Ago															
Creek Crusaders															
Water Conservation															

Moonee Ponds Creek Crusaders



GLOSSARY

<i>Adapt</i> <i>(adaptation)</i>	The evolutionary process whereby a population becomes better suited to its habitat.
<i>Biodiversity</i>	The range or number of different types of living things in an environment.
<i>Carnivore</i>	Any meat eating organism.
<i>Catchment</i>	The area of land from which a stream, river or lake receives its water. The rain falls on the area and makes its way to the waterway.
<i>Common species</i>	The population status of the species is abundant; not under threat.
<i>Detritus</i>	Non-living organic matter. It typically includes the bodies or fragments of dead organisms as well as fecal material.
<i>Ecosystem</i>	A complete system made up of the plants and animals living together and interacting to support the system.
<i>Environmental</i> ecosystems.	The amount of water needed in a waterway to maintain healthy <i>Flow</i>
<i>Erosion</i>	Loss of soil or wearing away of rock surfaces. Natural erosion is due to water or wind. Unnatural erosion can be caused by land clearing, cattle, lack of vegetation.
<i>Evolution</i>	The development of new species from older species through the process of natural selection.
<i>Fauna</i>	Collective name for animals
<i>Flora</i>	Collective name for plants
<i>Geology</i>	the science and study of the solid and liquid matter that makes up the earth and the processes by which they are formed.
<i>Habitat</i>	The natural environment on which an organism(s) rely for life, including food, shelter etc.
<i>Herbivore</i>	an animal that feeds entirely on plants.
<i>Omnivore</i>	an animal which eats plants, insects and other animals.
<i>Macro-</i>	are creatures such as snails, mites, bugs, beetles, dragonflies, <i>invertebrate</i> freshwater crayfish and worms that live in rivers and streams.
<i>Predator</i>	An animal which hunts, kills and eats other animals.

Moonee Ponds Creek Crusaders

