

**These Teacher Notes to accompany Student Booklets that contain colour photos which are available at the camp**

# **TEACHER NOTES**

## **ENVIRONMENTAL TRAIL**

### **TREES IN A CHANGING ENVIRONMENT**

#### **AIM.**

- \* To let students investigate how trees (and some other plants) respond to changes in the environment.
- \* To develop an awareness of environments and how their components are linked to each other.
- \* To develop observation and clear thinking skills.

#### **BACKGROUND.**

- \* The trail will take 45-90 minutes depending on how detailed discussions become.
- \* The trail is circular starting and finishing at the camp.
- \* There are sixteen main stops with a few stops in between.
- \* Each stop is accompanied by a photograph (1998); a brief explanation and some questions.

#### **HOW TO USE THE TRAIL.**

The trail can be used in a variety of ways.

- \* **You can follow it step by step and work through all the questions with the students.**  
It is best if they try to come up with the answers themselves with only some guidance from the teacher.  
How much you guide or lead the discussion is up to you.
- \* **You can skip stops and focus on only a few examples.**  
NB Stops 6a, 7, 8a, 11, 15a, require information from previous stops.
- \* **You can make up your own questions.**
- \* **You do not need to just use our stops but can look at other things that interest the students.**



Magnetic North ↑

0 50 100 150 200  
Meters

**Legend**

Man - made feature	x
Main Road	▬▬▬▬▬▬
Minor Road	▬▬▬▬▬▬
Foot Track	- - - - -
4 - Wheel Drive Track	- - - - -
Power Pole	p
Sign	s
Cliff	▬▬▬▬▬▬
Fence	▬▬▬▬▬▬
Tank	o
Building	□
Dam	☀
Location of Stops	● 2
Trail-Direction to Walk	➔

## Stop 1 - WOODLAND ENVIRONMENT.

### 1. HOW MANY DIFFERENT TYPES OF PLANTS CAN YOU SEE?

**HINTS** - Look up and down. Look on other plants.

There are at least **NINE** types of plant in this area:-

**Dogwood** - Small shrub with small needle-like leaves that smell like curry when rubbed between fingers.

**Gum trees** - Smooth barked eucalypts.

**Stringy barks** - Rough barked eucalypts.

**Wattles** - Small trees with black trunks.

**Tee tree** - Small trees with a paper like bark.

**Mosses** - Small green plants on the soil.

**Lichens** - Small blue-green plants on some trees.

**Herbs/Heath** - Very small woody shrubs.

**Grasses** - Self evident.

These are the main **types** there are many more **species** of plants in the area.

### 2. WHY DO YOU THINK THERE ARE SO MANY DIFFERENT PLANTS?

**HINTS** - Think about the soil. What do plants need? Why is there forest here and not farms?

The soil here is very sandy and low in nutrients. No single species of plant can dominate the others by out growing them and blocking them out. The competition for nutrients is too strong. Each type of plant will be limited to a very narrow range of nutrients and thus many plant types can live in the one place because they are not all competing for the same nutrient (food). If they were competing for the exact same nutrients you would see only a two or three main plant types.

“But the trees are so tall and healthy looking. The soil must be nutritious.” I hear you asking. This is the same mistake the early settlers made. Australian plants have adapted over millions of years to our ancient and rather infertile soils. They can grow in large numbers and in places that would not sustain a wheat crop because they are used to the soils and crops are not.

## Stop 2 A - TWISTED TREE.

### 1. WHAT COULD HAVE CAUSED THIS TWISTING?

**HINTS.** Think about the soil (again).

How close is the tree to the cliffs?

Where does the wind blow from?

The soil is very poor here as mentioned before. The lack of nutrients tends to stunt some plants.

Plants will also take after their parents if they were twisted the young trees will inherit this from them in the same way as children share the characteristics of their parents (eye and hair colour etc.)

The winds blowing over the lake can be very strong and will cause plants to bend over a long period of time.

Plants will also bend in search of light. If the tree was shaded by other trees it may have bent to try and get more sun light.

### 2. WHAT HAS HAPPENED TO THIS TREE?

**HINTS.** Look closely at the marks on the tree.

WHAT IS MISSING?

Part of the trunk has been cut off, adding to the twisted nature of the tree.

HOW DID IT HAPPEN?

Possibly with an axe by either a vandal or someone gathering wood.

## Stop 2 B - MOSSES AND LICHENS.

### 1. WHAT DOES IT FEEL LIKE?

Self evident.

### 2. CAN YOU SEE ANY SOIL TRAPPED BY IT?

Self evident.

### 3. IS THIS SOIL DIFFERENT COLOUR TO THE SURROUNDING SOIL? WHY?

**HINTS.** What is job or niche of the moss? What would it do to the soil and dust trapped?

The soil **should** be a darker colour. The moss breaks up the rock and sand and traps dust. It also traps small bits of plants blown into it. It helps in the breakdown of these plant bits as well as bits of itself that die and drop off. These are what add the colour to the sand turning it into soil.

Remember that soils are a combination of broken down rock and broken down plants.

**NB** - The amount of moss varies season to season and you may need to look in other places along the trail for more moss.

### Stop 3 - TWIN TREE WITH A STUMP.

1. WHY DO YOU THINK ONE HAS BEEN CUT OFF?

**HINTS.** What are you standing on?

The track you are standing on once went right round to Sandy Point and linked up to the road to Glenmaggie. The tree would possibly have been leaning over the track or may have broken off in a storm and falling onto the track. Either way it would have had to be removed for public safety.

It may have been cut down for fence posts or firewood.

2. WHY DO YOU THINK TREES HAVE LIGNOTUBERS?

**HINTS.** Think about what it has to survive. What does it have to **do** to survive?

Trees have to cope with many things. Such as - soil type, amount of water, wind, insects, birds, animals, disease, lightning and humans.

It takes a great deal of effort and energy for the tree to grow. It has to put down roots; send up a trunk and branches; make leaves and try and survive all the things mentioned above.

So if it is attacked by any of these things it needs a way to survive. The lignotuber acts as a safety net. If the tree top gets damaged in any way the lignotuber can send out new trunks and branches. This saves the tree having to die. It can use the roots it already has to gather nutrients to send up new growth. This ensures the survival of the tree and allows it to continue growing so it can grow seeds and create young. This ensures that its genes are kept in the environment.

#### Stop 4 - NATIVE CHERRY TREE.

1. WHICH SIDE OF THE TREE HAS MORE BRANCHES. WHY?

**HINTS.** What does the tree have to compete with?

Trees (and other plants) do not like competition. (Some plants even go so far as poisoning the soil around them so that other plants can't grow.) This tree has sent most of its branches out to one side so as not to compete with the other tree. The other tree is too big and would block out too much of the light for the Cherry Tree to grow.

2. FROM WHAT DIRECTION DO YOU THINK THE MAIN WINDS BLOW? HOW HAS THIS AFFECTED THE TREE?

**HINTS.** What way is the tree leaning?

This is quite a small tree as far as trees go and is affected easily by winds. The winds coming from the lake are not disrupted like winds from other directions and thus have a major influence on the Cherry Tree. They caused it to lean over.

The fruit as the name suggests, is edible and tastes like a very watery cherry. Unlike a common cherry the seed is on the outside of the fruit and on one end. Do not eat the seed.

## Stop 5 - EPICORMIC GROWTH.

### 1. WHAT HAS HAPPENED TO THIS TREE?

**HINTS.** Look at its shape and angle.

The tree has been burnt out and hollowed in part.  
It has also has a very distinctive lean.

### 2. WHAT HAS CAUSED THIS DAMAGE?

**HINTS.** Look at the colour.

Fire has cause some of the damage. Many trees in this area are fire damaged.  
The lean is caused by the poor sandy soil not supporting the tree. This is worsened by the fire damage and the strong winds that blow across the lake.

### 3. WHAT ARE THE BENEFITS FOR THE TREE?

**HINTS. Is there any new growth?**

The tree is sprouting new growth and this may grow into a large branch and allow the tree to continue to grow and breed.

### 4. WHAT ARE THE BENEFITS FOR ANIMALS?

**HINTS.** Where do animals live?

The hollow can provide homes and shelter for a wide range of animals (this will be discussed at stop 8b). The ash off the tree can fertilise the soil and the bugs that live in it. The dead wood could be food for a variety of insects..**Stop 6 A - THIN TWISTED TREE.**

NO QUESTIONS TO BE ANSWERED.

## **STOP 6 B - COPPICE GROWTH.**

1. WHAT HAS CAUSED THE STUMP AND THE RESULTING COPPICE GROWTH?

**HINTS.** Look at the top of the stump.

The original tree has been cut for either fire wood or to create the track you have been walking on. This damage to the tree has not killed it, but allowed coppice growth from the buds under the bark.

2. HAS THE TREE BEEN SUCCESSFUL IN ITS REGROWTH?

**HINTS.** Do the new branches look healthy? Are there new leaves or branches growing?

It sent up three quite strong trunks from the stump. They have done reasonably well for a small tree in poor soil and strong winds. The growths are weakening now. Three was probably too many to try and grow, but by having three, it gives the tree three chances to stay alive rather than just one.

## Stop 7 - YOUNG EPICORMIC GROWTH.

### 1. WHAT IS EPICORMIC GROWTH?

**HINTS.** Refer back to stop five.

### 2. WHY HAS THIS TREE SPROUTED NEW BRANCHES SO CLOSE TO THE GROUND?

**HINTS.** What damage has occurred to the tree?

The top of the tree has been broken off. The tree may be rotten or hollow inside. Epicormic growth will have a better chance of success if it starts at the base of the tree where the food transport system is still working properly rather than further up where the damage is at its worst.

This tree is in a rather bad way as some of the epicormic shoots have died, reducing the tree's overall chance of success. This is because there is only a limited number of buds available for epicormic growth.

### 3. WHAT ARE THE BENEFITS OF EPICORMIC GROWTH?

**HINTS.** Refer back to stop five.

## **Stop 8 A - YOUNG COPPICE GROWTH.**

1. WHAT IS COPPICE GROWTH?

**HINTS.** Refer back to stop six B.

2. WHY HAS CAUSED THIS TREE TO SPROUT NEW BRANCHES?

**HINTS.** Look for signs of what caused the damage, eg saw marks or splinters from being broken.

This tree has been cut down for either firewood or to create the track.

3. WHAT ARE THE BENEFITS OF COPPICE GROWTH?

**HINTS.** Refer back to stop six B.

## Stop 8 B - DEAD SPLIT TREE.

### 1. WHAT COULD HAVE KILLED THE TREE?

**HINTS.** What can kill humans?

It could have been killed by a variety of things, disease, lightning, old aged, not enough nutrients or water, damage by animals, wind or fire.

### 2. WHAT ARE SOME OF THE BENEFITS OF THIS TREE DYING?

**HINTS.** What would live in a dead tree?

Many animals would rely on such a tree for food and/or shelter. These include ants, termites, spiders, worms, birds, mice, antechinus (a small native, meat eating, marsupial), bats, moths, butterflies, bacteria, beetles, cicadas just to name some.

The breaking down of this tree by animals and rotting will provide nutrients to the soil and thus allow other trees to grow. This continues the cycle of nutrients. Trees take nutrients from the soil and use them to grow. When trees dies these nutrients go back into the soil to allow the next tree to grow.

## Stop 9 - TWISTED TREE.

1. Why do big trees do better than smaller trees?

**HINTS.** Which is stronger and fitter?

Bigger trees are stronger and have a more developed root system and more methods to survive hardship. More about this later.

2. WHAT COLOUR IS IT?

Self evident.

3. WHAT DOES IT FEEL LIKE?

Self evident.

4. DOES IT LOOK HEALTHY?

The soil is very light and sandy and not very healthy as far as farming goes but for this forest is ideal.

Remember plants will only grow when all of their needs are met. The plants may do better if there was more of some nutrients, but they are surviving well enough to grow and breed and that is all that really matters.

**Stop 10 A - LEANING TREE.**

1. IS THE WEB STILL THERE?

Self evident.

2. WHAT INSECTS COULD USE THIS HOLLOW?

Ants, termites, spiders, worms, moths, butterflies, beetles, cicadas just to name some.

3. WHAT HAS CAUSED THE HOLLOW?

A branch breaking off.

## Stop 10 B - BIG LEANING TREE.

### 1. WHAT HAS CAUSED IT TO LEAN?

**HINTS.** Think about the soil, environment and what a tree has to survive.

Many things could have caused it. Very strong winds; poor soils; weak roots damaged by disease or animals; gaps in the soil caused by rabbit burrows, loss of roots or erosion beneath the ground (not as uncommon as you may think). It could have been a combination of all of these.

### 2. WHAT ELSE HAS THIS TREE EXPERIENCED?

**HINTS.** Look at its shape and colour.

The tree has been burnt and has broken off branches, caused by wind or disease or lightning or fire or a combination.

## Stop 11 - BURNT TREE.

### 1. HOW HAS THIS TREE COPEd WITH BEING BURNT?

**HINTS.** Look for some of the things we have discussed.

The tree has survived by being a large tree and able to withstand a large amount of damage. It has also used coppice and epicormic growth.

### 2. HOW MANY OF THE THINGS WE HAVE LOOKED AT CAN YOU SEE?

**HINTS.** Look on both sides of the track. Look up and look down.

Woodland (like stop one)

Mosses and lichens (like stop two B)

Epicormic growth (like stop five)

Old dead trees (like stop eight)

Burnt trees (like stop eleven)

Twisted trees (like stop two A)

Lignotuber growth (like stop three)

Coppice growth (like stop six B)

Leaning trees (like stop ten)

### 3. WHAT OTHER INTERESTING THINGS ARE THERE TO SEE?

**HINTS.** Look on both sides of the track. Look up and look down.

There are many things to look at. Here are just some.

The undergrowth is thicker here away from the winds.

The soil is slightly different.

There are many stumps with paint marks on them (we do not know why).

Many trees are scarred with the wounds healing over to allow the tree to survive.

There are a wider variety of species.

## Stop 12 - VERY OLD LEANING TREE.

### 1. WHAT IS CREATED WHEN A BRANCH FALLS OFF?

**HINTS.** Look at where there have been branches.

Hollows are created when branches fall off. The hollows are enlarged by rotting or by animals making nests.

### 2. WHY IS THIS USEFUL?

**HINTS.** What could a hollow be used for?

Hollows provide a home for many types of animals such as birds, possums and others. One hollow may be used by several animals at once. Often they are different species as well.

### 3. WHAT IS THERE TO SHOW YOU THAT THIS TREE IS STILL GROWING?

**HINTS.** Look for new growth - branches or leaves.

There are new shoots or epicormic growth in several places on the tree.

**Stop 13 - DEAD STUMP AND LOG.**

1. WHAT ANIMALS WOULD RELY ON LOGS ROTTING LIKE THIS?

**HINTS.** What condition is the stump and log in? Is it hollow or solid?

Many animals would rely on such a log for food and/or shelter. These include ants, termites, spiders, worms, wombats, echidnas, birds, mice, antechinus (small native meat eating marsupial), bats, moths, butterflies, bacteria, beetles, cicadas just to name some.

2. WHAT OTHER PLANTS DO YOU NOTICE IN THIS AREA?

**HINTS.** Think back to stop one.

There are grasses, small shrubs and some dogwood.

## Stop 14 - OVER TURNED STUMP.

### 1. WHERE HAS THE REST OF THE TREE GONE?

**HINTS.** Look for marks on the stump. Are there saw marks or splinters from being broken?

Due to the clean cut marks on the stump the tree was cut up for fire wood, probably after it fell over.

### 2. WHAT WOULD HAVE CAUSED IT TO FALL OVER?

**HINTS.** Look at the roots and the soil.

Many things could have caused it. Very strong winds; poor soils; weak roots damaged by disease or animals; gaps in the soil caused by rabbit burrows, loss of roots or erosion beneath the ground (not as uncommon as you may think). It could have been a combination of all of these.

### 3. WHAT IS THE SOIL LIKE?

**HINTS.** Pick up some and feel it.

It is a very yellow sandy soil. This side of the lake is called Sandy Point due to the sandy soil.

### 4. WHAT HAS HAPPENED TO ITS ROOTS?

**HINTS.** Look for signs of damage.

The roots are broken and hollow. This could have been caused by disease or insects or by rotting.

### 5. DOES THIS GIVE YOU A CLUE AS TO WHY THE TREE FELL OVER?

The tree could have fallen over because the roots were not strong enough to hold it in place. A tree needs a very strong root system not only for food but to hold it up as well.

**Stop 15 A - LARGE LEANING TREE.**

1. WHAT TYPE OF GROWTH IS THIS?

**HINTS.** Think back to some of the previous stops.

Epicormic growth, in response to the tree leaning. As the new growth is straight up it tells us that the tree leant over before the epicormic growth.

2. WHAT COULD HAVE CAUSED THIS TREE TO LEAN?

**HINTS.** Think back to previous stops.

Many things could have caused it. Very strong winds; poor soils; weak roots damaged by disease or animals; gaps in the soil caused by rabbit burrows, loss of roots or erosion beneath the ground (not as uncommon as you may think). It could have been a combination of all of these.

## Stop 15 B - FIRE DAMAGED TREES.

### 1. WHICH ONES HAVE SURVIVED?

**HINTS.** Look at the size and or shape of the trees.

Generally the older, taller and larger trees have survived.

### 2. WHY DO YOU THINK THAT THEY HAVE SURVIVED AND THAT OTHERS DID NOT?

**HINTS.** Who do you think would survive a house fire? An adult or a child?

The older and larger trees survive as they have more defences, such as stronger root system to survive the heat of the fire, more epicormic buds and a stronger/larger lignotuber. The thin trees will burn easier due to a lack of protective bark and also because they are thinner they are like kindling and catch fire more easily.

### 3. WHAT HAVE THE TREES DONE AFTER THE FIRE?

**HINTS.** What have you seen other trees do after being damaged?

Some of the trees have died, some have dead or lost branches and other have sprouted epicormic growth.

## Stop 16 - HUMAN IMPACT ON TREES.

### 1. WHAT HAS THIS TREE BEEN USED FOR?

To hold fencing wire to make a fence.

### 2. HAS THIS CAUSED MUCH HARM TO THE TREE?

**HINTS.** Does it look healthy or sick?

Not really. There is some scarring but this has not adversely affected the tree, unlike one of the trees in the nuclear waste disposal initiative activity that was strangled and had to have part of it removed for safety reasons. The wire may eventually strangle the tree or cause it to grow slower than normal.

### 3. WHAT HAS THE TREE DONE TO COPE WITH THIS?

**HINTS.** Look at where the wire is. What does it look like.

The tree has started to grow over the wire and has sealed the bark over most of the wire. This will help in two main ways. It will stop insects and disease getting into the trunk's centre and secondly it allows the tree to continue to supply water and nutrients up to the top where leaves are.

### 4. WHAT OTHER THINGS ARE THERE TO SEE HERE?

**HINTS.** Look around you. Look up and look down.

There are shrubs, mosses, lichens, rabbit droppings, grasses, plants creeping along the ground and some stacked tyres (our compost bins) just to name a few of the things in the area.