North Coast Regional Botanic Garden, Coffs Harbour

EDUCATION KIT

Our Habitat – Our Home

1 JUNE 2025

Koala in the central forest area of the Botanic Garden, Coffs Harbour

Contributors: Graham Tupper and Simone Olsen
with Jaid Roden and Lillian Stormsong

With acknowledgement to the Traditional Custodians of country, the Gumbaynggirr people, and respect to their elders.

The development of this kit was supported by funding from the City of Coffs Harbour and by the volunteers of the Friends of the North Coast Regional Botanic Garden.

Our Habitat Our Home kit: for stage 3 students under the NSW Syllabus (2017)

Details of other available Education Kits and programs at the Botanic Garden are listed on the Botanic Garden website.

Website: coffsbotanicgarden.com.au
Email: coffsbotanicgarden@gmail.com
Phone: (02) 6648 4144 Information Centre, open 9am to 4pm daily.
Address: Hardacre Street and Coff Street, Coffs Harbour

Follow our Instagram: **coffsharbourbotanicgarden**

Follow our facebook: **Coffs Harbour Botanic Garden**

Design & Layout by Louise Campbell-Smith Contact: paintme.lcs@gmail.com – louisecampbellsmith.com
Photographs by Graham Tupper, or as credited.

Map of the Botanic Garden This map can be downloaded as a pdf from the Coffs botanic garden website. Printed copies of this map are in a visitor brochure available for free at the garden entrance.

Bus parking is available on Coff Street near the garden entrance. Toilets located in the entrance building.

The detailed content of this education kit is based on information drawn from an ongoing fauna survey program at the Botanic Garden conducted by volunteers of the Friends of the Botanic Garden.

CONTENTS

1. INTRODUCTION

The learning activities in this kit aim to foster curiosity and observation. As active learners, students will investigate a variety of plants and animals living in six different types of habitat in the botanic garden. The kit offers a range of learning activities to choose from, or to adapt, to make the most of a field trip to the botanic garden. The kit reflects the NSW Education Standards Authority Stage 3 primary school syllabus.

1.1 Aims

- To learn about the different natural habitat types in the North Coast Regional Botanic Garden, which are typical of the wider Coffs Coast region and NSW North Coast.
- To learn about the relationships between plants and animals in these habitats.
- To understand the need to protect and restore habitats.

1.2 Key Understandings

- Habitats are the homes of living things: plants, fungi, animals.
- Habitats provide shelter, food and water for a variety of animals
- This network of living things creates an ecosystem which interacts with the physical environment including light and water, and can change over time.
- Living things have adaptations which enable survival in the conditions of their habitat.
- Older trees with tree hollows are important in providing habitat for a variety of animals

1.2 Related NSW Syllabus Learning Outcomes (2017)

Science and Technology K–6 Syllabus Stage 3

ST3-1WS-S Plans and conducts scientific investigations to answer testable questions, and collects and summarises data to communicate conclusions ST3-2DP-T Plans and uses materials, tools and equipment to develop solutions for a need or opportunity ST3-3DP-T Defines problems, and designs, modifies and follows algorithms to develop solutions ST3-4LW-S Examines how the environment affects the growth, survival and adaptation of living things

Geography K-10 Syllabus Stage 3

GE3-1 Describes the diverse features and characteristics of places and environments
GE3-2 Explains interactions and connections between people, places and environments
GE3-3 Compares and contrasts influences on the management of places and environments

English 3–10 Syllabus Stage 3 (2024)

EN3-OLC-01 Communicates to wide audiences with social and cultural awareness, by interacting and presenting, and by analysing and evaluating for understanding EN3-VOCAB-01 Extends Tier 2 and Tier 3 vocabulary through interacting, wide reading and writing, morphological analysis and generating precise definitions for specific contexts EN3-CWT-01 Plans, creates and revises written texts for multiple purposes and audiences through selection of text features, sentence-level grammar, punctuation and word-level language

Aboriginal Languages K-10 (2022) Stage 3

3.UL.3 Interacts with others by sharing key points of information in Aboriginal languages

2. ABOUT THE BOTANIC GARDEN IN COFFS HARBOUR

The Botanic Garden was opened in 1988 after years of volunteer work to clean up and plant out the site. The garden has a herbarium (a plant library) a seed bank and a new Nature Discovery Centre serving as an indoor/outdoor classroom available for school use. Most of the visitor services in the garden are run by the volunteers of the Friends of the Botanic Garden. More information about the garden and themed walks is available on the website.

Photo Credit: Rob Cleary

Aerial photo of the garden showing the lake/red bridge in the centre, surrounded by the tidal Coffs Creek.

2.2 The Plants and Wildlife of the Botanic Garden

The Nature Gallery on the garden website contains photos of plants and animals living in the garden. Each photo includes a caption with the common and scientific name of the living thing, where it can be found in the garden, and some fun facts.

NATURE GALLERY: **https://coffsbotanicgarden.com.au/learn/nature-gallery/**

The botanic garden website also offers a range of downloadable introductory guides to the plants and animals living in the garden. See Section 6: Resources and References.

Website:	**coffsbotanicgarden.com.au**
Instagram:	Coffs Harbour Botanic Garden
Facebook:	Coffs Harbour Botanic Garden

There are over 5,000 species of plants recorded on the database of living plants in the Coffs Harbour Botanic Garden.

Over 100 species of birds have been observed in the garden and fauna surveys reveal the garden to be home to koalas, gliders, possums, bats, echidnas, lizards, snakes and frogs.

Wildlife observed in the botanic garden on fauna surveys:

Koala	*Phascolarctos cinereus*
Ringtail Possum	*Pseudocheirus peregrinus*
Squirrel Glider	*Petaurus norfolcensis*
Echidna	*Tachyglossus aculeatus*
Grey-headed Flying Fox	*Pteropus poliocephalus*
Gould's Wattled Bat	*Chalinolobus gouldii*
Eastern Water Dragon	*Intellagama lesueuri*
Land Mullet	*Bellatorius major*
Garden or Sun Skink	*Lampropholis delicata*
Carpet Python	*Morelia spilota mcdowelli*
Peron's Tree Frog	*Litoria peronii*
Powerful Owl	*Ninox strenua*
Brush Turkey	*Alectura lathami*
Eastern Yellow Robyn	*Eopsaltria australis*
Lewin's Honeyeater	*Meliphaga lewinii*
Variegated Fairy-wren	*Malurus lambberti*

Photo Credit: Norm Farmer

Water Dragons are often seen by the pond near the garden entrance in the warmer months.

3. TUNING IN: BEFORE A VISIT TO THE BOTANIC GARDEN

To prepare students for a visit to the Botanic Garden and make the most of their discovery walk at the garden.

3.1: Discovering life in the botanic garden and what makes a 'habitat'

Introduction: To help students tune into learning about plants and animals in the Botanic Garden:
See the list of plants and animals in section 2.2
Explore the 'Nature Gallery' on the botanic garden website (under the 'Learn' tab)

- Who has been to the Botanic Garden in Coffs Harbour before?
- What kinds of plants might you expect to find in the botanic garden?
  (tall forest trees, smaller trees, shrubs, grasses, vines)
- What types of animals might be found in the botanic garden?
  (birds, frogs, reptiles, mammals, insects, spiders and other invertebrates.)
- Where might you find birds living in the botanic garden?
  (in the forest trees, in the undergrowth of trees, by the muddy creek, on a lake)

What is a habitat?

Some simple definitions:
A habitat is the natural environment, or home, of a plant or animal.
A place to find food, water and shelter. A place to live!

Eliciting ideas from students about what a habitat is.

Ask students what they need from their habitat?

- Where do they get their food and water?
- Where do they find shelter?
- Where do they go to learn?
- How far do they travel around their habitat, their 'home range', over a week?

Ask students what other animals might need from their habitat?
For example:

- What does a possum living in a tree need?
- a frog or a lizard on the ground?
- a bird living by a creek?

Explore examples of how some animals might be food for other animals in their habitat.

For example: What do birds eat?
Forest birds: Nectar, insects and spiders on trees. Water birds: Fish and crabs and molluscs

3.2 Comparing different types of habitats

Introduction to Australian habitats

See the range of habitat types on this Australian Museum page:
https://australian.museum/learn/teachers/learning/habitat-posters/

Recap the understanding of what is a habitat. Ask students:

What are some types of habitats found in our location?

For example:

- School yards, urban homes, shopping areas (modified habitats!)
- Eucalypt or gum tree forest habitat
- Rainforests or Mangrove forests as distinctive habitats
- Wetlands or swampy area habitats
- Coastal beaches and headland habitats

Coffs Coast habitats
Different types of 'plant communities' make up different habitat types.
From coastal heathlands to woodlands, to swampy wetlands, to tall dry forests, to rainforests.

Think about how many habitat types there might be on the Coffs Coast?

On the Coffs Coast scientists have identified nearly 90 different "Plant Community Types". Each plant community type equates approximately to a habitat type. These are listed in a report on Fine Scale Vegetation Mapping available on the City of Coffs Harbour website.

Habitats in the Botanic Garden
At the botanic garden in Coffs Harbour the 'Our Habitat Our Home' discovery walk passes through different habitats made up of different types of soil conditions and plants.
These are based on the Plant Community Types in the Coffs Coast vegetation map.

Activity: Habitat Type Match Up

Print off copies of the Habitat Type Match Up page following.

Ask students to match up the photos with the name of the habitat type by drawing a line from the habitat name and description to a photo. There are clues in the habitat description to match up with the right photo.

HABITAT TYPE Match Up

Draw a line from the habitat name to the photo of this habitat type

HABITAT NAME

Mangrove Forest

Grow in the mud by a tidal creek.
Special roots poke up through the mud to breathe.
Smooth barked Mangrove trees.

Dry Open Forest

Large patches of blue sky seen through the leaves.
Tall old trees, some with a lean.
Drier soil with grasses and shrubs

Paperbark wetlands

Swampy waterlogged ground.
Boardwalks to keep your feet dry!
Paperbark trees growing up through green sedges, like tall grasses.

Wet Ferny Forest

Ferny on the moist forest floor.
Less blue sky through thick layers of leaves. Very tall gum trees high above and a second layer of trees

Swamp Mahogany zone

Trees with very thick brown bark by a road – in the just right zone.
Not too dry and not too wet.

3.3 Investigating old trees as important habitat

See these websites for background on why old trees are so important as animal habitat.
https://www.nefa.org.au/old_trees
https://www.environment.nsw.gov.au/resources/cpp/AssessHabitat.pdf

Ask students to think why are trees important as habitat?
What do trees provide for animals?
Explore the different kinds of food and different kinds of shelter.

Why do some animals like living in the trees – up and away from the ground?
Explore for example: Why do koalas live in trees? What might attack a Koala on the ground?

Why might the very old trees be even more valuable to animals as 'habitat trees'.
Discuss how old does a tree need to be before it starts to form useful hollows for animals?
How do hollows form? What little insects eat wood? Why do branches fall off old trees?

Trees need to be at least 100 years old, and often older to form hollows: they are great grandma and grandpa trees.

ACTIVITY: Habitat Tree Match Up

Using the Habitat Tree illustration (next page) ask the students to match up the name of the animals living in the habitat tree with the illustration of that animal.

This drawing is based on a typical Blackbutt tree (*Eucalyptus pilularis*) which grow along the Our Habitat Our Home walk circuit in the Botanic Garden. The animals shown in the drawing have all been observed to be living in the garden in recent fauna surveys.

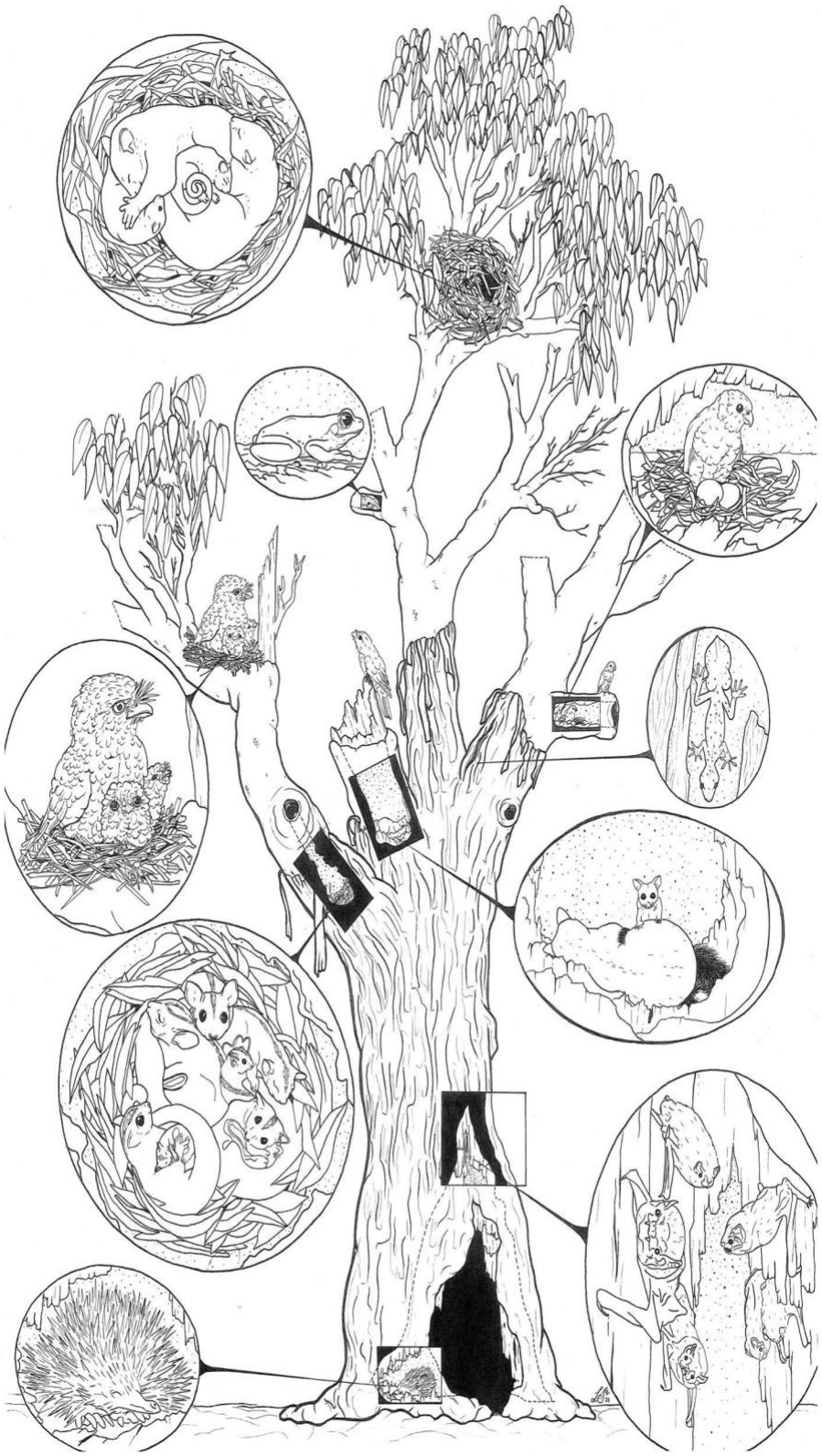
Habitat Tree illustration by Lillian Stormsong. Used with permission.

ANIMALS LIVING IN THE HABITAT TREE
For teacher reference: clockwise from the top of Habitat Tree illustration:

Ringtail Possums – family asleep in a drey (a soccer ball like nest of leaves, bark and vines).
Rainbow Lorikeets – nesting inside a small hollow in a tree.
Leaf-tailed Gecko – hides under peeling bark in the day time.
Brushtail Possums – mother and baby joey sleep inside larger tree hollows in the day time.
Microbats – some species sleep in cracks under the bark or in dark hollows in the tree trunk
Echidna – often rest in hollows dug under logs or tree roots
Squirrel Glider – sleep together in groups in leafy lined small hollows
Tawny Frogmouths – rest and nest on horizontal branches: staying still to imitate a branch
Green Tree Frog – hide by day in crevices or tiny hollows in the tree.

HABITAT TREE MATCH UP – What lives where in a tree?

Draw a line from the animal name - to the drawing of that animal on the tree



Rainbow Lorikeets
nesting on their eggs in a tree hollow

Ringtail Possums
family curled up asleep in a drey – a soccer ball sized nest of sticks and leaves

Leaf-tailed Gecko
hiding in the bark

Green Tree Frog
hiding in a crevice by day to croak at night

Squirrel Gliders
a group resting together in a leafy lined small hollow

Brushtail Possums
mum asleep with a baby – called a joey

Microbats
resting by day in dark hollows inside a tree trunk

Echidna
resting in a burrow under the tree roots

Tawny Frogmouths
imitate a branch while resting/nesting by day. Hunt at night.

Illustration by Lillian Stormsong

4. FINDING OUT:
DISCOVERY WALK AT THE BOTANIC GARDEN

The Our Habitat Our Home Photo Set with Guide Notes for the discovery walk is provided in Section 7. Laminated copies of this Photo Set are available to borrow from the Botanic Garden Information Centre and Shop on arrival at the garden. The photo set assists teachers and guides to lead a process of inquiry about different habitat types at each of the eight Stops on the Discovery Circuit walk and the different animals that live in each habitat type.

Other learning activities using equipment and resources in the Nature Discovery Centre can be organised as part of the visit to the garden by arrangement with the Education Officer. Email: schoolsCBG@gmail.com or use the inquiry form on the botanic garden website

4.1 Arrival and setting up a base for the group at the botanic garden

- **Transport:** Students may be dropped off from a bus at the entrance path to the garden inside the garden carpark. Parking for buses is on Coff Street just outside the entrance to the garden carpark.
- **Information Centre:** The Information Centre and Shop run by volunteers is open from 9am to 4pm each day.
- **Amenities:** Toilets are located at the entrance building opposite the Information Centre and Shop. Alternate Amenities located within the park - see the map on page 2.
- **Drinking water:** A water fountain, with a water bottle refill tap at the side, is located opposite the café tables inside the entrance building. There is also a water tap at the creek side picnic area.

Options for setting up a home base for visiting school groups at the botanic garden:

1 On the front lawn with a covered stage pavilion at the far end, near the garden entrance.

2 The Nature Discovery Centre - about 70 metres inside the garden (must be booked prior).

3 The expansive picnic area - by Coffs Creek, about 100 metres from the entrance building.

Front lawn and Pavilion

Nature Discovery Centre

Picnic area by Coffs Creek

4.2 Distance and timing of the 'Our Habitat Our Home' circuit walk

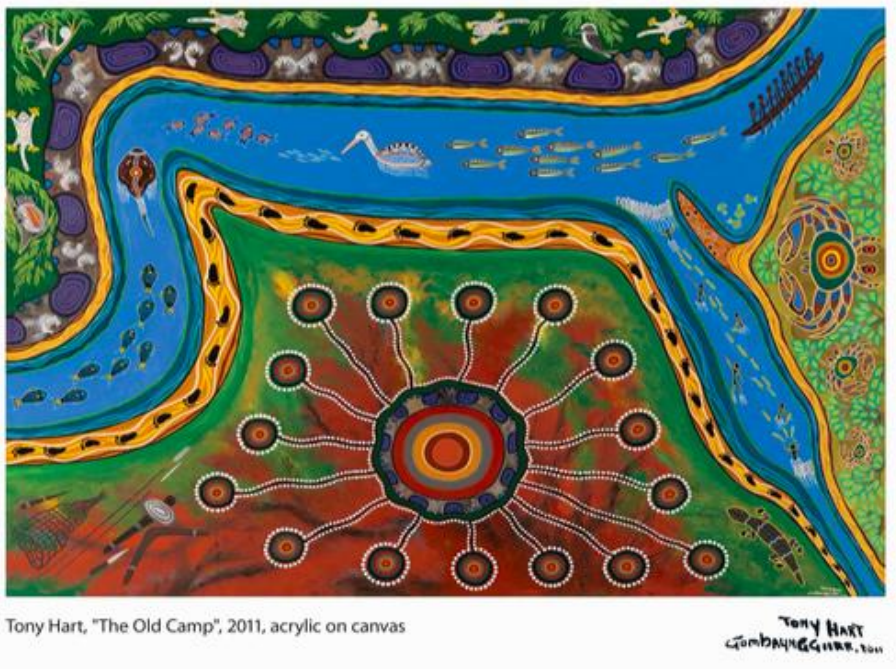
See the map of the circuit walk in Section 7

- The full Our Habitat Our Home circuit walk is 800 metres long and takes between 60 to 90 minutes, depending on the time spent at each stop.
- There are 8 stops on the full circuit walk and each stop is marked on the path by a blue painted circle with a koala symbol.
- The circuit walk can be shortened to 650 metres and walked in under an hour, by returning along the access road instead of the Nature Trail - cutting out Stops 6 and 7.
- The walk starts at the northern end of the picnic area by Coffs Creek: Stop 1 is at the mangrove forest by the creek path just as it leaves the picnic area.

4.3 Acknowledging the traditional custodians – the Gumbaynggirr

Commence the walk with an acknowledgement of the Traditional Custodians:

We acknowledge that Gumbaynggirr families
lived together on this land for thousands of generations
and were known as "the sharing people" because they shared so much.
We thank the thousands of generations of Gumbaynggirr custodians
who cared for this country to keep it healthy and full of life.
We pay our respect to the Gumbaynggirr Elders living today
and acknowledge their continuing relationship to,
and care of the country, waterways, sea and sky.



A painting of the area along Coffs Creek and around the botanic garden
By Gumbaynggirr artist: Tony Hart

5. SORTING OUT: AFTER A VISIT TO THE BOTANIC GARDEN

5.1 Activity: Make a profile of an animal living in its habitat

Choose an animal and the type of habitat this animal lives in to make a profile of this animal in its preferred home.

Investigate:

- The common name and the scientific name of the animal
- The Gumbaynggirr name of the animal (see the website link below to get started)
- Where does the animal usually live? What type of habitat does it usually live in?
- What does the animal usually eat? Where does it find this food?
- What are the predators of this animal? Where does it hide or rest?
- What are some features of this animal which help it to find food, or to hide?
- Any other fun facts about the animal?

Draw an illustration showing the animal in its habitat.
Or use photos of the animal and of the habitat type to illustrate your profile.

Finding Gumbaynggirr names for animals and habitats. To get started download this list:

https://www.environment.nsw.gov.au/resources/education/2010GumbaynggirrLanguageDatabase.pdf

5.2 Activity: Write a story "A day in my life in my habitat'

Imagine you are the animal that you have made a profile about living in your habitat.
Write a short story about how you live over one day and night.

- Where do you wake up? (Do you wake up in the day or at night?)
- What do you eat and how much of your time is taken up finding food?
- What noises do you like to make?
- Do you take familiar routes around your territory?
- What scary things might happen to you along the way?
- Where do you hide? Are your parents still nearby?
- How do you find some friends?
- How do you hear and see and smell the world around you?

5.3 Prepare poster presentations about threatened species

ACTIVITY 1 Make a poster: "Why I need your help" (with the animal name)

Choose a threatened animal species which lives in the Botanic Garden and make a poster to inform others about:

- what type of habitat the animal needs
- how much habitat or space the animal needs (size of its normal home range)
- the threats to the survival of this animal
- how we can help the animal to survive

Some threatened species living in the Botanic Garden
Photos of these animals can be found in the photo set for the discovery stops in Section 7:

- Squirrel Glider — See photo at Stop 3
- Powerful Owl — See photo at Stop 5
- Grey-Headed Flying Fox — See photo at Stop 7
- Koala — See photo at Stop 8

ACTIVITY 2 Make a poster showing the need for safe wildlife corridors

Make a poster with a map or illustration of habitat or forest areas which are fragmented or surrounded by urban or farmlands in or around a town or city.

For example, see the map on how the Botanic Garden and the bushland along Coffs Creek is surrounded by houses and roads which create barriers to the safe movement of animals.

Show how the animals might be isolated or at risk when they try to move around.
For example: by being hit by cars on roads or attacked by dogs near houses.

Investigate the value of planting wildlife habitat corridors which connect habitat areas and allow animals to move around more safely to find food or new places to live.

ACTIVITY 3 Make a 'Wanted Poster' – blending me and my favourite animal

Find your favourite animal, and make a self portrait with half of the head as your favourite animal, half the head as a self portrait.

Write under the poster why you chose this animal and what it needs to live.
Explain how we need to look after the environment as it has consequences for all animals, including humans. Put yourself in the place of other animals that try to live on the earth and how we all share the environment. Comment on how we all rely on healthy habitats.

GOING FURTHER

- Turn the posters into a display for the school
- Create a quiz for another class on the threatened species in the posters
- Write a story with some photos to explain more ways to help a threatened species recover from habitat loss

Create an aerial map of your school and surroundings to see how animals might move around and what barriers are in their way. For example: See this image below of the botanic garden on a big bend in Coffs Creek and with some vegetation along the creek for animals to move around BUT also surrounded on all sides by houses and roads.

Photo Credit: NSW Six Maps

Aerial photo of the Botanic Garden on a peninsula by Coffs Creek and bushland strips surrounded by roads and houses.

6. RESOURCES AND REFERENCES

6.1 Resources available from the Coffs Harbour Botanic Garden website

The **Nature Gallery** on the garden website contains photos of plants and animals living in the garden. Each photo includes a caption with both the common and scientific names of the living thing, where it can be found in the garden, and some fun facts.

NATURE GALLERY: **https://coffsbotanicgarden.com.au/learn/nature-gallery/**

Art in Nature – Shapes Education Kit

Lesson plans with activities for before, at and after a visit to the Botanic Garden including a detailed pictorial discovery walk guide exploring the shapes of leaves and plants.

INTRODUCTORY GUIDES (Single double-sided A4 page, folded to A5)

Available to download from: https://coffsbotanicgarden.com.au/learn/learning-resources/

- Garlambirla Walk (Plant Use by the Gumbaynggirr people.) This walk along the path by Coffs Creek has 12 information boards explaining the significance and use of different plants.
- Wildlife of the Botanic Garden
- Birds of the Botanic Garden - Introduction
- List of Birds observed at the Botanic Garden (105+ species)
- Powerful Owl brochure with fold out mini-poster
- Journey into the Sub-tropics – introduction to sub-tropical plants
- The Glasshouse – an Introduction to plants in the Tropical House and the Shade House
- The Lake and Japanese Garden
- How to use iNaturalist to identify living things

6.2 References

Australian Museum: https://australian.museum

See a range of habitat types on this Australian Museum page:
https://australian.museum/learn/teachers/learning/habitat-posters/

Gumbaynggirr names for animals and habitats
https://www.environment.nsw.gov.au/resources/education/2010GumbaynggirrLanguageDatabase.pdf

Background on why old trees are so important as animal habitat.
https://www.nefa.org.au/old_trees
https://www.environment.nsw.gov.au/resources/cpp/AssessHabitat.pdf

Friends of the Koala: https://friendsofthekoala.org/about-koalas/
NSW North Coast based organisation with useful facts and educational activities on koalas.

Australian National Botanic Garden: Plant Science Learning Hub
A free educational resource designed for educators and students to explore the science and stories of Australian native plants. Explore plant life cycles, structure, pollination and more.

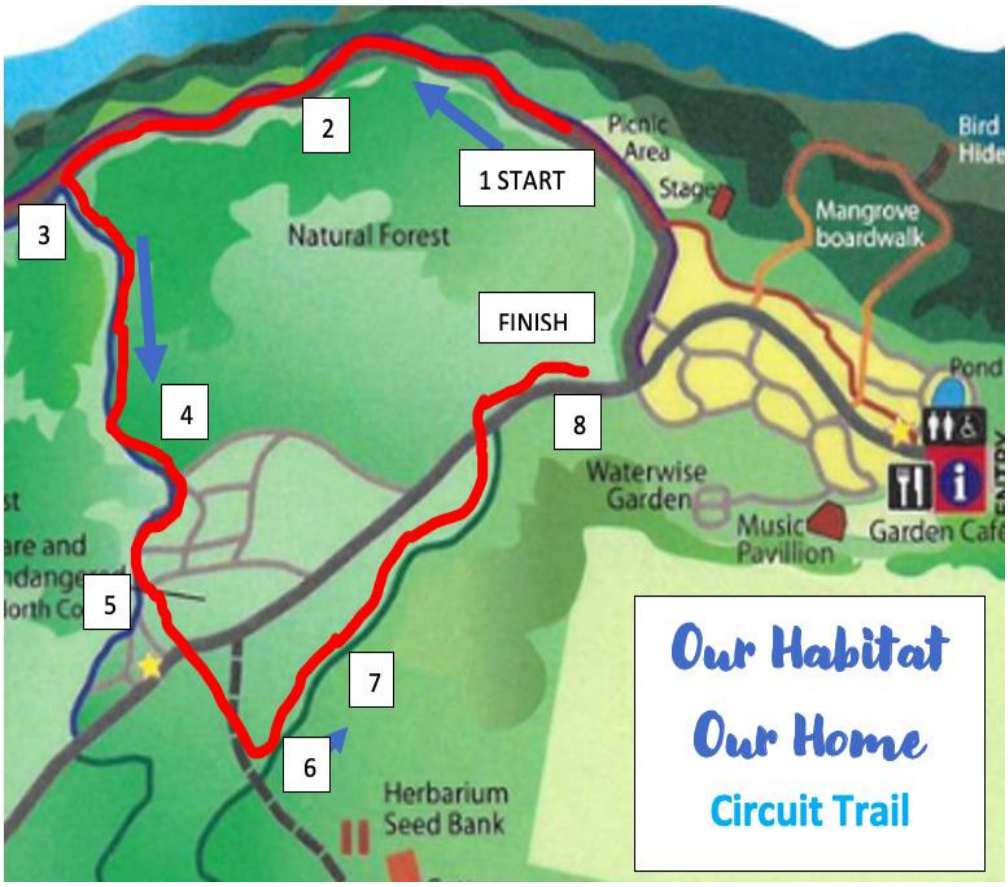
Habitat Tree Poster

Artwork by:
Lillian Stormsong

7. PHOTO SET WITH GUIDE NOTES FOR DISCOVERY WALK

Laminated copies of this Photo Set with Guide Notes are available to borrow at the Botanic Garden Information Centre and Shop.

7.1 MAP: OUR HABITAT OUR HOME WALK CIRCUIT AND DISCOVERY STOPS



The walk can be shortened by returning down the road after Stop 5 to finish at Stop 8.

DISCOVERY STOPS ALONG THE WALK CIRCUIT

Stop 1 Mangrove Forests – a salty wetland (just north of the creek side picnic area)
Stop 2 Brush Turkey Incubation Mound (by the creek path)
Stop 3 Dry Open Forest – Coastal Sands Type (Pink Bloodwood)
Stop 4 Paperbark Forest and Sedges (with a short boardwalk)
Stop 5 Wet Ferny Forest (Tall Blackbutts with hollowed out trunks and branches)
Stop 6 Dry Open Forest – Escarpment Type (Scribbly Gum)
Stop 7 The Sounds of the Forest (An outdoor classroom with bench seats for 15)
Stop 8 The Swamp Mahogany - a Koala feed tree

7.2 How to use the Our Habitat Our Home photo set

To prompt observation, investigation and comparison of habitat types at each stop:

1. ASK: what are the characteristics of this habitat? How is this habitat different to other habitats on the discovery walk?
2. THINK: what animals might live in this habitat and why?
3. SHOW: the photos of animals which live in this habitat and consider: What special features or adaptations do these animals have that help them live in this habitat?

If you spot an animal:

- What can you observe about its appearance that might help this animal live here?
- How is the animal behaving and how might this help it to survive?

7.3 Tuning in the senses ready for the discovery walk

To help leave behind the distractions and assist to focus and connect with the surroundings in the garden, try these fun ways to tune the senses of sight and sound.

Seeing with Powerful Owl Eyes

Powerful Owls live in the garden, resting by day in shady trees and hunting by night. Owls have special eyes that see things very sharply and peripheral vision to sense what is around them.

ACTIVITY 1:

Stand in a circle and close your eyes imagining you are an owl perched in a tree. Imagine the wind gently ruffling your feathers.

Open your eyes wide but do not focus on one thing – try to see around the corners of your eye (peripheral vision) to see the wider picture and take a note of any movement you see.

This is how an Owl waits to notice small movements in the trees to find something to eat.

Hearing with Squirrel Glider Ears

Squirrel Gliders live in the Botanic Garden. They sleep in tree hollows by day and feed on nectar and leaves in the trees by night. Gliders are small and have to be very quiet in case an owl or other predator finds them. They have large ears to funnel the sound down inside the ear so they can hear very faint sounds.

ACTIVITY 2:

Cup your hands behind your ears like the large ears of a glider to help catch the sound, close your eyes and keeping as quiet as possible, listen to all the sounds around for 30 seconds. Now open your eyes: what types of sounds did you hear?

Gliders need to listen all the time when foraging at night to avoid being eaten by an owl.

Discovery Circuit Walk

STOP 1: Mangrove Forests – a salty wetland

White faced Heron

Sacred Kingfisher

Semaphore Crab

Cormorant

Photo Credit Bird Photos: Cheryl Cooper

Discovery Circuit Walk

STOP 1: Mangrove Forests – a salty wetland

NOTES FOR GUIDES

Stop 1: The Habitat

This part of Coffs Creek rises and falls with the daily tide flowing up from the sea at Park Beach.

Salt water flows come from the ocean. Freshwater flows downstream from the mountains. Where the salt and fresh water mix is called 'brackish water' (slightly salty water).

- **What do you notice that's different about Grey Mangroves from other trees on the land?** Observe the root system in the mud. The 'snorkel' roots (pneumatophores) growing vertically from lateral roots radiating out from the trees under the mud and silt.

- **Why do you think their roots grow upright like that?**
  They allow mangroves to breathe and expel salt to grow in water-logged soft mud.

Stop 1: Our Home - The Inhabitants

A variety of birds forage here:

- Heron wading in the mud
- Cormorants - swimming underwater to catch fish and then drying out their wings.
- Sacred Kingfishers perch on branches and swoop down to catch crabs, fish and small lizards.

- **What would waterbirds hunting in the mangrove forest be looking for to eat?**
  Small fish, crabs, shellfish, worms in the mud.

- **Why would fish and crabs live amongst the mangrove roots?**
  They feed on food broken down from leaves and detritus in the mud.
  The roots provide places to hide from larger fish and birds.

- **How might birds that forage here be adapted to this habitat type?**
  Observe the shape of a bird's bill, the length of its legs, and its stalking behaviour.
  Long beaks and legs to stalk in the mud.
  Sharp eyesight helps to see little crabs and fish move.

Discovery Circuit Walk

STOP 2: Brush Turkey Incubation Mound in Dry Open Forest

Adult Brush Turkey

Baby Brush Turkey

Size comparison - Baby Chicken and egg compared to Baby Brush Turkey and egg

Brush Turkey illustration Credit: https://fieldofmar-e.schools.nsw.gov.au/fact-sheets/brush-turkey.html

Discovery Circuit Walk

STOP 2: Brush Turkey Incubation Mound in Dry Open Forest

NOTES FOR GUIDES

Note: If there is a lot of leaf litter on the walking path near the mound, this may be the work of a Brush Turkey scraping the mulch to find food.

Stop 2: The Habitat: Dry Open Forest - Coastal Sands type

- **What do you notice about the forest around this big Brush Turkey mound?**
  A variety of trees (Pink Bloodwood, Angophora, Blackbutt), shrubs and grasses with fallen bark and leaves on the ground ready to rake into a mound. While the male Brush Turkey scrapes up leaves to make the mound they find lizards, insects, fallen seeds and berries to eat. Brush Turkey mounds are usually built in dappled light so that the temperature is not too warm or too cold. Some light is coming through the tree canopy and there are some shady areas. This is called a Dry Open Forest.

Stop 2: Our Home - The Inhabitants

- **Why would a bird the size of a chicken make such a big mound?**
  To keep the eggs warm deep inside to help them incubate and hatch. Incubation mounds are made by the male Brush Turkey so that females can lay their eggs deep inside, about half a metre deep or more. The break down of the leaf litter deep inside generates heat to keep the eggs warm. Unlike the nests that other birds make where the parents need to keep the eggs warm, the Brush Turkey parents just let the heat of the incubation mound keep their eggs warm.

- **How does a chicken-sized Brush Turkey make such a big mound?**
  The male Brush Turkey scrapes leaf litter together into a pile using his big, rake-like feet. A mound can be used for many years, and each year more leaf litter might be raked on.

- **How is the temperature controlled inside the mound for the incubation of eggs?**
  The male looks after the mound and keeps the temperature just right by adding to or scraping away more leaf litter on top of the mound. He digs little holes in the mound to put his head and neck inside to test the temperature.

- **Why does Brush Turkeys lay such big eggs with a large amount of yolk?**
  When the little Brush Turkey chick hatches it must look after itself as there is no parent around to help it. The chick has very well developed wings, which are grown from all the food in the large egg, to be able fly up into the safety of the trees above.

- **How many eggs might there be inside a mound?**
  One mound might have 5 to 50 eggs buried deep inside laid by different females.
  The eggs take about 50 days to hatch. The eggs normally hatch between September and February.

Discovery Circuit Walk

STOP 3: Dry Open Forest – Coastal Sands Type (Pink Bloodwood)

Brushtail Possum

Squirrel Glider

Discovery Circuit Walk

STOP 3: Dry Open Forest – Coastal Sands Type (Pink Bloodwood)

NOTES FOR GUIDES

The Pink Bloodwood Tree: "Great Grandma Corymbia"

At this path junction take the path leading away from the creek to get to Stop 4.

Stop 3: The Habitat

- **Why is this an 'Open Forest"? How much light is coming through the tree canopy above?** Ask students to hold both hands above their head to see the tree tops and sky, holding the tips of thumbs and index fingers together to make a diamond-shaped hole. Looking up through that hole, take a guess on how much blue sky can be seen between the leaves of the trees, the tree canopy. About half? Less than half? More than half?

  In an Open Forest there is about 50% canopy coverage, ranging between about 25% and 75%, depending on location and any understory trees.
  This exercise will be repeated at Stop 5 the Wet Ferny Forest to make a comparison.

- **Notice how big the trunk is and have a guess at how old this big Pink Bloodwood tree is?** This tree is estimated to be over 500 years old!
  We call this tree 'Great Grandma Corymbia. *'Corymbia'* is the scientific name of the genus, which is closely related to the *Eucalyptus* genus which includes most gum trees.

- **Imagine how the world has changed in the 500 years since this tree was a little seedling.** The tree was here when Gumbaynggirr people fished and hunted, then white settlers came in the 1800's to cut down Turpentine trees to float downstream to build jetties. In the 1980's it become a botanic garden and some paths were made.

- **Why is this tree called a 'Bloodwood'?** Look at the trunk where sap has oozed from a cut or scape in the bark. What colour is it? A red colour, like blood.
  The Gumbaynggirr people used the sap to heal wounds.

Stop 3: Our Home - The Inhabitants

- **Count how many branches have broken off this very old tree?**
- **What might live in the hollows formed by the remains of the broken branches?**
  Possums and gliders sleep in hollows by day. Some birds nest in hollows.
  What else does this old tree provide for animals?
- **Gliders also scrape the trunk to lick the sugary sap and eat the fruit and leaves.**

Trees need to be well over 100 years old before they begin to make good hollows for small animals to inhabit. Look closely at the rough scaley trunk:

- **Can you see signs of even smaller animals living on the trunk?** Spider webs, small insects or small lizards. These micro homes in the trunk for the smaller animals attract birds to feed on them. The tree is home to a little ecosystem of life!

Discovery Circuit Walk

STOP 4: Wetland - Paperbark Forest and Sedges

Land Mullet

Skink

Striped Marsh Frog

Discovery Circuit Walk

STOP 4: Wetland - Paperbark Forest and Sedges

NOTES FOR GUIDES

This stop is located on a short boardwalk with limited room (for up to about 12 people). For larger groups stop on the sealed path at the start of this short boardwalk.

Stop 4: The Habitat

Look back along the path you came and then look forwards towards the boardwalk.

- **What changes do you notice in the types of trees and plants?** The dry Open Forest trees with an understory of shrubs changes abruptly to mainly Paperbark trees and Bangalow Palms with an understory of sedges such as the soft Tassel Cord Rush.

- **Why do you think the vegetation changes so quickly here?** The soil becomes more water logged at the boardwalk. This area is often swampy after heavy rain. The roots of the Paperbark Trees and the tall grass like sedges can live in wet soils.

Walk over the boardwalk to the other side:

- **How many Paperbark Trees can you see from here?**

- **How do you think the Gumbaynggirr people used the bark from a Paperbark Tree?** The Gumbaynggirr people used the bark to wrap and cook food, to bandage injuries, and to make shelters and sleeping mats.

Stop 4: Our Home - The Inhabitants

Observing that this area is often very wet or swampy

- **What small animals might like to live in a swampy area where they can find food such as insects and spiders to eat?** Frogs and lizards like to live close to water where they can find more food. Small skinks and larger lizards like the Land Mullet are often seen warming up in the sun on the path.

- **What other animals that like to eat frogs and small lizards might live nearby?** Snakes like the Green Tree Snake or Carpet Python (non venomous) usually live in the trees in these wetland areas. The Red-Bellied Black Snake (venomous) is sometimes seen on the ground near wet swampy areas. Often curled up in a sunny place trying to warm up, or resting.

Birds like the Kookaburra will also perch in the trees around these wet areas to try and catch a lizard, frog or a smaller snake to eat.

Discovery Circuit Walk

STOP 5: Wet Ferny Forest

Powerful Owl

Termites

Echidna

Discovery Circuit Walk

STOP 5: Wet Ferny Forest

NOTES FOR GUIDES

Stop 5: The Habitat

Notice how here there are very tall trees such as the Blackbutt gum tree (*Eucalyptus pilularis*) and some shorter trees underneath - to make two layers of tree canopy?

- **How much light is coming through the tree canopy above?**
  Students hold both hands above their head to see the tree tops and sky, holding the tips of thumbs and index fingers together to make a diamond-shaped hole. Look up through that hole and take a guess on how much blue sky can be seen between the leaves of the trees, the tree canopy. About half? Less than half? More than half?

  In a Wet Forest there is often about three quarters (75%) of the sky blocked out by the leaves if standing in a place with two layers of trees above – the very tall trees and the shorter trees.

- **What can you see growing on the ground under these trees?**
  Lots of ferns which can grow in lower light and like to be in moist areas. Also the "Elephant Ear" or "Cunjevoi" with its very large leaves to absorb the filtered light.
  The soil here is also wetter.

Stop 5: Our Home - The Inhabitants

IN THE TREES - Powerful Owls often like to rest here in the thick leaves after a night of hunting for food in the forest around. They also build a big nest in the hollow of a broken off tree trunk.

- **What do you think the Powerful Owls eat?**
- **Why do they like to live here amongst these old trees?**

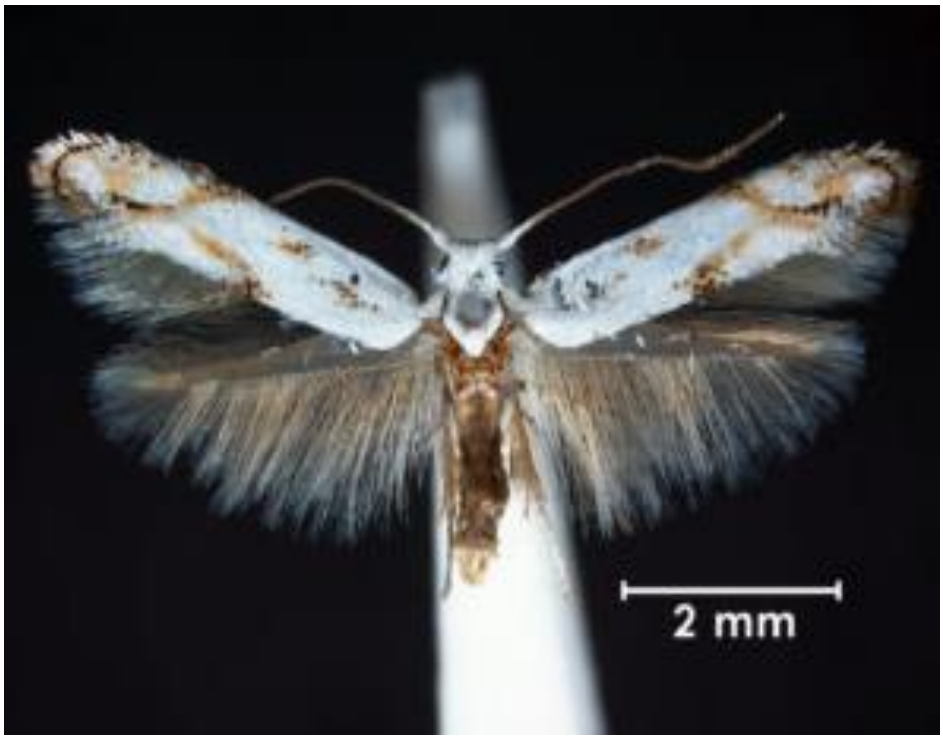
Powerful Owls eat possums, gliders and bats which are plentiful here because the forest has hollows for the small animals to hide in by day and offers flowers and nectar to eat at night.

ON THE GROUND - Find a broken off and hollowed out branch that is laying on the ground nearby, or look inside the large blackbutt tree near the main path which has a hollow trunk.

- **What tiny insects might eat the wood and hollow out the inside of branches and trees?**
  Termites eat the wood. Some types live inside the tree and others build termite mounds.
- **What animal with spikes and a long tongue likes to eat termites and ants?**
  Echidnas are seen in this area and often search for food at night when it is cooler.
- **Where might an Echidna or a lizard hide during the day?**
  Echidnas often hide inside or dig underneath fallen logs and branches.
  Lizards and snakes also like to hide inside hollow branches which fall on the ground.

Discovery Circuit Walk

STOP 6: Dry Open Forest – Escarpment Type (Scribbly Gum)



Scribbly Gum Moth (magnified)

Photo Credit: CSIRO

Lewin's Honeyeater

Eastern Yellow Robin

Photo Credit Bird Photos: Cheryl Cooper

Discovery Circuit Walk

STOP 6: Dry Open Forest – Escarpment Type (Scribbly Gum)

NOTES FOR GUIDES

STOP AT THE SCRIBBLY GUM TREE WITH THE SCRIBBLY GUM SIGN SHOWING THE MOTH

Stop 6: The Habitat

This type of Dry Open Forest looks a bit like the forest near the creek but is different because it is dominated by Scribbly Gums, alongside the Blackbutt and Turpentine Trees. The Scribbly Gums prefer these soils as do many native shrubs and some types of ground ferns growing underneath.

Look at the trunks of the Scribbly Gum and also look around the base for any bark that has been shed to see the scribbles inside the bark:

- **What makes the scribbles on the Scribbly Gum Tree?** The larvae or grubs of the tiny Scribbly Gum Moth feed on the soft tree bark underneath a thin layer of outer bark before the outer layer peels off each year to reveal their scribbly trackways.
- **Q. Why would the Scribbly Gum Moth lay their eggs under the outer bark?** To protect the larvae from being eaten by insects, spiders and lizards and to enable the larvae to feed on the tree.

Stop 6: Our Home - The Inhabitants

Many insects, including the Scribbly Gum Moth, lay their eggs in the bark of trees. Because the Scribbly Gum sheds its bark each year we can see the evidence of the insects under the bark.

Look around at the other trees here with thick bark and see if you find any evidence of insects or spiders living in the cracks of the bark. All of the trees around will have insects and spiders living in the bark but they are harder to see inside the thick bark of the other trees.

- **What type of animal living in the trees might like to find and eat small grubs, insects and spiders living in the bark of the trees?** Birds such as the Tree Creeper and Yellow Robin are often seen in this forest where they search the bark for things to eat.

  The Tree Creeper creeps up the tree in a spiral pattern looking for insects and spiders.

  The Yellow Robin perches on a branch and flies over to a tree to catch an insect after looking around. All birds have very good eyesight

Discovery Circuit Walk

STOP 7: The Sounds of the Forest

Kookaburra

Rainbow Lorikeet

Eastern Whipbird

Grey-headed Flying Fox – mainly heard at night

Variegated Fairywren

Photo Credit Bird Photos: Cheryl Cooper

Discovery Circuit Walk

Stop 7: The Sounds of the Forest

NOTES FOR GUIDES

Stop 7: The Habitat

There are three main types of forest tree living around here with different types of bark. The Scribbly Gum we have just seen has smooth bark which it sheds every year.

- **Can you find an example of each of these trees growing around here?**

Blackbutt Tree – the bottom half of the tree, the main trunk, has rough bark, while at the top half of the tree the branches have smooth bark.

Turpentine Tree – has rough furrowed bark all the way up the trunk to the thin branches.

Scan the trees closely to search for little hollows in the trunk and inside broken branches. If you have some - use some binoculars to help your scan.

- **How many hollows can you see?**
  Small birds like the Rainbow Lorikeet and small mammals like the Squirrel Glider prefer to live in the very small hollows, with an opening less than the size of a tennis ball. Larger birds like the Kookaburra or big mammals such as the Brush-tailed Possums need to find larger hollows.

Activity: Listening to the Sounds of the Forest

In these forests a variety of birds live such as: Kookaburras, Magpies, Whip Birds, Rainbow Lorikeets, Honeyeaters, Scrub Wrens and the dainty little Fairy-wrens.
Sometimes the Grey-headed Flying Fox (or Fruit Bat) will roost by day, or feed here by night.

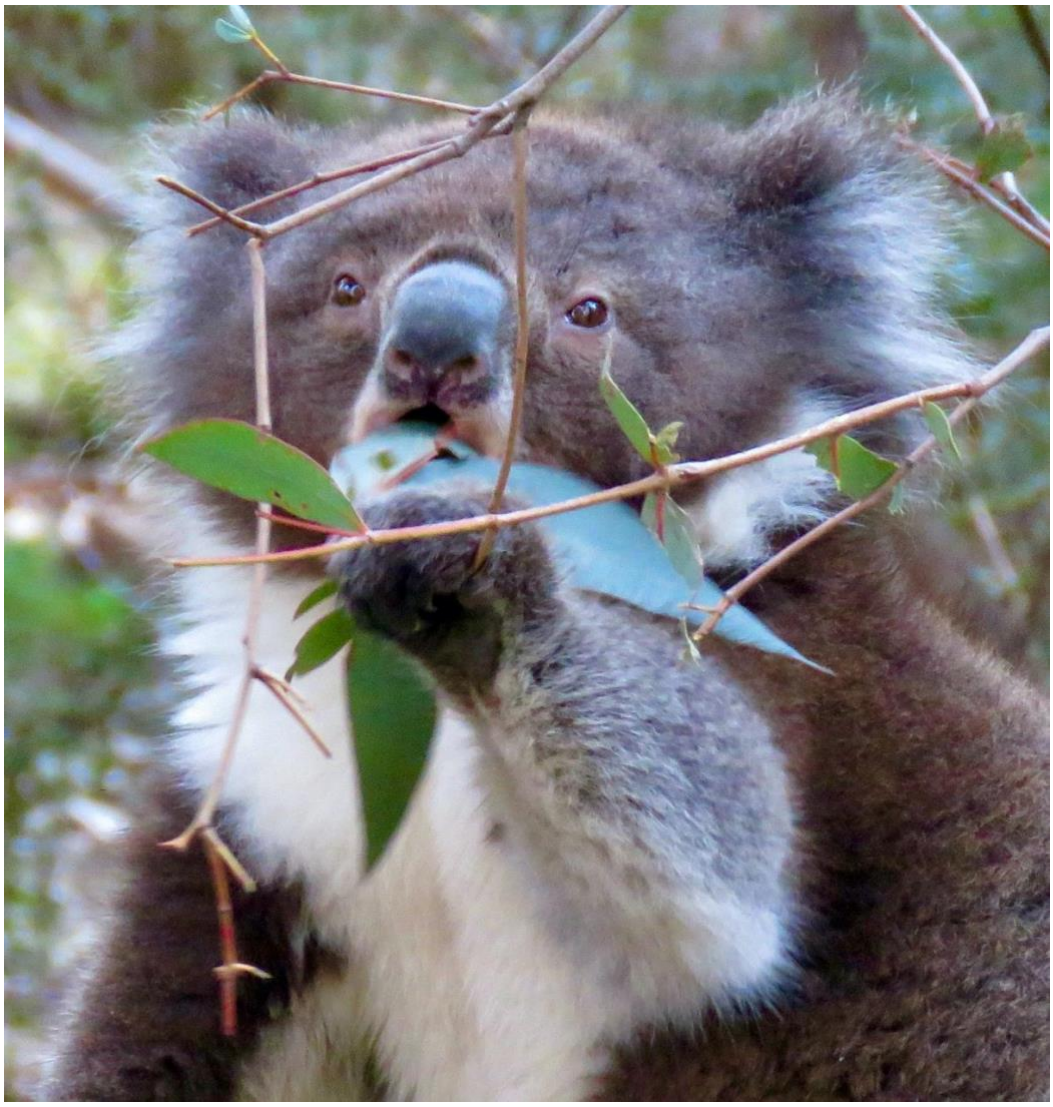
Cup your hands around your ears (Squirrel Glider ears) and close your eyes. Be as quiet and as still as possible for one minute and listen to how many different sounds you can hear in the forest.

Try to ignore the sounds of the cars or trucks outside of the garden, or of people talking as they walk through the garden. Focus on the sounds of the forest, the calls of the birds, the rustling of the leaves and the creaking of the branches.

- **How many different forest sounds did you hear?**
- **What types of sounds did you hear?**

Discovery Circuit Walk

Stop 8: The Swamp Mahogany - a Koala feed tree



Koala

Swamp Mahogany leaves

Swamp Mahogany bark

Discovery Circuit Walk

STOP 8: The Swamp Mahogany - a Koala feed tree

NOTES FOR GUIDES

STOP AT THE LABELLED SWAMP MAHOGANY TREE NEXT TO THE ROAD

Stop 8: The Habitat

Observe on one side of this road (to the west) there is sloping ground which has drier soils and on the other side of the path (to the east) the ground is flat with wetter soils.

- **What differences can you see in the types of vegetation on each side?** The drier sloping ground side has Scribbly Gums, Blackbutt trees and Turpentine trees. The wetter flat side has lots of Palm Trees, with water loving Paperbark trees further in.
  In between the drier and wetter sides alongside this road is a special tree that prefers to grow in moist ground, not too dry and not too wet: the Swamp Mahogany tree.

- **What do you notice about the bark of this tree?**
  It is very thick and soft with a tan brown to dark brown colour.

- **How many Swamp Mahogany trees can you see growing on each side of the path here?**

Stop 8: Our Home - The Inhabitants

The leaves of the Swamp Mahogany tree are wider than most gum tree leaves. They just seem to look more tasty to a leaf eating animal.

- **What kind of animal which lives in a tree might like to eat these leaves?**
  The Swamp Mahogany is one of the Koala's favourite food trees. There are at least three Koalas living in the Botanic Garden and often they are found sleeping or feeding in a Swamp Mahogany tree. Have a good look up and down the branches of the trees nearby in case a koala is curled up asleep in the fork of a branch above. Koalas tend to be more active at night, or at dawn and dusk, and sleep a lot during the day.

Have you ever noticed that a Koala has a big black nose for sniffing the leaves?

- **Why would a koala sniff the leaves before eating them?** The Koala can smell which leaves have less toxins inside and are more nutritious. Leaves often contain toxins to resist them being eaten. Koalas get most of the water they need from the leaves they eat. The Swamp Mahogany passes the Koala sniff test for breakfast, lunch and dinner!

- **How many trees does one Koala need to survive happily?** A lot! In good quality habitat with lots of their favourite trees one koala will usually require a forest of at least 400 to 500 trees and roam over a range of at least 5 to 10 football fields in area. In habitats with fewer preferred feed trees one koala will need to roam through thousands of trees over an area two to four times larger. Koala territories often overlap at the edges.

Koalas need lot of trees and safe ways to travel in between their feed trees.

The Koala survival slogan: ***'No trees, No Me'.***