BACKYARD EXPLORER

A learning resource for *Wild Backyards*
Years 6–9

In this ecological study, you will find out what native animals and habitats are found in your schoolyard, and make a digital story about them.

Name: ______________________________

Year: ______________________________

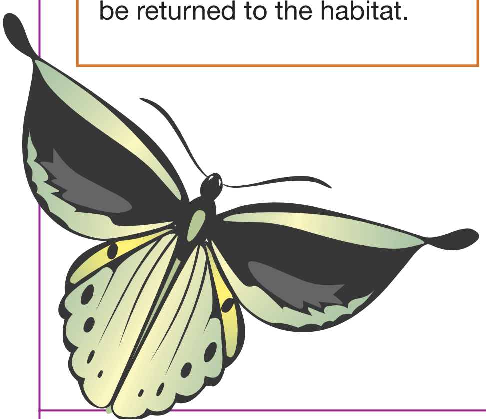
Queensland Government

queensland museum

Finding out about the study area

We have a greater diversity of living things in our backyards in Australia than most temperate climate countries. What's your schoolyard like? In this activity you will collect data about the animals and plants in your study area and use this to evaluate its biodiversity. Scientists value high biodiversity because it means an area has a variety of species of plants and animals, and the ecosystem of which they are a part is sustainable.

You should follow ethical procedures when handling any animals or plants. Guidelines are set out in The *Animal Care and Protection Act 2001*. Vertebrates (animals with backbones) should not be collected, only observed. Although the Act applies to vertebrates, your class should take the minimum number of any type of invertebrate such as insects for identification. Collating class results minimises damage to the ecosystem being studied. Do not modify habitats. Logs and rocks that are moved should be placed back into their original position because they can be reptile habitats. Any leftover leaf litter should also be returned to the habitat.



Habitats in the study area

The places where animals and plants live are called habitats and they are a part of ecosystems. Sometimes animals and plants have specific habitats and requirements, and sometimes they can live in a variety of places. For example, echidnas live in many parts of Australia, whereas the cassowary does not.

Scientists who study the environment name habitats. The naming system they use is based on the dominant plant species, usually tall trees, and the amount of space between them (estimated using canopy or leaf cover). This standard naming system means the habitat name can be understood and used by others. The type of habitat is also a sign of the food and shelter available for animals.

Details of the naming system for habitats are available at: *How to name habitats* <http://www.qm.qld.gov.au/education/resources/mangrove/pdf/scienceskills/QM_how_to_name_habitats.pdf.>

In many backyards or schoolyards, the natural habitat has been dramatically changed by garden plantings of tall trees and resembles open woodland, the habitat of behaviourally aggressive birds. These disturbed habitats have fewer vegetation layers, especially shrubs, which provide protection and food for smaller native birds. By doing the activities presented, students will understand more about how people have changed local habitats, and about ways of increasing biodiversity in urban environments.

Use the following focus questions to guide student activities:

What characteristics of the habitat affect the survival of plants and animals?

How much has the habitat changed from its natural state? Can students see any undisturbed habitat in their study area?

What are the signs of animal activity in their study area?

What are the food sources available for animals?

Make a hypothesis: a statement about a relationship students think exists in the study area, which can be tested.

Are there parts of the study area that are very disturbed? They could act as a good comparison with other parts of the habitat.

If they are working with another school, then students could compare the study area with another school before writing their research question.

What part of the study area will have greater biodiversity?

What evidence do they need to support their hypothesis? To reject their hypothesis?

Years 8–9: Student activity 1

Naming the habitat

Aim: To name the habitat(s) of your study site.

You can refer to the *Australian Natural Resources* Atlas (Australian Native Vegetation Assessment) for information and maps which show the original habitat of your study area, available at: <http://www.anra.gov.au/topics/vegetation/pubs/native vegetation/nat_veg_qld.html>

Typical Brisbane schoolyard: modified open woodland habitat.

Work in groups

Equipment:

- 30 cm ruler
- 1 m^2 quadrat, made with plastic irrigation pipes or similar
- Transect line or tape measure
- Tent peg, to measure soil compaction
- Copy of downloadable resource *Science Skills: How to name habitats*, available at: <http://www.qm.qld.gov.au/education/resources/mangrove/pdf/scienceskills/QM_how_to_name_habitats.pdf.>

Method:

1. Choose an area that contains some native trees. Refer to *How to name habitats* for information about how to complete the table that follows.
2. Sample the vegetation along a transect line if the area is large. Collect and record data every 5 m.
3. Measure ground cover in a 1 m × 1 m quadrat. Either use your transect line to sample the area in several places or study a typical part of the area.
4. Complete the table which follows. Name the habitat.

   Note: Habitats cannot be named accurately in disturbed areas.
5. Try to compare this area with a more or less disturbed part of the habitat, and form a research question about the comparative biodiversity expected in the two areas. Take photographs of the areas as a record.

Years 8–9: Student activity sheet 1

Habitat identification data

Use this table to repeat data collection across a transect line, or collate class data to make more detailed observations of your study area. Take some photos of your study area, of disturbed and less disturbed parts, using a digital camera.

My habitat photo

Vegetation	Height (m)	Count of plant types	Percentage cover
Trees	Canopy or over storey >2–3 m		**Canopy** **> 70%** **< 70%** **< 30%**
	Understorey <2 m		
Shrubs	Many-stemmed woody plants		
Ground cover, including grasses	Herbs, non-woody plants		
Leaf litter	Depth (cm)		
Soil compaction using tent peg (cm)			
Animals observed			

** If using a transect line, copy this table.*

Name of habitat:____

Years 6–7: Student activity 1

What's my habitat like?

Other animals or plants and non-living factors are regarded as part of an organism's habitat, and affect their survival. Non-living, or physical, factors can be measured easily, such as the temperature of the soil and air, the humidity, light, wind speed and soil type. In other activities that follow you will also collect and observe some of the living things in your study area.

Coastal paperbark swamp, Bribie Island. *Photo: B. Cowell, QM.*

Take a photograph of a typical, and a more disturbed, part of the habitat.

Aim: To measure some important physical factors of the habitat and infer how they affect the survival of living things.

Equipment:

- Thermometer
- Tent peg
- Water
- Gloves
- Anometer (to measure wind speed)
- Hygrometer (to measure relative humidity)

1. Soil

Soil temperature

1. Choose a typical part of your study area; for example, if it is mostly shaded, choose a place in the shade.
2. Place the bulb of the thermometer in the soil. Make a pilot hole first with a tent peg, if you are using a glass thermometer.
3. Leave for one or two minutes until the temperature reading stabilises. Record the temperature.

Soil type

Use the Soil Type Key provided. The soil needs to be able to be worked in the hands: **if the soil is dry, add a little water**.

Soil type or texture affects the water-holding capacity of your study area's soil, its organic matter levels and its pH (acidity or alkalinity).

2. Air

Relative humidity

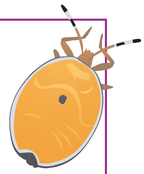
Use the hygrometer, according to the instructions provided. Record your result.

Wind speed

Use the anometer, according to the instructions provided. Record your result.

Air temperature

1. Hold the thermometer in the air where you are observing and trapping animals.
2. Wait a minute or so for the temperature to stabilise. Record your result.



What's my habitat like?

Group name: ______________________________

Location: ______________________________

Date: ______________________________

Weather: ______________________________

Habitat photo gallery

My habitat

Disturbed part of my habitat

Physical factor	Value	Class range
Air temperature		
Humidity		
Wind speed		
Soil temperature		
Soil type		*List types*

Have you recorded the units of measurement for those factors that are measured?

Can your data can be read and understood by others? Upload this data into the interactive database, if you can.

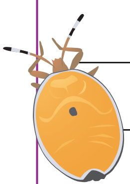
Analysis questions:

1. Write a description of your study area's habitat using its physical factors.

2. Do its physical factors vary from site to site within the study area?

3. Provide an explanation for these differences if you can. Discuss your reasons with others in your group.

4. Are these physical factors affected by the living things in the habitat? Explain fully.

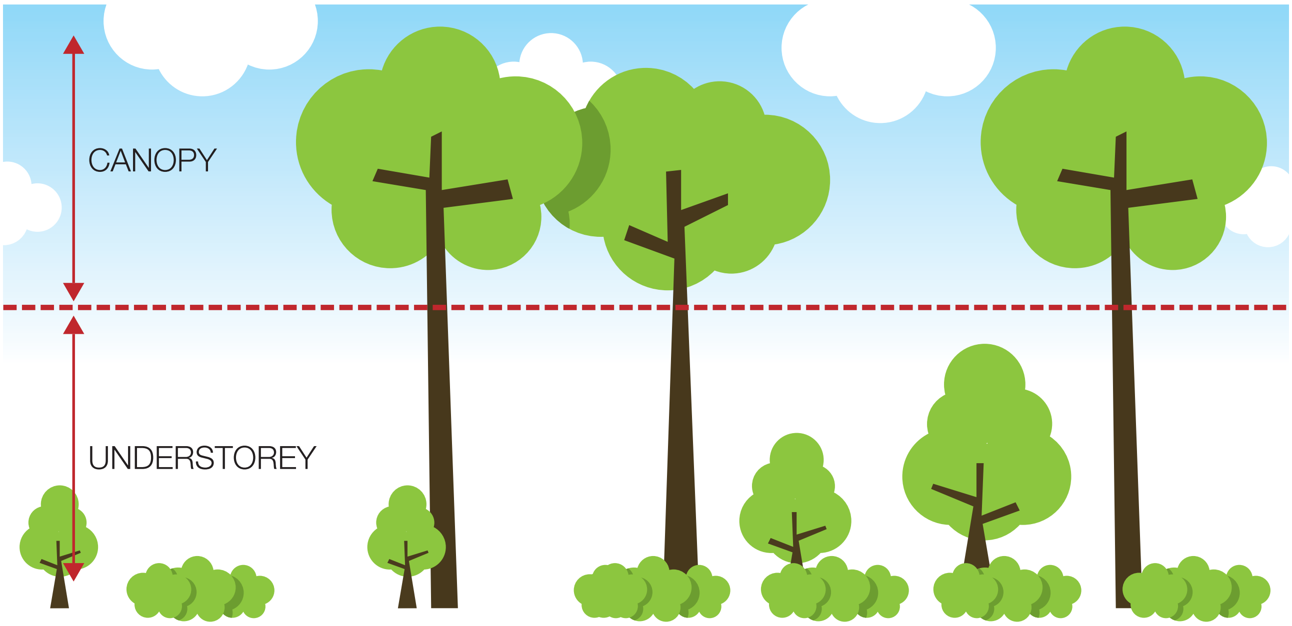


Student activity sheet 2

Habitat profiles

The vegetation layers in a habitat can show human impact on your study area. They are represented in a profile diagram. *Use a pencil* to draw your diagram, and show the relative heights of plants. Draw only their outline, not all the detail.

Label each type of plant in your profile as grass, herb, shrub, tree, and understorey or overstorey, see the rainforest profile. For more information about plant types refer to *How to name habitats*, available at: <http://www.qm.qld.gov.au/education/resources/mangrove/pdf/scienceskills/QM_how_to_name_habitats.pdf.>



Habitat profile of a rainforest showing four vegetation layers.

Profile diagram:

Analysis questions:

1. Has your local habitat been completely changed from its natural state?
   Refer to the *Natural Resources Atlas* (Australian Native Vegetation Assessment) for information about the natural habitat, available at: <http://www.anra.gov.au/topics/vegetation/pubs/native vegetation/nat_veg_qld.html>

2. Loose soil is important to the survival of burrowing native mammals and skinks. Was the soil in your study area firm and compacted, or suitable for these animals? Are there any other signs of native mammal activity in your study area?

3. List all the animals you saw in your study area. What are their requirements? You could put this data into a table.

What animals could live in this habitat?

You can identify food sources available for animals in your study area, and predict what animals you might find there. The consumers listed in the table live in disturbed and more natural areas, close to urban development.

Use the table as a checklist to identify any food available for animals in your study area. Also, tick ✓ food sources you observe in your study area.

	Consumers			
Food source	**Insects**	**Reptiles**	**Birds**	**Mammals**
Plant sap	Sucking insects e.g. aphids, bugs			
Leaves	Stick insects Grasshoppers Caterpillars			Possums
Flower (nectar)	Butterflies Moths		Honeyeaters Lorikeets	Gliders Flying-foxes
Fruit (e.g. *Syzgium* berries, Moreton Bay figs)			Honeyeaters Figbirds Channel-billed Cuckoos	
Flowers				Possums Native rats
Tree seeds (*Acacia*, *Grevillea*)	Beetle larvae Moth larvae Ants		King Parrot Rosellas Cockatoos	
Grass seeds			Galahs Sulfur-crested Cockatoos Peaceful Doves	
Nuts (e.g. Macadamia)				Native rats
Logs, leaf litter	Termites Beetle larvae			
Insects	Other insects Spiders	Lizards	Honeyeaters	

Finding the habitat's consumers

Insects are the largest group of animals on the planet and important consumers in all land ecosystems. Consumers are those organisms that feed on other living things, including plants.

Beetle having a meal, and chewed leaves (left). *Photo: Australian Insect Farm.*

Note: Flora and fauna reserves, state forests and national parks are protected areas, so insect collection is banned in these areas.

Preserving insects

Many insects do not need to be killed and preserved for identification purposes. They will survive in specimen jars for several days and then can be returned to their habitat. However, they are easier to identify, examine and photograph once they have been killed. To do so, place the specimen in a jar and cover with methylated spirit. Remember, a labelled preserved specimen is a voucher to check identifications later.

In this activity you will use some methods scientists use to catch and identify invertebrates in large trees in your study area. Large trees are often a source of food for immature and adult insects, so are a good place to search for them. Invertebrates live **on leaves**, **under bark**, **on the ground** and in **leaf litter**. *If there are no large trees in the area, use the largest plants available, shrubs or even grasses, and modify the methods used*.

Although spiders are predators of insects, because they are often nocturnal, they are not likely to be trapped and observed during the day.

Use the following focus questions to guide student activities:

What are important microhabitats where animals live in the habitats?

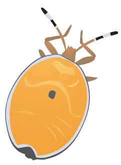
What types of invertebrates would you expect to trap in the leaves, under bark, in leaf litter and on the ground?

What food do insects typically consume? Draw a simple food chain showing a feeding relationship you identified.

Are there suitable places in your habitat for vertebrates such as reptiles and birds to live?

What birds did you observe during field work? Were they behaviourally aggressive?

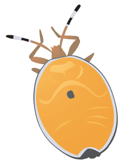
How reliable are your results? What are some of your sources of error?



*Note: Student activities marked **are intended for Years 8 and 9 students.*

Student activity 3

Trapping and identifying invertebrates



Either use the Insect Identifier provided to identify insects using their common name or identify the order to which the insect belongs using the interactive *Key to Invertebrates*, available at: <http://www.ento.csiro.au/education/key/couplet_01.html>

Labelling specimens

Scientists put labels inside the jar with the specimens. They do this to ensure labels cannot be rubbed off accidentally. They use two labels. On one they record the date, collector's name, and location and habitat details. On the other they record the common name and identification, and this is written later. Scientists write labels on small strips of paper in special inks that do not run, but also use HB pencils.

Aim: In this activity you will trap and identify invertebrates where they live in the habitat, in and around the plants.

Work in groups to collect and identify invertebrates.

Collecting in the leaves

1. Beating

Beating enables you to collect invertebrates from the tree foliage. As you beat the foliage with a stick, invertebrates drop from the tree as a response to avoid predation. Immature insects can also be caught by beating, while other insects fly away.

Equipment (per group):

- A piece of solid dowel (a broom handle is good)
- Large sheet of white paper, beating trays or a sheet of calico
- Specimen jars
- Methylated spirit (optional)
- Paper and pencil for labels
- Hand lenses

Method:

1. Place your sheet on the ground under the branch used to sample invertebrates.
2. Beat the branch and its foliage using the dowel.
3. Collect invertebrates from the sheet and place them in jars. Add methylated spirit to cover. Label in pencil with the date, collector's name, type of tree and location and place in the jar. Put all this information into your data table.
4. Use the *Insect Identifier* provided.
5. Record common names of your specimens; for example, true bug, ant, snail or caterpillar in the data table, and write this information on another label. Either, place this is the jar with the specimen, or identify further using the interactive key (see step 7).
6. Observe and identify their mouthparts using a hand lens. Record this information in the data table.
7. **Use the interactive key, *The Key to Invertebrates*, to identify any insects you find to their order. It is available at: <http://www.ento.csiro.au/education/key/couplet_01.html>. **Ask your teacher for help with this key.** Add this information to your data table.

Scientist with beating tray and stick collecting invertebrates.

Photo: J. Wright, QM.

Collecting insects caught by beating.

Photo: J. Wright, QM.

**means a more advanced activity

Trapping insects that fly with a sweep net *Photo: J. Wright, QM.*

2. Netting

You can use a butterfly or sweep net to sample insects from foliage that fly away when disturbed.

Equipment:

- Butterfly or sweep net
- Specimen jars
- Methylated spirit (optional)
- Labels
- Pencil

Method:

1. Make wide sweeps with your net across tree foliage.
2. Remove the invertebrates and place in specimen jars. Preserve by covering with methylated spirit. Label with the date, collector's name, type of tree and location.
3. Use the *Insect Identifier* to identify the trapped invertebrates. Record their common names on a label in pencil, as well as in the data table.
4. **Use *The Key to Invertebrates* to identify any other adult insects, available at: <http://www.ento.csiro.au/education/key/couplet_01.html>
5. Record their identification in the data table and on a label.

Collecting on the ground

You can use **pitfall traps** to catch ground-active, often burrowing, invertebrates. Traps are usually placed about 5 m apart along a transect line, and left overnight, or for several days.

Equipment (for each trap):

For pitfall trap:

- 1 or 2 L ice cream container with lid with large central hole cut (see images below)
- Trowel
- A piece of perspex roofing or chicken wire cut to size to cover the trap, refer to the *Terrestrial Invertebrate Status Review*
- Water with a little detergent (makes trapped insects sink)
- Specimen jars
- Sieve

Method:

Use information in the *Terrestrial Invertebrate Status Review* to make pitfall traps (19–20), available at: <http://www.qm.qld.gov.au/organisation/2005/terrestrialinvertebratesstatusreview_brisbane.pdf.>

1. Use a trowel to dig a hole large enough for the container. Place the ice cream container 'trap' in position. Add the water and place the roof over the trap.
2. Leave the trap overnight.
3. Pour off the water carefully, so you do not lose specimens. You could use a sieve.

Scientist making pitfall trap to catch ground-dwelling invertebrates.
Photo: J. Wright, QM.

Pitfall trap.
Photo: J. Wright, QM.

4. Place your specimens into jars. Cover with methylated spirit, and label.
5. Identify your invertebrates using the *Insect Identifier*.
6. Record their common names; for example, true bug, ant, snail or caterpillar, in your data table, as well as on labels in the specimen jars.
7. Use a hand lens to observe, identify and record the mouthparts.
8. **Identify your invertebrates using the *The Key to Invertebrates*, available at: <http://www.ento.csiro.au/education/key/couplet_01.html>. Record the identification on the label and in the data table.

Collecting under the bark

Loose bark can make a very good habitat for some invertebrates. At certain times of the year some gums shed their bark, so invertebrates are easier to trap. Just peel back the bark. What do you see? Record the common names of invertebrates and other collection data in your data table, as before.

> **Avoid** hairy larvae and woolly pupal cases of insects; they can be very painful if touched.

Collecting leaf litter to catch invertebrates. *Photo: J. Wright, QM.*

Collecting in the leaf litter

Scavengers and decomposers live in leaf litter, and break down leaf litter and other plant matter, dead animals and wastes in the soil. They are vital to the nutrient cycles of all land ecosystems.

Some people use a Berlese-Tullgren funnel to trap soil organisms, but this simple method works very well.

Equipment:

- Garden rake
- Specimen jars, labels etc.
- Methylated spirit
- White sheets of paper, a white tote box or a beating cloth made from calico
- Several pairs of gloves

Method:

1. Rake up some leaves — enough to fill a white tote box.
2. Wearing gloves, place the leaves in the box, on the sheet or on the beating cloth.
3. Leave in the sun for 30 minutes.
4. Shake. Your insects will move down onto the sheet or bottom of the tote box. Remove leaves. Wear gloves and use a specimen jar to catch any invertebrates.
5. Preserve specimens in the jar and label, as before.
6. **Identify your invertebrates using the key, available at: <http://www.ento.csiro.au/education/key/couplet_01.html>
7. Record this information in your data table and on labels in the specimen jars.

> **Do not touch** millipedes, spiders or centipedes: they can bite.

Left: a millipede. *J. Wright, QM.*
Right: a centipede. *B. Cowell, QM.*

Student activity sheet 2

Invertebrate collection results

Collection method	Sample information	Common name	Order**	Mouthparts	Diet
Beating	23 Oct 07, A. Collector, gum tree near Year 7 class Albany Hills State School	Butterfly	Lepidoptera	Long coiled tube	Liquid sugar (nectar)

Take photos of any interesting or common invertebrates you find. They tell you a lot about your study site.

Look at your invertebrate collection data. Write three things you now know about your study site from this data:

1. ______________________________

2. ______________________________

3. ______________________________

Analysis questions:

**means a more advanced activity

1. What types of insects are more common than others? List them below.

2. Do the types you trapped vary between microhabitats on the tree? Make a list of common insects and those that are less common. Try to find out more about the way they live. Their role in an ecosystem is called a niche.

3. Look at the mouthparts of your invertebrates. They show the type of food eaten; for example, insects with sucking mouthparts feed on sap, or even blood, and spiders have fangs. List the insects that are definitely herbivores.

4. Which ones are you not sure about? Justify your choice. Were the insects you caught mainly herbivorous or carnivorous? Why do you think there was more of one than the other?

5. Have you caught any immature insects? How do you know? Were they more common in one microhabitat than another?

6. **Make a generalisation about the roles of invertebrates in your study area. Do the insects fill all the roles they could in the habitat you studied? In what niches were they relatively uncommon?

7. **Can you account for differences seen in your study site, compared to other areas studied by other students?

Something to think about …

Scientists do not think flying insects caught on a tree necessarily feed on its foliage. What signs would you look for to determine if insects were living and feeding in trees?

Student activity 3

Other consumers: reptiles

Some reptiles can survive well in disturbed habitats. Reptiles are often shy, but they become more active in spring and summer, and can be seen by a careful observer. You will need to be **very quiet** to observe them. They can be found along path edges and in well-lit places in the warmer months. In disturbed areas other factors can affect their diversity, such as rocks and food availability, so if you notice any factors that seem to affect their numbers, record them.

Reptiles feed on insects or both insects and plants. They hide from predators under logs and rocks or they sit up high on rocks or fences to bask in the sun.

Reptile diversity

If you watch skinks closely, you might observe their territorial and other behaviours. You could also hear the chuck-chuck-chuck of Asian House Geckos, which are active during the day. In some areas, Bearded Dragons (sometimes incorrectly called Frillneck Lizards) and Water Dragons are quite common.

Lounge lizards?

A lizard lying on a fence post in the sun is a common sight in Australian backyards. They are called skinks, and are Australia's largest and most diverse reptile group. Some live in loose soil or humus and have no legs; others bear live young. Smaller skinks eat insects, while large skinks are often omnivores.

Source: Wildlife of Greater Brisbane (2007) Brisbane: Queensland Museum

Wall Skink, *Cryptoblepharus vigatus*. *Photo: J. Wright, QM.*

Other consumers: birds

The Australian bird list stands at nearly 800 species, and some of these you can see in your schoolyards or backyards. Sometimes, birds are only temporary visitors to your schoolyard habitats. For example, some migrate from mountains to lowlands and, sometimes, to other parts of the world in search of food.

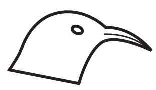
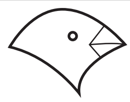
Equipment:

- Binoculars
- Data record sheet
- Pencil
- Hat
- Field guide

Bird watching should be done in the early morning or late afternoon when birds are active. Your students could survey birds at different times of the year, to see if they always live in the habitat or whether they migrate to other habitats. In North Queensland you may see a much greater variety of birds than shown in the table.

Student activity sheet 3

Bird watch data

Bird observed	**Characteristics** (Source: *Wildlife of Greater Brisbane* (2007). Brisbane: Queensland Museum)	**Habitat characteristics** • Little canopy • Trees • Grassed • Scrubby area	**Beak types/diet**	**Observed behaviour** • Preening • Feeding • Courtship
Behaviourally aggressive birds (attack other birds, and sometimes people)				
Magpies	Black and white bird with red eye. Greyish-white beak with dark tip. 45 cm.			
Butcherbirds	Grey, black and white bird. Grey beak with black tip. 30 cm.			
Currawongs	Large black bird with yellow eye and white rump. 50 cm.			
Noisy Miners	Grey bird, with white forehead and black face. Yellow patch near eye. Short curved yellow beak. 25 cm.			
Rainbow Lorikeets	Green, with bright blue head, yellow-green collar. Small, long tail. 30 cm.			
Crows	All black bird. Long tail. 50 cm. *ark-ark-ark* call.			
Indian Mynas (*introduced*)	Dark brown bird with yellow beak. Yellow patch around eye. 25 cm.			
Peewees	Black and white bird with short yellow beak. Finely built. 30 cm.			
Other birds				
Willy Wagtails	Lively black bird with white belly. Long fanned tail. 20 cm.			
Honeyeaters	Brown to yellow-green (usually). Fine curved beak. About 15-20 cm.			
Finches	Brown or grey. Small.			
Figbirds	Dull brown with streaked underside (female); mainly greenish back with grey underside and black head with red eye (male).			
Fairy-Wrens	Brown with blue tail (female); black and red or blue, with chestnut wings (male). Long tail. Round body. 15 cm.			

Student activity sheet 3

Other consumers

Analysis questions:

1. Does your study area contain potential reptile habitats? Describe them.

2. Make a list of any reptiles you observe, and their possible requirements, based on your observations.

3. Make a list of the common birds you observed. What food do they eat? Where did they live? This data could be represented in a table.

4. What types of birds are missing from your list? Provide an explanation for their absence from your study area. Think carefully, there could be a few reasons.

Years 6–7:

Communicate your results: make a documentary!

Magpies

What causes magpies to dive bomb and attack people at certain times of the year? Many magpies live in organised social groups of up to 10 birds, and they can display very aggressive behaviour during their breeding season in spring. Male birds actively defend territories and sometimes attack people selectively: that's why Australia Post has funded research on magpie behaviour. Magpie nests are often located 30–50 m from the territory boundary they defend. Away from urban environments magpies live in open woodland habitats so are well adapted to our backyards. *In what way are these environments similar?*

Source: Jones, D. (2002) Magpie Alert: Learning to Live with a Wild Neighbour. Sydney: UNSW Press

Trophic levels and pyramid of numbers

Scientists can tell a lot about the health of an ecosystem from the types of animals and plants they observe. Often, they use specific species called bio-indicators to make this assessment. For example, the presence of certain frogs, reptiles or even insects, can show that a study area has reasonable biodiversity. You can make an assessment of your schoolyard or study area ecosystem using the trophic (or feeding) levels of invertebrates.

Research: Either ask your teacher or consult a reference book to find out the meaning of trophic levels. In healthy ecosystems there can be up to five trophic levels.

A pyramid of numbers is one way to compare the numbers of organisms at different trophic levels in your study area. Plants make up level one. Herbivorous insects make up level two, with other herbivores, and so on.

Analysis questions:

1. Draw a pyramid of numbers using your group or class data. What assumptions did you make to draw a pyramid?

Assumptions:

____

____

2. Disturbed ecosystems have reduced biodiversity. Make an assessment of your study area's biodiversity, using this pyramid of numbers. Is there any trophic level where few invertebrates are represented?

____

____

3. Are there any orders of insects missing from your study area? Any trophic levels having few animals? Try to account for the differences you find.

____

____

Insect plagues (many specimens of the same type) are a sign of an unhealthy ecosystem. What would cause insects to increase in number? List some causes of plagues.

____

____

Years 8–9: Student activity 5

Physical factors of the study area

The physical, or non-living, factors of the study area affect the survival of plants, animals and micro-organisms, while the activity of living things can also affect physical factors.

For example, dead plants and animals in a habitat increase the amount of organic matter in the soil, provided conditions are suitable for decay.

In this activity you can measure the physical factors of your study area including soil pH, texture, temperature, organic matter, wind speed, relative humidity and air temperature, and attempt to determine their effect on living things.

Ask your teacher what tests you will conduct. Draw up an appropriate data table (include units).

Equipment:

- Thermometer
- Distilled water
- Universal indicator solution
- Barium sulfate powder
- Hydrogen peroxide solution
- Tiles, spotting tiles
- Stirring rod or skewer
- Test tubes
- Gloves
- Anometer (to measure wind speed)
- Hygrometer (to measure relative humidity)

1. Soil

Temperature

1. Choose a representative part of the study area; for example, if it is mostly shaded, choose a place in the shade. Direct sunlight can affect the soil temperature.
2. Place the bulb of the thermometer in the soil. Make a pilot hole first if you are using a glass thermometer.
3. Leave for one or two minutes until the temperature reading does not change. Record the temperature.

Take a soil sample from your study area, and then conduct the following tests:

Soil type

Soil type or texture affects the water-holding capacity of your study area's soil, its organic matter levels and its pH.

1. Use the key to determine texture.
2. If your soil sample is too dry, add a little water.

pH

The conventional test using universal indicator solution can be difficult to read. Read the overview *Finding soil type*, which includes a simple explanation of soil pH, available at: <http://www.qm.qld.gov.au/education/resources/mangrove/pdf/scienceskills/QM_finding_soil_type.pdf>.

Wear gloves when conducting this test. Universal indicator is poisonous.

1. On a white tile, put a teaspoon of soil and leaf litter or humus.
2. Cover with barium sulfate powder and mix with a stirring rod or skewer, keeping the pile fairly compact.
3. Cover with universal indicator solution until the sample is moist.
4. Match its colour with the chart. Record soil pH.

Organic matter

Organic matter is the level of decaying living tissue in the soil. It improves the nutrient levels and water-holding capacity of soil. To test the organic matter levels, use hydrogen peroxide (bleach). It forms oxygen and, on adding a small drop of detergent, foam forms.

For this test use a control to compare the height of the foam. Sand contains very little organic matter, so it is a good control to use.

Wear gloves when conducting this test because hydrogen peroxide burns the skin.

1. Obtain a sand and soil sample in two test tubes. About two centimetres of each is enough.
2. Add a drop of detergent to each.
3. Cover with hydrogen peroxide.
4. Warm both test tubes in a hot water bath (a beaker containing hot water) for a few seconds until the reaction starts.
5. Observe the height of foam produced. Compare the test tube with the control.

Record your result from + → ++++ (if foam is produced).

2. Air

Relative humidity

Use the hygrometer, according to the instructions provided.

Wind speed

Use the anometer, according to the instructions provided.

Air temperature

1. Hold the thermometer in the air in the study area.
2. Wait a minute or so until the temperature stabilises.
3. Record the result.

Results:

Record your data in your prepared data table.

Years 8–9: Student activity sheet 5

Physical factors of the study area

Attach your data table to this sheet

Analysis questions:

1. Write an overview of the physical factors you found in your study area. Usually, you would try to estimate if the levels are high or low, such as if the daytime temperatures were hot. Are there any factors that seem too high or too low? List these. What effect would they have on the organisms living there?

2. Comment on how we change habitats, and if that makes animal survival more difficult. Do any living things benefit from human impact on habitats?

3. Compare your study site to others in your class. What factors were consistent and what factors varied across sites? What conclusions can you draw about the similarities and differences?

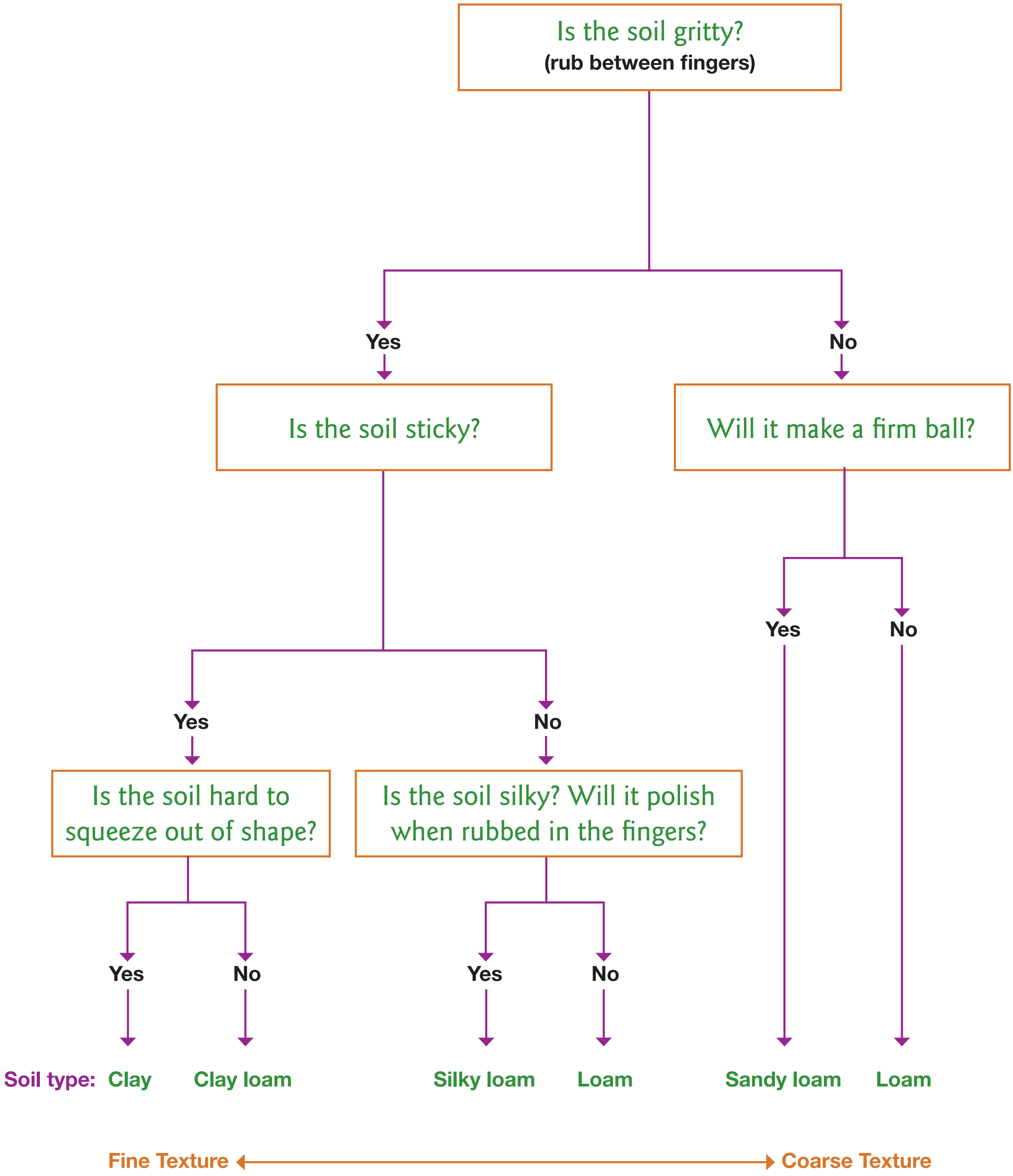
Years 8–9:

Communicate your results:

write a report about your results OR make a documentary about the biodiversity of your schoolyard or backyard.

Key for Soil Type Identification

Before finding texture, make sure the soil is moist, but not wet. It must be able to be moulded.



Insect Identifier

Have you found an unusual insect? Use *The Key to Invertebrates* to identify it accurately.

Bee or wasp

- Adult winged
- Two pairs of wings often hooked together; membranous (transparent)
- Narrow waist (start to abdomen)


Ant

- Adult wingless (usually)
- Narrow waist; long bent antennae
- Live in complex nests


Fly or mosquito

- One pair of forewings; hind wings reduced to knobs; membranous (transparent)


Butterfly or moth

- Two pairs of wings; covered in scales
- Coiled mouthparts


Cockroach

- Flat body top to bottom
- Two pairs of wings (adults may have no wings)
- Forewings partly hardened; hind wings not


Beetle

- Forewings form hard cover over hind wings
- Two pairs of wings


Bug

- Two pairs of wings
- Forewings partly hardened
- Tube mouthpart (for sucking)


Grasshopper or cricket

- Two pairs of wings
- Forewings partly hardened
- Enlarged hind legs for jumping


insects not shown to size

Section 2

Tell a digital story about your backyard

What's your backyard like? One way to tell people about the biodiversity of your backyard is to make a digital story. They are micro-documentaries, personal stories which inform, convince, provoke, question and can even be funny.

Above: Beating for insects at the Australian Insect Farm, Innisfail.
Right: Finding reptiles in a Roma backyard. *Photo: C. Eddie.*

A digital story contains photos, text and text slides and a voice-over telling the story. Digital story software is used to place the photos in sequence, then to add motion, transitions and text, and record voice-over using a computer microphone.

In this activity you will make a digital story about the wildlife of your schoolyard or study area. You can use a simple software package Microsoft Photo Story, which is free to download at:

Microsoft Photo Story 3 Download Page <http://www.microsoft.com/photostory>

Useful website tutorials about Photo Story

Create your first photo story at:

<http://www.microsoft.com/windowsxp/using/digitalphotography/photostory/tips/firststory.mspx#ERD>

Making photo stories at:

<http://www.learningplace.com.au/deliver/content.asp?pid=36049>

This tutorial is aimed at Early Phase teachers, but it demonstrates Photo Story features, and is easy for beginners to follow.

Look at other people's stories of the wildlife in their backyards, in *Wild Backyards*, available at:

http://www.qm.qld.gov.au/learningresources/

Five steps to making your own science digital story

Work in small groups of two or three people. Any digital story should be no more than **1½ – 2 minutes in length**, so its file size is not too big. Your story should be good enough to show to the rest of your class, or to the general public.

Excerpts from the *Wild Backyards* digital stories.
(available at http://www.qm.qld.gov.au/education/resources/wild/index.html)

1. Observe and record data from your field study of your schoolyard or study area.

In your story you could give advice on how to make your schoolyard a better habitat for native animals, using your data.

- Photograph and identify interesting animals or plants you have studied over some weeks. **Take a number of photos**.
- Select from 8 to 16 of these photos to make your story. Try to show the context of any animal you have photographed by taking a photo of its habitat.
- Save these photos.
- Transfer them to a folder called by_photosgi (by+photo+group initials) in the same drive. To do this, in Windows Explorer File> New> Folder, then name the folder. Drop and drag your photos into the folder.

Refer to our fact sheet on *Tips on how to take great wildlife photos*.

2. Make a storyboard

Storyboards are plans of digital stories. They allow you to think about the titles and narrative of your slides and transitions in your story, to make it more cohesive and save time.

- Select the photos you want to use. You could create a proof sheet of them using the Picture toolbar in Word (Click on insert picture icon).
- Fold an A4 sheet into 8 or16 parts, so each part represents one of your photos.
- Draw the outline of your story on this A4 sheet.
- Add text and labels to each photo.

3. Create an interesting story

Good digital stories are personal, and should be based on your experience and interests. What was interesting about your field work, your schoolyard or the animals you saw?

4. Finish it off

- Open Photo Story. Choose new story, and import photos from your folder in the sequence you want. Drag and drop them into order, edit and add effects using the next and back buttons.

- Write the script of your voice-over (no more than 300 words).
- Record your voice-over using a computer microphone.
- Plan your transitions between slides to be punctuation marks for your voice-over.

5. Be a critic

Show your digital story to a select audience. What works, what doesn't? Write a short critique of your digital story based on the audience response.

Other hints

1. Make a text graphic

You can add titles to your pictures in Photo Story, but you may also want to write more text to explain some of the scientific elements of your story's pictures. Photo Story will import text as a graphic or picture file (JPG), after it has been created in PowerPoint.

- Open PowerPoint. Choose a slide layout that allows you to write text. Change the font size to suit the amount of text you are writing, and be economical with the words you use.
- Change text colour or use textboxes to add photos or diagrams.
- To save the text graphic: File> Save as > File type (JPEG) > Write file name <Enter> Choose Current slide only.

This file is now ready to import into your digital story.

2. How to name animals

Add the common name or scientific name to the titles of your pictures. Check correct names in guides and handbooks such as *Wildlife of Greater Brisbane* (Queensland Museum).

Conventions apply when naming plants and animals.

- **Common names**: For a recognised common name and these vary, the first letter of each name is capitalised.
- **Scientific names**: Scientific names are species names, so they are precise. They consist of two names, both written in italics. A capital is used for the first letter of the first name (genus name), with all lower case letters for the second name (descriptive name). This is the internationally-recognised Linnaean system, for example:

Common name:
Blue-tongued Skink
Scientific name:
Tiliqua scincoides

Blue-tongued Skink (*Tiliqua scincoides*) basking in the Roma sun.
Photo: C. Eddie.

What makes a good story?

- Live your own story; tell it in first person.
- Show a lesson you learned about your schoolyard.
- Develop creative tension in a story, by using motion wisely; for example, motion across a beetle says much about the beauty of our backyards.
- Show, don't tell.
- Don't use too much narrative.
- Polish your digital story so its photos, transitions and voice-over produce the meaning you want.

Fact sheet

Tips on how to take great wildlife photos

Queensland Museum photographer Jeff Wright gives you some tips on how to improve your photos of wildlife and landscapes.

***Banksia aemula* photographed by Jeff Wright.**

Light

Strong sunlight casts hard shadows, which may or may not be a feature you want in your photograph. So, either move the object into the shade or photograph it at a different time of day.

It is usually a good idea to switch off your camera's flash because it is often hard and direct.

To avoid 'camera shake', hold your camera still, preferably using a tripod.

Use a **reflector** if one side of a subject appears a little dark. They can be made from everyday materials of any shape and size, such as white polystyrene foam, white card or card covered with aluminium foil.

Landscapes

Take pictures of landscapes early or late in the day. You need to take some time to see how the landscape looks at those times before you take a photo.

Composition

Two main things affect the way a subject in a photo looks: framing and camera angle. For example, if photographers want to show cities as bustling, crowded places, they would frame a street scene rather than a single person in the street.

Framing

A **frame** is what you see in the camera's viewfinder or on its screen. You can place the subject in different places in the frame if you move it to the side or centre of the frame when you take the photo. You can also change your subject's size in the frame if you move in closer, step back a little or use the camera's zoom.

Camera angle

Most people take photographs from eye height, so to vary the camera angle, get down lower or look at your subject from above.

Take lots of photos

Study your photos to see which compositions, lighting and camera settings worked best.

Be organised

Check your camera batteries are fully charged and there is plenty of space on the memory card. You might also need water, hat, sunscreen, raincoat and a plastic bag or case to keep your camera clean and dry.

Final tips

Reduce background clutter to make your compositions strong and simple.

Keep the eyes of animals and wildlife in focus.

Jeff Wright

3 December 2007

Teacher notes

Backyard Explorer helps students to appreciate the biodiversity of their schoolyards, even though they may be modified, urban habitats.

It creates a relevant, locally-focused context to teach ecology using field work activities suitable for middle school students. Some activities suitable for Years 8–9 are marked **. By trapping and making observations, they can determine the number and variety of invertebrates, reptiles and birds in natural, or more disturbed, local areas. The methods of *Backyard Explorer* are used by scientists at the Queensland Museum to audit biodiversity; see the *Terrestrial Invertebrate Status Review* for Brisbane City available at: <http://www.qm.qld.gov.au/organisation/2005/terrestrialinvertebratesstatusreview_brisbane.pdf>

High levels of animal and plant biodiversity indicate healthier ecosystems. A comparison study with a more disturbed area, or with data collected in other areas by other schools, would improve student understanding of factors that affect biodiversity.

The activities in *Backyard Explorer* should be supplemented with textbook and other resources. Technical terms should be used when required such as predators, competitors, food chains and webs and ecosystems.

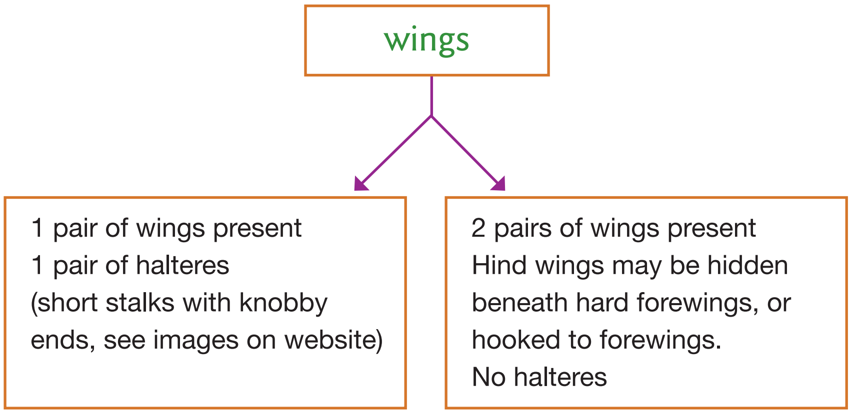
Literacy focuses

- tables
- habitat profile
- numbers pyramid
- wildlife photos
- storyboards
- digital story

Using the interactive key

The Key to Invertebrates is available at: <http://www.ento.csiro.au/education/key/couplet_01.html>

An **erratum** to this key reads as follows:



Making digital stories

Digital stories are mini-documentaries. They are a good way for students to demonstrate understanding of issues of backyard biodiversity, such as the need for habitats for animals.

Free software can be downloaded from: *Microsoft Photo Story 3* Download Page

<http://www.microsoft.com/photostory>

Students can make their own digital story about the area they studied — some examples can be seen on the Queensland Museum website, available at: <www.qm.qld.gov.au/learningresources>

Ethics and animal trapping

Find information about trapping animals in *Animal Care and Protection Act 2001*, Chapters 1 to 8, available at:

<http://www.legislation.qld.gov.au/LEGISLTN/CURRENT/A/AnimalCaPrA01.pdf>

Glossary

Bio-indicator
Often called bio-indicator species. An animal or group of animals that are sensitive to changes in ecosystems e.g. certain frogs.

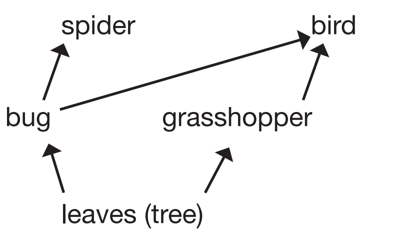
Carnivore
An animal that eats another animal e.g. spider.

Consumers
Living things that feed on other living things.

Ecosystems
Observing ecosystems is the main way the environment is studied. Ecosystems are groups of living things, the physical factors that affect their survival and any interactions, and can be as small as puddles.

Food chain
Diagram of relationships in an ecosystem as a single pathway e.g. leaves (tree) → bug → spider.

Food web
Diagram of feeding relationships in an ecosystem as interconnecting food chains. Shows animals often have many food sources, e.g.



Habitat
Place of a living thing. Contains all an organism's requirements and factors that affect survival e.g. insects live in schoolyard habitats.

Herbivore
An animal that eat plants e.g. grasshopper.

Humus
Pieces of decayed animal and plant matter in the soil that affect the soil's physical factors including water-holding capacity, nutrients and pH.

Microhabitat
A specific part of a habitat e.g. leaves of a tree.

Mouthparts
Parts that make up the mouths of insects e.g. special feeding appendages (jaws) for chewing in grasshoppers; coils for sucking in butterflies. Chewing mouthparts are sometimes used to make nests e.g. termites.

Niche
Role of an organism in an ecosystem e.g. seed-eating ground-living parrot.

Producers
Plants are producers, not consumers. They make food in a chemical reaction called photosynthesis, which uses the energy of the sun, and carbon dioxide and water.

Pyramid of numbers
A graph of the numbers of living things in a food chain or web. It resembles a pyramid because the numbers of living things decrease at high trophic levels.

Omnivore
An animal that eats plants and animals e.g. Honeyeater.

Order
Classification group widely-used in insect identification e.g. Lepidoptera (butterflies and moths), Coleoptera (beetles).

pH
A scale from 1–14, measured using universal indicator. Acids have a low pH (1–6). Bases have a high pH (8–14). Water is neutral, pH 7.

Physical factor
A non-living factor that affects the survival of living things e.g. temperature. Able to be measured.

Quadrat
A plastic or wire square, area from 100 cm^2–10 m^2. Size used depends on the size of the habitat to be sampled e.g. 100 cm^2 to count crab holes.

Transect
A rope line marked every 5 or 10 m. Used to sample an ecosystem e.g. for the number and type of plants.

Trophic levels
Feeding levels in an ecosystem e.g. plants are level 1, herbivores are level 2. Used to construct pyramid of numbers, and biomass and energy pyramids.

Equipment list

- Transect lines
- Tent pegs
- 1 m^2 quadrats
- Gloves
- Physical factors
- Thermometers
- Water
- Distilled water

****For the soil pH test, or use a commercial kit**

  - Universal indicator solution
  - Barium sulfate powder
  - Hydrogen peroxide solution
  - Tiles, spotting tiles
  - Stirring rod or skewer
- Test tubes
- Gloves
- Anometer (to measure wind speed)
- Hygrometer (to measure relative humidity)

Invertebrate study

- Broom handles or pieces of dowel of similar length
- Beating trays or calico sheets
- Butterfly or sweep nets
- White tote boxes
- Rakes
- Ice cream containers (1 or 2 L)
- Perspex roofing or chicken wire
- Trowels
- Specimen jars
- Labels
- Methylated spirit (optional)
- Washing up detergent
- Rubber gloves
- Hand wash

Bird watch

- Binoculars (optional)
- Field guide

Assessment

Essential Learnings by the end of Year 9 (Queensland Studies Authority 2008)

Science

Ways of working

Students are able to:

- Plan investigations based on guided scientific concepts
- Collect and analyse data, information and evidence
- Evaluate data, information and evidence to identify connections, construct arguments and link results to theory
- Select and use scientific equipment and technologies to enhance the reliability and accuracy of data collected in investigations
- Draw conclusions that summarise and explain patterns that are consistent with the data
- Communicate scientific ideas, explanations, conclusions, decisions and data, using scientific argument and terminology, in appropriate formats
- Reflect on learning, apply new understandings and justify future applications.

Life and living

Organisms interact with their environment in order to survive and reproduce.

- In ecosystems, organisms interact with each other and their surroundings e.g. *the scavenger role of the crab in the mangroves means that it has a plentiful supply of food and it contributes by cleaning its surroundings*
- Changes in ecosystems have causes and consequences that may be predicted e.g. *bushfires destroy natural bushland, which temporarily changes the ecosystem; birds return to dried-up waterholes after rain*

Science as a human endeavour

Responsible and informed decisions about real-world issues are influenced by the application of scientific knowledge.

- Immediate and long-term consequences of human activity can be predicted by considering past and present events e.g. *consequences of unsustainable use of fossil fuels can be seen in environmental impacts*
- Responsible, ethical and informed decisions about social priorities often require the application of scientific understanding e.g. *use of alternative forms of energy; use of recycled water; development of influenza and cervical cancer vaccines*

ICTs

Operating ICTs

Students use a range of advanced ICT functions and applications across key learning areas to inquire, create, collaborate and communicate, and to efficiently manage information and data. They:

- apply efficient operational sequences for the operation of a variety of ICTs
- apply formats and conventions when undertaking tasks
- describe a range of devices and processes for performing complex tasks using the correct ICT specific terminology

- apply agreed processes for accessing and working with personal information and content access appropriate support when updating or learning new operational skills
- manage integrity of information and content in personal or collaborative digital environments
- reflect on, analyse and evaluate their operational skills to meet the requirements system resources, processes and conventions in personal or collaborative digital environments.

Creating with ICTs

Students experiment with, select and use ICTs to create a range of responses to suit the purpose and audience. They use ICTs to develop understanding, demonstrate creativity, thinking, learning, collaboration and communication across key learning areas. They:

- express and creatively represent ideas, information and thinking in innovative ways.

Communicating with ICTs

Students experiment with, select and use ICTs across key learning areas to collaborate and enhance communication in local and global contexts for an identified purpose and audience. They:

- collaborate, exchange ideas, distribute information, present critical opinions, problem solve and interpret messages
- consider and apply ICTs to enhance interpersonal relationships in order to develop social and cultural understandings
- apply suitable presentation and communication conventions and protocols
- select and apply a variety of ICTs to exchange and interpret messages and meanings
- present an individual or group identity in communication
- reflect on feedback to analyse and improve their use of ICTs and to describe more effective use of ICTs in future communications.

Essential Learnings by the end of Year 7 (Queensland Studies Authority 2008)

Science

Ways of working

Students are able to:

- identify problems and issues, and formulate testable scientific questions
- collect and analyse first- and second-hand data, information and evidence
- evaluate information and evidence and identify and analyse errors in data
- select and use scientific tools and technologies suited to the investigation
- draw conclusions that summarise and explain patterns in data and are supported by experimental evidence and scientific concepts
- communicate scientific ideas, data and evidence, using scientific terminology suited to the context and purpose
- identify, apply and justify safe practices
- reflect on different points of view and recognise and clarify people's values relating to the applications and impacts of science
- reflect on learning, apply new understandings and identify future applications.

Knowledge and understanding

Life and living

Living things have structures that enable them to survive and reproduce.

- Systems of scientific classification can be applied to living things *e.g. dichotomous keys can be designed for groups of organisms*
- Survival of organisms is dependent on their adaptation to their environment *e.g. animals use camouflage to protect themselves; plants in very dry areas may store water in modified structures*
- Different feeding relationships exist within an ecosystem *e.g. producer, consumer, herbivore, carnivore relationships form a food web*

Technology

Ways of working

Students are able to:

- select resources, techniques and tools to make products that meet specifications
- plan and manage production procedures and modify as necessary
- make products to meet specifications by manipulating and processing resources.

Knowledge and understanding

Information, materials and systems (resources)

The characteristics of resources are matched with tools and techniques to make products to meet design challenges.

- Techniques and tools are selected to manipulate or process resources to enhance the quality of products and to match design ideas, standards and specifications *e.g. a story can be re-created with digital media to make it more appealing*

ICT

Creating with ICTs

Students use ICTs to develop understanding, demonstrate creativity, thinking, learning, collaboration and communication across key learning areas. They:

- express and creatively represent ideas, information and thinking
- reflect on their use of ICTs as creative tools and evaluate the quality of their ICT responses, plans and processes against criteria.

Communicating with ICTs

Students experiment with, select and use ICTs across key learning areas to collaborate and enhance communication with individuals, groups or wider audiences in local and global contexts for an identified purpose and audience. They:

- collaborate, develop, organise and present new ideas
- consider how ICTs can be used to enhance interpersonal relationships and empathise with people in different social and cultural contexts
- apply suitable or agreed communication conventions and protocols
- select and apply a variety of digital media to improve communication
- establish their own or a group image and identity in communication
- reflect on their use of ICTs and consider feedback to improve collaboration and refine and communicate meaning.

Operating ICTs

Students use a range of advanced ICT functions and applications across key learning areas to inquire, create, collaborate and communicate, and to manage information and data. They:

- apply operational conventions when using ICTs
- identify operational advantages to manage personal ICT resources and customise interfaces
- apply agreed processes for personal management of digital content and identify the advantages of customisation.

Years 8/9 Science Ecology Study   Student: ______________________

Data collection, analysis and reporting of ecology study: Assessable elements	Descriptors A	B	C	D	E
Knowledge and understanding	Comments about or names the habitat using data. Identifies 11–20 common insects from different microhabitats (leaves, leaf litter, ground) using the dichotomous key. Records detailed habitat, mouthparts and diet data about insects, reptiles and birds, and classifies them according to niche. Collects detailed data about physical factors. Makes a good assessment of biodiversity using data.	Comments about or names the habitat using data. Identifies 10 or so common insects from different microhabitats (leaves, leaf litter, ground) using the dichotomous key. Records detailed habitat, mouthparts and diet data about insects and birds. Collects detailed data about physical factors. Makes an assessment of biodiversity using data.	Comments about or names the habitat. Identifies at 5–10 common insects from different microhabitats using the dichotomous key, their mouthparts and diet from a range of microhabitats (leaves, leaf litter, ground), as well as birds or reptiles. Classifies them according to the food they eat. Collects some data about physical factors. Makes an assessment of biodiversity.	Identifies the habitat, some common insects and their mouthparts and diet. Classifies some of these according to the food they eat	Rudimentary knowledge and understanding of insect identification, habitat and diet.
Investigating	Data collection is detailed, with logical, complete and well-labelled tables, quality sketch of vegetation profiles. Investigates own problem using data at own or other site.	Data collection is detailed, with logical, complete and well-labelled tables, good sketch of vegetation profiles.	Data collection mostly complete. Data tables lack some detail in insects identified, physical factors or labelling. Vegetation profile attempted.	Some parts of data collection not done. Some parts of the data tables not complete.	Many parts of data collection not done. Tables quite incomplete.
Evaluates data, identifies connections and links results to theory	Analysis and evaluation shows a detailed understanding of ecological issues: habitat change due to human causes, insect and bird niches and lifecycle stages, numbers pyramid. Compares one site with another in some detail. Draws well-reasoned conclusions which show interrelatedness of many factors measured.	Analysis and evaluation shows understanding of ecological issues: habitat change due to human causes, insect and bird niches and lifecycle stages, numbers pyramid. Compares one site with another. Draws reasoned conclusions using some of the factors measured.	Relevant analysis and evaluation including some of habitat change due to human causes, insect and bird niches and lifecycle stages, numbers pyramid, to draw credible conclusions. Simple comparison with other sites.	Narrow analysis and evaluation to propose obvious conclusions.	Cursory analysis and evaluation to propose conclusions.
Communicates scientific ideas using scientific terminology appropriately	Uses a range of terms skillfully in report or digital story.	Uses a range of terms in report or digital story and in conclusions. Some used well.	Uses some terms in digital story and in conclusions. Some used well.	Occasionally uses terms in digital story and in conclusions.	Rarely uses terms in digital story or in conclusions.
Guide to making judgements			Overall: A	B C	D E

ICTS

Creating with ICTs

- Create and document and present their learning, thinking and learning, using photos and the media of digital stories

Communicating with ICTs

- Identify group in forum or database
- Use the forum to post, and critically analyse and problem solve questions or comment on results of others to develop links with other schools
- Apply the conventions and protocols of the digital story genre
- Create a biodiversity message in the digital story
- Reflect and improve on the way they take photos or make digital stories

Operating ICTs

Use an interactive database to record results, save data and access data records of other groups

Year 7 Science Ecology Study Student: ____________

Data collection, analysis and reporting of ecology study: Assessable elements	Descriptors				
	A	B	C	D	E
Knowledge and understanding	Identifies the habitat, 5 common insects, their mouthparts and diet from a range of microhabitats (leaves, leaf litter, ground), as well as birds and reptiles, and does this in some detail. Classifies these according to the food they eat. Identifies one or two other insects accurately using the dichotomous key. Names them appropriately. Makes a good assessment of biodiversity using data.	Identifies the habitat, 5 common insects, their mouthparts and diet from a range of microhabitats (leaves, leaf litter, ground), as well as birds and reptiles, and does this is some detail. Classifies these according to the food they eat. Identifies one other insect using the dichotomous key. Names them appropriately. Makes an assessment of biodiversity using data.	Identifies the habitat, at least 5 common insects, their mouthparts and diet from a range of microhabitats (leaves, leaf litter, ground), as well as birds or reptiles. Classifies these according to the food they eat. Uses the dichotomous key. Makes an assessment of biodiversity.	Identifies the habitat, some common insects, their mouthparts and diet. Classifies some of these according to the food they eat.	Rudimentary knowledge and understanding of insect identification, habitat and diet.
Investigating	Data collection is detailed, with logical, complete and well-labelled tables, quality sketch of vegetation profiles. Investigates own problem using data collection methods and shows this data.	Data collection is detailed, with logical, complete and well-labelled tables, good sketch of vegetation profiles.	Data collection mostly complete. Data tables lack some detail in specimens trapped and identified or labels. Vegetation profile attempted.	Some parts of data collection not done. Some parts of the data tables not complete.	Many parts of data collection not done. Tables quite incomplete.
Evaluates data, identifies connections and links results to theory	Discerning analysis and evaluation to draw well-reasoned conclusions.	Logical analysis and evaluation to draw reasoned conclusions.	Relevant analysis and evaluation to draw credible conclusions.	Narrow analysis and evaluation to propose obvious conclusions.	Cursory analysis and evaluation to propose conclusions.
Communicates scientific ideas using scientific terminology appropriately	Uses a range of terms skillfully in digital story and in conclusions.	Uses a range of terms in digital story and in conclusions. Some used well.	Uses some terms in digital story and in conclusions. Some used well	Occasionally uses terms in digital story and in conclusions.	Rarely uses terms in digital story or in conclusions.
Guide to making judgements			Overall: A	B C	D E

Year 7 Technology (ICT) Digital Story Production

Student: ______________________________

Photostory production: Assessable elements	Descriptors				
	A	B	C	D	E
Knowledge and understanding	Uses 8-16 slides to make digital story 11/2 -2 minutes in length. Uses digital story devices including transitions, text, and layout.	Uses 8-16 slides to make digital story 11/2 -2 minutes in length. Uses digital story devices including transitions, text, and layout.	Uses 8-16 slides to make digital story 11/2 -2 minutes in length. Use digital story devices including transitions, text, and layout.	Uses 8-16 slides to make a digital story. Variable use of digital story devices.	Rudimentary knowledge and understanding of digital story devices.
Investigating and designing	Uses scientific research very well to choose and interpret digital story content. Shows this content in photos, storyboard and script of the digital story. Script complements photos.	Uses scientific research well to choose and interpret digital story content. Shows this in photos, storyboard and script of the digital story.	Uses scientific research satisfactorily to choose and interpret digital story content. Shows this in photos, storyboard and script of the digital story.	Variable interpretation and analysis of scientific research to choose and interpret digital story content.	Rudimentary interpretation and analysis of scientific research to choose and interpret digital story content.
Producing	Quality photos showing composition and good lighting. Implementation of production processes such as transitions, motion, text and text slides as well as voice-overs make a coherent digital story.	Some quality photos. Implementation of production processes such as transitions, motion, text and text slides as well as voice-overs to make a digital story.	Implementation of production processes such as transitions, motion, text and text slides as well as voice-overs to make a digital story.	Variable implementation of production processes such as transitions, motion, text and text slides as well as voice-overs to make a digital story.	Minimal implementation of production processes to make a digital story.
Evaluating	Insightful self-critique of digital story and processes based on audience response.	Informed self-critique of digital story and processes.	Relevant self-critique of digital story and processes.	Narrow evaluation of digital story and processes.	Cursory evaluation of digital story and processes.
Reflecting	Perceptive reflection on the use of a digital story to present a biodiversity message.	Informed reflection on the use of a digital story to present a biodiversity message.	Relevant reflection on the use of a digital story to present a biodiversity message.	Superficial reflection on the use of a digital story to present a biodiversity message.	Cursory reflection on the use of a digital story to present a biodiversity.
Guide to making judgements			Overall: A	B	C D E

References

Brisbane City Council (2005) *Terrestrial Invertebrate Status Review: Brisbane City*. Queensland Museum: Brisbane. Available at: <http://www.qm.qld.gov.au/organisation/2005/terrestrialinvertebratesstatusreview_brisbane.pdf> (Accessed 29 October 2007).

Curtis, S. (2006) *Wild Things in the School Grounds*. Workshop. Brisbane: Queensland Museum.

Department of the Environment and Water Resources (2007) *About Australia's Native Vegetation*. Canberra: Commonwealth of Australia. Available at: <http://www.environment.gov.au/land/vegetation/about.html> (Accessed 14 October 2007).

Garden, J.G. et al. (2006) Review of the ecology of Australian urban fauna: A focus on spatially explicit processes. *Austral Ecology*, **31**, p126–148.

Garden, J.G. et al. (2007) Habitat structure is more important than vegetation composition for local-level management of native terrestrial reptile and small mammal species living in urban remnants: A case study from Brisbane, Australia. *Austral Ecology*, **32**, p669-685.

Jones, D. (2002) *Magpie Alert: Learning to Live with a Wild Neighbour*. Sydney: UNSW Press

Queensland Museum (2007) *Science Skills: How to name habitats*. Available at: <http://www.qm.qld.gov.au/education/resources/mangrove/pdf/scienceskills/QM_how_to_name_habitats.pdf> (Accessed 14 October 2007)

Queensland Museum (2007) *Science Skills: How to sample mangrove habitats*. Available at: <http://www.qm.qld.gov.au/education/resources/mangrove/pdf/scienceskills/QM_sample_mangrove_habitats.pdf> (Accessed 14 October 2007).

Queensland Museum (2007) *Wildlife of Greater Brisbane: A Queensland Museum Wild Guide*. Brisbane: Queensland Museum.