



**EDUCATION
RESOURCES**

What is a Frog?



frogid.net.au

MAJOR PARTNER



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What is a Frog?

Frogs are amphibians. Amphibians have two parts to their life cycle (amphibian means 'both life') - the first in water during the egg and larva stage and the second on land during the adult stage.

Frogs are the only Amphibians that are native to Australia.

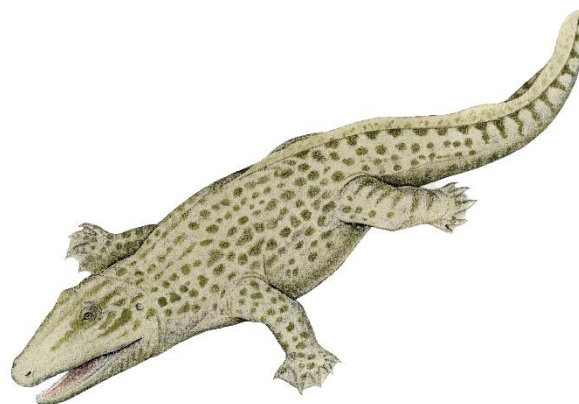
The ancestors of frogs and other amphibians were fish that had fleshy fins and sometimes breathed air. They evolved about 350 million years ago. Having legs and breathing air allowed early amphibians to live on land but they had to return to water to breed.

Some of the most primitive amphibians were called labyrinthodonts but these may not be direct ancestors of modern amphibians. Today's amphibians lie on an ancient branch of the amphibian tree and not on the evolutionary line that led to reptiles. There are 3 orders of amphibians:

- **Anurans (or tailless) frogs.** These usually begin life as tadpoles (small fishlike larvae with tails and gills) but, as they grow, they absorb their tails and gills and develop long hind legs suitable for jumping. There are about 4000 living species of anuran.
- **Urodelans (or tailed) salamanders.** These usually start life as gilled larvae, have smooth moist skin, long tails and small, weak legs. They were probably the first vertebrates to spend any length of time on land.
- **Apoda (or legless) caecilians.** These are worm-like, poor sighted amphibians with short tentacles. They can burrow into moist soil hunting for earthworms to eat; or they can live and feed in water. They are rarely seen, and their biology is not well known.

Frogs are amphibians that:

- have a backbone and an internal skeleton (vertebrates)
- have four limbs. Their hind legs are usually much longer than their forelegs. They have hands with four fingers and feet with five toes.
- have simple sac-like lungs to breathe air.
- have soft, moist skin that allows water and oxygen to pass into and out of the body.
- are ectothermic or depend on the temperature of the environment for their warmth because they cannot make their own body heat.
- undergo metamorphosis or transformation from a swimming tadpole larva into an air-breathing adult.
- lay unshelled eggs covered with jelly. The eggs can dry out easily, so they are often laid in water or damp places.



A giant salamander-like labyrinthodont amphibian *Paracyclotossaurus davidi* found in a brick pit in the Sydney suburb of St Peters.

Frogs and toads

Frogs which have short legs and dry, warty skin are often called toads. True toads, which belong to the family Bufonidae, have a different bone structure from most other families of frogs. The introduced Cane Toad is **the only toad in Australia**.

Frog types

There are five families of frogs in Australia:

- **Tree Frogs**, the Pelodytidae, can be divided into climbing frogs, ground-living frogs and water-holding frogs.
- **Ground Frogs**, the Myobatrachidae, also live in a variety of different habitats.
- **Narrow-mouthed Frogs**, the Microhylidae, live on the ground. Some of them have toe discs for climbing and most are walkers rather than leapers.
- **True Frogs**, the Ranidae, have long hind legs which allow them to swim and leap well. There is only one species of True Frog in Australia.
- **Toads**, the Bufonidae, have a different bone structure from other families of frogs. The introduced Cane Toad is the only toad in Australia.

What is FrogID?

FrogID is a national citizen science project that aims to make learning about Australian frogs, what is happening to them, and the importance of conserving frogs easy. With the FrogID app, people from all over the country can record frog calls and identify frogs in their area using their smartphones!

The app is also being used to collect data on the Cane Toad, allowing us to track its whereabouts, and to identify where frog populations are thriving and where they are threatened. Using FrogID, you can help scientists determine where frogs are most at risk of habitat loss, climate change and disease.



Why are frogs important?

Frogs play a vital role in many food webs, as both predators and prey. Frogs are major predators of insects and other invertebrates, including pest species. As prey, they provide food for birds, fish, snakes, and other larger animals.

They are also key biological indicators of the health of the environment. Environmental degradation, climate change and disease have detrimental effects on frog populations. Their special permeable skin often means that environmental changes such as increasing pollution are indicated early by declining populations.



By returning to sites where frogs have been recorded at different times and under different weather conditions, we can track changes in frog populations and habitats over time, and so gauge the effect of environment change on different frog species. Data obtained through the app can also help us to track the spread of introduced Cane Toad.

Frog Conservation

Due to the various threats against frog populations and their rapidly decreasing numbers, conservation efforts have become vital to their survival.

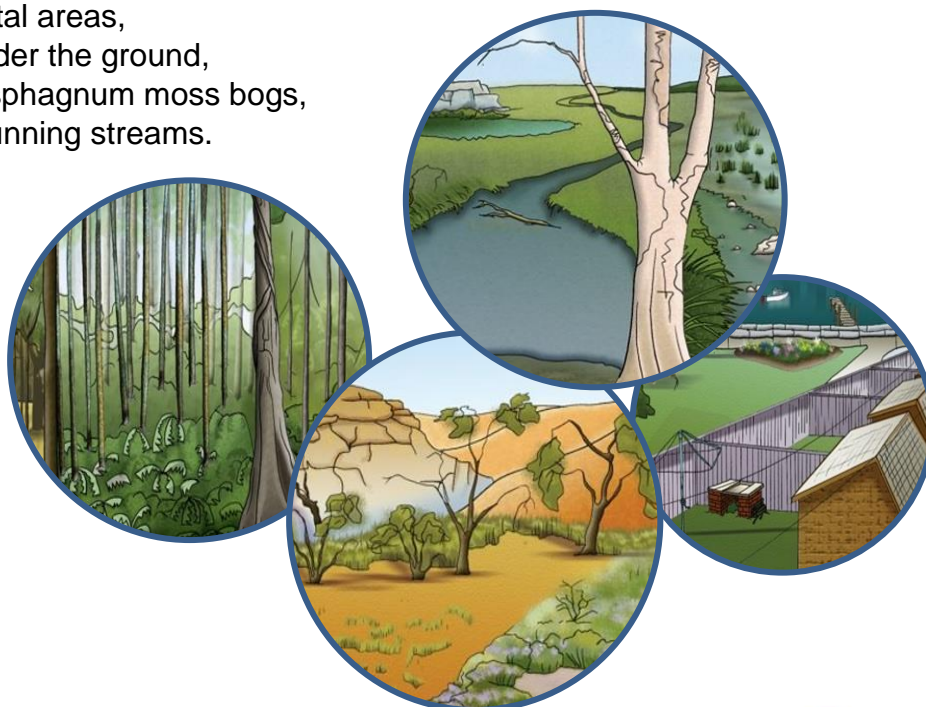
Tracking frog populations by recording frog calls with the FrogID app will allow us to learn how different frog species are responding to their changing environments. Collecting this information and making use of it in conservation efforts could be crucial to saving Australia's frogs.

In urban areas, human development has reduced the natural habitat available to frogs. Building a frog pond in your school or backyard helps conservation efforts by giving frogs in your area somewhere to live, providing a haven from habitat destruction and pollution.

Frog habitats

Frogs live on all the large landmasses of the world, except Antarctica and Greenland. They are most common in the warm, wet tropics, but they also live:

- in rainforests to deserts,
- in alpine to coastal areas,
- in treetops to under the ground,
- on cliff faces to sphagnum moss bogs,
- in still water to running streams.



Frog adaptations

Frogs are specially adapted to the conditions that they live in. Many frogs that live in forests and rainforests have sticky toe discs that help them climb and keep them in place when resting on leaves and branches.

Frogs that live in arid areas have tough tubercles (nodules) on their back feet to help them dig into the earth when burrowing. Frogs that swim have webbed feet to make them more efficient in the water.



Desert frogs

Some frogs are adapted to live in dry deserts. When conditions become dry the frogs:

- burrow down into the earth to a depth of up to a metre by shovelling the sand or mud from under them with their back feet.
- make a small chamber in the earth.
- form a cocoon made from many layers of dead skin, encasing their entire body.

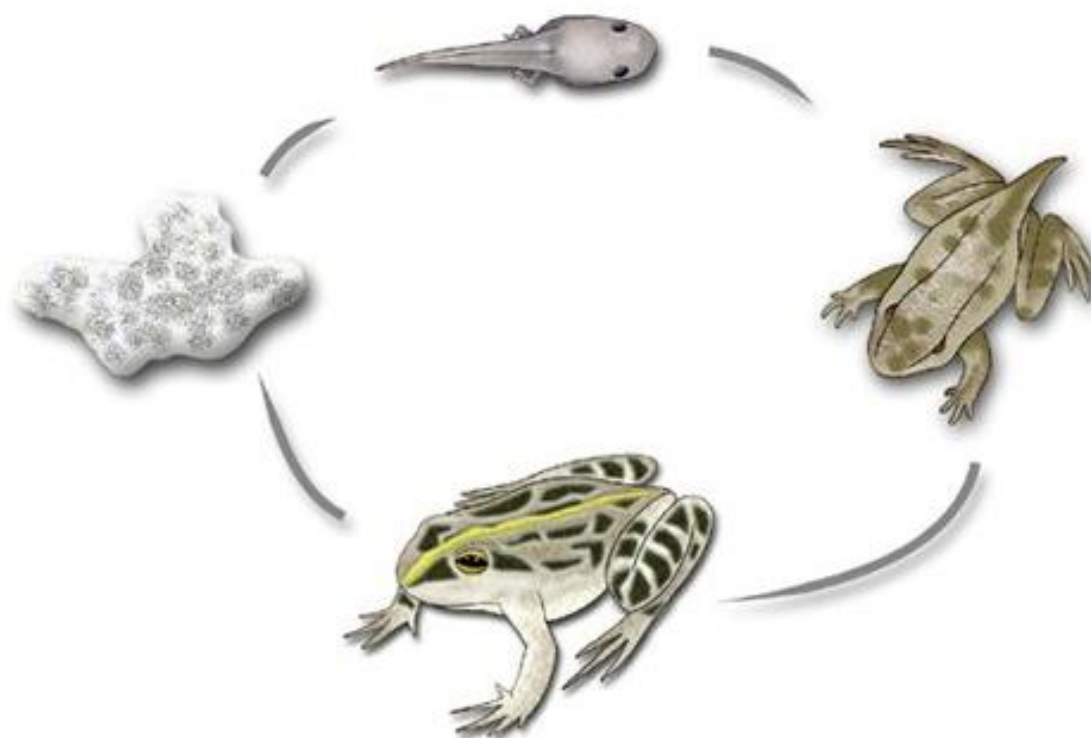
When rain falls again, frogs emerge; find mates, lay eggs and feed – all in a short space of time. The tadpoles have to develop very quickly into adults before the puddle they live in dries up.



Life cycles

The word 'amphibian' comes from Greek meaning 'two kinds of life' or 'both lives'. It refers to the fact that amphibians start life by having an aquatic gill-breathing larval stage which is followed by a terrestrial lung-breathing adult stage.

The Life Cycle of the Spotted Marsh Frog



Spotted Marsh Frogs have four stages in their life cycle:

- egg
- tadpole
- metamorph
- adult

Spotted Marsh Frogs live in the eastern half of Australia. They can be found in swamps, lagoons and creeks in wet coastal areas and dry inland areas. They eat water insects, flying insects and spiders. Birds, lizards, snakes, turtles and water rats all like to eat Spotted Marsh Frogs.

Adult Spotted Marsh Frogs breathe by inhaling air into their lungs. They can also absorb oxygen through their wet skin when they are out of the water. Tadpoles get oxygen from the water through their gills.

When Spotted Marsh Frogs breed, males use a mating call to attract females. The males then make a floating foam or bubble raft in which the eggs are placed. When the tadpoles hatch out, they drop into the water.





Frog sounds

Most frogs can make sounds if they are distressed or under attack. Male frogs may also make territorial calls. But the usual call that we hear is the advertisement call, made only by male frogs to attract female frogs. They make these calls by pumping air over the vocal cords in their throat. Vocal sacs under their throat increase the volume of the sounds from the vocal cords. Female frogs have ears that are tuned to the call of their own species, so that they can hear calls of their own species in a crowd of calling males.

Threatened frogs

The main threats to frogs are:

- Habitat destruction
- Pollution
- Introduced species
- Disease – including the amphibian chytrid fungus
- Climate change



Frogs are often the first animals to be affected by environmental change, and so may act as biological indicators of the state of the environment. Their reactions to the environment provide an early warning of environmental degradation and pollution.

What is a Frog? Teacher Resource

1. Summary

Students learn about the classification of frogs, basic anatomy and the concept of different animal adaptations.

2. Objectives

- Students are introduced to the classification of frogs and toads.
- They are introduced to the concept of different animal adaptations.
- They know the correct terminology for frog body part.
- They know about a few common Australian frogs.

3. Curriculum links

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| <ul style="list-style-type: none"> • Stage 1 <ul style="list-style-type: none"> ○ ACSSU017 ○ ACSSU030 | <ul style="list-style-type: none"> • Stage 2 <ul style="list-style-type: none"> ○ ACSSU044 ○ ACSSU072 | <ul style="list-style-type: none"> • Stage 3 <ul style="list-style-type: none"> ○ ACSSU043 • Stage 4 <ul style="list-style-type: none"> ACSSU111 |
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4. Resources

- What is a Frog? Information for Students (pages 10-12)
- Frog or Toad Game – Student Activity (pages 13-16)
- Classification – Student Activity (pages 17-21)
- Tree Frogs and Ground-Dwelling Frogs fact sheets on Australian Museum website: <https://australianmuseum.net.au/frogs-amphibians>
- What's the difference between frogs and toads: <http://australianmuseum.net.au/blogpost/science/frogs-and-toads>
- Frog: Class Amphibia factsheet: <http://australianmuseum.net.au/frogs-class-amphibia>

5. Session structure

a) Introduction - Engage

- Establish students' prior knowledge –What is a frog? What is the lifecycle of a frog? Do we have frogs in Australia?
- Introduce students to
 - Classification of frogs
 - Concept of different animal adaptation
 - Terminology for frog body parts

b) Activities – Explore, Explain and Elaborate

• What is a Frog? Activity

Students study the 'What is a Frog? Information for Students'

They could:

- Change the information into a different format e.g. a digital presentation, a poster about frogs.



- Use the information as a springboard to carry out deeper research on one aspect of frogs. e.g. Features of a Frog, Frog Skin, Life Cycle, Threats to Frogs, Frogs in Australia. This activity could be done in groups with each of the 5 groups focussing on one aspect. The groups could do detailed research and present their findings in an imaginative way.
- **Frog or Toad Game – Student Activity**

Students use the information on pages 13 to 15 to identify whether the animals in the 8 photos are frogs or toads.
- **Classification – Student Activity**

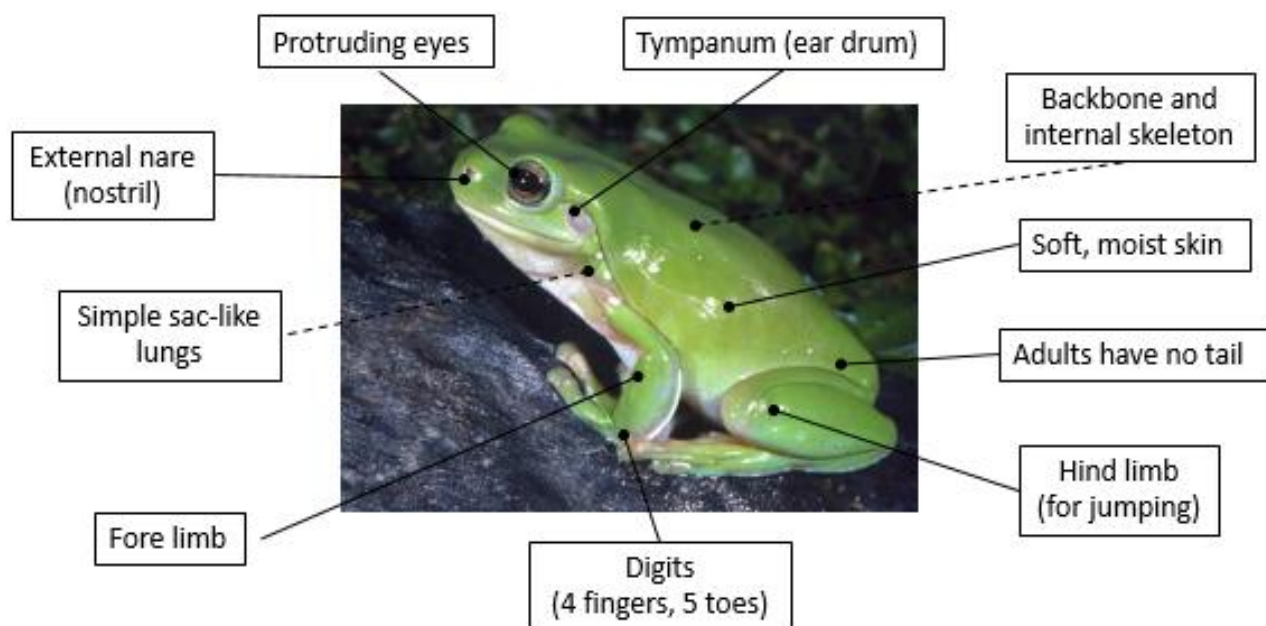
Review the five classes of vertebrates (fish, mammals, reptiles, amphibians, birds), and how 'class' fits within biological taxonomy (i.e. kingdom, phylum, class, etc.) with the students. Introduce or review dichotomous keys. Lead a brief discussion as to why they are a useful classifying tool in the biological sciences.
- **Exercise 1: Classifying Vertebrates**
 - Students classify vertebrates using a dichotomous key.
- **Exercise 2: Classifying Frogs**
 - Students use the physical features of frogs in photos and a dichotomous key to identify the species names of 6 frogs. They could construct a table to show their answers – a template is given.
- **Exercise 3: Amphibian Exhibit Confusion (Research Task)**
 - Students use a dichotomous key and the frog profiles on the Australian Museum's website to match 9 frogs with their correct enclosure in the Amphibian Exhibit at the State Zoo. There are template tables for their response.



What is a Frog? Information for Students

Frogs are amphibians. They evolved about 280 million years ago. The word Amphibian means 'two lives'. Amphibians include frogs, toads, salamanders and caecilians. Australia has 240 species of native amphibians, all frogs. Frogs are cold-blooded, vertebrate animals.

Features of a Frog



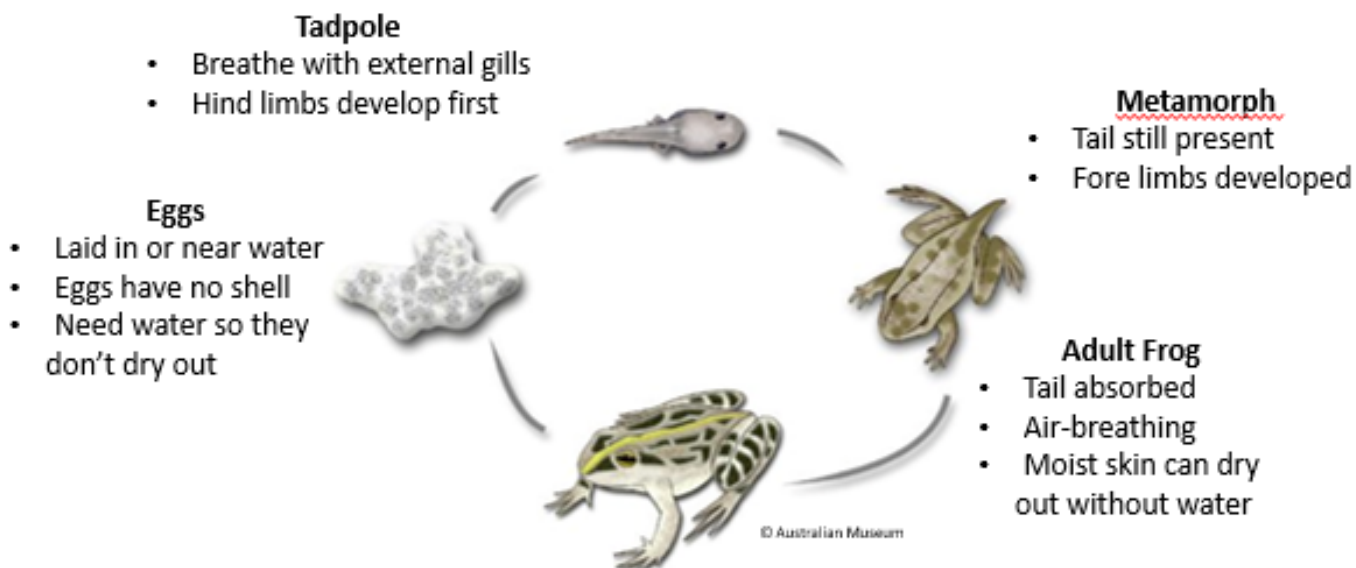
Frog Skin

- Frogs live on land and in water.
- Their specialised skin allows them to live on land.
- Their moist skin has important biological functions including:
 - absorbing oxygen and releasing carbon dioxide
 - regulating their salt content and absorbing water
 - changing colour to camouflage themselves
 - secreting mucous to avoid drying out.



Frog Life Cycle

- Frogs have slightly different life cycles depending on their habitat.
- They have the following 4 basic stages in their life cycle:



Threats to Frogs

Frogs are affected many changes in their environment:

- Salinity can impact on a frog's ability to regulate its salt/water balance.
- Temperature change can force populations to alter their habitat use and spawning times.
- Large changes in pH can also change the distribution of local species and, in some cases, they will move out of an area altogether.

At present, frog populations are declining all around the world.

- Using frogs as bio-indicators can be as simple as noticing that a formerly noisy frog habitat has become silent.

Frogs in Australia

- Australia is home to about 240 native frog species.
- Frogs have adapted to many different habitats.
- Some frogs can burrow.
- Some can climb trees.
- Some frogs will live in your backyard.



3 Australian Frogs

The following three frogs are found in Australia:

Ornate Burrowing frog

Limnodynastes ornatus

- This frog is well adapted to burrowing when there is little water and is often found far from the coast and in arid environments.
- This burrowing species is usually active after rain.



Corroboree Frog

Pseudophryne corroboree

- This frog lives in the Australian Alps.
- It is found in marshlands and sclerophyll forests under logs and vegetation.
- It likes to breed in sphagnum bogs.
- This is **Australia's most endangered frog** and their numbers are decreasing.



Perons Tree Frog

Litoria peronii

- It is the second most common suburban frog.
- It has black and yellow marbling on its thighs, armpits and groin.
- Its eggs are laid in a floating raft which sinks a few hours later.
- It is found hiding by day in plant pots, drainpipes.
- By night they are sometimes seen on windowsills catching incoming insects.



Frog or Toad Game – Student Activity

Duttaphrynus melanostictus

- Common in South-East Asia
- Bumpy ridges on its head and back
- Large parotoid glands



Vandijkophrynus angusticeps

- Native to South Africa
- Large, flat body with bumpy, 'warty' skin
- Short fore and hindlimbs



Rhinella marina

- An introduced pest in Australia
- Can live in many habitats such as coasts, sand dunes and grassland
- Large swellings behind their eyes store poison



Rhinella proboscidea

- Commonly found in the Amazon Rainforest
- Highly toxic to predators
- Short forelimbs



Litoria gracilent

- Found in tropical locations in Queensland and Northern NSW
- Lives in urban areas
- Long hind legs help it get long distances

***Litoria fallax***

- Found on the east coast of Australia
- Short, narrow body
- Lives near swamps, lagoons and ponds

***Limnodynastes tasmaniensis***

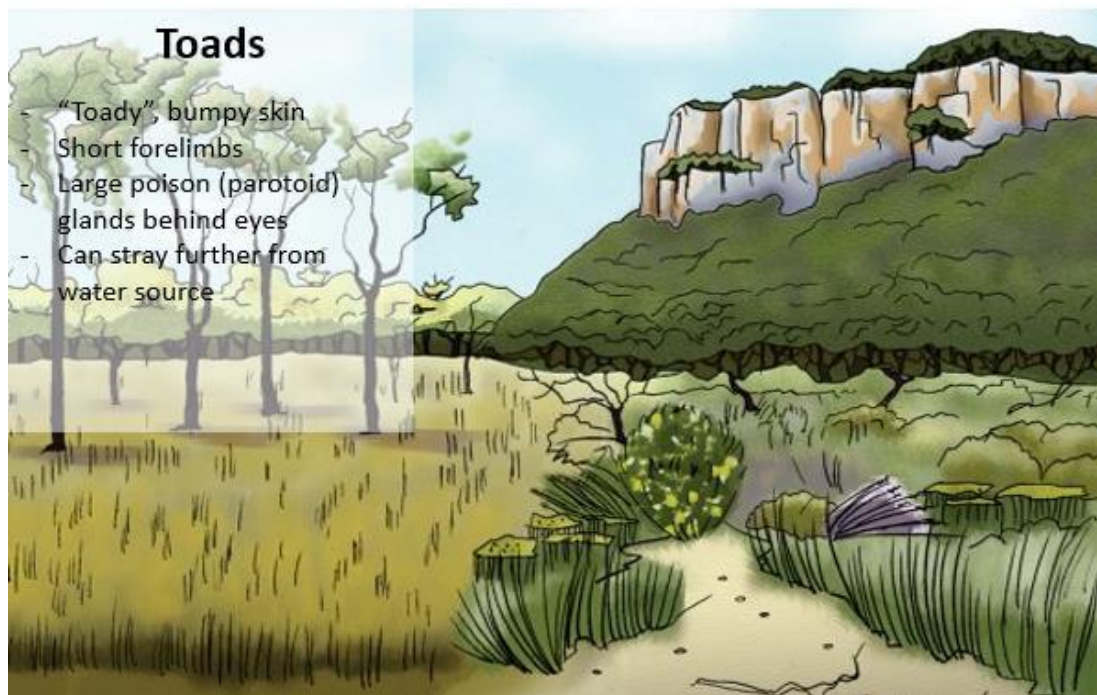
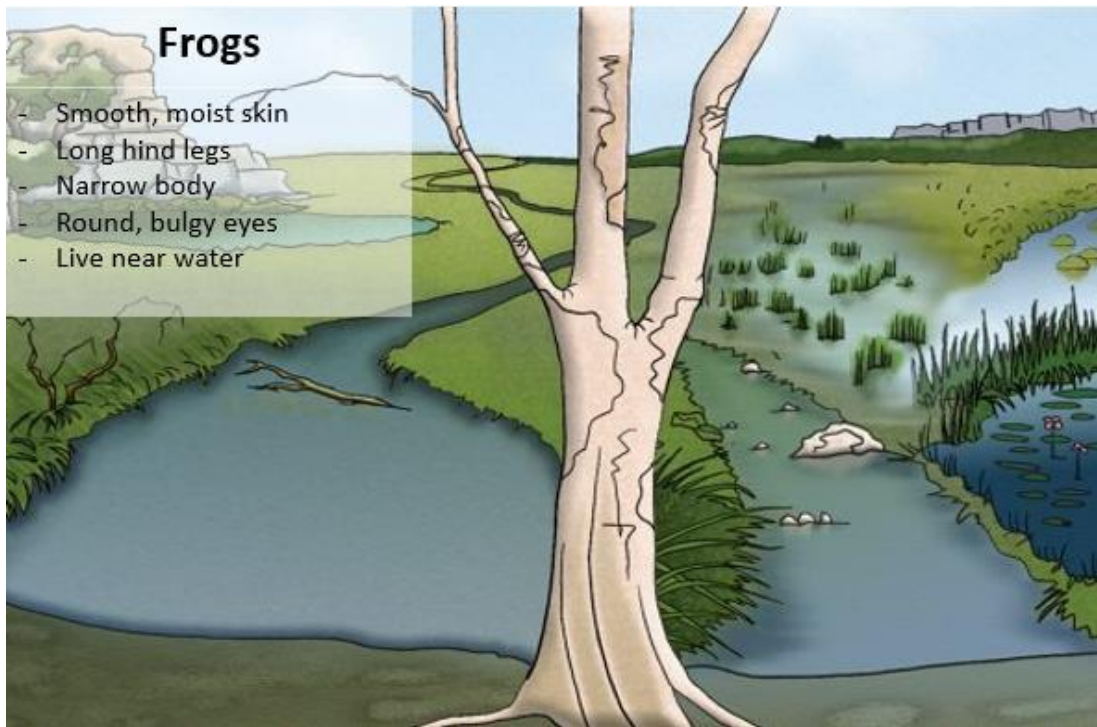
- Found throughout Eastern Australia
- Often the first to spread to new dams and wetlands
- Round, bulgy eyes

***Crinia signifera***

- Skin can be smooth or 'warty'
- Found in Eastern Australia
- Lives near any habitat that is sufficiently damp



Frog or Toad Game



Frog or Toad?

Classify the following 8 species as a frog or toad:

1



2



3



4



5



6



7



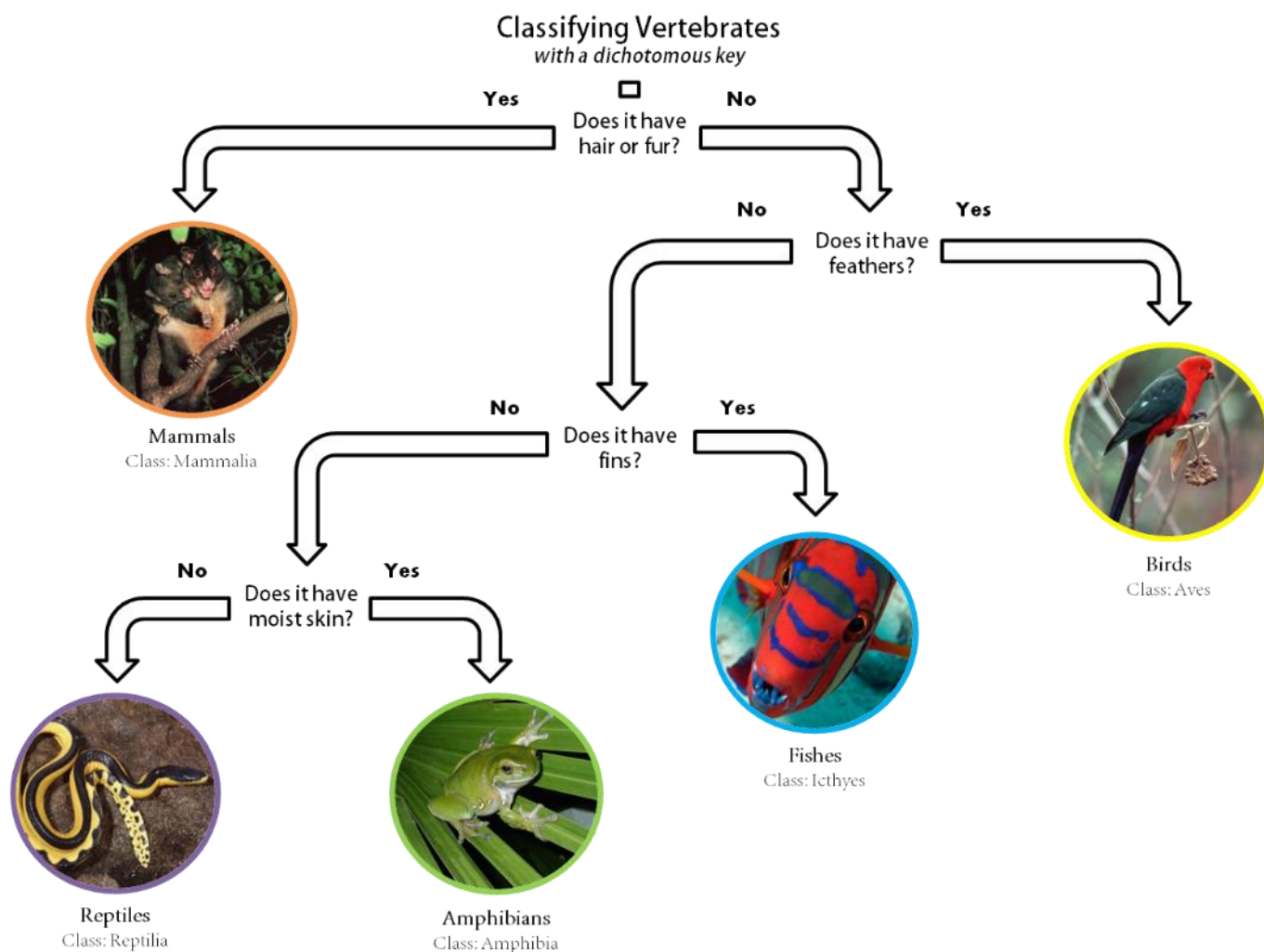
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Classification – Student Activity

Exercise 1

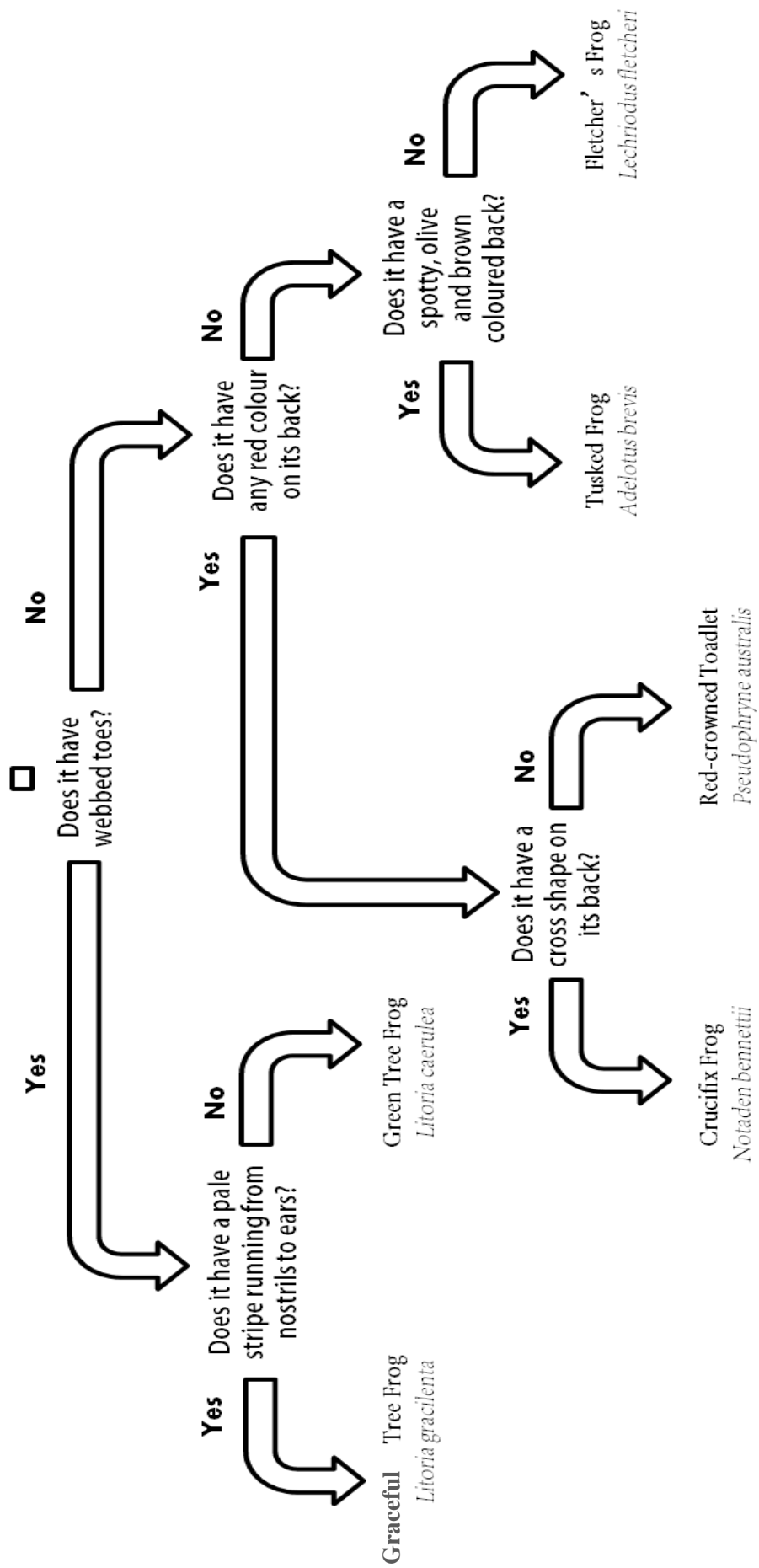
Use this key to describe the features of each class of animals.



Exercise 2

Use the physical features of these unidentified frogs to respond to the dichotomous key below. By correctly interpreting the dichotomous key, identify the species of frogs and construct a table to match the frog photos with a scientific and common name.

Classifying Amphibians with a dichotomous key





Exercise 3 – Amphibian Exhibit Confusion! (Research Task)

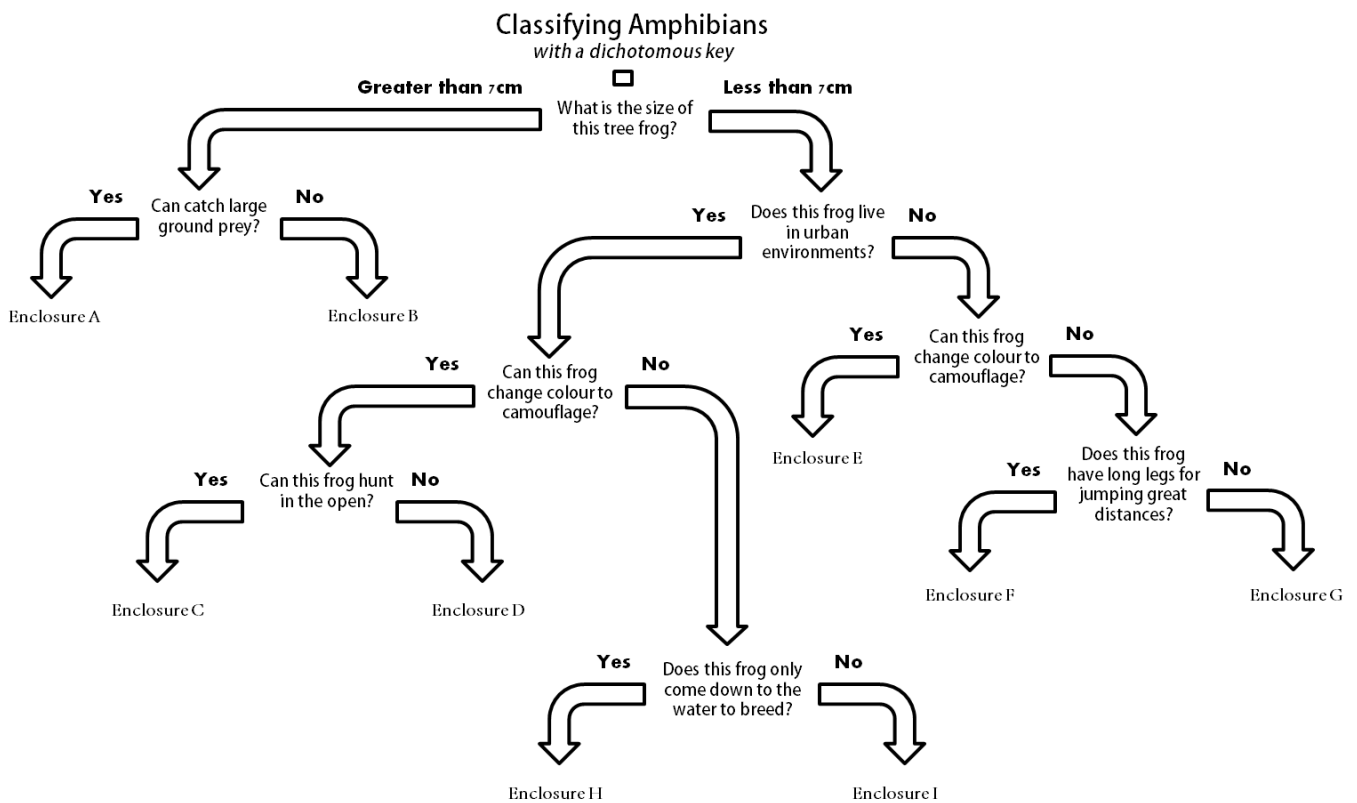
There has been a mix up at the Amphibian Exhibit at the State Zoo, and, as the new Head Amphibian Keeper, you have to solve it! The Amphibian Exhibit has nine different habitat enclosures for their nine different frog species. Last week, the exhibit was closed so that the enclosures could be cleaned and updated and the frogs were temporarily removed from their habitats. Now that the enclosures have been updated, no one can figure out which frog belongs in which habitat!

Resources you have:

- The 9 frog names.
- Classifying Amphibians with a dichotomous key.
- The frog profiles on Australian Museum website.

Use the frog profiles on the website to gather information about each species and use the key to match each frog to its new enclosure. Make sure the frogs are comfortable in their own habitat and make sure you keep your job!

Use the tables to record your findings.



Exercise 3 – Amphibian Exhibit Confusion! (Research Task)

Frog Species	Q.1	Q.2	Q.3	Q.4	Letter
Peron's Tree Frog <i>Litoria peroni</i>					
Leaf Green Tree Frog <i>Litoria phyllochroa</i>					
Red-eyed Tree Frog <i>Litoria chloris</i>					
Graceful Tree Frog <i>Litoria gracilenta</i>					
Eastern Sedgefrog <i>Litoria fallax</i>					
Rocket Frog <i>Litoria nasuta</i>					
Jervis Bay Tree Frog <i>Litoria jervisiensis</i>					
Green and Golden Bell Frog <i>Litoria aurea</i>					
Green Tree Frog <i>Litoria caerulea</i>					

Frog Species	Enclosure Code
Peron's Tree Frog <i>Litoria peroni</i>	
Leaf Green Tree Frog <i>Litoria phyllochroa</i>	
Red-eyed Tree Frog <i>Litoria chloris</i>	
Graceful Tree Frog <i>Litoria gracilenta</i>	
Eastern Sedgefrog <i>Litoria fallax</i>	
Rocket Frog <i>Litoria nasuta</i>	
Jervis Bay Tree Frog <i>Litoria jervisiensis</i>	
Green and Golden Bell Frog <i>Litoria aurea</i>	
Green Tree Frog <i>Litoria caerulea</i>	



Appendix – Answers for educators

Frog or Toad Game – Student Activity

1. Black-spined Toad
2. Spotted Marsh Frog
3. Cane Toad
4. Dainty Tree Frog
5. Cape Sand Toad
6. Eastern Dwarf Tree Frog
7. *Rhinella proboscidea* (toad)
8. Common Eastern Froglet

Classification – Student Activity

Exercise 1: Classifying Vertebrates

Class of Vertebrate:	Does it have fur?	Does it have feathers?	Does it have fins?	Does it have moist skin?
Mammals	Yes	-	-	-
Birds	No	Yes	-	-
Fishes	No	No	Yes	-
Amphibians	No	No	No	Yes
Reptiles	No	No	No	No

Exercise 2: Classifying Frogs

Unknown Species	Species Common Name	Species Scientific Name
Unknown Species 1	Graceful Tree Frog	<i>Litoria gracilentia</i>
Unknown Species 2	Tusked Frog	<i>Adelotus brevis</i>
Unknown Species 3	Fletcher's Frog	<i>Lechriodus fletcheri</i>
Unknown Species 4	Red-crowned Toadlet	<i>Pseudophryne australis</i>
Unknown Species 5	Green Tree Frog	<i>Litoria caerulea</i>
Unknown Species 6	Crucifix Frog	<i>Notaden bennettii</i>



Exercise 3 – Amphibian Exhibit Confusion (Research Task)

Frog Species	First Q.	Second Q	Third Q	Fourth Q	Letter
Peron's Tree Frog <i>Litoria peroni</i>	<7 cm	Can live in urban areas	Changes colour to camouflage	Does hunt in the open	C
Leaf Green Tree Frog <i>Litoria phyllochroa</i>	<7 cm	Can live in urban areas	Changes colour to camouflage	Doesn't hunt in the open	D
Red-eyed Tree Frog <i>Litoria chloris</i>	<7 cm	Can live in urban areas	Cannot change colour to camouflage	Only comes down from trees to breed	H
Graceful Tree Frog <i>Litoria gracilentia</i>	<7 cm	Can live in urban areas	Cannot change colour to camouflage	No. Eggs are often laid on plants	I
Eastern Sedgefrog <i>Litoria fallax</i>	<7 cm	Cannot live in urban areas	Changes colour to camouflage		E
Rocket Frog <i>Litoria nasuta</i>	<7 cm	Cannot live in urban areas	Cannot change colour to camouflage	Has long legs that allow it to jump long distances	F
Jervis Bay Tree Frog <i>Litoria jervisiensis</i> Green and Golden Bell Frog <i>Litoria aurea</i>	<7 cm	Cannot live in urban areas	Cannot change colour to camouflage	Does not have long legs	G
Green Tree Frog <i>Litoria caerulea</i>	>7 cm	Can catch large ground prey			B
Peron's Tree Frog <i>Litoria peroni</i>	>7 cm	Cannot catch large ground prey			A

Frog Species	Enclosure Code
Peron's Tree Frog <i>Litoria peroni</i>	C
Leaf Green Tree Frog <i>Litoria phyllochroa</i>	D
Red-eyed Tree Frog <i>Litoria chloris</i>	H
Graceful Tree Frog <i>Litoria gracilentia</i>	I
Eastern Sedgefrog <i>Litoria fallax</i>	E
Rocket Frog <i>Litoria nasuta</i>	F
Jervis Bay Tree Frog <i>Litoria jervisiensis</i>	G
Green and Golden Bell Frog <i>Litoria aurea</i>	B
Green Tree Frog <i>Litoria caerulea</i>	A



Curriculum Links

Stage 1:

ACSSU017 - Living things have a variety of external features:

- Recognising common features of animals such as head, legs and wings
- Describing the use of animal body parts for particular purposes such as moving and feeding

ACSSU211 - Living things live in different places where their needs are met:

- Exploring different habitats in the local environment such as the beach, bush and backyard
- Recognising that different living things live in different places such as land and water
- Exploring what happens when habitats change and some living things can no longer have their needs met
- Recognising that frogs live in lots of different types of environments in Australia
- Recognising that frogs have needs that are met by their environment

ACSSU030 - Living things grow, change and have offspring similar to themselves:

- Representing personal growth and changes from birth
- Recognising that living things have predictable characteristics at different stages of development
- Exploring different characteristics of life stages in animals such as egg, caterpillar and butterfly
- Observing that all animals have offspring, usually with two parents

Stage 2:

ACSSU044 - Living things can be grouped on the basis of observable features and can be distinguished from non-living things:

- Recognising characteristics of living things such as growing, moving, sensitivity and reproducing
- Recognising the range of different living things

ACSSU072 - Living things have life cycles:

- Making and recording observations of living things as they develop through their life cycles
- Describing the stages of life cycles of different living things including: insects, birds, frogs and flowering plants

ACSSU073 - Living things depend on each other and the environment to survive:

- Recognising that environmental factors can affect life cycles such as fire and seed germination
- Recognising that frogs depend on their environment
- Recognising that frogs are adapted to their environment



Stage 3:

ACSSU043 - Living things have structural features and adaptations that help them to survive in their environment:

- Explaining how particular adaptations help survival such as nocturnal behaviour, silvery coloured leaves of dune plants
- Describing and listing adaptations of living things suited for particular Australian environments
- Exploring general adaptations for particular environments such as adaptations that aid water conservation in deserts
- Describing particular adaptations that help frogs survive in their environments

Stage 4:

ACSSU111 - Classification helps organise the diverse group of organisms:

- Considering the reasons for classifying such as identification and communication
- Grouping a variety of organisms on the basis of similarities and differences in particular features
- Considering how biological classification has changed over time
- Classifying using hierarchical systems such as kingdom, phylum, class, order, family, genus, species
- Using scientific conventions for naming species
- Using provided keys to identify organisms surveyed in a local habitat

ACSSU112 - Interactions between organisms, including the effects of human activities can be represented by food chains and food webs:

- Using food chains to show feeding relationships in a habitat
- Constructing and interpreting food webs to show relationships between organisms in an environment
- Classifying organisms of an environment according to their position in a food chain
- Recognizing the role of microorganisms within food chains and food webs
- Investigating the effect of human activity on local habitats, such as deforestation, agriculture or the introduction of a new species
- Exploring how living things can cause changes to their environment and impact other living things, such as the effect of cane toads



Stage 5:

ACSSU176 - Ecosystems consist of communities of interdependent organisms and abiotic components of the environment; matter and energy flow through these systems:

- Recognising that changes in ecosystems impact on frog populations
- Investigating how changes in the ecosystem, such as climate change, can have wide ranging impacts on species in the system

ACSSU185 - The theory of evolution by natural selection explains the diversity of living things and is supported by a range of scientific evidence:

- Identifying adaptations of frogs which makes them suited to their environment



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