



ACT and Region
Frogwatch
Schools Education Kit



Linking learning with our local environment

A project initiated by the Ginninderra Catchment Group as part of the ACT and Region Frogwatch Program, with support from the ACT and Australian Government's National Action Plan for Salinity and Water Quality.



Frogwatch Schools Education Kit

Published by the Ginninderra Catchment Group 2009.

Prepared By:

Rachelle McConville

Lana Twyford

Alexandra Hilvert

Lynn Churchill

Sandra Harding

Many of the resources and lesson plans included in this kit have been sourced from a variety of educational, scientific and special interest organisations. We would like to thank these organisations for allowing reproduction of their material here. In particular:

www.asxfrogfocus.com

www.frogs.org.au

www.anbg.gov.au

www.eduref.org

For further information, contact the ACT Frogwatch Coordinator:

Ginninderra Catchment Group

www.ginninderralandcare.org.au

Phone: 6278 3309

Email: waterwatch@ginninderralandcare.org.au

Mail: PO Box 446, Holt, ACT, 2615

The Frogwatch Schools Education Kit has been developed by the Ginninderra Catchment Group as part of the ACT and Region Frogwatch Program. Funding for initial development of the Kit was provided through the ACT Government's Environment Grants Program 2003 - 2005. The second edition (2007) and current funding is through the ACT and Australian Government's National Action Plan for Water Quality and Salinity.

CONTENTS

Introduction

Section 1: Teacher's Notes	1
Frogwatch extension ideas	2
Frogs are amphibians	3
All about frogs	4
Frog facts	6
Our local frog species	7
- Common species	
- Rare, vulnerable or poorly understood species	10
Frogs on the web	14
Books (Australian)	15
Section 2: Amphibians	16
Animal categorisation	17
Classifying animals	18
Naming frogs	19
Lifecycle filmstrip	20
Metamorphosis of frogs	23
Changes – Poem	24
Keeping tadpoles in the classroom	25
Section 3: Adaptations and Some Special Species	26
A long winter's nap	27
Flipper feet	28
Frog feet shop	28
Model mania	29
Skeletal structure	29
"Cree cree cree" - Finding a mate	30
"Cree cree cree" - I'm the loudest	31
Frogs found at the Australian National Botanic Gardens	32
Our endangered species	34
Corroboree Frog	
Green and Golden Bell Frog	36
Section 4: Habitat	37
My special place	38
Classroom habitat	39
An Ode to a Toad - Poem	39
Food webs	40
Food pyramids	41
Tiddalick - The Frog who caused a flood. A poem based on a dreamtime story	42
Create a Frog Bog!	43
Extra Resources	
Contacts for support and further information	44
Teacher evaluation form	46

Introduction

The Frogwatch Education Kit provides information and resources to teachers in the ACT and Region to support implementation of frog-related activities and learning experiences in schools. The Kit provides information that is specific to our local environment and local frog populations so that students are engaged and excited about their learning experiences and can see the relevance in their every day lives.

We envisage that exciting learning experiences focused on frogs will enable wider environmental issues and environmental citizenship to be explored with your class.

The ACT Frogwatch Coordinator is available to support the implementation of these activities in your school. We can:

- Present this Kit to a meeting of school staff to highlight contents of the Kit, answer teacher queries and offer further support.
- Visit class groups to provide a presentation about our local frog species, where they live, adaptations and surviving in changing conditions and how we can help to protect our amphibian friends.
- Provide advice and support for extension activities. These may include building a frog habitat in your school, providing a 'Tadpole Kit' with live tadpoles for loan or incorporating frog related activities with field trips.

We trust that you will find this Kit relevant, informative and useful for your planning and implementation of classroom activities. Please let us know if you require further support, information or have suggestions for improvement of the Kit.

Further information

ACT Frogwatch Coordinator
Ginninderra Catchment Group
Phone: 6278 3309
Email: waterwatch@ginninderralandcare.org.au
Website: www.ginninderralandcare.org.au
Mail: PO Box 446, Holt, ACT 2615



Section 1

TEACHER'S NOTES



This section provides:

- * some ideas to get you started*
- * information about amphibians in general*
- * information about our local frogs*
- * a list of resources for further exploration*

Frogwatch Extension Ideas



Frogs are AMPHIBIANS.....

The word 'amphibian' comes from two ancient Greek words *amphi* meaning double and *bios* meaning life. Amphibians have a double life. At a young stage most live in water and breathe through gills. As adults they are completely different. They breathe with lungs, live on land and most need water to breed. Amphibians vary enormously in shape and size but all amphibians are covered in moist skin and are ectothermic or cold blooded.

Amphibians can be divided into three groups: Anura, Urodela and Gymnophiona.

Green and Golden Bell Frog

All frogs belong to the Anura Group.

Photo: www.en.wikipedia.org



Anura

Amphibians in the Anura group don't have tails. This is the largest group of amphibians and includes around 5000 different species of frogs and toads.

Urodela

Amphibians in the Urodela group have long tails. They are similar to frogs but their bodies are longer and thinner. This group includes around 400 different kinds of newts, salamanders and sirens.

Fire Salamander

Salamanders, Newts and Sirens belong to the Urodela Group.

Photo: www.yale.edu



Sticky Caecilian

Caecilians belong to the Gymnophiona Group.

Photo: www.omahazoo.com



Gymnophiona

Amphibians in the Gymnophiona group have no legs and look like worms. This group includes around 200 different kinds of caecilians and most of them burrow in the soils of tropical rainforests. The biggest ones can grow to more than 60 centimetres. They have a powerful bite.

All About Frogs

Where do frogs live?

Frogs rely on moisture to breathe, reproduce and generally survive and thrive. Most frogs are active at night. Nocturnal life is one way of minimising the risk of drying out, as it is the coolest part of the day. It also means that it is harder for predators to find them.

Despite being dependent on water, frogs have evolved and diversified to occupy a variety of habitats. Frogs live in deserts, rainforests, alpine areas and coastal heathlands. They also live in backyards, golf courses and industrial sites.

For example there are tree frogs living in tropical rainforests that lay their eggs in tree hollows or in the cup-like bases of certain plants - plants that can collect a lot of water such as 'Bromeliads'. The eggs hatch in the watery pools and often the female frog comes back to lay feeder eggs to nourish the tadpoles (the name given to very young frogs) as they grow.

Frogs living in very dry areas survive by burrowing underground, storing water in their bodies and secreting mucus to waterproof their skin. Buried in the sand like this, they can survive until the next wet season arrives.

Our local frog species have evolved with different adaptive strategies to survive in the Canberra climate. Canberra is relatively dry and is subject to cold winters and hot summers. Some frogs can climb trees and nestle into the loose bark of eucalypts, while others have strong back legs to help them burrow into the soil. Another protective strategy frogs use is to find refuge in old logs, underneath rocks and amongst thick grass tussocks to escape predators and maintain their skin moisture.



Frogs need clean water to breed in and for tadpoles to grow up in. They also need thick native vegetation, old logs, trees or rocks to hide from predators and shelter from harsh seasonal conditions.

Reproduction

When frogs breed, the male will call to attract a female and to let other males know his territory. Different species have different calls so they don't attract the wrong mate! Calls can be told apart by pitch, frequency, duration, and the arrangement of tones and notes that make up the call. By studying the frog calls heard in an area, scientists can tell how many frogs are there and how many species live in a particular area.

Most frogs breed seasonally when conditions of temperature, day-length and moisture are right. In Canberra, most frogs breed in spring, but there are some that will breed all year round, or are opportunistic and breed whenever there are rain events. It is common to see tadpoles swimming in ponds at different times of the year. When a female lays eggs the male fertilises them and the resulting floating mass of eggs (spawn) is left while the frogs develop. Hatching of the tadpoles may take several days, followed by a period when the tadpole develops and finally changes into the adult frog, a process called metamorphosis (Refer to *Metamorphosis of Frogs* in the Amphibians section).

Why are Frogs important?

Frogs are a valuable asset to the environment. Frogs and tadpoles are an important link in the food chain of many ecosystems and do a great job helping to control insect populations. Tadpoles also act as natural nutrient filters and can help to control levels of algae in aquatic ecosystems.

Frogs are often sensitive to changes in their habitat and can serve as indicators of the overall health of both aquatic (water) and terrestrial (land) environments.

What is happening to Frogs?

Since about the 1980s, scientists started to notice dramatic declines in frog populations across the world. While nobody can say for sure what the cause is, something is happening to the environment, both within Australia and internationally, that is harming our frogs. It is particularly puzzling that some of the most dramatic declines are being observed in supposedly undisturbed environments, such as National Parks and other protected areas.

A number of factors may be contributing to the worldwide decline of amphibians:

- pollution of waterways
- loss of habitat
- global warming or climate change
- acid rain
- widespread use of chemicals
- spread of amphibian diseases (for example the *chytrid* fungus)



In some instances, a combination of these factors may be contributing to the loss of frog populations.

In the Canberra region, a number of our local species have been found to be susceptible to the amphibian *chytrid* fungus, which is now known to be present throughout the region. In addition, we have removed or altered large areas of frog habitat, introduced a range of potentially harmful chemicals into our environment and are likely to be affected by climate changes (especially in the alpine areas).

If we accept that frogs are an indicator species and that this is a warning environmental changes are taking place, it is in everyone's interest to take heed of this potential tragedy.

What can we do?

We can all play a part in making sure our frog populations are healthy and safe. Some ideas include:

- Being careful about chemicals we use at home or at school. Avoid using dangerous chemicals and always dispose of paints, oils, detergents etc safely.
- Creating habitat in our own backyard or school ground. (See the Frogwatch resource, "Creating a Frog Friendly Habitat").
- Keeping cats inside at night.
- Helping others to appreciate frogs and our environment in general.

Some information on this page is sourced from the Australian National Botanic Gardens

FROG FACTS

The **largest** frog is the African Giant or Goliath Frog (*Conraua goliath*) of West Africa. It can grow to 30 cm.

The **smallest** frog is the Cuban Frog (*Sminthillus limabuts*) which is 0.85 - 1.2 cm.

The **most poisonous** frog is the Golden Poison Arrow Frog of western Columbia, but all 60 or so species of Poison Arrow Frog have some of the most deadly toxins known to science. Some of this poison comes from eating toxic insects. The brightly coloured skin of some frogs advertises the fact that they can produce toxins or poisons which can taste nasty or even kill! Some frog toxins are powerful drugs, and have been used by humans as weapons and even heart disease treatment. Some scientists have called frogs "chemical treasure houses" due to their great potential in providing drugs to help combat human illnesses.

The Venezuela Skunk Frog is the **worst smelling**.

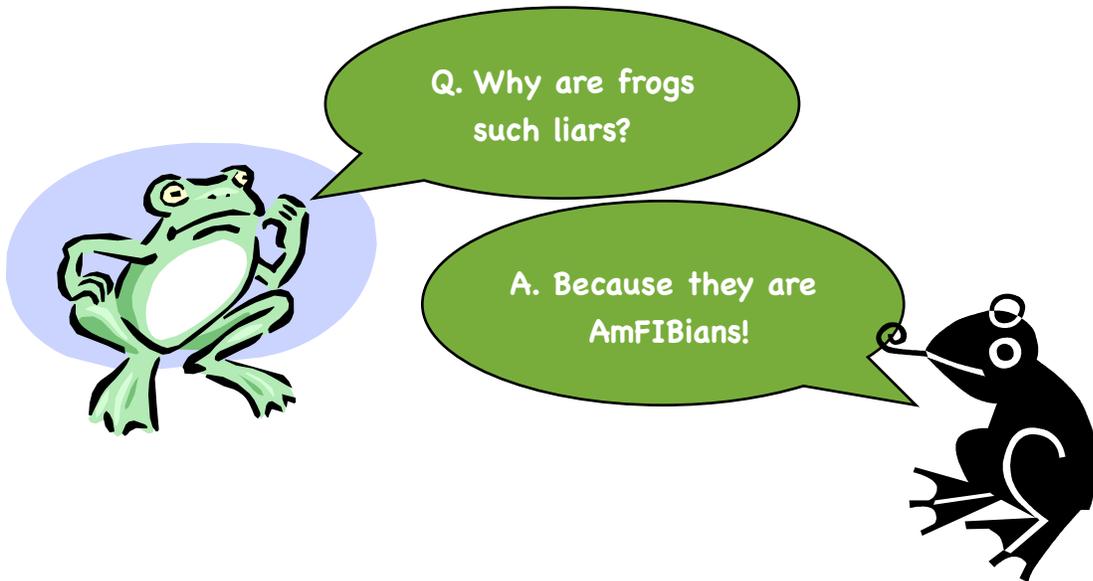
The female Cane Toad lays the **most eggs** 30 000 - 35 000 and the Cuban Frog (*Sminthillus limabuts*) lays the **least eggs** - 1 egg.

Small frogs often **jump the furthest**. A South African Sharp-nosed Frog (*Ptychadena oxyrhynchus*) which is 5.5 - 6.6 cm is recorded jumping 5.35 m.

The **earliest frog fossil** *Vieraella herbstii* is about 160 million years old and comes from Argentina. Frogs or at least ancestors of present day frogs evolved around 250 - 280 million years ago. The only fossil found so far that links modern frogs with their ancestors is a fossil cast found in Madagascar called *Triadobatrachus masenotti*. It is 200 million years old.

The first frog fossil bone found in Australia was in 1974, in South Australia. The oldest frog fossil from Australia comes from Murgon in south-east Queensland and is 54.5 million years old.

Information on this page has been sourced from The Australian Museum Web



OUR LOCAL FROG SPECIES

- Common Species

Reference

Information for this section has been taken from:

Wet and Wild, A Field Guide to the Freshwater Animals of the Southern Tablelands and High Country of the ACT and NSW. By Mark Lintermans and William Osborne

Published by Environment ACT. Copies are available from The Botanic Gardens Bookshop, and various other outlets. Photographs have been sourced with permission from the Victorian Frog Group from www.frogs.org.au, except where otherwise credited.

Crinia parinsignifera (Plains Froglet)



Found in	Lowland rivers, Lowland dams, Lowland creeks, Swamps, Farm dams and Lakes.
Mating Call	Slightly drawn out “wwrreeeeek” sound, repeated regularly. Calls from August to November.
Biology and Habitat	Prefers deep, permanent pools such as farm dams, swamps and other wetlands, but can also be found in slow moving stretches of streams and rivers.
Distribution and Abundance	A very common species, found predominantly in the open country and plains. In the Southern Tablelands, it is found only below 800m altitude.
Potential Threats	There are few perceived broad-scale threats to this species which has been advantaged by the construction of farm dams.

Crinia signifera (Common Eastern Froglet)



Found in	Upland bogs, Upland rivers, Montane creeks, Montane seepages, Lowland rivers, Lowland creeks, Swamps, Farm dams and Lakes.
Mating Call	A “crick crick crick crick crick” sound. Calls from June to January.
Biology and Habitat	Males begin calling regularly from pools during the wetter parts of winter and spring (later at higher altitudes). Calling is continuous throughout the day, but decreases on cold nights.
Distribution and Abundance	An abundant species with widespread distribution in south-eastern Australia. Occurring in a wide variety of habitats, it is commonly heard calling in spring and early summer from marshes, ponds, seepages and farm dams.
Potential Threats	There are few perceived broad-scale threats to this species which has been advantaged by the construction of farm dams and roadside ditches.

Limnodynastes dumerilii (Eastern Banjo Frog or Pobblebonk)



Found in	Upland rivers, Montane creeks, Lowland rivers, Lowland creeks, Swamps, Farm dams and Lakes.
Mating Call	A distinctive loud 'bonk' when frog is in the water; or a loud 'toc' if calling from land. Calls from September to January.
Biology and Habitat	Remain hidden in short burrows in the ground for much of the time. On hot summer evenings, they may be observed sitting on the road surface.
Distribution and Abundance	Widely distributed throughout the lowland areas of south-eastern Australia and the region. It is a common species which is more often detected by its call than by sightings of the animal itself.
Potential Threats	No major threats. Individuals are sometimes run over on roads.

Limnodynastes peronii (Striped Marsh Frog or Brown-striped Frog)



Found in	Lowland rivers, Lowland creeks, Swamps, Farm dams and Lakes.
Mating Call	A distinctive single 'pop', 'toc' or 'splut' that is monotonously repeated once every few seconds. The calls of many individuals combine into a more rapid continuous popping or sputtering sound. Calls from November to March.
Biology and Habitat	Found mainly in low-lying country that has a good cover of perennial tussock grasses.
Distribution and Abundance	Generally uncommon, mainly associated with open grasslands in low-lying areas. The Canberra region appears to be about the western-most limit of the distribution in this area, although other populations may yet to be found. In the region, they occur in and near shallow marshes and reed beds at the edges of the urban lakes and creeks.
Potential Threats	A very common species in coastal regions of NSW and at this stage there is little concern about its long-term protection. Some breeding sites in the ACT are threatened by urban development.

Limnodynastes tasmaniensis (Spotted Grass Frog)



Found in	Lowland rivers, Lowland creeks, Swamps, Farm dams and Lakes.
Mating Call	A "kuk uk uk uk" - a bit like a toy machine gun. Male frogs call whilst floating in the water. Calls from September to March.
Biology and Habitat	Associated with standing waters, including roadside ditches, marshes, swamps, lakes and ponds. They prefer situations where there is considerable flooded vegetation such as tussocks and sedges. During dry weather they shelter in deep cracks in the clays of dry wetlands, beneath large logs and in the base of grass tussocks.
Distribution and Abundance	An abundant species occurring throughout farmland and lower elevation woodland. It is very widespread throughout much of eastern Australia.
Potential Threats	There are few perceived broad-scale threats to this species, which has been advantaged by the construction of farm dams.

Litoria peroni (Peron's Tree Frog)



Found in	Lowland rivers, Lowland creeks, Swamps, Farm dams and Lakes.
Mating Call	A loud descending rattle or cackle. A shorter chuckling sound is also made. Calls from September to December.
Biology and Habitat	Common in farmland with scattered large eucalypt trees, woodland and there are farm dams or swamps for breeding. Males usually call from dead trees, partly submerged logs, clumps of rushes and reeds and other elevated perches in the water, or at its edge. Often reported climbing up onto window panes to catch insects at night. During the day, may shelter in tree hollows and any loose bark or in deep fissures in dead timber. In drier regions, they sometimes shelter in rainwater tanks.
Distribution and Abundance	In the Southern Tablelands region, they are found at lower altitudes (below about 800 m) particularly in association with woodland and farmland.
Potential Threats	Appears to be quite secure in the region. It occurs commonly in association with farm dams.

Litoria verreauxii verreauxii (Whistling Tree Frog)



Found in	Montane seepages, Lowland rivers, Lowland creeks, Swamps, Farm dams and Lakes.
Mating Call	A repeated whistling “cree ... cree ... cree ... cree ... cree ...”. Calls from June to October.
Biology and Habitat	Males usually call while partially submerged, or floating in water. Mating takes place in the water and the eggs are wound around submerged vegetation in large jelly-like clumps. During the non-breeding season, they are secretive and are rarely seen. May sometimes be found beneath logs and tussocks or under flat stones in streambeds, or in rocky areas near streams.
Distribution and Abundance	Relatively common in open valleys and cleared pasture country, particularly in areas where there are large shallow pools and stock ponds. They became quite rare during the 1980s, perhaps as a result of the severe drought experienced at this time, or from the amphibian chytrid fungus. However, the species has made a comeback and is now quite common in much of the region.
Potential Threats	Abundant in much of the region and is not likely to be threatened by current land use in rural areas. It certainly has benefited from the proliferation of farm dams in most rural areas. May be susceptible to the amphibian chytrid fungus.

Neobatrachus sudelli (Spotted Burrowing Frog)



Found in	Swamps and Farm dams.
Mating Call	A soft, rapidly repeated, lengthy sequence of evenly spaced “clucking” or soft “popping” sounds. Calling can occur at any time of the year, but only after extensive periods of wet weather.
Biology and Habitat	A very secretive species, they are thought to shelter in deep burrows in the soil, during much of the year. Individuals are usually only found active on the ground at night after periods of very heavy rainfall, when the ground is completely soaked.
Distribution and Abundance	Widespread in the Southern Tablelands.
Potential Threats	Does not appear to be as common in areas subject to pasture improvement. No other major threats known.

Uperoleia laevigata (Smooth Toadlet)



Found in	Swamps, Farm dams and Lakes.
Mating Call	A low-pitched, monotonous sounding “wwhrrkkkkkk” repeated at intervals of a few seconds. The call sounds a little like that of the Plains Froglet, but is deeper and longer. Calls from September to February.
Biology and Habitat	A range of drier habitat types. They appear to avoid low-lying pasture unless drier, rocky or tussock-covered hillsides are nearby. They occur in forest, woodland and tussock grassland in the Canberra region. Males call from partially hidden sheltered positions amongst grass tussocks, fallen branches or leaf litter positions, up to 10 m away from the breeding pond.
Distribution and Abundance	Occur throughout the Southern Tablelands at least as far south as the Jindabyne area and into the lower parts of Kosciuszko National Park and Namadgi National Park, up to about 1100 m elevation. It is very common in the Canberra region, where it appears to prefer hill country.
Potential Threats	Few obvious threats. Over-grazing is likely to reduce the tussocky ground cover and leaf litter used for shelter.

OUR LOCAL FROG SPECIES

- Rare, vulnerable or poorly understood species

Litoria aurea (Green and Golden Bell Frog)



Found in	Lowland rivers, Swamps, Farm dams and Lakes.
Mating Call	Distinctive drawn out deep 'wrrraaaaagh wrrraaaaagh wrrrkk, wrkkk wrk'. Calls from September to January.
Biology and Habitat	A semi-aquatic species, spending much time in wetlands, either perched amongst emergent vegetation, floating or swimming in the water, or basking in direct sunlight. They are voracious predators, capturing invertebrates and small frogs, including their own species. Sites that supported the species typically were in open country with thickly vegetated with reeds, sedges and rushes and contained relatively permanent water that did not contain predatory fish. They have also been recorded in some forested areas.
Distribution and Abundance	Predominantly a coastal species with the western-most occurrences being near Canberra. Prior to their decline, the bell frog group were found in ponds, swamps, lakes and along slow-moving parts of some rivers such as the Molonglo River in the ACT.
Potential Threats	This species has disappeared almost entirely from its former range in the Southern Tablelands, most likely as a result of infection by the amphibian chytrid fungus, perhaps acting in concert with some other unknown causes. Remaining populations on private property may be threatened with habitat change from pasture improvement. The spread of alien fish such as the Eastern Gambusia is also suggested by some researchers to be a serious threat, because the fish have been shown to eat the eggs of bell frogs and to prey on tadpoles.

Litoria booroolongensis (Booroolong Frog)



Found in	Upland rivers, Montane creeks, Lowland rivers and Lowland creeks.
Mating Call	A soft, repeated purring sound very similar to that of the Rocky Stream Frog. Calls from November to December.
Biology and Habitat	Associated with rocky streams and rivers, occurring in undisturbed locations in National Parks as well as in farmland. Breeding occurs during late spring and early summer.
Distribution and Abundance	Recorded from parts of the Northern and Central Tablelands of NSW, as well as along the western fall of the Southern Highlands between Tumut and the Victorian border. It has not been recorded in the ACT. It is now exceptionally rare, having disappeared from much of the region. The largest remaining populations occur near Tumut.
Potential Threats	The clearing of stream-side vegetation, the spread of blackberries and siltation of the riverbed are threats to local breeding populations. Some individuals have been found infected by the amphibian chytrid fungus but the overall threat to this species is not yet known. The tadpoles are relatively unpalatable to trout.

Litoria castanea (Tablelands Bell Frog or Spotted-thighed Bell Frog)



Found in	Lowland rivers, Swamps, Farm dams and Lakes.
Mating Call	Similar to the Green and Golden Bell Frog, but lacks the long drawn out growls of the other 2 species of bell frog.
Biology and Habitat	The ecology of this species is poorly known but believed to be quite similar to that of the Green and Golden Bell Frog and Southern Bell Frog. Unfortunately, it appears to have become extinct before any detailed studies could be detected.
Distribution and Abundance	Occurred throughout much of the Southern Tablelands, but also occurred in parts of the Central and Northern Tablelands where it apparently was fairly localised in its occurrence.
Potential Threats	Believed to be extinct, most likely as a result of infection by the amphibian chytrid fungus, perhaps acting in concert with some other unknown causes.

Litoria latopalmata (Broad-palmed Frog)



Found in	Lowland rivers, Lowland creeks and Farm dams.
Mating Call	A very distinctive, repeated, duck-like quacking that typically starts slowly and builds to a rapid crescendo. Calls from September to December.
Biology and Habitat	Very little is known about the ecology and field behaviour of this species in the region. They may prefer open country interspersed with rocky areas and woodland. Most breeding populations near Canberra have been found in steeply dissected landscapes supporting small rocky streams with occasional still pools. Male frogs have been heard calling from hollows among grass and on rocky benches at the edges of these pools. Individuals have also been found breeding in farm dams.
Distribution and Abundance	Uncommon in this region. It occurs mainly along parts of the Murrumbidgee River and some larger tributary streams and creeks, between Kambah Pool in the ACT and Lake Burrinjuck in NSW.
Potential Threats	Threats are not known, but may include over-grazing and trampling by livestock along. Construction of farm dams in some areas may have helped the dispersal of this species.

Litoria lesueuri (Rocky Stream Frog or Lesueur's Frog)



Found in	Upland rivers, Montane creeks, Lowland rivers, Lowland creeks and Lakes.
Mating Call	A soft, repeated purring sound. Calls from November to December.
Biology and Habitat	A stream-dependent species associated mainly with rocky streams and rivers that have a permanent flow. Breeding takes place from about November to late December or early January.
Distribution and Abundance	Widespread and common along the coast and ranges of eastern Australia, at altitudes up to about 1200m. Uncommon in cleared agricultural country.
Potential Threats	The clearing of stream-side vegetation, the spread of blackberries and siltation of the riverbed are threats to local breeding populations. Some individuals have been found infected by the amphibian chytrid fungus but the overall threat to this species is not yet known. The tadpoles are relatively unpalatable to trout.

Litoria nudidigitus (Southern Leaf-green Tree Frog)



Found in	Upland rivers.
Mating Call	A series of short repeated creaking sounds 'eccccck cruk! cruk! Not particularly loud.
Biology and Habitat	Associated with rivers and larger mountain streams which contain deep, slow-moving pools with banks covered densely with ferns, shrubs and tussock grasses. In the early summer males may be heard calling from elevated positions on overhanging vegetation at the edges of deeper pools where water flow is fairly slow.
Distribution and Abundance	Quite rare in the region, confined to the densely vegetated edges of larger mountain streams such as along parts of the Cotter River in the ACT and Goodradigbee and Geechi rivers in Kosciuszko National Park. It is however, quite common along streams in the coastal ranges of south-eastern Australia south of Sydney.
Potential Threats	The clearing of stream-side vegetation, the spread of blackberries and siltation of the riverbed are threats to local breeding populations. Some individuals have been found infected by the amphibian chytrid fungus but the overall threat to this species is not yet known. The tadpoles are relatively unpalatable to trout.

Litoria raniformis (Southern Bell Frog or Warty-backed Bell Frog)



Found in	Lowland rivers, Swamps, Farm dams and Lakes.
Mating Call	Consists of a long introductory note (growling sound) followed by a series of shorter grunts. Similar to the Green and Golden Bell Frog. Calls from September to January.
Biology and Habitat	A semi-aquatic species, spending much time in wetlands, either perched amongst emergent vegetation or floating or swimming in the water. On occasions it has been noticed basking, although in areas where predatory water birds are common it may remain hidden in thick vegetation. The general ecology and breeding biology is similar to that of the Green and Golden Bell Frog.
Distribution and Abundance	The Southern Bell Frog is primarily a southern and inland species, which had its eastern-most populations between Lake George, Cooma and Bombala. It formerly occurred at altitudes up to about 1200 m. At some stage during the early 1980s, the entire Southern Tablelands population of this species vanished, and to date no remnant have been found.
Potential Threats	This species is now believed to have disappeared from the southern Tablelands region, most likely as a result of infection by the amphibian chytrid fungus, perhaps acting in concert with some other unknown causes. The spread of alien fish such as the Eastern Gambusia is also suggested by some researchers to be a serious threat because the fish have been shown to eat the eggs of bell frogs and to prey on tadpoles.

Litoria spenceri (Spotted Tree Frog)



Found in	Upland rivers and Montane creeks.
Mating Call	A short series of short repeated 'whirrs' and 'cruks' (not particularly loud). Calls from November to December.
Biology and Habitat	Occurs along larger streams and rivers in the montane tract of the Eastern Highlands of Victoria and southern NSW. Within these streams it is restricted to areas where the bed of the stream is dominated by riffles and cascades with exposed rock beds. A feature of this species is the very obvious basking behaviour of adults and smaller frogs. During sunny weather the frogs actively perch on damp boulders in direct sunlight. Breeding occurs during spring.
Distribution and Abundance	This nationally endangered species is largely restricted to the northern and western slopes of the Great Dividing Range between Lake Eildon in Victoria and Bogong Creek near Mount Kosciuszko. It is known in only 19 streams, only one of which occurs in NSW (Bogong Creek in Kosciuszko National Park).
Potential Threats	Disturbance to streams from land clearing, timber harvesting, altered flow regimes, and spread of weeds such as blackberry and European broom brush. Alien trout are likely to have reduced populations extensively. The amphibian chytrid fungus, which probably caused the loss of the Bogong Creek population in Kosciuszko National Park, poses a very strong threat.

Pseudophryne bibroni (Brown Toadlet)



Found in	Upland bogs, Montane seepages, Swamps and Farm dams.
Mating Call	Identical to call of the Southern Toadlet and similar to the Corroboree Frog, but is shorter and sharper, sounding like a short, sharp 'ek' repeated infrequently. Calls from February to July.
Biology and Habitat	The ecology of this species is very similar to that of the Southern Toadlet. The diet and breeding biology appear to be identical in these closely related species. This species generally occurs at lower altitudes than the Southern Toadlet. However, in the Fiery Range and Bogong Mountains west of Canberra, it occurs at some high montane locations. It previously occurred in drier forests and woodlands near Canberra.
Distribution and Abundance	Found throughout much of south-eastern Australia except for coastal areas south of Jervis Bay where it is replaced by the Southern Toadlet. In the region, it occurs on the plains north and west of Canberra and in the Tumut district where it is still reasonably common. It once occurred in bushland in suburban Canberra but has disappeared and is now only known from a few scattered sites in the foothills south-west of Canberra.
Potential Threats	Disappearance of ephemeral wetlands may have affected many populations. It is not known if this species is affected by the amphibian chytrid fungus.

Pseudophryne corroboree (Southern Corroboree Frog or Corroboree Frog)



Found in	Upland bogs.
Mating Call	The advertisement call is a short and nasal 'wrrankk ... erkkerkk' repeated infrequently. The threat call is a drawn out erhkkk'. Calls from January to April.
Biology and Habitat	Restricted to subalpine areas that contain small, semi-permanent pools and seepages that provide suitable sites for tadpole development.
Distribution and Abundance	Found only in the Snowy Mountains between Smiggin Holes and near Round Mountain in Kosciuszko National Park, occurring at elevations between 1300 and 1760 m. This species is now extremely rare and has disappeared from most areas where it previously occurred.
Potential Threats	Demonstrated to be susceptible to drought, particularly during autumn and winter when tadpoles are still in the nest sites or pools. In the long term, like other alpine species, it may be affected by global warming. Recently the amphibian chytrid fungus has been found in this species, and may be the major cause of the decline. Researchers believe that this striking species will be extinct in the wild within the next five to ten years and as a safeguard the species is now the focus of a captive breeding program.

Pseudophryne dendyi (Southern Toadlet or Dendy's Toadlet)



Found in	Upland bogs and Montane seepages.
Mating Call	Very similar to that of the Corroboree Frog, except shorter and sharper, sounding like a short, sharp 'ek' repeated infrequently. They also make threat calls that are very similar to those of both species of Corroboree Frogs. Calls from February to May.
Biology and Habitat	Very similar to the Corroboree Frogs, but tends to be found in drier habitats than the Corroboree Frogs. It breeds in shallow seasonal depressions and seepages in wet heaths, grassland and woodland.
Distribution and Abundance	Confined to the south-eastern corner of Australia where it occurs at altitudes up to about 1700 m. Present throughout the Snowy Mountains and along the Brindabella Range where it is quite rare. It is very common still in the ranges and coastal forests east of Cooma and Braidwood.
Potential Threats	Populations at high elevations have declined and may have been affected by the amphibian chytrid fungus. Disappearance of ephemeral wetlands may have affected many populations.

Pseudophryne pengilleyi (Northern Corroboree Frog or Corroboree Frog)



Found in	Upland bogs and Montane seepages.
Mating Call	The advertisement call is a short and nasal 'wrrankk ... erkkerkk' repeated infrequently. The threat call is a drawn out erhkkk'. Calls from December to April.
Biology and Habitat	Very similar to the Southern Corroboree Frog. It breeds in a wider range of wetland types including moss or herb dominated areas, seepages along drainage depressions, and in pools in bogs and wet heaths. Some populations have persisted in small clearings that are now in pine plantations. It is not known if the frogs actually move into the pine forest once breeding is completed.
Distribution and Abundance	Restricted to a mountainous region west of Canberra with the range including the Bogong Mountains, Fiery Range, Brindabella Range and Bimberi Range. Much of the species range occurs in Kosciuszko National Park, Bimberi Nature Reserve and Namadgi National Park, particularly at altitudes between 900 and 1800 m. In the ACT, this species has declined dramatically in the last few years.
Potential Threats	May be susceptible to drought, particularly during autumn and winter when tadpoles are still in the nest sites or pools. In the long term, like other alpine species, it may be affected by global warming. Recently the amphibian chytrid fungus has been found in this species, and may be the major cause of the decline at high elevations.

Frogs On The Web

Ginninderra Catchment Group

www.ginninderralandcare.org.au

Find out about the Ginninderra Catchment Group, and the environmental education activities and resources that we can provide to support your learning activities.

Amphibian Research Centre / Victorian Frog Group

www.frogs.org.au

A first stop for Australian frog enthusiasts, this site provides comprehensive and varied information on all aspects of Australian Frogs. This site includes audio files of the calls of Australian frog species, and the community frog forum, where you can chat about frogs with experts and other community members. Includes links to: Project Corroboree, The Victorian Frog Group, The Frogs of Australia (database), The Melbourne Water Frog Census, Alcoa Frog Watch, The Lost Frogs' Home ... and much more!

Frogs Australia Network

www.frogsaustralia.net.au

The Frogs Australia Network aims to establish itself over the coming years, providing a comprehensive 'portal' that showcases the efforts of frog conservation across Australia and directs you to the right source of information and people. The website includes the Australian Frog Database, Conservation, Resources, Community, Members, and News.

Frogs of the Australian National Botanic Gardens

www.anbg.gov.au/anbg/frogs/index.html

Information about frog species that are present in the Botanic Gardens, including a description, drawing and audio bite of the mating call for each species. Includes worksheets.

Corroboree Frogs

www.corroboreefrog.com

Help with the conservation of the iconic Corroboree Frog by adopting a frog!

Amphibian Diseases Home Page

www.jcu.edu.au/school/phtm/PHTM/frogs/ampdis.htm

A homepage for diseases of amphibians relevant to amphibian declines. Contains protocols for handling of specimens and surveys for the amphibian *Chytrid* fungus.

The Educators' Reference Desk

www.eduref.org

Contains over 2000 searchable lesson plans and other resources.

Commonwealth Department of Environment and Heritage:

Australian Frogs, An Overview

www.environment.gov.au/biodiversity/threatened/publications/frog-overview.html

Details evidence and possible reasons for frog population declines in Australia.

Frogland

www.allaboutfrogs.org

From a frog-lover who wants to share her learning, Frogland seems boundless. This very, very extensive site is both a fun place to kill some spare time and a useful starting place to go about locating any frog-related information on the internet.

Teachers Net - All About Frogs

www.teachers.net/lessons/posts/1828.html

Discovery School

www.school.discoveryeducation.com/lessonplans/programs/frogs/index.html

Free online lesson plans on frogs and many other topics.



There are hundreds more ridiculous, informative and fascinating frog related sites! If there is something you still want to know surf the web, or ask your local Frogwatch Coordinator!

Books (Australian)

Australian Frogs: A Natural History. Tyler, M.J., 1994, Reed Books.

- An excellent introduction to the natural history and diversity of Australian frogs.

Wet and Wild. A Field Guide to the Freshwater Animals of the Southern Tablelands and High Country of the ACT and NSW. Lintermans, M. and Osborne, W. 2002, Environment ACT.

- A great field guide to frogs, fish, reptiles and birds available through the ACT shopfront or Waterwatch.

Tadpoles of South-eastern Australia. Anstis, M., 2002, Reed New Holland.

A field guide to Australian frogs. Barker, J., Grigg, G.C., and M. J. Tyler. 1995, Surrey Beatty, Chipping Norton.

For primary aged kids

Tiddalick, The Thirsty Frog. Carthew, M., 2003, Pearson Education.

- An adaptation of an Aboriginal Dreamtime legend, kit includes scripts developed for children's plays.

Australian Frogs: Amazing Amphibians. Morris, J. and Tracey L., 1995, Greater Glider, Malaney, QLD.

- Beautiful artworks of over 30 species and includes biology, maps and behaviour information on Australian frogs.

It's a Frog's Life! Clyne, D., 1995, Allen and Unwin, St Leonards, NSW.

- Clyne uses a personal, narrative style in her writing and discusses her own experiences of finding, photographing and listening to frogs.

Tadpole diary. Drew, D., 1998, 'Informazing series', Nelson, South Melbourne.

- The book follows the development of tadpoles into frogs. Facts about frogs and details on keeping tadpoles are included at the end of the book.

It's True! Frogs are Cannibals. Tyler, M.J., 2004, Allen & Unwin.

- A great Australian book including tonnes of fascinating facts and folklore.



Section 2

AMPHIBIANS



This section provides a variety of lesson plans and activities to introduce students to:

- * amphibians*
- * classifying and naming animals*
- * metamorphosis and amphibian life cycles*

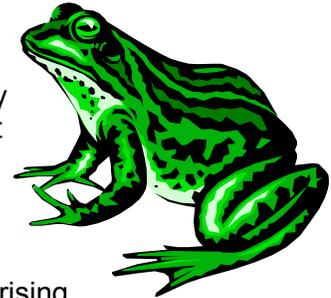
Animal Categorisation

Subject(s):

Science/Animals

Overview:

Students report finding the study of science "boring and difficult". They do not seem to have a working knowledge of how to go about discovering answers to questions about the scientific world around them.



Purpose:

This lesson will help students become familiar with the need for categorising scientific information, in this case - animals and more specifically vertebrates.

Objectives:

Students will categorise the 5 groups of vertebrates (mammals, fish, birds, reptiles, & amphibians).

Resources and Materials:

1. Films, filmstrips, or slides about animals. Must include all 5 categories of vertebrates.
2. Pictures of animals from each category.
3. Magazines: 2 per child. Make sure the magazines have plenty of animal pictures in them.
4. Scissors

Activities:

Discuss with students the process of separating animals into groups or categories so that they are more easily studied and discussed by scientists and others. Explain that the following activity will help students learn about the categories of animals.

* Do not give any clues at this time as to how animals are to be categorised. Students will come up with their own unique system of grouping.

Divide students into small groups of 3-5. Give each child 1-2 magazines which have a lot of animal pictures in them (National Geographic and Australian Geographic are great). Students in each group look through the magazines and cut out any pictures of animals that they find. Have students keep a common stack for their group.

After all pictures have been put into a pile, each group divides their pile of pictures into 5-7 smaller categories. This is done through group discussion and consensus.

After each group has categorised their pictures, bring the entire class back together and let one person from each group explain why they grouped their pictures as they did. Students may come up with groupings by colour, size, shape, extinct or not, eating habits, living habits, size of ears and tails, etc. Students will come up with categories you and I would never dream of!

An AskERIC Lesson Plan

*Author: Sandra J. Rost, Lewis-Arriola Elementary School Cortez, CO
Grade Level(s): Kindergarten, 1, 2, 3*

Classifying Animals

We classify animals in groups in order to make sense of the enormous amount of information we have about them. Classification helps us understand how animals are related to one another. Animals can be classified in many ways. Systems of classification that are based on structure are generally the most useful.

Dichotomous keys introduce a choice between two options. **Design a dichotomous key to classify your class.** Brainstorm the criteria needed to design the key, focusing on features such as:

- Male or female
- Long or short hair
- Dark hair colour or light hair colour
- Glasses or no glasses
- Uniform or no uniform
- Freckles or no freckles

Focus on animal classification. Discuss the differences between living and non-living, animal and plant, vertebrates and invertebrates. **Discuss how animal species are different from one another.**

Explore the diversity of vertebrates as a group and focus on:

- Different body coverings (fur, feathers, wet scales, dry scales, moist skin)
- Different methods of reproduction (eggs, pouched young, young attached to an internal placenta)
- Different methods of moving (walking, swinging, swimming, running, hopping, gliding, flying)
- Different ways of controlling body temperature (warm blooded and cold blooded)

Use the dichotomous key to classify the main five vertebrate groups.

Information on this page sourced from www.ASXfrogfocus.com



Naming Frogs

How do frogs get their scientific names?

Zoological or scientific names provide a standardised international system for labeling and classifying animals. The names are usually of either classical Greek or Latin words, or modern words.

Scientific names are composed of two parts: the genus name, which is the first word, and the specific name, the second word. The first letter of the genus name is always capitalised and the first letter of the specific name is lower case. Both words are *italicised*.

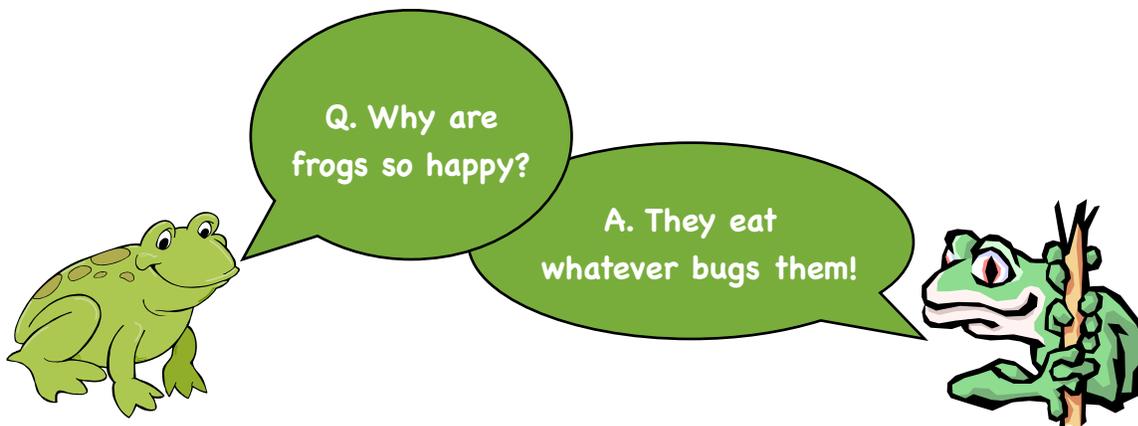
Compare the common and scientific names of all the frogs in the ACT Region. A list of local frogs is included in the 'Teacher's Notes' section. Some examples include:

- *Crinia signifera*
- *Litoria peronii*
- *Limnodynastes tasmaniensis*
- *Pseudophryne corroboree*.

Students will realise that some frogs have the same genus name, but different specific names. Frogs with the same genus name are closely related. Explore the meanings associated with the genus names and research why a particular frog is in a specific genus.

- *Crinia* means 'water lily pad'
- *Litoria* means 'shore or beach'
- *Limnodynastes* means 'lord of the marshes'
- *Pseudophryne* means 'false toad'

The Ngunnawal people are a group of traditional Aboriginal people who originate in the ACT region. They have their own names for frogs, do you know what these are? Researching these names could be an extension of the project.



LIFECYCLE FILMSTRIP

To evaluate the students' knowledge and understanding on the lifecycle of a frog, challenge them to design a frog lifecycle filmstrip.

Materials:

Matchbox or a small box with a lid
Outline of the film strip
Pictorial representation of a frog's lifecycle
Coloured pencils
Scissors
Glue

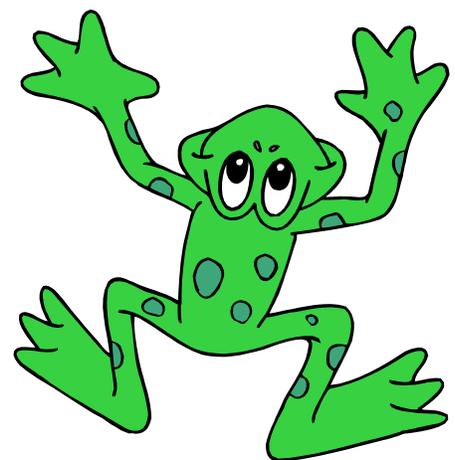
Method:

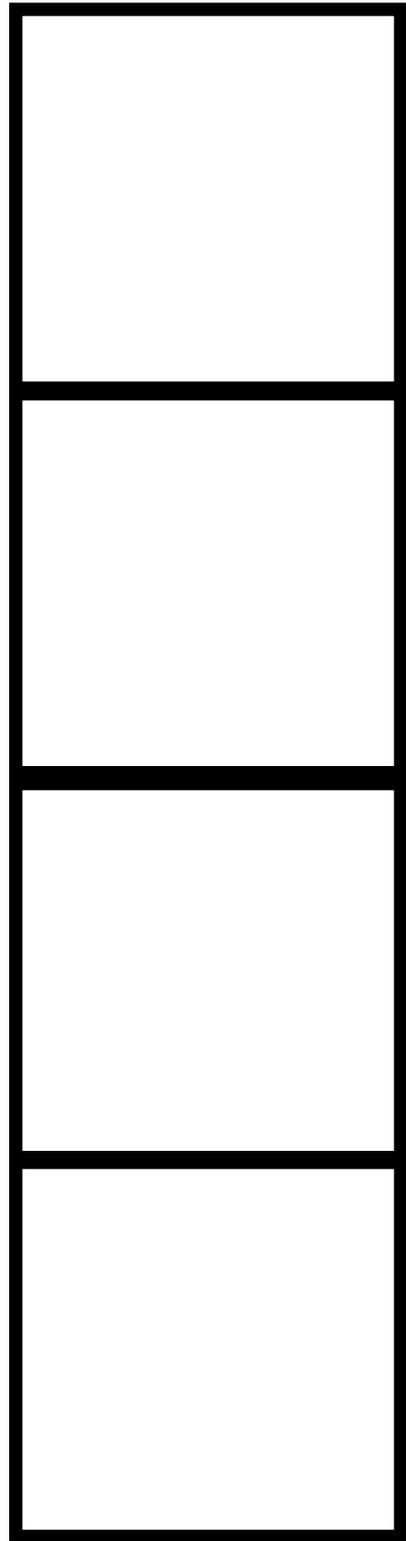
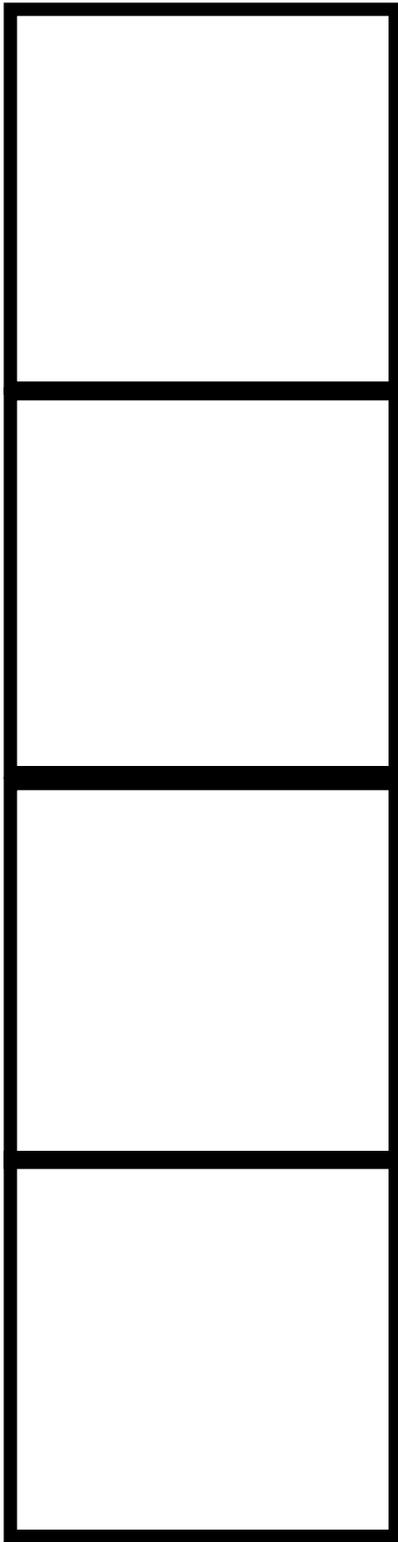
Photocopy the film strip outline and the pictorial representation of a frog's lifecycle (illustration sheets attached)

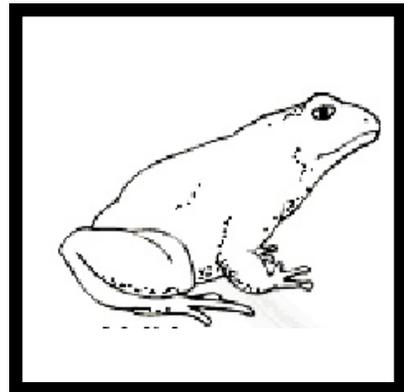
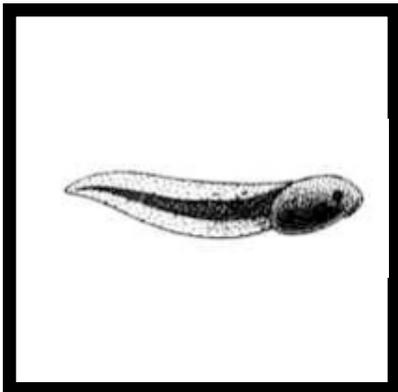
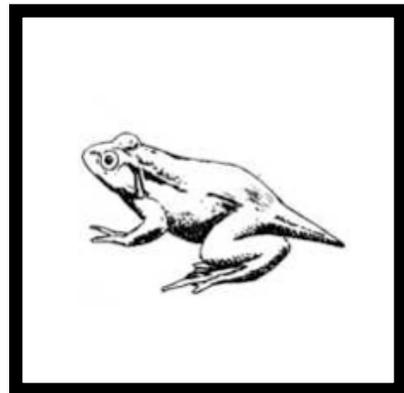
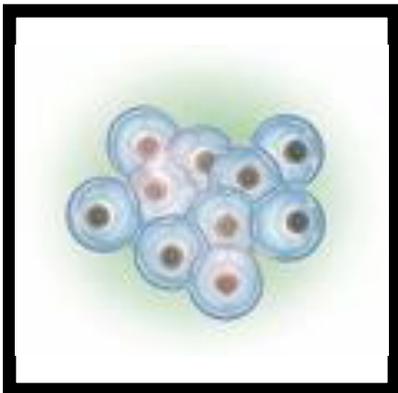
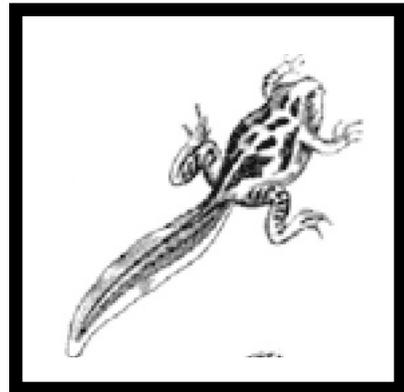
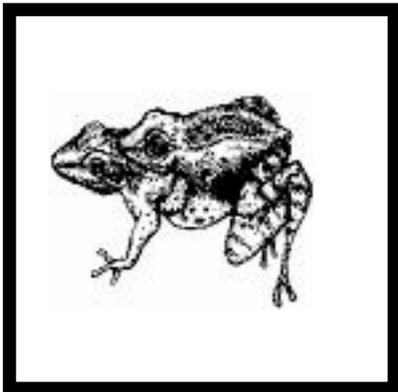
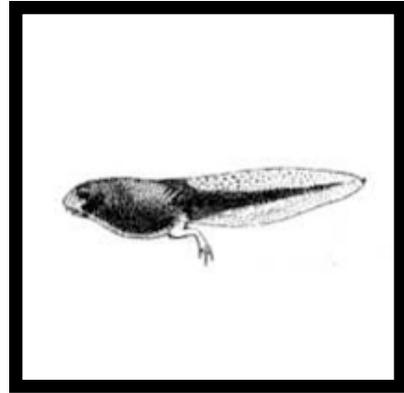
Students cut and paste each stage of a typical frog's lifecycle in order, onto the film strip (male frog vocalising, male and female frogs in amplexus, spawn, tadpole, tadpole with back legs, tadpole with front legs, adult frog)

Thread the filmstrip through the box, form it into a circle and paste the ends together

Students verbally share their frog lifecycle filmstrip and explain each stage of a typical frog's lifecycle with a student from another grade.







Metamorphosis of Frogs

Subject(s):
Science/Animals

Duration: A series of sessions.

Description: Children will observe live frogs at different stages of their lifecycle. They will learn the names and functions of each cycle.

Goals: Students learn the lifecycles of frogs through literature and observing live animals.

Objectives: Predicting: make statements about what the frogs will look like next time the class observes them.

Observations: The students will look at the tadpoles/frogs throughout metamorphosis.

Recording Data: Make a chart recording all the data you learned through the observations.

Comparing: Compare a frog to a human. List the similarities and differences using a Venn diagram.

Materials: Live frogs at different stages of their lifecycle and a book about frogs.

Procedure: Begin by reading a book about frogs. I chose "The Mysterious Tadpole" by Steven Kellogg. Discuss the book's pictures and content.

Display the tadpole: What do you see in the tank? Talk about what you see. Is a frog similar to humans? Discuss survival needs, habitat, communication. In what ways are they different? Using the pictures as a reference, review the different stages of metamorphosis. What stages are 'our' frogs in?

Guess what is going to change during the next stage. After we complete the pictures of the different stages, put the frog on the table and let the children see the frog at its complete metamorphosis.

Review vocabulary words learned for example - hibernating, species, metamorphosis, gills.

Assessment: Have the class create a book about frogs. It should have illustrations in it, and a story explaining the pictures. The book must include facts and details about the metamorphosis of frogs.

A lesson plan from www.eduref.org, submitted by Maria Ragucci

IMPORTANT NOTE: See the information on the following pages regarding collecting or keeping tadpoles, frogs or frog spawn.



CHANGES

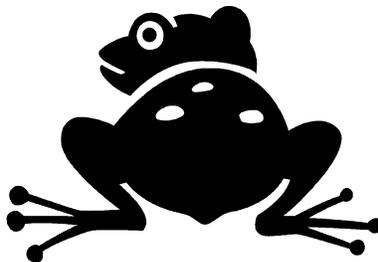
I haven't felt so funny
Since the day we left our eggs.
Some bumps are growing near my tail,
They really look like legs.

Well, legs are good for swimming
And flippers have their charms,
But what's this coming through my chest?
This time I'm getting arms.

I'm a funny sort of tadpole,
My tail is hardly there.
I used to gulp the water,
But now I'm breathing air.

It makes me feel like croaking
As I sit upon this log.
I'm not a tadpole any more -
I've turned into a frog!

Information on this page sourced from www.ASXfrogfocus.com



KEEPING TADPOLES IN THE CLASSROOM

License Requirements

Every state in Australia has different laws governing the keeping of tadpoles and frogs in captivity. These laws are important to ensure that our local frog populations are protected from 'overharvesting' and that diseases are not introduced to wild populations.

In the ACT it is illegal to collect frogs, tadpoles or frog spawn from the wild without a permit. Schools can obtain a permit to take frogs or tadpoles from the wild for study purposes. A condition is that the frogs must be returned to the site where they were taken from, once metamorphosis has occurred.

To find out more about obtaining a license, contact: ACT Government, Territory and Municipal Services, License Enquiries: 13 22 11, or www.tams.act.gov.au/live/environment/native_plants_and_animals/licensing_of_plants_and_animals

If your school registers to receive a Frogwatch Tadpole Kit, the tadpoles will be the species, *Limnodynastes tasmaniensis* (Spotted Grass Frog), which is a species exempt from licensing requirements (www.tams.act.gov.au/live/environment/native_plants_and_animals/licensing_of_plants_and_animals/exempt_animals).



Frogwatch Tadpole Kits - some guidelines

- Your school can borrow a Tadpole Kit from ACT Frogwatch for up to 6 months, to experience the magic of metamorphosis in your classroom.
- The school is responsible for adhering to the instructions for 'Caring for Tadpoles' as detailed in the various fact sheets provided with the Kit.
- Once metamorphosis has occurred, the school must return the Kit and froglets to ACT Frogwatch.
- When you return the Tadpole Kit, all equipment must be returned in good condition, so that it can be used by other school groups.
- Under no circumstances should the tadpoles or adult frogs be released to the wild (or to the sewage system!). This is to ensure that our wild frog populations are protected from potential disease introduction and are not disrupted by artificial introductions.

Contact the ACT Frogwatch Coordinator to organise a Tadpole Kit for your class.

Section 3

ADAPTATIONS AND SOME SPECIAL SPECIES



This section provides a variety of lesson plans and activities to introduce students to:

- * ways that frogs adapt to survive in our local environment*
- * different frog species - how they differ and how we can recognise them*
- * locally endangered species*

A Long Winter's Nap

Concepts:

Coping with seasonal changes in temperature and precipitation.
Hibernation, torpor, dormancy, estivation, diurnation.

Catalyst Question:

What are some of the ways that frogs and other animals adapt to winter?

Background:

Frogs are found all over the world in every type of habitat from the Arctic Circle to tropical regions, from deserts to rainforests. In order to survive these diverse conditions, frogs use several coping mechanisms.

The first of these, **hibernation**, is a response to cold winters. The frog finds a place that is protected from the weather and predators. Its metabolism slows down and it lives off energy that is stored in the body. The frogs are able to survive due to the large amount of glucose in their vital organs that serve as a sort of antifreeze.

Some frogs spend the winter underwater. They reach a state called torpor. **Torpor** is a state of mental and motor inactivity with partial or total insensibility. It is characterised by extreme sluggishness but is not a total slow down of body functions like that which occurs during hibernation. The underwater frogs lay on top of the mud in oxygen-rich water and may even occasionally swim around slowly. Sometimes torpor is a short-term solution for an intermittent period of cold weather.

Diurnation occurs when a frog goes into a state of torpor at night (when it is cooler) but is more active during the day.

Estivation is a reaction to diverse environmental conditions such as drought. Frogs like the African bullfrog dig deep into the soil just like during hibernation and become dormant. They then shed several layers of skin. This forms a waterproof cocoon that leaves only the nostrils exposed to the air. The frog can survive in this manner for a period as long as seven years if necessary. The frogs free themselves of the skin layers when moisture returns.

Objectives:

After completion of this activity students should be able to describe ways in which frogs adapt to seasonal changes.

Materials:

Chart paper	Markers
Pencils	Paper

Method:

Have students make a chart comparing how they act and feel during winter, and how they act and feel during summer. Discuss the changes humans make for different seasons and the ways that animals respond to winter.

Example: Summer – Outside most of the time – Wear few clothes
Winter – Outside some of the time – Wear heavy clothing

Flipper Feet

Why do some frogs have webbed feet?

To demonstrate how effective webbed feet are, ask students to push their hand through a tub of water with their fingers spread.

Repeat the exercise, but this time place a plastic bag over the student's hand (students will be able to feel the increased push they can give to the water).

Ask the students the following questions:

- How did it feel different with the plastic bag and without?
- How would webbed feet assist a swimming frog?
- Do all frogs have webbed feet? Why or why not?
- Name other animals that have webbed feet.

Frog Feet Shop

Imagine there is a '**Frog Body Shop**' where frogs could go and buy different feet.

Design a catalogue for the different types of frog feet.

List their strengths and weaknesses.

Remind the students that they are trying to sell a product, so their advertising catalogue needs to be bright, exciting and motivating!

Information on this page sourced from www.ASXfrogfocus.com



The Peron's Tree Frog (*Litoria peronii*) has special discs at the ends of its toes, which make it a very agile climber! This enables this frog to find shelter in the bark of old trees.

Photo: L.Fuckso www.frogs.org.au

Model Mania

Students design a three-dimensional model of a frog using material such as plasticine, play dough, bread dough or clay. Encourage students to think about the size, colour and physical features of frogs before they begin their creation.

In small groups, students share their models and compare the different features of their frogs.

As a class discuss the reasons for particular frog features by asking questions such as these:

- Are all frogs green?
- Are all frogs the same size?
- Why do some frogs have patterns?
- Why are some frogs only a single colour?
- Why do some frogs have webbed feet?
- What covers a frog's body?

Skeletal Structure

When paleontologists uncover a fossil, it is usually an imprint of the skeletal structure of an animal. But how would they know whether an animal was a frog?

Collect pictures that depict the skeletal structure of a variety of animals, including a frog and maybe even a human. Organise students in groups, and ask them to identify features of the skeletons, like the backbone, head, pelvis, legs, eye sockets.

Focus on the following parts of the skeleton and compare the differences between the frog skeleton and the other animals.

- *Skull* – frogs have a broad stocky head with a large mouth and large eye sockets
- *Backbone* – frogs have a small backbone with no more than nine pre-sacral vertebrae
- *Pelvis* – frogs have an elongated hip bone that is fused together
- *Ribs* – frogs do not have very big ribs if they are present at all

By using skeletal features, paleontologists can state whether a fossil is a frog or not. The only question is, do the frogs of today have the same skeletal structure of 'frogs' that lived millions of years ago? Has the skeletal structure of frogs evolved over the millions of years? Research frog fossils and compare frogs of today to frogs that lived millions of years ago.



Photo:
www.cameronmccormick.blogspot.com/search/label/Animal%20Art

“Cree cree cree” - Finding a Mate

Background:

Every frog species has its own unique call. A male frog uses a vocal sac to make sounds when he wants to advertise that he's ready to mate. These sounds enable the female to find him when she's ready. Frog calls also create a risk for the male because they attract animals that would like to eat the frog (such as snakes). Each species has a totally unique call and only the females of that species will respond to it. Even when the calls of two different species sound alike to us, they are actually at slightly different frequencies or pitches. Scientists use electronic testing equipment to create a 'sonogram' of the calls and these sonograms graphically show the minute differences that are too subtle for our ears to distinguish.

You can use the audio CD, “Frog Calls of the ACT and Region”, supplied with this Kit for this activity.

This activity demonstrates the advantage of each frog species having its own unique call.

Description:

One student is selected to leave the classroom while the rest of the class assembles in a large circle. Distribute cards with a written frog call to each student in the circle. The student outside the room is blindfolded and placed in the middle of the circle. The teacher names a frog and vocalises its call. All students take part in the chorus of calls using the calls on their cards. The task of the blindfolded student is to listen carefully and locate the student in the circle who is making that exact call.

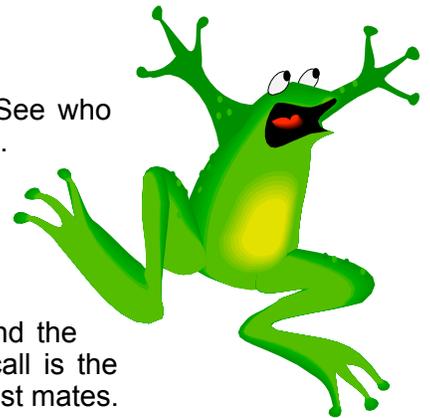
There are a number of variations to this activity:

Have two students blindfolded and listening for the same frog call. See who gets there first. This demonstrates the competition between rival males.

Have two students blindfolded, listening for the same frog call and calling as well. This demonstrates that if females vocalise as well, then female frogs would be attracted to the call of other female frogs.

Have one student blindfolded and with several potential mates around the circle vocalising the same call. This demonstrates that the loudest call is the most likely to be heard. As in nature, the loudest frog often gets the most mates.

Have half the class outside with a set of cards, each one representing different frog calls. They are the females and they each learn their call and then go into the classroom where the rest of the class, the male frogs, desperately call. They need to find their mate amidst the cacophony of calls. This demonstrates the difficulty in finding a partner amongst the volume of the calls.



Information on this page sourced from www.ASXfrogfocus.com

“Cree cree cree” - I’m the Loudest!

Using a variety of materials, challenge students to increase the volume of their frog call. This can be as simple as blowing through a cardboard tube.

Question students as to why some frogs have been known to call from within drainpipes (*to increase the volume of their call*).

How can females hear a male call amongst a deafening frog chorus? (*females have finely tuned ears so they only hear sound at or near the sound frequency with which males of their own species call*).

Information on this page sourced from www.ASXfrogfocus.com



Frogs have a vocal sac that helps to make their call extra loud!

This is a Common Eastern Froglet (*Crinia signifera*).

Photo: www.frogs.org.au

Frogs have a number of different calls.

The calls you hear most often are the calls that males make - usually to attract a mate. They may also make threat calls (stay off my patch!) or alarm calls if threatened.

This is a Spotted Grass Frog (*Limnodynastes tasmaniensis*).
Photo: www.frogs.org.au



FROGS OF THE ACT REGION

(Found at the Australian National Botanic Gardens)

Common Eastern Froglet (*Crinia signifera*)

A small frog up to 3 cm in size. Extremely variable in colour and pattern. Upper surface pattern of either uniform light grey or brown contrasting with black sides; or grey or brown with irregular darker patches and sometimes a light vertebral stripe; or a broad dark vertebral band bordered on either side by a light brown or grey band from eye to groin. This small gregarious species is common in and around the pools in the Gardens.

Call: "crick-crick-crick".



Eastern Banjo Frog (*Limnodynastes dumerilii*)

A stout frog from 6-8 cm in size. Gray or brown with blackish marblings, with or without a continuous or broken narrow vertebral stripe. Sides often beautifully marked with a bronze and purple sheen with black mottling. A pale yellow stripe from below the eye to above the base of the forelimb is conspicuous. Common in ponds around the Gardens.

Call: "bonk-bonk-bonk". Two or more frogs in unison sound like "pobblebonk"



Spotted Grass Frog (*Limnodynastes tasmaniensis*)

Up to 4.5 cm in size. Light brown to rich olive-green above, usually with a series of large, regular dark brown splotches and often with a narrow white, yellow or russet vertebral stripe from snout to vent. Shelters under logs and stones on edges of permanent and temporary swamps, pools and creeks.

Call: a very rapid "uk-uk-uk-uk".



Brown-striped Frog (*Limnodynastes peronii*)

Up to 6.5 cm in size. Light brown above with a series of irregular dark brown stripes. Frequently a pale vertebral stripe from snout to vent. A dark brown band behind eye. Secretive by day, hiding under logs, stones or leaf litter. Burrows effectively.

Call: usually a single "plonk" or "whuck", repeated at intervals of a few seconds.



Peron's Tree Frog (*Litoria peronii*)

Medium-sized frog to 6 cm. Rich grey or brown above, varying in intensity with temperature and temperament. Irregular darker mottling and numerous small bright green spots over upper surface. Groin and hind sides of thighs mottled black and bright yellow. May be found long distances from water in a variety of habitats, usually in trees and shrubs. Will forage for food on the ground.



Call: a loud, penetrating long rattle. Has been variously described as a "loud chuckling trill" and a "sound of a pneumatic drill".

Eastern Froglet (*Crinia parinsignifera*)

Small frog to 3 cm in size. Almost indistinguishable from the Common Eastern Froglet. Males may only be distinguished by their call. Females have a rather granular white belly pattern while Common Eastern Froglet females have a belly mottled with black and white. Difficult to find this species in the Gardens, although it is present. More experienced observers may pick it out by the different call.



Call: long, low drawn out "squelch".

Whistling Tree Frog (*Litoria verreauxii*)

Up to 4 cm in size. Highly variable in colour pattern, this species may be fawn, brown or reddish-brown above. A dark brown stripe extends from the nostril through the eye to the shoulder. Groin pale yellow with black spots. Front and hind sides of thighs are orange. Found in a variety of habitats from swamps, lagoons, wet and dry sclerophyll forest to alpine grassland and bogs. Breeding groups occur around ponds, dams and creeks. One of the few species to call throughout the year.



Call: rapid, pulsing whistle "cree-cree-cree-cree".

Information sourced from www.anbg.gov.au

The species listed here are those commonly found in the Botanic Gardens site on Black Mountain. Detailed information on frog species found in all of the ACT and Region can be found in the Teacher Notes section.

You can listen to the audio CD, "Frog Calls of the ACT and South-East NSW" that is included with this Kit.

Our Endangered Species

The Corroboree Frog

Scientific Name: *Pseudophryne corroboree*

Habitat of the Corroboree Frog:

The sub alpine snow-gum woodlands and nearby sphagnum bogs of the alpine ranges of southern NSW and the ACT.



Distribution and Habitat:

There are 3 main populations of Corroboree Frog located in the Snowy Mountains, Fiery Range and the Brindabella Range. The frog moves between sub alpine snow-gum woodlands and the fragile sphagnum bog habitats which are unique to the Alpine ranges. Scientists believe that there are only a few hundred individuals left in the wild. Within its range, the Corroboree Frog used to be quite common. Populations have decreased over the past few years for a number of reasons:

- hydro-electrical and ski resort developments
- summer droughts
- bushfires
- the *Chytrid* fungus

The most threatened breeding group is located at Coree Flats in the Brindabella Range where four-wheel drive vehicles are destroying their nesting grounds.

Description:

The Corroboree Frog is the most striking in Australia. Our local Corroboree Frog from the Fiery and Brindabella Ranges, has lime/yellow and black stripes. It is less than the size of a 20 cent piece.

The Southern species from the Snowy Mountains region have brighter yellow stripes. Adult frogs grow to about 25 mm. Each individual frog has its own distinct pattern.

Call:

The male produces a strange sound which sounds like a wet finger running over a balloon.

Food Glorious Food:

The young frogs (froglets) eat a varied diet of springtails, beetles, bugs, ants, insect larvae and mites. The adults mostly eat ants but also gobble up beetles and mites.



Life Cycle and Reproduction:

The Corroboree Frog not only looks different from other frogs but also has a very different life cycle. It spends up to one year in the embryo and tadpole (pre-metamorphic) stage.

The adults hibernate throughout the cold winter months in the snow gum woodlands on the edge of the sphagnum bogs. Here they hide amongst fallen gum leaves, bark, grass, rocks and old logs. With warm spring temperatures, the adults return to the sphagnum bogs for the breeding season in summer (most other frogs breed in spring).

Sphagnum Moss:

Sphagnum moss bogs are breeding sites for the Corroboree Frog and also make up a vital water catchment area for Australia. The male frog finds a mossy spot on the edge of a shallow pool and digs a small burrow for mating and nesting. When the burrow is finished he starts calling to stake his claim and attract females.

They mate inside the burrow and the female lays a small clutch of 16 to 38 eggs (her neighbour, the Eastern Banjo Frog produces up to 4000 eggs!). The eggs develop into tadpoles in about 4 weeks but, unlike other tadpoles they stay in their egg jelly for about 6 months. They finally hatch when the nests are flooded by the melting snow and winter rains. They are only 6 mm long and they grow very slowly.

One year later...

As the water warms up in the summer the tadpoles change into froglets. First the back legs grow and then the front legs. When they are about 8 mm long their tails disappear and they leave the nesting pools for the journey overland to their winter homes amongst the snow gums.

The Rescue Operation

The numbers of both Northern and Southern Corroboree Frogs have been rapidly declining over the last few years in the Brindabella and Snowy Mountain regions. The latest monitoring information suggests there are less than 100 adult Northern Corroboree Frogs left in the ACT. This means that it could be facing extinction in the ACT within the next ten to twenty years.

In October 2003 Parks, Conservation and Lands ACT relocated 360 Corroboree Frog eggs to a purpose built facility at Tidbinbilla Nature Reserve, to establish a captive breeding program. This program is part of the National Recovery Program for the Northern Corroboree Frog. The number of Northern Corroboree Frogs in captivity in 2009 numbers over 1000. The aim of the program is to release frogs back into the wild, with the hope that they will bolster existing populations and develop natural immunity to disease, as has occurred in other frog species.

The Amphibian Research Centre in Victoria also conducts a captive breeding program for the Southern Corroboree Frog.

Conserving the habitat of the Corroboree Frog is, however, the best way to save this species from extinction. Looking after our National Parks, keeping our waterways clean and conserving water are just some of the ways this can be done. To find out more about the plight of the Corroboree Frog check out www.frogs.org.au.

Information sourced from www.anbg.gov.au and Parks Conservation and Lands ACT

Green and Golden

Bell Frog

Scientific Name: *Litoria aurea*



Description:

The Green and Gold Bell Frog has smooth skin, usually green, with a variable pattern of golden brown blotches. It has a creamy-gold stripe along the side of the body, from the eye to the hind legs. The inside of the thighs are distinctly coloured in turquoise-blue. The tadpoles are dark grey-brown with a pinkish tinge to the underside. Females grow to an adult size of approximately 10 cm in length, and males are smaller, rarely exceeding 8 cm.

Habitat:

The Green and Gold Bell Frog is usually found around dams, creeks and lakes, often where sites have been disturbed by human activity such as disused quarries. Their preferred habitats always have ample vegetation both in and around the water. This species is found in the eastern half of New South Wales and Victoria. It is predominantly a coastal species with the western-most occurrences once being near Canberra.

The Green and Gold Bell Frog is listed as being nationally vulnerable under the EPBC (Environment Protection and Biodiversity Conservation) Act, and was thought to be extinct in the Canberra region. Over just a few years between 1978 and 1981, it virtually disappeared from the ACT and Southern Highlands region, and there is currently only one known population that has since been observed near Captains Flat. Prior to that, the species was thought to be locally extinct.

The Green and Golden Bell Frog has disappeared almost entirely from its former range in the Southern Tablelands, most likely as a result of the amphibian *chytrid* fungus and prolonged dry periods. The spread of alien fish such as the *Eastern Gambusia* (mosquito fish) is also a serious threat because they eat the frog eggs and tadpoles.

Diet:

The diet of this frog consists of spiders, crickets, beetles, damselflies, butterflies and ants. It also preys on smaller frogs including juveniles of its own species.

Reproduction:

To attract females, many males congregate at ponds and call while floating in the water. Their breeding season is usually during the spring and summer and their eggs are laid amongst loose floating vegetation. Tadpoles take about 10-12 weeks to metamorphose, though this is somewhat dependent on the temperature of the water.

Did You Know?

Although a member of the tree frog family, the Green and Golden Bell Frog has only small pads on its toes and fingers. Their call is a long, deep droning croak accompanied by approximately four shorter grunts. The Green and Golden Bell Frog has declined dramatically over the last few decades. There are several factors contributing to this including habitat modification and destruction, and introduced predators, particularly the *Eastern Gambusia* (mosquito fish). Other threats include disease and possibly the effects of increased ultraviolet light from ozone layer depletion. Its natural predators include birds and snakes.

Section 4

HABITAT



This section provides a variety of lesson plans and activities to introduce students to:

- * the importance of habitat for frogs and other animals*
- * the interrelationships (such as food webs) that exist in our local environment*
- * how we can protect, enhance or create habitat*

My Special Place

Local Environment Study

What lives in your local natural environment? What animals does it support?

Complete a local environment study and investigate a local park, area of natural bush, National Park, council reserve or school grounds and record observations about this special place.



Investigate

Interview people in the school and community about their local natural environment. What is special to people about this place? How do other people use this special place?

Describe and Record

Map the features or complete a survey of the plants and animals in this special place. Record or document information about your special place - take photos; write reports; compile a diary of the seasons. On a large map, draw your special place, school, home and other important parts of your local area. Write an account, report, story or poem about your special place.



Improve

Look at the things that may need improving in your special place: is there erosion, rubbish, weeds? How can your class improve things in this special place? Collect rubbish that is polluting this special place, try to identify where it came from or how it got there. Write a letter to your local council asking them to protect your special place.



Enjoy this special place!

Information on this page sourced from www.ASXfrogfocus.com

Classroom Habitat

Create an amphibian atmosphere in the classroom:

Place coloured cellophane on the windows

Play soft ambient music depicting sounds from nature

Display pictures of different species of frogs

Display pictures of different frog habitats

Download the frog screensaver from 'Frog Focus' onto the classroom computer

Collect and display a variety of books on amphibians

Place paper lily pads on the floor leading to the book display

Surround the classroom with pot plants and draped cloth

Dress up as a frog with wetsuit, green lycra flippers and mask!



Sourced from [www.ASXfrog focus.com](http://www.ASXfrogfocus.com)

An Ode to a Toad

(sung very seriously to the tune of O Christmas tree)

Oh Tom the Toad, Oh Tom the toad,
Why are you lying on the road?
Oh Tom the Toad, Oh Tom the Toad,
Why are you lying on the road?

Did you not see that truck ahead?
Now you are lying FLAT AND DEAD (scream this part as you pound him flat)
Oh Tom the Toad, Oh Tom the Toad, Why are you lying on the road?

-Stacy

From Patuxent Wildlife Research Centre web site www.im.nbs.gov

Food Webs

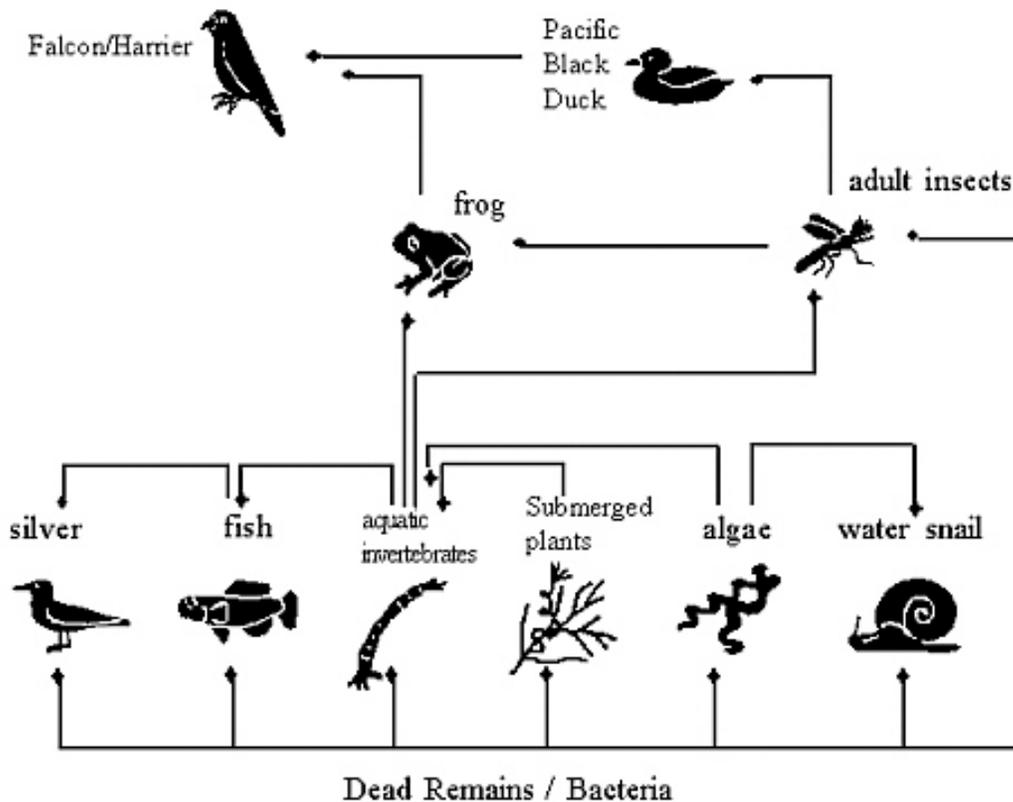
A food chain is a pattern of feeding relationships within an ecosystem. A food web highlights the interconnectedness of food chains.

Usually the smallest animal is eaten by a larger animal, which in turn is eaten by an even larger animal and the pattern continues. Discuss the concept of a food chain and investigate what frogs like to eat (prey) and which animals like to eat frogs (predators).

Make some line drawings to design a pictorial representation of animals in a food chain. Repeat the process to investigate a tadpole's food chain. An example of a wetland food web is shown below. We found it at: www.cwmb.sa.gov.au/kwc/section5/5-05.htm.

Use the information to make a board game similar to Snakes and Ladders.

When the user of the board game lands on prey they move forward, but when they land on a predator, they move back. This activity could lead into a discussion of the strategies frogs use to catch prey and those they use to avoid predators.



Food Pyramids

Food pyramids are like a food chain with numbers.

Students can calculate how many insects, frogs and snakes are eaten in this food chain.

Imagine if:

- 10 frogs eat five insects each per day
- 2 snakes eat four frogs each per day
- 1 eagle eats 3 snakes per day

Use the numbers to draw up a food pyramid.
Put the eagle at the top and the insects at the bottom.

Calculate the numbers for a week, a month and a whole year.
What is the number of insects needed in this food chain?
Imagine a valley without a pair of eagles living there.
Calculate the number of insects, frogs and snakes eaten.
What happens when the eagles raise a chick and the chick needs half the amount of food the parents do?
Can you work out the extra insects, frogs and snakes needed to feed the chick until it leaves the valley at one year old?

Information on this page sourced from www.ASXfrogfocus.com



Tiddalick The Frog Who Caused a Flood

In the time of the dreaming
Before the earth was old
Myths were in the making
Legends yet untold

Here began a story
Of one enormous frog
Solemn in his glory
He drank from every bog

Tiddalick the great one
Had to quench his mighty thirst
He drank from all the waterholes
So much he nearly burst

He drained the lake and river
The stream and billabong
Soon there was no water left
It was all very wrong

Others now grew thirsty
There was no sign of rain
Hot sun scorched the arid earth
No water did remain

Tiddalick's swollen stomach
Was squelchy round and wide
He was so big he couldn't move
The water was inside

Animals assembled
Men gathered with them too
They had to end this great distress
And work out what to do

Boomerangs were useless
Spears bounced off his sides
Getting angry didn't help
Even though they tried

The Kookaburra had a plan
We need to make him laugh
To hold his side and open wide
We need to show some gaffe

If only we can do that
The water will pour out
We all must work together
To end this mighty drought

C'mon laugh you big fat frog
You're like a bursting pot
If only you could see yourself
Squelching as you squat

Tiddalick moved his mournful head
He had a doleful face
He didn't see the humor
Of smiles there were no trace

The Kangaroo and Platypus
Wombat and Emu
All tried their best to make him laugh
But Tiddalick stayed Blue

Some danced and some told stories
Others somersaulted
Tiddalick grew tired and bored
And slept while antics halted

The last to try was Norang the Eel
He was their final hope
He turned himself into a hoop and
Wriggled like a rope

The rope stood upright on the sand
Then it began to spin
It went round like a whirlwind
Tiddalick began to grin

Then out slopped some water
Before it reached the sand
Man and beast began to drink
It worked like they had planned

But Norang went on spinning
Till he was scarcely seen
Tiddalick began to chuckle
It really made a scene

As his belly rumbled
The frog rocked too and fro
With his hands upon his sides
The stream began to flow

Tiddalick's mouth was open wide
With water gushing out
a surging tidal river
Spewed like a water spout

It swept away the animals
And covered all the sand
A shining lake of water
Had spread over the land

Now Tiddalick has shrunken
He's just a little frog
Who sometimes hides in desert sands
Or sits upon a log

There are many versions of the Tiddalick story. It is thought to originate from the Aboriginal people of South Gippsland in Victoria.

Some people think this story is about the Water-Holding Frog, found in Central and Western Australia (picture below).

You can find out more about The story of Tiddalick from: www.frogs.org.au/vfg/features/whoistiddalik.php.



Create a Frog Bog!

This activity is based on work done at Aranda Primary School, ACT as part of a School Community Environment Program in 1999. The frog bog was a part of a partnership project between Healthy Cities Canberra and Aranda Primary School, Canberra, Australia to develop new approaches to environmental, social, health and peace education.

Frog Bog

Construction of a Frog Bog is an activity which has been proposed in response to concern about the decline in frog populations around the world due to habitat change, pollution, global warming and perhaps even the destruction of the ozone layer.

Making school grounds more frog-friendly is just part of 'thinking globally-acting locally'.

Habitat Design

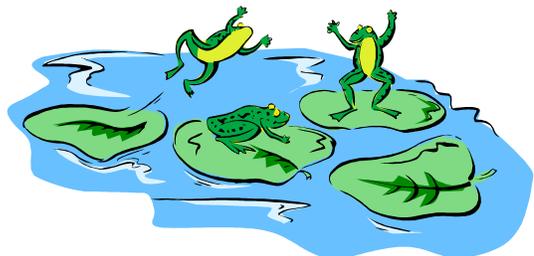
Most frogs spend most of their time on land, hiding by day and hunting by night, often far from the water. So a pond is not enough in frog-scaping - a whole habitat is required.

Essential ingredients include:

- **Moisture** - a bog and/or shallow pond with shallow edges and lots of surrounding vegetation. Frogs need to keep their skin moist, so lots of leaf litter, old logs and rocks will provide shelter where frogs can stay moist.
- **Food** - Tadpoles eat algae and small parts of rotting plants, so some aquatic plants and submerged logs (where algae will grow on the side) are ideal. Froglets and adult frogs eat insects, so a productive ecosystem is required. If there are plenty of plants, clean water and a variety of habitat types (eg under rocks, trees nearby, thick grass tussocks, mulch, shrubs, flowering plants) there will be plenty of insects to eat.
- **Shelter** - hiding places for frogs away from sun and drying winds. Some species like to burrow, so need friable soil. Others like to climb trees and hide in loose bark. Others need thick grass tussocks, reeds, logs and rocks to hide amongst.
- **Safety** from predators - no cats!
- **No toxic plants** to drop leaves/needles into the pond/bog (including pines, oleanders)
- **Chemical-free zone** - Frogs are very sensitive to chemicals, especially insecticides - no bugs means no frogs!

For more detailed information about making a frog bog, have a look at the Frogwatch resource, "Creating a Frog Friendly Habitat". It has lots of tips about location, materials and plant species to use and is designed specifically for the Canberra region.

The ACT Frogwatch Coordinator will be happy to support your school to make your own Frog Bog. Once you have built your Frog Bog, your school is not only more frog friendly, but has a great educational resource.



Contacts for support and further information

ACT Frogwatch Coordinator Ginninderra Catchment Group

For further information about this Kit, or the ACT and Region Frogwatch Program. The Frogwatch Coordinator can visit your class, provide support for extension activities or put you in touch with someone who can help.

Phone: 6278 3309

Email: waterwatch@ginninderralandcare.org.au

Website: www.ginninderralandcare.org.au

Mail: PO Box 446, Holt, ACT 2615

ACT Waterwatch Network

Find out about the ACT Waterwatch Network - visit your local wetland, investigate aquatic life and assess your local creek's health. We provide free environmental education services to schools throughout the ACT and region. Local Waterwatch Coordinators can visit your school, lead a field trip and engage your students in all things watery.

ACT Waterwatch Facilitator

Phone: 6207 2246

Email: tanya.noakes@act.gov.au

Website: www.act.waterwatch.org.au

Ginninderra Waterwatch Coordinator

Phone: 6278 3309

Email: waterwatch@ginninderralandcare.org.au

Website: www.ginninderralandcare.org.au

Reptiles Inc.

Find out more about keeping amphibians, or even take your class to visit the amazing animals that are on display here!

Phone: 6231 2894

Email: info@canberraexotics.com.au

Website: www.reptilesinc.com.au

Address: 1 Samson Place, Kambah, ACT, 2902

ACT Sustainable Schools

Your school can sign up to the Sustainable Schools Initiative - a whole-of-school approach, to improve the school's management of resources and facilities including energy, waste, water, biodiversity, landscape design, products and materials. It also addresses educational, social and economic issues associated with the sustainable management of a school and the school community.

Phone: 6207 5812 / 0418 295 807

Email: vanessal.whelan@act.gov.au

Website: www.sustainableschools.act.gov.au

Frogs, Frogs and More Frogs!

An incredibly useful website, containing portals for the Amphibian Research Centre, Victorian Frog Group, the Australian Frog Database and much much more. Of particular use is the 'community' section, where you can have all of your amphibian queries answered by Australian frog experts.

Website: www.frogs.org.au

Frogzone - Centre for Environmental Education Australia

The CEEA FROG ZONE project is gradually establishing wetland sites in school environments across Australia. A great education kit is available for purchase, that includes guidelines, teaching strategies and curriculum links to support schools in the development of model wetland habitats in school grounds in each State and Territory.

Website: www.ceeaustralia.org

Teacher Evaluation Form

School name:

Teacher name:

Class level:

Q1. Have you used the Frogwatch Schools Education Kit? YES / NO

If yes which activities or lesson plans did you find most useful for your class?

and which parts of the Teachers Notes did you find most useful?

If you didn't use the Education Kit - why not?

Q2. Which part of the Education Kit did you find least useful?

Q3. Is there any additional information that you think would be useful in the kit?

Q4. What kind of extra support would you like to implement your class activities or extension activities?

Any extra comments are most welcome. Your feedback will be used to improve the Frogwatch Program in future years.

Please return this completed form to the Frogwatch Coordinator.

PO Box 446, Holt, ACT, 2615. 6278 3309. waterwatch@ginninderralandcare.org.au

