A Frog's Place

Unit Of Work
Key Learning Area : Science

PART ONE

Developed by Alex Hilvert as a Science Unit for Upper Primary Students as part of a B. Education Degree at the University of Canberra.

Term Overview

Over the course of this term students will explore ‘how a frog fits in’, focusing on classification and habitat. The students will visit a wetland, collect data and speak with a local scientist. This unit will include an investigation project, exploring the needs of a frog and require the creation and presentation of a group report. The report will be shared with the greater school community. In the NSW curriculum the key learning areas of science and technology have been integrated. A technology unit that includes the designing and making of a school frog pond/bog will follow this unit.

This science unit is based on the outcomes, teacher strategies and inclusive practices of the NSW board of studies k-8 science curriculum. For more information see http://k6.boardofstudies.nsw.edu.au/

Unit Outline

Rationale

The following unit has been designed for a group of year four students. In the NSW board of studies K-6 science curriculum year four students are considered at a stage two level. As the majority of the students are extremely capable some stage three outcomes have been included.

The class has thirty students and includes four pupils who have recently settled in Australia and one child with a mild learning disability. During the course the school ESL and learning support teachers will be accessed, and classes have been adapted to include appropriate inclusive practices.

The year 4 classroom has direct access to a wet area and 10 computers. The school facilities include an extensive library and a bus. There is an ongoing connection between the school and the Ginninderra Catchment Education Officer.The lessons, one to five detailed in this document, will be run once a week, over five weeks. During this period extra time will be allocated to the supplementary lessons suggested.

The role of science education has been described by Goodrum, Hacking & Renning (2001) [1]as a process that enables individuals to "be able to identify questions, investigate and draw evidence based conclusions and make informed decisions about the environment and their health and well being".

The specific focus of this science unit is living things, one of the eight content strands identified in the curriculum. The specific theme of this unit is frogs, although the course addresses broader understandings about "the structure and ways living things interact with other living things and their environment".[2] The objective of this unit is to offer students an opportunity to develop scientific knowledge as well as scientific skill.

During the unit students will undertake a scientific investigation, researching the needs of local frogs. This process will extend the skills of clarification, questioning, researching and require the communication of scientific understandings. To complement students' frog research, the unit will offer a series of mini investigations that include observation, the manipulation of materials, proposing explanations, classifying, recording data and drawing conclusions. The investigations presented in this unit emphasize hands-on, authentic and purposeful experiences of science.

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[1] Goodrum, Hacking & Renning quoted in ***Stage 2, Life and Living,*** **Plants in Action**, Primary Connections, Department Of Education Science and Training, 2001.

[2] ***NSW Science and Technology k-6 syllabus and support document***, Board of Studies, NSW, 1993.

Students involved in the unit will know that the purpose of their investigation is to inform the school about the needs of a frog. This activity will prepare the school for a frog pond/bog design process. The course has been sequenced so that classroom science learning can be enriched by 'real world' experiences on excursion to a wetland. On excursion students will have the opportunity to meet and question a community scientist. As a result of the report project, the children will develop interpersonal skills through negotiating plans for their group's presentation.

This unit acknowledges the social nature of science and emphasizes cooperative learning. During the lessons children will be given opportunities to work in variety of groupings, including interest based, mixed gender, pairs and independently. To ensure successful cooperative learning processes, students will be advised on group skills and asked to reflect on their experiences.

Reflecting on learning is a key teaching strategy recommended in the NSW curriculum. Other strategies incorporated into the following document include: gathering and building on student's prior knowledge, integrating science across the curriculum, using a range of assessment strategies that cater for diverse learning styles and the inclusion of indigenous perspectives on science.

Safety Guidelines

- See the school's policy on safety in the classroom and for excursions.
- Check student's health records so that you are aware of potential problems, such as allergies.
- Be aware of potential dangers by trying out activities before students do them.
- Caution students about the potential dangers of each situation.
- Clear up spills immediately as slippery floors are dangerous.
- Instruct students never to taste smell or eat unless given permission.

Guidelines are based on Primary Connections safety guidelines. See references for more details

Activities included in lesson one have been adapted from lesson plans on the Educators Reference website. www.eduref.com

Outcomes:
Knowledge/Understanding:
Living things show variation within a species (LT S3.3)
Values:
Exhibits curiosity and responsiveness to scientific ideas and evidence. (V2)

Meaningful Links to Other Lessons:

KLA: Technology – Based on pop-up book used in Around Here, student may choose local frogs from the book and design their own frog pop-up card. Some technical instruction about the pop-up making will be taught.
KLA: Music – students will learn song "Galoomp Went the Little Green Frog" and explore call and response songs. For more information see www.clipart.usscouts.org/ScoutDoc/Australa/SongBook/Songs1.pdf -
KLA: SOSE/English – Student examine Indigenous words used in 'Around Here' book.

Safety Details:
- Discuss appropriate behavior/caution in wet areas.
- Discuss safe use of plastic bags.
- Discuss treating blindfolded person with care.
- Ensure students are using scissors correctly.

Resources: See also collected Resource list for more information
Books
Bennett, R. ***Reptiles and Frogs of the ACT***, National Parks ACT, 1997.
Clyne, D. ***It's a Frog's Life***. Allen and Unwin, Sydney,1995.
MacLulich, C. ***Australian Frogs.*** Scholastic Australia, Gosford,1996.
Parish, S. ***First Field Guide to Australian Frog and Reptiles***. Steve Parish Publishing, Fortitude Valley,1997.
Winer Y. ***Frogs Sing Songs***, Margaret Hamilton Books, Australia 2002

Websites
Amphibian Research Centre / Victorian Frog Group
www.frogs.org.au
Frogs of the Australian National Botanic Gardens.
www.anbg.gov.au/anbg/frogs/index.html
Includes detailed images of local focus with matching Mp3's of frog calls
Kiddyhouse Education site
http://www.kiddyhouse.com/Themes/frogs/frogs.html

CD ROM
Tyler, M.J. ***Frogs of Australia.*** Publisher Webster Publishing, Frenchs Forest.

Teacher's Notes

Information About Frog calls:
Frogs are far more often heard than seen. Most frog sounds are the advertisement calls of the males, intended to attract the females for breeding. Frog voices may carry for long distances, especially the higher pitched calls of the smaller species. The males increase the loudness of their calls by ballooning out their throats or special sacs at the sides of their throats, creating a kind of resonating chamber. Only male's produce advertisement calls, but both sexes may give shorter warning calls or screams when danger threatens. Males can also produce distinct calls that warn away rival males that approach their calling or breeding sites.

Different species have different calls so they don't attract the wrong species. 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, we can tell how many frogs are there and how many species live in a particular
area. Frogs call to breed seasonally when conditions of temperature, day-length and moisture are right. It is common to see tadpoles (young frogs) 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 tadpoles may take several days, followed by a period when the tadpole develops and finally changes into a frog.

Information sourced from www.ASXfrogfocus.com and www.amonline.net.au (see collected resource list for more details)

Why frogs have different feet
Frogs can be found almost anywhere except Antarctica. However, most species are found in tropical regions. More frogs are found in warmer countries. You can find frogs in water or near places that have water like ponds and streams. However, some frogs will never enter the water. They live mainly on land and go to the water only to mate. Then, there are some kinds that live in trees. These frogs have tiny sticky pads on their fingers and toes to help them cling to the tree trunk as they climb. Some frogs are burrowers. Burrower frogs live on land and have short hind legs and cannot hop. Frogs that live in cold winter places, hibernate during this time. They hibernate either in burrows or buried in mud bottom of ponds.

Some frogs have webbed feet for swimming. Some frogs have suction disks on the tip of their toes to help them climb. The back feet of the Spade-Foot Toad have a special hard spur to make it easier for burrowing.
Some have large webs to assist them in gliding in the air, almost like flying. Examples: The Chinese Gliding Tree Frog and Asian Blue-Webbed Gliding Tree Frog.

Information sourced from kiddyhouse.com/themes/frogs/frogs.html

Different frogs that live in our region and their calls:

Several species of frog can still be found, or, more likely heard, in the Australian National Botanic Gardens. At certain times of the year male frogs distend their vocal sacs (situated just below the throat) with air to serve as a resonance chamber to amplify sounds and issue a great variety of calls to attract females. It is common to hear great choruses of different species trilling away, endeavouring to attract mates. Frogs, which can be heard in the Gardens, in decreasing order of likelihood of discovery, are:

- Common Eastern Froglet *Crinia signifera*
- Eastern Banjo Frog *Limnodynastes dumerilii*
- Spotted Grass Frog *Limnodynastes tasmaniensis*
- Brown-striped Frog *Limnodynastes peronii*
- Peron's Tree Frog *Litoria peronii*
- Eastern Froglet *Crinia parinsignifera*
- Whistling Tree Frog *Litoria verreauxii*

Common Eastern Froglet - *Crinia signifera*

A small frog can grow 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. Grey 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/anbg/frogs/index.html

Station One

Why do some frogs have webbed feet?

Investigation

1. Move your hand through the water, try making your fingers stiff and spreading them.

2. Place a plastic bag over your hand until your fingers reach the edge of the bag. Wrap the rest of the bag around your wrist and hold with other hand. Try to make the bag firm but not tight.

3. Now repeat step number one.

4. Do you notice any difference? Can you answer the question at the top now?

Station Two

How come frogs are sometimes found calling from drainpipes?

Investigation

Using the materials here try to make something that will increase the volume of your call.

What have you found out?

Outcomes:
Knowledge/Understanding:
Plants and animals live in environments that supply their needs (LT S2.3).
Living things depend on other living things to survive (LT S2.3).
Skills:
State the issue or area to be investigated (INV S2.7)
Values/Attitude:
Works cooperatively with others in groups on scientific (and technological) tasks and challenges (VA5).

Meaningful Links to Other Lessons:
KLA: English (During Library) – a follow up research class. Ask Librarian to advise on helpful Internet research/general research strategies.
KLA: English - Students collect words they are unclear of and produce a glossary.
KLA: Science - supplementary lesson to continue research.
KLA: Technology – students explore how they will present their group report, giving consideration to their particular audience.

Safety Details:
- Ensure groups are working cooperatively
- Ensure safe practices are demonstrated around computers

Resources:
Books
Bennett, R. ***Reptiles and Frogs of the ACT***, National Parks ACT, 1997.
Casey, K. ***Attracting Frogs to Your Garden - Creating An Ideal Habitat For Native Frogs In Your Own Backyard.*** Kimberley Publications, Brisbane.Clyne, D. 1969.
Hoser, R.T. ***Australian Reptiles and Frogs.*** Pierson and Co., Sydney. 1989.
Lintermans, M. & Osbourne, W.. ***Wet and Wild: a field guide to the freshwater animals of the Southern Tablelands and High Country of the ACT and NSW***. Environment ACT, 2002
Romanowski, Nick. 2000. ***Water Garden Plants and Animals: The Complete Guide for all Australia.*** University of New South Wales Press, Sydney.
Tyler, M.J. ***Frogs.*** Collins, Sydney. .1976
Tyler, M. J. ***Encyclopedia of Australian Animals: Frogs.*** Angus and Robertson, Sydney. 1992

Websites
Amphibian Research Centre / Victorian Frog Group
www.frogs.org.au
Frogs Australia Network
www.frogsaustralia.net.au
see also lesson two hand out
CD ROM
Tyler, M.J. ***Frogs of Australia***. Webster Publishing, French Forest, 2001

Teacher's Notes

Jigsaw Group Projects - In jigsaw projects, each member of a group is asked to complete some discrete part of an assignment; when every member has completed their assigned task, the pieces can be joined together to form a finished project. To give an example: One student will research the question "What do the frogs eat? Once the student has completed their research question they meet with others who have covered the same question and compare notes. The students will then return to their report groups to share their expert information. The students can then devise a strategy for presenting and reporting on their findings to other students (in this case the students are in other classes).

What does a frog Need?
The task is for the students to find out what a frog needs, but here is some basic info about frogs that will help

Frogs depend on water to breed, with most frogs breeding in shallow ponds, marshes and streams.
However, some species live in areas where water is scarce or far away, for example tree frogs in tropical
rainforests. These frogs lay their eggs in tree hollows or in the cup-like bases of certain plants (like
bromeliads) where water collects. The eggs hatch in the watery pools and often the female frog comes
back to lay feeder eggs to nourish the tadpoles as they grow. Some frogs can live in very dry areas, such as arid places and deserts. They take advantage of rain as it falls and can survive dry periods by storing water in their bodies and secreting mucus to waterproof their skin. Buried in the sand like this, they can survive until the next rains. Therefore it is important to find out what are the most common local frogs are (see lesson one teacher notes) and what their needs are.

Information sourced from **Frogs Australia Network** www.frogsaustralia.net.au

To find out more look at resource list above or go to www.frogs.org and see "Bonking in the Garden" article

Great Tips for Group Work

In this project the task is to work together. It will be fun if you can remember to:

Make sure everyone in the group has had a chance to share their ideas.

Encourage others to speak.

Remember to share your ideas.

Make sure you listen to other people's ideas

Let others finish what they are saying.

Try to encourage other people ideas

Try not to put down others ideas.

It all takes practice. Good luck!

Frog Websites

Amphibian Research Centre / Victorian Frog Group
www.frogs.org.au

ASX Frog Focus.
www.asxfrogfocus.com

Frogs Australia Network
www.frogsaustralia.net.au

Frogs of the Australian National Botanic Gardens.
www.anbg.gov.au/anbg/frogs/index.html

Outcomes:

Knowledge/Understanding:
Identifies and describes the structure and function of living things and ways in which living things interact with other living things and their environment LT S2.3)
Skills:
Propose explanations using simple observations (INV S2.7)

Meaningful Links to Other Lessons:
KLA: SOSE- organise an a talk for students from a local Indigenous person about the local environment/history.
KLA: Science – students may need a follow up lesson to finish arranging living things into existing classification systems.

Safety Details:
- Use safety pins for badges.

Resources:
Books
The Australian Encyclopedia, Grollier society of Australia, Sydney, 1983.
The World Encyclopedia, World Books International, London, 1996
Bennett, R. ***Reptiles and Frogs of the ACT***, National Parks ACT, 1997.
Clyne, D. ***Australian frogs.*** Lansdowne Press, Melbourne. 1969.
Parish, S. ***First Field Guide to Australian Frog and Reptiles***. Steve Parish Publishing, Fortitude Valley. 1997.
Tyler, M.J. ***Australian Frogs: A Natural History.*** New Holland, Sydney. 1999.

Teacher's Notes

Dichotomous key (kie-KOT-un-mus KEY) - a tool for identifying plants and animals based on answers to a sequence of questions. Each question offers two choices.

How do scientist group living things?
Taxonomists searched for a way to group organisms that would distinguish one species from another and would reflect the relationships that exist between life forms. This search eventually led to the development of a systematic classification system known as the **Five Kingdom System**. In this system, organisms are grouped into one of five kingdoms and are then further subdivided into **phylum**, **class**, **order**, **family**, **genus** and, finally, **species**. Each of these groupings is more specific than the last. For example, a genus may encompass many species.

Plants and animals are divided into Flora and Fauna. Plants are subdivided into phylum, class, order, family, genus and species.

The animal kingdom can also be organized according to skeletal structure. Animals with backbones (spinal columns) and craniums (hard, bony cases around their brains) are in a group called *vertebrates* (VER-teh-brits). The name comes from vertebrae (VER-teh-bree), small bones that form the spinal column. Another name scientist's use for this group is *chordates*. Animals without backbones, such as snails, starfish, jellyfish, insects, spiders, squid and earthworms, are called *invertebrates.*

The vertebrate group is broken down into five classes: mammals, birds, fish, reptiles and amphibians. Each class has its own characteristics. Mammals and birds are endothermic. Fish, reptiles and amphibians are ectothermic.

So where do frogs fit in?
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.

Frogs are Anuras :The class Amphibia is comprised of three orders, Anura (Salientia), Caudata (Urodela), and Gymnophiona (Apoda).

Anuran Biology - Frogs and Toads are amphibians of the order Anura. Found all over the world, in nearly every habitat, anurans are a highly diverse group of amphibians. Frogs are likely the most recognizable group of amphibians.

Caudate Biology – Salamanders, Newts, Sirens, Amphiuma, Waterdogs, and Mudpuppies are amphibians of the order Caudata (Urodela). Caudates are commonly referred to as the "tailed amphibians", a feature lacking in frogs and often overlooked in caecilians.

The class Amphibia is comprised of three orders, Anura (Salientia), Caudata (Urodela), and Gymnophiona (Apoda). Although the exact taxonomic classification of each order is often debated, there are some definite characteristics that differentiate each order from the others. For the most part, it is rather easy to see the external differences between a typical frog, salamander, and caecilian, however, there are even greater differences, as well as similarities, below the surface. d papillae in the inner ear. It is important to note that there are some amphibians groups considered highly advanced, and some that are rather primitive, and although the present physiology may be drastically different, the ancestral forms were more similar. For instance, lungless salamanders did at one time possess lungs, but lost them through evolution. In other words, in many cases recent evolutionary characteristics must be disregarded, in a sense, in order to validate specific taxonomic classification.

Anuran Biology - Frogs and Toads are amphibians of the order Anura. Found all over the world, in nearly every habitat, anurans are a highly diverse group of amphibians. Frogs are likely the most recognizable group of amphibians.

Caudate Biology – Salamanders, Newts, Sirens, Amphiuma, Waterdogs, and Mudpuppies are amphibians of the order Caudata (Urodela). Caudates are commonly referred to as the "tailed amphibians", a feature lacking in frogs and often overlooked in caecilians.

Other Ways of Grouping Living Things

There are other ways of grouping living Things.
Some examples include:

- Warm-blooded/cold blooded
- As a part of their habitat i.e some frogs are a wetland species
- From an indigenous perspective, i.e considering which frogs/living things may be edible and if they are appropriate to eat with respect to individual clans totem spirit, or which dreaming story they are part of.

For each of these points there is basic information below, for more details look at resource list.

Warm-blooded and cold-blooded, terms often used to describe how an animal maintains its body temperature, tend to give the false impression that a cold-blooded animal has cold blood. Better terms for identifying these two groups are *endothermic* and *ectothermic*. *Endo* means *inside; ecto* means *outside*. *Therm* means *heat*. Ectothermic animals, such as snakes, lizards, fish, frogs and insects, must gain heat for activity from outside their bodies. They depend on the sun to heat up their bodies and allow any activity. If the environment is cold, ectothermic animals are slow-moving and sluggish. That is why a snake must bask in the sun before it can move about to hunt for food. If the temperature gets too hot, a snake must find shade or burrow in the ground to keep its body cool or die. Endothermic animals, on the other hand, make their own heat. The heat they produce inside their bodies comes from energy from food. An endothermic animal's body engine works hard to keep its body the right temperature for activity all the time. When the outside temperature is too hot, an endothermic animal can cool off by sweating or panting. The cost an endothermic animal pays for this inside body heat system is that it

must eat much more often than an ectothermic animal. For example, a lion (endothermic) eats its weight in food every seven to ten days. A ten-foot-long, ectothermic reptile, the Komodo dragon, eats its weight in food every sixty days.
Information sourced from

Wetlands are areas of permanent or periodic/intermittent inundation, with water that is static or flowing fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed 6m.

Wetlands support an enormous variety of plants and invertebrates, fish, amphibians, reptiles, birds and mammals. Many species are unable to survive elsewhere. Many unique, rare endangered species including Swamp Orchids, Western Swamp Tortoises, and Trout Cod are found only in wetlands. About 80 species of migratory birds depend on Australian wetlands to some extent

Information sourced from
http://www.epa.qld.gov.au/nature_conservation/habitats/wetlands/

Native plants and animals eaten by Aboriginal people are referred to as bush tucker. Bush tucker varies depending on the region, climate, and season. Kangaroo, Emu, and possum are available all year round and are popular meat choices among the Aborigines. Other meats, such as lizards, frogs, and turtles, are most often enjoyed during the summer. Seafood is also a common meal, particularly in communities along the seacoast. In the mountains of New South Wales, the Aborigines may feast on moths, which are rich in fat. The deserts of central Australia are home to witchery grubs (larvae) found in the roots of acacia bushes. The larvae, which are high in calories, protein, and fat, were once staples in the Aboriginal diet. Other insects in the traditional Aboriginal diet are bees, ants, and termites. Native edible plants include yams, onions, spinach, tomatoes, berries, and grass seed. Roots of some other native plants are also harvested to eat. Seeds and flowers of the acacia were ground to make a kind of flour that could be mixed with water to make a simple cake.

Information sourced from http://www.foodbycountry.com/Algeria-to-France/Australia-Aborigines-and-Bush-Tucker.html

Reptiles such as goannas (iguanas), lizards, frogs and snakes also found a place in the Aboriginal diet, as did birds of all sizes – emus, turkeys, swans, ducks, parrots and cockatoos. To catch flying birds such as parrots, the Aborigines set nets across trees. Boomerangs were thrown above the flock.

Names_____

Task

Decide which living things should be in the same group. You need to come up with at least 3 groups, but no more then 7 groups. You will need to explain how you came up with your ideas. You can write your ideas on this paper.

Outcomes:
Knowledge/Understanding:
Plants and animals live in environments that supply their needs.(LT S2.3)
Skills:
Make accurate observations and describe these observations, or record them as diagrams, tables of data or graph (INV S2.7)

Meaningful Links to Other Lessons:
KLA: Science/Math's/Technology - Data collected about Invertebrate numbers will be analysed, calculated and interpreted into a Pollution Index. Students will be able to make judgements about the quality of the water and submit their findings to a local survey. See www.bugsurvey.nsw.gov.au for more information.
KLA: English - Student will write descriptive piece based on their recorded observation of the excursion or complete an article about the day for the school newsletter.

Safety Details:

- Pre-class, make sure all permission notes have been collected. Bring first Aid Kit. Before leaving school discuss behavior expectations with students.
- Discuss safety around the water /watch out for slippery surfaces.
- Remind students to be aware of holes, snakes, prickly vegetation and watch out for road crossings near the site.
- Advice students to not touch rubbish
- Discuss using equipment with awareness (scoop handles are long)
- Ensure students are appropriately dressed/ depending on weather e.g. warm clothing and shoes with good grip.
- Pack a First Aid kit.
- All hands need to be washed after the survey.
- Minimise impact on the stream habitat.
- Return bugs to wetland — alive

Resources:
For more information pre-excursion look at
www.bugsurvey
examine Collected Resource List
or talk with Ginniderra Catchment Education Officer 62783309.

Teacher's Notes

Why search for water bugs?
Some water bugs are more sensitive to pollution than others. The presence or absence of particular bugs in a waterway tells us a lot about the health of the Catchment. When water becomes polluted or disturbed, sensitive water bugs like stoneflies, mayflies and shrimps may die. Flatworms, leeches and bloodworms are more tolerant to a polluted home and changes in habitat.

Catching bugs
It is important to collect at least 100 water bugs and preferably 150-200 bugs to get a reliable stream pollution index. In slow moving water and pools, sweep the net across the surface to collect striders and beetles. Drag the net beneath the surface and through water plants to collect nymphs and water scorpions. Snails and worms live among the rocks, litter and sediment. In fast flowing water with a rocky river bed, hold the net on the floor of the river-bed so the mouth is facing upstream. With the net in position, thoroughly kick and rub stones in front of the net to dislodge the water bugs.

To link this activity to our frog studies – Frogs are an Indicator species/bio indicators
Bio Indicators a living (*bio means life*) creature that is indicating or telling you something about the area that it lives in. It can be something positive (good) or negative (bad). For example, having lots of frogs in an area tells you and scientists that the environment is healthy and complete for the frogs. If for some reason frogs are suddenly missing from an area or their population is declining (shrinking), then this is telling you that their environment is changing. Sometimes bio-indicators can be used to show us that the quality of the air we breathe or water we drink may not be of a high quality.

Frogs are good bio-indicators because...
1. they spend part of their life cycle on land and some in water
2. have a permeable skin (which allows substances to move relatively freely into its body) and
3. absorb and concentrate (make stronger) toxins (poisonous substances) in their fatty tissueStudying frogs is important because frogs are sensitive to environmental change. Frogs sensitive skin absorbs pollution as well as water, so they can tell us how polluted an area is. . The decline in their numbers around the world should act as an alarm call to us to look at how we are affecting the environment.

Name

Bug Type	***Number of bugs found***
Very Sensitive Bugs	
Stonefly Nymph	
Sensitive Bugs	
Water Mite	
Tolerant Bugs	
Whirligig Beetle and Larva	
Freshwater Yabbie/Crayfish	
Damselfly Nymph	
Freshwater Shrimp	
Very Tolerant Bugs	
Waterboatman	
Freshwater Worm	
Mosquito Larva and Pupa	
Freshwater Snail	

Draw a picture of your favourite bug here

At the Wetland:

What does it smell like?	What can you hear?
What can you see?	What textures can you feel?

Outcomes:

Knowledge/Understanding:
Plants and animals live in environments that supply their needs.(LT S2.3)
Skills:
Recognizes that the results of investigations can lead to more questions. (INV S2.7)

Meaningful Links To Other Lessons:
KLA: Technology/English – (Pre- lesson) students have had time to work on report and presentation.
KLA: Science/Technology - student undertake school yard observation to suggest possible frog pond/bog locations and start to design frog pond.

Safety Details:

- Ensure students lift and move technology required for presentations with care and supervision where required.

Resources:

Robert, R. 1980. ***Tiddalick the Frog Who Caused a Flood***. Penguin.

If students still require access to research materials see lesson two resource list.

Name_____

Reflection on Frog Project

What I Liked most was…..

What I would like to know more about is …

What I know about frogs is…..

The best thing about my group was….

My group could have been better at…

What I like about group work is…….

Collected References/Resource List

Curriculum Information

NSW Board of Studies K-6 Science and Technology Curriculum.
Complete Syllabus available at www.bosnsw-k6.nsw.edu.au/

General Frog Books

Bennett, R. ***Reptiles and Frogs of the ACT***, National Parks ACT, 1997.

Clyne, D. ***Australian frogs.*** Lansdowne Press, Melbourne, 2000.

Fleming, G and K. **Investigate: Frogs and Toads.** Random House 2000.

Hoser, R.T. ***Australian Reptiles and Frogs.*** Pierson and Co., Sydney, 1989.

Lintermans, M. & Osbourne, W.. ***Wet and Wild: a field guide to the freshwater animals of the Southern Tablelands and High Country of the ACT and NSW***. Environment ACT, 2002.

Swan, G. ***Green Guide to Frogs of Australia.*** New Holland, Sydney,2001.

Tyler, M.J. ***Australian Frogs: A Natural History.*** New Holland, Sydney, 1999.

Tyler, M. J. ***Encyclopedia of Australian Animals: Frogs.*** Angus and Robertson, Sydney,1992.

Tyler, M.J. ***There's a Frog in my Stomach.*** Collins, Sydney,1984.

Children's Frog Books

Clyne, D. ***It's a Frog's Life***. Allen and Unwin, Sydney, 1995.

MacLulich, C. ***Australian Frogs.*** Scholastic Australia, Gosford,1996.

Murphy, S. and Bosch, S. ***The Floatingest Frog***, New Frontier Publishing, NSW, 2004.

Parish, S. ***First Field Guide to Australian Frog and Reptiles***. Steve Parish Publishing, Fortitude Valley,1997.

Robert, R. ***Tiddalick the Frog Who Caused a Flood***. Penguin,1980.

Winer Y. ***Frogs Sing Songs***, Margaret Hamilton Books, Australia 2002.

Books For Learning About Frog Habitat

Casey, K. ***Attracting Frogs To Your Garden - Creating An Ideal Habitat For Native Frogs In Your Own Backyard.*** Kimberley Publications, Brisbane,1996.

Flemming, R. ***Wetlands Study***, Townsville District Education Centre, 1986.

Romanowski, Nick.. ***Water Garden Plants and Animals: The Complete Guide for all Australia.*** University of New South Wales Press, Sydney, 2000.

Articles:

Marantelli, G. Bonking in the Garden, published on www.frogs.org.au

Ginninderra Catchment Group, ***Creating a Frog Friendly Habitat in The ACT Community***, Ginniderra Catchment Group, ACT 2005.

General Science Books

The Australian Encyclopedia, Grollier society of Australia, Sydney, 1983.

The World Encyclopedia, World Books International, London, 1996

Isaacs, J. ***Aboriginal Food and Herbal Medicine***, Gary Allen Publishing, NSW, 1993.

Frog Websites

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 sound bites 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!

ASX Frog Focus. www.asxfrogfocus.com
A curriculum-based education resource that will motivate and engage school students and their communities in the study of frogs.

Amphibia Web www.dlp.cs.berkeley.edu/aw/index.html
AmphibiaWeb is an online system enabling anyone with a Web browser to search and retrieve information relating to amphibian biology and conservation. This site was inspired by the global declines of amphibians, the study of which has been hindered by the lack of multidisciplinary studies and a lack of coordination in monitoring, in field studies, and in lab studies. We hope AmphibiaWeb will encourage a shared vision for the study of global amphibian declines and the conservation of remaining amphibians.

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.

Frogland www.allaboutfrogs.org
From a frog-lover with too much time on her hands, 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

Livingunderworld www.livingunderworld.org
"A non-profit, educational website, whose purpose is to make available accurate, and organized amphibian information for hobbyists, professionals, or curious individuals".

Previous ACT and Region Community Frogwatch Census Reports.
www.environment.act.gov.au/airandwater/waterwatchact.html. Pdf files of previous Frogwatch reports, and the Frogwatch Field Data Sheets are available here.

Images of frogs on the Net

Viridans Images Website: **http://www.viridans.com/best/frog/bestfrog.htm**

Wildlife Images
http://www.australiannature.com/

Oceanwide Images

Specialising in native Australian animals including rare and endangered species.
http://www.oceanwideimages.com.au/

Other Websites

Australian National Museum on line
www.amoline.net.au

Primary Connections
Australian Government Department of Education science and Training,
Australian Science Academy,
http://www.science.org.au/primaryconnections/index.htm

The Educators Reference
www.eduref.org
American Education site

Bug Survey
http://www.bugsurvey.nsw.gov.au/
NSW government waterwatch education intiative

Center for Environment Education
http://www.ceeaustralia.org/Aboutus.htmCEE AUSTRALIA
An Australian Not for profit organisation with information about frog projects happening in schools.

The Jigsaw Group Strategy Page
http://www.jigsaw.org/tips.htm
tips on group work implementation

CD ROMS:

Tyler, M.J. ***Frogs of Australia.*** Webster Publishing, Frenchs Forest, Sydney, 2001.
This encyclopedic reference work includes graphics, videos, cross-referenced text, search facility, maps and games, along with a project-preparation facility and a variety of ways

of viewing information. Superb pictures and extensive, up-to-date information are easily accessed through an impressive line-up of options. The search facility enables finding a creature even when the name is unknown, through 'custom' search, where locality may be drawn on the given map. Data on each specimen includes a distribution map which may be overlaid by rainfall, climate, drainage or vegetation change maps. A 'Facts in brief' screen is included for each entry, and related reading is indicated. Scientific terms are glossaried through hypertext.

General Books about Teaching Children Science

Fleer, M. and Hardy, T**.** ***Science for Children 2nd edition***, Pearson Education Australia Pty Limited, NSW, 2001

Gould League of Victoria, ***Environmental Starters***, Gould League of Victoria, 1981.
General Websites for Teaching Children Science

Sewell, A. & Smith W. ***Working Scientifically, Life and Living,*** Educational Directions Publications, NT, 2002.