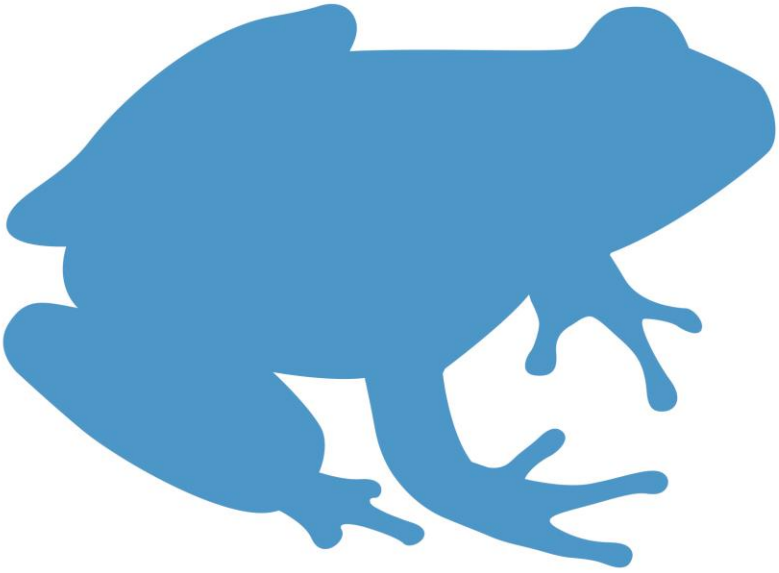


Module 3: 5-6

Frog habitats

Melbourne Water Frog Census

Melbourne Water
Enhancing Life and Liveability

Frog habitats (Years 5–6)

Lesson plan

Introduction

Where do frogs live? What helps them survive there? Exploring where frogs live in your local area and how frogs' adaptations aid their survival provides a great backdrop to start a conversation on the effect that environmental changes have on frog populations. Designing a frog-friendly habitat encourages students to aid frogs' survival in their own backyard.

These activities use digital applications such as Melbourne Water's Frog Census app and CSIRO's Atlas of Living Australia to develop students' ICT skills.

The Frog Census app is a powerful citizen science tool that enables students, their families and the wider community to contribute to understanding the biology and distribution of frog species in Melbourne; information that will help to develop effective policy and management strategies to conserve and enhance these populations.

Activity 1: Who's who in the water?

Students learn how to identify frogs from their calls.

Activity 2: Adaptations

Students investigate frog adaptations.

Activity 3: Find your local frogs online

Students use the online *Atlas of Living Australia* to create and visualise information about frogs in their local area.

Activity 4: Whose wetland is it?

Students explore different points of view about the proposed residential development of a frog

Victorian Curriculum F–10[1] links:

Science

Levels 5 and 6

Science Understanding

Science as a human endeavour

Scientific understandings, discoveries and inventions are used to inform personal and community decisions and to solve problems that directly affect people's lives (VCSSU073)

Biological sciences

Living things have structural features and adaptations that help them to survive in their environment (VCSSU074)

The growth and survival of living things are affected by the physical conditions of their environment (VCSSU075)

Geography

Geographical Concepts and Skills

Data and information

Represent the location of places and other types of geographical data and information in different forms including diagrams, field sketches and large-scale and small-scale maps that conform to cartographic conventions of border, scale, legend, title, north point and source; using digital and spatial technologies as appropriate (VCGGC089)

Geographical Knowledge

Factors that shape places and influence interconnections

Environmental and human influences on the location and characteristics of places and the management of spaces within them (VCGGK096)

Digital Technologies

Data and Information

Acquire, store and validate different types of data and use a range of software to interpret and visualise data to create information (VCDTDI028)

Design and Technologies

Materials and technologies specialisations

Investigate characteristics an properties of a range of materials, systems, components, tools and equipment and evaluate the impact of their use (VCDSTC037)

[1] Victorian Curriculum and Assessment Authority (VCAA) <http://victoriancurriculum.vcaa.vic.edu.au/> Accessed 5 February 2017.

habitat.

Activity 5: Make a frog habitat—classroom or at-home activity

Students design and make a model of a frog-friendly habitat.

Activity 6: Conducting a frog census in our local area—excursion or at-home activity

Students participate as citizen scientists in the Frog Census by recording frog calls in a local frog habitat.

Activity 1: Who's who in the water?

You may be able to hear frogs but you need to be quiet to distinguish one species from another. In this activity, students use field guides to identify frog calls: a skill that will be useful on a field trip or excursion.

Equipment

Frog Census app (available from the App Store for Apple and Play Store for Android devices) <https://www.melbournewater.com.au/frogcensus>

A beginners guide to frog identification <https://www.melbournewater.com.au/getinvolved/protecttheenvironment/Documents/Frog%20Guide_Online.pdf>

Know your river booklets <https://www.melbournewater.com.au/getinvolved/education/educationalresources/Pages/teacher-resources.aspx>

Whiteboard markers

Other frog field guides (Appendix—Resources)

For each student

One copy of the *Guide to frog calls of Melbourne* (Worksheet 1)

One copy of *Frog call bingo game card* (Worksheet 2)

Preparation

Print the bingo game and laminate game cards, if possible.

Activity steps

Finding frogs

1. Ask students what they know about frog calls. Explain that when you are listening for frogs in the field, it can be useful to have a guide for identifying frog calls. Hand out the *Guide to frog calls of Melbourne* (Worksheet 1).
2. Demonstrate how to match frog calls to frog images by listening to the calls on the Frog Census app. Open the app and select Frogs. Each frog has a recorded call. Play a selection of frog calls from the Frog Census app. Some easily identified calls are:

    Striped Marsh Frog (Bok… bok… bok…)

    Growling Grass Frog (Grruh-uh-uh-urk. Grruh-uh-uh-urk. Grruuuurk)

    Eastern Banjo Frog (Bonk…bonk…pobble-bonk)

Frog call bingo

3. Play frog calls from the Frog Census app one by one. Students number the frog on the *Frog call bingo game card* (Worksheet 2) when they think they have a match—in the order it is played. At the end of the game, the students who have the right frogs in the right order win.

Extension activity

Scientists often associate calls with other sounds (e.g. an Eastern Banjo Frog sounds like someone plucking the strings of a banjo). Students choose a call and find associated sounds to help remember them.

Students explore the type of habitat each frog lives in. Does it burrow/live in the grass/at the water's edge? Why?

Worksheet 1

Guide to frog calls of Melbourne[2]

Frogs can be very hard to find. They are usually highly camouflaged and blend into their environment. So it is most likely that you will hear a frog before you see one.

When you hear a frog, listen very carefully to the call. Are you sure it's a frog? What does the call sound like? See if you can imitate the call or think of something to compare it to. Use the table below to see if any of the call descriptions sound like the frog call you hear.

Call	When	Frog	Pg.

[2] The following information is taken from page six of *A beginners guide to frog identification* <https://www.melbournewater.com.au/getinvolved/protecttheenvironment/Documents/Frog%20Guide_Online.pdf>

Crick, crick, crik, crik, crick	All year	Common Froglet	9
To-to-to-to-tik-tik-tik—tik—tik	All year	Common Spadefoot Toad	10
Bonk…bonk…pobble-bonk	All year	Eastern Banjo Frog	11
Reee bip bip, ree bip bip bip	All year	Eastern Dwarf Tree Frog	12
Nyeeah…nyeeah…aank-nyeaah	All year	Eastern Sign-bearing frog	13
Grrruh-uh-uh-urk. Grrruh-uh- uh-urk. Grrruuuurk.	Aug – Apr	Growling Grass Frog	14
Nyuh-gruh-gruh-gruh	Aug – May	Leseur's Frog	15
Grah-a-a-a-ah-ah-ah-ah-aah- aah-aah-aaaah-aaaah	Sept – Jan	Peron's Tree Frog	16
Gr-ank…Gr-ank…Gr-ank	All year	Red-groined Froglet	17
Cree-cree-cree-cree-cree	All year	Southern Brown Tree Frog	18
Uhk…ahk…Uhk…ahk…	Autumn	Southern Toadlet	19
Click…Click…Click…Click…	All year	Spotted Marsh Frog	20
Bok…bok…bok…	All year	Striped March Frog	21
Grrraaawk pip pip pip pip pip	Sept – June	Victorian Smooth Froglet	22
Weep-weep-weep-weep-weep	All year	Whistling Tree Frog	23

Worksheet 2

Frog bingo card[3]

Eastern Common Froglet *Crick, crick, crik, crik, crick* 	Eastern Banjo Frog *Bonk… bonk… pobble-bonk* 
Lesueur's Frog *Nyuh-gruh-gruh-gruh-gruh-gruh* 	Growling Grass Frog *Grruh-uh-uh-urk. Grruh-uh-uh-urk. Grruuuurk* 
Spotted Marsh Frog *Click…click…click…click* 	Common Spadefoot Toad *To-to-to-to-tik-tik-tik—tick—tick* 
Southern Brown Tree Frog *Cree-cree-cree-cree-cree* 	Eastern Dwarf Tree Frog *Ree bip bip, ree bip bip bip* 

[3] *Frog images courtesy of Peter Robertson*

Striped Marsh Frog *Bok…bok…bok…* 	Victorian Smooth Froglet *Grrraaawk pip pip pip pip pip* 

Activity 2: Adaptations

How have frogs adapted to where they live? What helps a frog survive in a changing environment? Students will explore these and other questions during this activity.

Equipment

Online dictionary or search engine

Dictionaries

A beginners guide to frog identification <https://www.melbournewater.com.au/getinvolved/protecttheenvironment/Documents/Frog%20Guide_Online.pdf>

Other frog field guides (Appendix—Resources)

Computers or devices for student use, either individually or in pairs

For each group:

One copy of the TWHL chart (Figure 1)

Preparation

Create and copy a TWHL chart for students. Alternatively, students can draw their own charts on an A3 sheet of paper.

T What do we **t**hink we know?	W What do we **w**ant to learn?	H **H**ow do we find out?	L What did we **l**earn?

Figure 1 TWHL chart

Activity steps

What's an adaptation?

1. Introduce the topic of adaptations by asking students to consider their own adaptations:

   What helps you live your life? (*Your legs help you walk and run. Your brain thinks. Your lungs help you breath.*)

How do you adapt to cold weather? (*Wear warmer clothes, stay indoors*)

How do you adapt to warmer weather? (*Wear less clothes, wear hats, drink more water*)

How do other animals adapt to their environments?

2. Students look up the term *adaptation* in a dictionary (hard copy or online) or via a search engine such as Google. The *biological* meaning of the word is most relevant for this activity.

   e.g. *Biol. a.* Alteration in the structure or function of organisms which enables them to survive and multiply in a changed environment. [4] (Macquarie Dictionary Online)

Frog adaptations

3. In groups, students discuss the meaning of the word *adaptation*. Ask them to focus on what they know about frog adaptations: what frogs look like and how they behave.

   Working in groups, students fill in the first three columns of a TWHL chart about frog adaptations:

   What do we think we know about frogs' adaptations?

   What do we want to learn about frogs' adaptations?

   How do we find out about frogs' adaptations?

4. In groups, students choose a frog from *A beginners guide to frog identification* and research its adaptations. Students could also use the information from the Amphibian Research Centre's web site <http://frogs.org.au/frogs/state/Victoria/>.

   Students devise one or two focus questions each to guide their research into the adaptations of their chosen frog. Explain that these adaptations could be:

   - structural features (e.g. appearance, ears, skin, feet)
   - how their bodies work (e.g. how they take in water and oxygen)
   - how they behave.

   The group's questions should cover all three of these types of adaptation. For more information about frogs refer to Appendix—Teacher background.

5. Group members present the findings about their particular frog. They could:

   - read out the list of adaptations
   - role-play the list of adaptations
   - draw a picture of the frog with adaptations labelled.

6. Groups complete the 'What did we learn' column in their TWHL chart. As a class, discuss any surprising or unexpected adaptations. Were their preconceived ideas correct?

[4] *Macquarie Dictionary Online*, 2017, Macquarie Dictionary Publishers, an imprint of Pan Macmillan Australia Pty Ltd, <www.macquariedictionary.com.au>

Activity 3: Find your local frogs online

In this activity, students research the frogs that have been recorded in their local area. They use CSIRO's online biodiversity portal, *Atlas of Living Australia*, to access frog species data recorded nearby.

Equipment

Frog Census app (available from the App Store for Apple and Play Store for Android devices) <https://www.melbournewater.com.au/frogcensus>

Atlas of Living Australia <http://www.ala.org.au/>

Atlas of Living Australia user guides (include screenshots) <http://www.ala.org.au/education-resources/teachers-guides/>

Computer or digital device with a digital projector or interactive whiteboard for whole class discussions

Computers or devices for student use, either individually or in pairs with a spreadsheet app (e.g. Microsoft Excel) and a thinking tool app (e.g. Pyramind thinking tool[5])

For each student:

One copy of a large triangle copied onto an A4 sheet

Activity steps

1. Discuss the idea that habitat loss is a key threat to frog populations across greater Melbourne. Ask students to predict what types of development might cause habitat loss. Some examples are:
    - new housing estates
    - new shopping centres
    - suburbs spreading further out
    - land clearing for wood harvesting
    - land clearing for new parks and gardens
    - planting exotic species
    - wetlands filled in
    - polluted waterways
    - litter in waterways

    List ideas on the whiteboard.
2. Explain that we can use online data to find out how frog numbers have changed over time. Follow these instructions to find species recorded in your area.

[5] Department of Education and Training Victoria, 2007, Pyramind, <https://www.eduweb.vic.gov.au/edulibrary/public/teachlearn/student/pyramind.pdf> Accessed 12 March 2017.

Display the Atlas of Living Australia (ALA) homepage, and select 'Browse locations' under the 'Species by location' tab. Then select 'Browse by location' under the 'Explore by address or location' tab.

3. Under 'Explore your area', type your school name or another address or place name into the box. You can also change the size of the area by selecting the km radius in the 'Display records in a' drop down box.

   To see all frog records, click on 'Amphibians' in the left hand side column. The map displays the recorded sites with dots. The species names and number of records are listed in the shaded section.

4. Working individually or in pairs, students use computers or devices to find the Victorian conservation status of each frog—endangered, vulnerable or secure—by checking *A beginners guide to frog identification* <https://www.melbournewater.com.au/getinvolved/protecttheenvironment/Documents/Frog%20Guide_Online.pdf>

   More information about each frog species is available on the ALA by selecting the name of the frog (in the shaded section) then selecting 'species profile'. This shows a number of photos of the frog, the year it was first recorded and its conservation status—but not necessarily in Victoria. If you scroll down the page, there is more information about the biology and ecology of the frog.

5. Briefly discuss how Melbourne has changed in the last 200 years and how the changes in population growth have affected the distribution of frogs. Refer to the ideas listed on the whiteboard (Step 1).

   Explain that students can use the ALA records to look at a particular frog's distribution over time. Again, select the name of a frog in the shaded section then select 'list of records' for that species. Under the 'Records' tab, you can see the dates the frog was observed. The 'Map' tab shows a map of exactly where the frog was observed. If you select one of the red dots, then view record you will find more information about the frog and the observation. The 'Charts' tab shows the record of the species by decade.

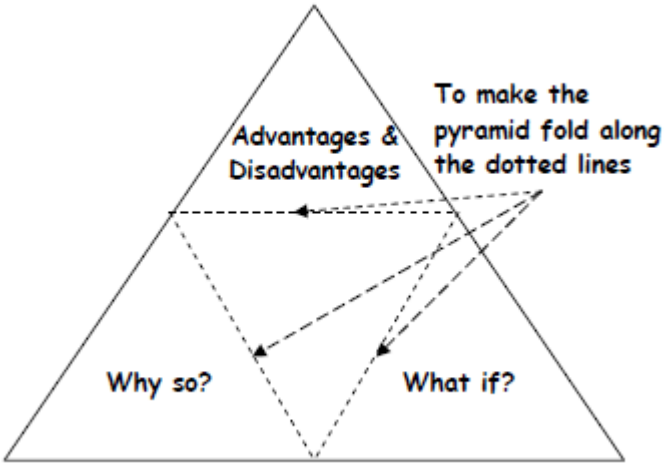
6. Ask students to look at the recorded observation over time. Has it changed? Declined or improved? Can you think of some reasons for this? Some reasons may be:

   - new housing development
   - new parkland with exotic species
   - rejuvenated wetland
   - clean up activity
   - recovery after fire
   - recent fire
   - more people sending in observations
   - greater use of technology to record species
   - more awareness of citizen science
   - more awareness of environmental programs

7. Ask students to research:

- Where are the frogs most concentrated?
- What is the habitat like?
- What does the site look like? (If the site is close, take a walk there. Alternatively, Display the site on *Google Street View*.)
- Why does that particular frog species live in this habitat?

8. The land around us constantly changes. New houses are built, areas are reclaimed for parkland, land is cleared by people or by fire, wetlands are filled in, exotic plants are planted. All of these factors can affect a species' decline or survival.
9. Using the pyramind thinking tool, students predict whether all changes are bad for frogs.



Display the above picture of the pyramind thinking tool on the whiteboard and ask students to cut around the large triangle then fold at the internal lines of the template triangle.

Use the headings above or similar headings.

Pyraminds can be cut out and taped together then strung to form a mobile to display in the classroom: students' ideas could be floating above their heads.

10. Students choose a site that a frog species has been recorded. What are the advantages and disadvantages of this site? For example:

Advantages

- The site was recently cleaned up during a working bee.
- The site has a permanent creek running through it.

Disadvantages

- The site has a lot of exotic plants.
- The site is close to a dog-off-leash park.

Students then list why these factors would be an advantage or disadvantage. For example:

- A clean up means less pollution and litter which makes the habitat much healthier.
- Permanent water means frogs can stay all year round.
- Exotic plants might not be the right habitat for this species of frog.
- Dogs may disturb the frogs.

11. Students predict what might happen to frogs if something changes on the land. See Step 6 for a list of ideas. For example:
    - if a fire went through, the frog population might decline
    - if more people recorded their observations, the recorded observations would increase for those species
    - if the site was replanted with endemic species, frog numbers might increase
    - if the creek became polluted, frog numbers might decline.
12. Make a class list of the physical conditions that affect the growth and survival of frogs across Victoria such as water, temperature, chemicals in the water, weather and climate.

Call to action

13. You can record frog calls using the Frog Census app or data sheet. Your recordings will be verified and included on the ALA database. This information will help to develop effective policy and management strategies to conserve and enhance these populations.

Note: You will notice a lot of the recordings on ALA are a few years old. The ALA has a number of verification levels and observations must be verified by a panel of experts. This takes time. Other online portals such as Bowerbird www.bowerbird.org.au ask people to record their sightings. The information is not as strictly verified but can still offer useful data. The Frog Census frog call recordings are verified by an expert before the observation is submitted to the Victorian Biodiversity Atlas and the ALA.

Extension activity

Use the ALA to explore frogs in other areas of Melbourne, your local council area, reserves etc. to compare the difference in data.

If you know the history of a local wetland, use a timeline template to correlate the historical changes at that site with changes to the frog population at the same time. Predict what might happen in the future. See the example below.

Year	1980	1990	2000	2010	2020	2030
Event at site						

Frog population data						

Activity 4: Whose wetland is it?

In this activity, students explore different points of view about a proposed residential development. It demonstrates that environmental decisions are complex but there are useful strategies that can assist in making effective decisions.

Equipment

For each student:

one *Whose wetland is it? role card* (Worksheet 3)

For each group:

one large sheet of paper for a PMI chart (A3 or butcher's paper)

Preparation

Print *Whose wetland is it? role cards* (Worksheet 3) on thick card and cut up to make role cards for each character. The cards could be laminated. Print enough cards so that each student has one.

Activity steps

1. Hand out one role card (Worksheet 3) to each student. Read the following scenario to the class:

   A new housing development is proposed for an area that has a seasonal wetland—frogs are often heard here. Five different people are interested in the area but they each have a different opinion. Can they come to a compromise? Why do people have different opinions? Is anyone right?

2. Ask one student in each role to read out their card—12 year old boy, real estate developer, park ranger, environmentalist, council officer. Brainstorm the issues as a class and list them on the whiteboard.
3. The students with the same card (role) form groups. In their groups, they discuss the positives, negatives and interesting aspects of their character's point of view using a PMI chart on a large sheet of paper.

The issue:		
Plus	Minus	Interesting

4. Each group shares their PMI chart with the class. Students in the other groups can make notes about the different points of view.
5. Ask each group to put together a solution. They should take into account the other points of view but ultimately form their own solution. Each group presents their solution to the rest of the class.
6. Groups perform a SWOT analysis on another group's solution.

Strengths (What are the advantages of this solution?)	**Weaknesses** (What are the disadvantages of this solution?)
Opportunities (What other chances will this solution give?)	**Threats** (What obstacles will you face with this solution?)

7. Return each SWOT analysis to the group it belongs to. Give students time to read the comments. Ask them to change their solution if they want to, based on the evaluations.
8. Ask students how useful this process was for finding a solution to the problem. Explain that in real-life, scenarios like this can create legal cases that need to be mediated or settled in court. Were they able to come to a compromise?

Extension activity

Students investigate real-life cases, such as:

The dusky gopher frog habitat case in New Orleans, USA <https://www.courthousenews.com/attorney-vows-frog-habitat-battle-headed-for-supreme-court/>

Other environmental law case studies in Australia <http://envlaw.com.au/category/case-studies/>

Worksheet 3

Whose wetland is it? role cards

12 year old boy

Mum and Dad are talking about moving into the new development. I like our house but they said the new house would be closer to my high school for next year. It would be a brand new house and we'd decide how it's designed. At the moment that land is bushland and paddocks.

Real estate developer

A great piece of land has just come up for sale. Close to schools and the train line. I could sell it in a flash. 50+ houses would fit on there. We could keep the wetland and turn it into a nice lake for families to walk around and enjoy. It backs onto a nature reserve which will improve its sale value.

Park ranger

I've heard the land next to our reserve is for sale. I wish we could take it over as part of our nature reserve but we wouldn't have the money. They will make millions out of that piece of land if it's sold for housing. I wonder if there's a way we can get the developer on side to see if the frog habitat can be saved. The seasonal wetland is home to hundreds of frogs and it would be a shame to see more of their habitat destroyed.

Environmentalist

This is an outrage! The land should be taken over by the nature reserve. We have so much housing spreading out further and further. There needs to be a limit set on development! Where will the frogs go? This is their home. Not to mention the birds and other animals that rely on the wetland as a water source. Housing developments bring dogs and cats and people. The wetland will be bulldozed and hundreds of animals will lose their homes.

Council officer

The area has recently been rezoned for low density housing. The land can be sold as housing but because of the nature reserve, the house lots would be bigger. The council environment department might also have restrictions on which trees can be removed and what can be done with the wetland. There might also be curfews on cats.

Activity 5: Designing for frogs—in classroom or at-home activity

Students design a frog-friendly habitat and build a model using plasticine or Lego.

Equipment

For each group

Enough plasticine or Lego to build a model of a frog-friendly habitat

One copy of *Creating a frog friendly habitat* <https://www.melbournewater.com.au/getinvolved/protecttheenvironment/Documents/Frog-friendly-habitat-guide.pdf>

Preparation

Print copies of *Creating a frog friendly habitat* or display pages 3 and 4 on the whiteboard.

Activity steps

1. Explain that there are 35 frog species in Victoria and 16 of these live in Melbourne. All around the world frog numbers are declining, partly due to habitat loss, pollution and chytrid fungal disease. Frogs help control insect populations and they also provide an essential food source for many predators. They can act as an indicator of waterway health as they are often sensitive to changes in their habitat.
2. Ask students 'what can we do?' Students could suggest ideas such as protect habitat, record frogs we hear, pick up litter etc.
3. Introduce the idea of creating a frog-friendly habitat. It helps provide vital habitats for these amazing creatures when their natural habitat is in decline.
4. Using *Creating a frog friendly habitat* booklet as a guide, ask students (in groups) to develop a design for a frog-friendly habitat that could be built at school, at home or in a public park. The habitat design should incorporate all the tips suggested in the booklet. The design can be sketched by hand first then made out of plasticine or Lego. Students could do additional research using websites such as <http://www.sgaonline.org.au/frog-ponds/ >
5. Students display their models to the class, explaining the reasons behind their design.
6. Students evaluate each other using a set of criteria such as:
    - location and size of habitat in relation to the area (e.g. *it shouldn't take up the whole school yard*)
    - position (*will it receive enough sunlight in the morning and shade in the afternoon*?)
    - Are there enough plants, stones and branches?
    - Are there deep and shallow areas?
    - Will the habitat have natural, clean water supply (e.g. *rainwater*)?
    - Based on their evaluation, ask students if there is anything they would change in their design.

Extension activity

Photograph the construction of the design and turn it into a claymation video. Websites such as the *Stop motion classroom* provide advice about how to start (<http://stopmotionclassroom.weebly.com/engage.html>).

Build a real frog habitat at school or in your backyard!

Activity 6: Conducting a frog census in our local area—excursion or at-home activity

Giving students the opportunity to explore their local environment provides benefits on many levels. There is an increasing volume of literature which suggests that interaction with the natural environment—even impacted urban environments—leads to improved well-being and both cognitive and behavioural function and development[6].

In this activity, teachers and students have the opportunity to be citizen scientists: collecting meaningful and useful data for the Frog Census, an initiative managed by Melbourne Water.

Conducting a Frog Census excursion to a local frog habitat site is a great way to interact with your local environment. Students gain an appreciation of the ecology of frogs' habitat and experience the impacts of humans on urban wetlands. While the frogs themselves may be difficult to find, in breeding season they are easily heard.

Information about how and when to conduct a frog survey, organise a school monitoring program, prevent the spread of frog disease and staying safe are included in the *Frog Census Handbook for Schools* available from: <https://www.melbournewater.com.au/getinvolved/protecttheenvironment/Pages/Frog-Census.aspx>

Equipment

Know your river booklets <https://www.melbournewater.com.au/getinvolved/education/educationalresources/Pages/teacher-resources.aspx>

A beginners guide to frog identification <https://www.melbournewater.com.au/getinvolved/protecttheenvironment/Documents/Frog%20Guide_Online.pdf>

Frog Census app (available from the App Store for Apple and Play Store for Android devices) <https://www.melbournewater.com.au/frogcensus>

The Frog Census app, developed by Melbourne Water, makes frog monitoring easy and provides a great opportunity for Melbourne students to contribute to this important citizen science project.

Alternatively, you can download resources from the Melbourne Water Frog Census web page above. Students can record frog calls and send the Frog Census datasheet and sound files to Melbourne Water as per the instructions on the web page.

Preparation

Print out A4 pictures of frogs that could be found in your area.

[6] This paper is just one of many available online:
De Young, R. et.al. 2017. Some psychological benefits of urban nature: Mental vitality from time spent in nearby nature. In A. M. Columbus (Ed.) Advances in Psychology Research 116. Chapter 4 (Pp. 93-120) Hauppauge, N.Y.: Nova Science Publishers. Available from <https://deepblue.lib.umich.edu/handle/2027.42/136087 >

Laminate or display the frog pictures in a clear plastic pocket folder. Alternatively, take along an iPad with the Frog Census app on it.

Activity steps

The frog census

1. Once you are onsite, outline safety guidelines (see *Frog Census Handbook for Schools* <https://www.melbournewater.com.au/getinvolved/protecttheenvironment/Pages/Frog-Census.aspx>).
2. Discuss with students that you're in frogs' habitat. What can you see that would benefit a frog's survival? What can you see that might have a negative impact on frogs' survival? How might the environment be improved to aid frogs' survival?
3. Show printed or iPad pictures of frogs from the Frog Census app. Give students a brief description of the frog and some of its adaptations. Play its call so they know what to listen for.
4. Conduct the frog census. Using the Frog Census app or another recording device, students record frog calls and identify the frogs.
5. To conclude, discuss with students what you heard and where you heard it. Ask students how the frogs' adaptations assist in their survival e.g. does its camouflage work? Is it calling from the water's edge? Explain that the information now goes to Melbourne Water to be included in the Frog Census data. This data is added to the Atlas of Living Australia and the Victorian Biodiversity Atlas and is used to manage the health of Melbourne's rivers and creeks.

Appendix

Teacher background

Key messages

The key messages for students are:

- frogs have distinct calls that can be recorded for a range of purposes using the Frog Census app
- frogs are extremely important to our ecology
- frogs have a range of adaptations
- frogs' survival depends on how we manage the environment
- information about frogs' location over time is available online. We can contribute to that information.
- we can create a habitat to attract and protect frogs.

Frog Census

The Frog Census is a way for anyone to contribute to monitoring which frogs are living where in Melbourne. For more information, go to: <http://www.melbournewater.com.au/getinvolved/protecttheenvironment/Pages/Frog-Census.aspx>

Frog facts

Reproduction

Frogs call during their reproductive season. The calling frogs are males who are trying to attract females and warn other males to keep their distance.

Frogs can lay as many as 4000 eggs in frogspawn.

Species

There are more than 4000 types of amphibians in the world, but Europe has very few—only 45 species.

Australia has 216 species of frogs and over 30 species are found in Victoria.

Body features

The eyes and nose of a frog are on top of its head so it can breathe and see when most of its body is under the water. Frogs can breathe through their skin as well as with their lungs.

Frogs have long back legs and many species have webbed feet for jumping and swimming.

Certain frogs can jump up to 20 times their own body length in a single leap.

Frogs have excellent vision and hearing. They don't have external fleshy ears like we do, but a large eardrum just behind the eye. As well as using their eyes to see, frogs use their big, bulgy eyes as part of the feeding process. A frog's tongue is used for catching prey rather than eating, so when a frog catches something they close their eyes tight and push the food down their throat with their eyeballs.

Diet

Frogs absorb water through their skin so they don't need to drink.

All frogs found in the Melbourne area are carnivores. Different species of frogs prey on different types of animals, but in general they will eat anything living that fits in their mouth. Smaller species live on small insects like flies and other invertebrates, while larger species eat large insects, small lizards and other frogs.

Threats

Frog species are in decline globally. Four species have become extinct in Australia. Threats include:

- invasive plants and animals
- land clearing
- pollution
- diseases, such as the deadly Chytrid fungus (an infectious disease contaminating frogs worldwide). This disease also affects many vulnerable species.
- Climate change

Habitats

Frogs are typically found in and around aquatic environments such as wetlands, lakes, dams, creeks, streams, rivers and occasionally even backyard swimming pools. They are move likely to be found in areas with different types of native plants, particularly those that grow into the water like reeds, grasses and sedges. They are also often found in bodies of water with shallow sections which the frogs use to call from and lay their eggs.

Adaptations

Some adaptations of frogs:

- nocturnal behaviour so as not to attract predators
- soft skin that must stay moist, making them susceptible to foreign substances in waterways
- produce toxic secretions to deter predators
- highly camouflaged to blend into their environment
- bright colours to warn of toxins
- require damp conditions or water to breed
- lay eggs in water which hatch into gilled tadpoles
- tadpoles use gills to breathe oxygen in water
- gills develop into lungs
- tadpoles develop legs
- frogs breathe air
- frogs live in areas that shelter them.

Calls

Frogs have a wide range of calls—some of which sound like 'typical' frog calls and other which are often confused with insect or bird calls.

Only male frogs call. They call to find a mate and to warn away other competing males. Frogs make calls by passing air through the voice box and using their puffed out throat pouches to amplify the sound. The calls of closely related species are sometimes similar.

Useful links

Melbourne's water story—Melbourne Water

This video explains the history of water supply in Melbourne and the vision that Melbourne Water has for a sustainable future <http://waterstory.melbournewater.com.au/>

Frog Census—Melbourne Water

This link describes how the Frog Census app is used to help monitor frog species in the Melbourne region and manage the health of Melbourne's waterways <www.melbournewater.com.au/frogcensus>

Frogs of Australia—The Amphibian Research Centre

This web site contains a wealth of information about frogs <http://frogs.org.au>.

Atlas of Living Australia—CSIRO

The Atlas of Living Australia is the national biodiversity database and provides free online access for teachers and students. It is used for environmental monitoring, planning and management <http://www.ala.org.au/>

Resources

Taylor, MJ & Knight, F 2009, *Field Guide to the Frogs of Australia*, CSIRO Publishing.

Robinson, M 1998, *A field guide to the frogs of Australia: from Port Augusta to Fraser Island including Tasmania*. Reed Books.

Anstis, M 2002, *Tadpoles of South-Eastern Australia: a guide with keys*, Reed New Holland.