

# Module 4: 7-8

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Exploring our frogs



Melbourne Water Frog Census

 **Melbourne  
Water**  
Enhancing Life and Liveability



## Module 4: 7-8

Exploring our frogs

### Exploring our frogs (Years 7–8)

*Lesson plan*

#### Introduction

Investigating the frogs of your local area provides a great context for developing student understanding about biological classification, ecosystem processes and the impact that humans have on the natural environment. It is also a great way to encourage students to explore, develop their observational skills and to enjoy the natural world around them.

These activities use digital applications such as Melbourne Water's Frog Census and the Atlas of Living Australia (ALA) 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 improve our understanding of 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: Finding our frogs

Students explore local frogs using the Atlas of Living Australia and learn about how frogs are named and classified by biologists.

#### Activity 2: Identifying our frogs—excursion or at-home activity

Students learn how records are added to the Atlas of Living Australia and how they can be citizen scientists using the Frog Census app by submitting frog calls and photos to Melbourne Water for identification.

#### Activity 3: Frogs and food webs

Students create a food web based on the feeding relationships of organisms in the Edithvale Wetlands and evaluate the impact that changes to the food web might have on the survival of the frogs.

#### Victorian Curriculum F–10<sup>1</sup> links:

##### Science

##### Levels 7 and 8

##### Science Understanding

##### Science as a Human Endeavour

Science and technology contribute to finding solutions to a range of contemporary issues; these solutions may impact on other areas of society and involve ethical considerations (VCSSU090)

##### Biological sciences

There are differences within and between groups of organisms; classification helps organise this diversity (VCSSU091)

Interactions between organisms can be described in terms of food chains and food webs and can be affected by human activity (VCSSU093)

##### Digital technologies

##### Data and information

Analyse and visualise data using a range of software to create information, and use structured data to model objects or events (VCDDTI038)



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





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### Activity 4: Visualising local frog data

Students investigate how the Atlas of Living Australia (ALA) stores and visualises biodiversity data. They devise a fictional dataset of frog species in a mythical Melbourne suburb, design a data table in Microsoft Excel and visualise the data using Google My Maps.



Melbourne Water Frog Census





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### Exploring our frogs

#### Activity 1: Finding our frogs

In this activity, students explore the Atlas of Living Australia (ALA) to identify frogs in the local area. They learn how frogs are named and classified using a taxonomic hierarchy. Students pose questions about the distribution of local frog species and answer their questions geospatially using data in the ALA.

#### Equipment

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

Whiteboard

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

#### Activity steps

##### What frogs are found in our local area?

1. Ask students to describe their experiences with frogs in your local area. Record key information on a whiteboard. This information could include:
  - where the frogs were found
  - what the frogs looked like
  - what frog calls students have heard
  - what time of the day the frogs were calling
  - what kinds of frogs they found.
2. Explain that in these lessons, students will investigate the frogs found in the local area, how biologists identify and group living organisms and how they record their observations so that other biologists can use the data.
3. Explain that the Atlas of Living Australia<sup>2</sup> (ALA) is an online suite of tools that can be used to map and manage Australia's biodiversity. Display the home page <<https://www.ala.org.au/>>.
4. To find the species that have been logged around your school, follow the ALA Teacher Guide 1 (Finding the species recorded in your area) at <<http://www.ala.org.au/wp-content/uploads/2015/03/G1-SpeciesByLocation.pdf>>. Enter your school address in the Search box and set the 'Display records' box for 5 km radius.
5. Discuss the number and types of species found in your area. For instance:
  - Which results are interesting or surprising? Why?
  - What groups of organisms are more common? Why?
  - Which groups are less common? Why?
6. Focussing on frogs, ask students how they can find the data about the frogs found around the school. You might need to explain that a frog is an amphibian and what an amphibian is.

<sup>2</sup> This activity is adapted from the Years 7 and 8 Exercise on the Atlas of Living Australia website at <http://www.ala.org.au/education-resources/classroom-exercises/exercises-years-7-and-8/>





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7. Ask students to pose some questions about the types and distribution of frogs around the school they could investigate using this atlas. List the questions on the whiteboard. Questions could include:
  - How many frogs are found within a one kilometre radius?
  - How many frogs are found within a ten kilometre radius?
  - Where have frogs been found near the school? What frogs are they?
  - Are there some areas where more frogs have been found?
  - Have any rare or endangered frogs been found in the area?
8. Students work in pairs to answer the questions by exploring the Atlas of Living Australia on computers or devices. Encourage them to think of new questions to explore. Each pair records the results of their research and shares them with the class.

#### How do we name frogs?

9. Display the 'Explore your area' screen to the class. Select a frog found close to the school. Display the screen to the class and select a frog in the 'Species: Common Name' column and then select the 'species profile'.
  - How many names does the frog have?
  - Why does the frog have a common name and a scientific name?
10. Explain that the scientific name is totally unique to that frog and that biologists all over the world would recognise that frog. In contrast, sometimes a frog might have different common names depending on the area where it is found. For instance, the growling grass frog (*Litoria raniformis*) is known by different common names in different states. In New South Wales, it is called the southern grass frog while in Tasmania it is called the green and gold frog.
11. Biologists use the scientific names to avoid this confusion. Explain that sometimes scientific names can change as ideas about the grouping of species change.

A scientific name has at least two words: the first word is the genus name and the second word is the species name. The genus name describes the group that the frog belongs to and the species name is the unique name for that particular frog. Point out that the scientific name is always shown in italics. The genus name has a capital while the species name is all lower case.
12. Display the species profile of a local frog to the class. Select the classification tab and briefly introduce the hierarchical system used to group the frog highlighting the kingdom, phylum, class, order, family, genus and species.
13. Students create a mnemonic to remember the order e.g. King Phillip Came Over For Good Soup. Note that in the Three Domains system of classification, the classification starts with the Domain which for animals like frogs would be 'Eukarya'.
14. To conclude this activity, ask the students to select a frog that is found in the local area from the list of amphibians in the ALA. Record the following information about that frog from its species profile:

Common name:

Genus:





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Species:

Family:

Order:

Class:

Phylum:

Kingdom:

Note that there are many activities you can use to introduce grouping and classifying to students. Some ideas are suggested in the introduction of the ALA's Exercises: Years 7 and 8<sup>2</sup>.

### Useful links

#### **Classifying macroinvertebrates (Years 7 and 8)—Melbourne Water**

This lesson plan includes two activities in which students identify and classify macroinvertebrates (waterbugs). In *Activity 2 Classifying macroinvertebrates* learn how to use a dichotomous key and devise their own dichotomous key for waterbugs. This can be found on the Melbourne Water Story website at <http://waterstory.melbournewater.com.au/educate/year-7-8>





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#### Activity 2: Identifying our frogs—excursion or at-home activity

Recording frog calls in their local area is an easy way to introduce students to their local environment and the importance of healthy waterways to the biodiversity of the area. There is a limited number of species to find and each species has a distinctive call. Even if students can't see the frog, they can still identify the species.

In this activity, students and their families have the opportunity to be citizen scientists: collecting meaningful and useful data for the Frog Census, an initiative managed by Melbourne Water. Using the Frog Census app or another recording device, students record frog calls and identify the frogs.

You could conduct this activity as a class excursion to a local frog habitat site. Ensure you follow all school excursion and health and safety guidelines. Students could also monitor frogs with their parents/carers as an at-home activity. Provide the relevant Frog Census information links (listed in Equipment) to interested parents/carers.

Information about how and when to conduct a frog survey, organise a school monitoring program, prevent the spread of frog disease and stay safe are included in the *Frog Census Handbook for Schools* (see link below).

The Frog Census app makes frog monitoring easy and provides a great opportunity for Melbourne students to contribute to an important citizen science project. The app can be downloaded from the web site above and can be used on both Apple and Android devices.

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

The following lesson steps use the Frog Census app.

#### Equipment

Frog Census app

<<https://www.melbournewater.com.au/getinvolved/protecttheenvironment/Pages/Frog-Census.aspx>>.

Portable device e.g. tablet

*Frog Census Handbook for Schools* and *A beginners guide to frog identification*

<<https://www.melbournewater.com.au/getinvolved/protecttheenvironment/Pages/Frog-Census.aspx>>

#### Activity steps

##### Before the excursion

##### How do we identify frogs in our area?

1. Review the ideas about the Atlas of Living Australia (ALA) discussed in Activity 1. Display the 'Explore Your Area' page of the ALA for your school location and select 'Amphibians'. Discuss the number of records in the right hand column. Ask students how they think these records were collected and discuss.
2. Select a local frog species and click on 'list of records'. Discuss where the record came from and when it was collected. Select 'View record' to gather more information about the record.





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3. Explain that some of the records were provided by biologists while other records were provided by members of the community who submitted the information as part of a citizen science program. Citizen science is simply members of the community collecting or analysing information for scientific purposes. Anyone, including students, can help science and the environment.
4. Use the ALA to predict the frog species that you might find during the frog census and make a class list.

#### How do we use the Frog Census app?

5. Students open the Frog Census App. Discuss the home screen. Explain that students can record a frog call or take a photo of a frog and follow the prompts to submit the record to Melbourne Water. An ecologist will then identify the species of frog.
6. Students explore the other tabs at the bottom of the screen in the app. For instance, they could:
  - locate one or two local species identified in the ALA by selecting the 'Frogs' (Browse frog) tab
  - explore the 'Map' tab
  - find out 'How to use this app' in 'Settings'.
7. Students are now ready to monitor frogs in your local area. They can identify their frogs using the 'Frog' tab or use *A beginners guide to frog identification* on the Frog Census web page (link above). This identification guide also provides useful information about how to find frogs and their biology.
8. Work through the information in the *Frog Census Handbook for Schools* about Field hygiene and Safety guidelines so that students understand the importance of these recommendations.
9. Organise parents and carers as helpers for this excursion and ensure that they have the relevant background information.
10. Conduct the excursion.

#### After the excursion

15. Debrief by asking students for their impressions and experiences. Review the species of frogs found. Compare your results with the list of species you expected to find. Ask student how they thought that the weather conditions and habitat condition might have affected the results.







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### Activity 3: Frogs and food webs

Students investigate the organisms and their feeding relationships at the Edithvale Wetlands and create a food web based on the story of the eastern common froglet. They predict the effect that changes in the environment would have on their food web.

#### Equipment

Interactive whiteboard or digital projector with computer or device

For each group:

A4 sheets of paper for labels

Pens

Pencils

Eraser

Glue

Scissors

One A3 sheet of paper

One copy of the *My life as a frog in the Edithvale Wetlands* (Worksheet 1). Note that you could shorten or simplify the text based on the needs of your students.

Optional: one copy of the *Food web symbols* (Worksheet 2)

#### Activity steps

1. Display the video *Animals of the wetland* [2:38] about the Edithvale-Seafood Wetlands <<https://www.youtube.com/watch?v=4nJqIBeux6Y>>. Ask the students to explain why these wetlands are important habitat. Replay the video so that students can pick up the key points.
2. Ask students to explain what a food web is. Discuss the idea that it is a useful graphical diagram representing the feeding relationships in an ecosystem. It can be used to map what is known about the plants and animals and to make predictions about the possible effects of changes in the populations of different organisms in the food web.
3. Students work in groups to make a food web based on the story *My life as a frog in the Edithvale Wetlands* (Worksheet 1) using the terms in **bold type**. You may need to model how to start the food web for the class. Write the names of individual organisms on pieces of paper or cards e.g. *frog*, *pond algae*, *insect*, *bird*, *snake*. Place the 'frog' label in the middle of the whiteboard and ask students to suggest a food chain that would include 'frog'. For instance,  

pond algae → insect → frog → bird → fox
4. Explain that the arrows point to the 'eater'. They can think about the arrows pointing into the mouth of animal that is doing the eating.
5. Discuss some of the issues that might arise with the food web. For instance, frogs eat different foods in two phases of their life cycle (tadpole, frog) or predators may





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only eat tadpoles and not adult frogs. It is easier to have separate labels for tadpole and frog.

6. Students divide into groups and make the individual labels for the components of the food web described in the story. Each group decides how they will place the labels on a blank A3 sheet of paper to most clearly display their food web. Once the labels are in their final positions, glue them to the paper and add the arrows in pencil.

Alternatively, students can use the images in *Food web symbols* (Worksheet 2). You can source your own symbols from the free Integration and Application Network (IAN) Image library at <http://ian.umces.edu/imagelibrary/>. See Useful resources below for more information. Of course, students may choose to draw their own images.

7. Ask some of the groups to explain their food web to the class. The class evaluates the food webs presented: identifying the positive, negative and interesting elements of the food webs.
8. The groups review and evaluate their food webs and make changes as discussed. Ask students to suggest how changes in the Edithvale Wetlands environment might affect the food web and the ecosystem. It might be useful to replay the *Animals of the wetland* video for additional ideas.
9. Groups share their ideas with the class and discuss the impacts and issues. Ask the students to consider what management strategies they would use to address the ecological impacts and issues in the Edithvale Wetlands.

#### Extension activities

Students could create a food web about the endangered growling grass frog using the resources in the Years 9–10 Lesson plan Activity 3.

Students research a frog in their local area using the Australian Living Atlas and other online resources from websites like the Victorian Museum. They could create a food web for a local ecosystem or write their own story featuring a local frog.

Students create a digital food web using the images from the IAN image library.

#### Useful resources

##### Using the IAN Image library

*Explaining our catchment* lesson plan—Queensland Government (2013)

This Year 7 resource explains how students use symbols from the IAN image library to create a conceptual diagram of their catchment that represents the ecological processes at work. Conceptual diagrams are science communication tools that aim to communicate complex ideas about systems and processes in a simple, visual way.

It is published under a Creative Commons By Licence and can be accessed from <https://publications.qld.gov.au/storage/f/2014-12-12T01%3A22%3A06.516Z/water-life-year7-geography-explaining-catchment.pdf>> You can find additional information and examples of conceptual diagrams at <https://wetlandinfo.ehp.qld.gov.au/wetlands/resources/pictorial-conceptual-models.html>>





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### Worksheet 1

#### My life as a frog in the Edithvale Wetlands<sup>3</sup>

It's often stated that it's not easy being green. As a **frog** in the Edithvale Wetlands, I know this to be very true. Well, I am more brown than green but the same principle applies.

I am an eastern common froglet and very useful to have around to control bugs. I eat small **insects** while my **tadpoles** eat the **algae** in the water. I am quite adaptable and can cope when the wetlands periodically dry out, but I really have to be sneaky to avoid my predators.



There are lots of animals that find me very tasty. For a start, the Australasian **bitterns** would eat me if they could catch me. Mind you, it is an endangered species so I am happy to co-exist with them in the wetlands. Bitterns are shy wading waterbirds which forage for food at night in shallow water and feed on frogs, insects and occasionally on **water plants**.

Other native reptiles also eat me. The lowland copperhead **snake** mostly feeds on frogs and **lizards** but will also eat small **birds** and mammals such as native **rakali** (water-rat). It is carnivorous which means it only feeds on animals. Interestingly, tiny **ticks** live on the snakes, sucking their blood.

The eastern snake-necked **turtle** is another Edithvale reptile local. It eats tadpoles, insects and small **fish**. In its turn, the turtles can be eaten by water rats and lizards.

Rakali live in burrows in the banks of the wetlands and feed on many things including **fish**, **crayfish**, insects and frogs. Crayfish eat almost anything; they mostly scavenge on the bottom of ponds and creeks for dead plant and animal material (detritus) but they also eat water plants and meat if they can find it.

Local pet **cats** hunt in the wetlands if their owners let them out at night and there are lots of feral cats that would happily have me for dinner. The cats also eat or kill rakali and pretty much any animal they can catch.

Introduced **rats** are also a problem for me. There are two kinds: the brown rat and the black rat. They are both omnivorous which means they eat both plants and animals.

But I am most worried about the **foxes**. These introduced predators are crafty hunters and I need to hide in the long grass to avoid them. Foxes are common around Melbourne but not often seen. They eat small mammals, birds, fruits, insects and frogs.

In the water, my tadpoles can be eaten by mosquitofish. These are small fish introduced from the USA and they have invaded the creeks and wetlands in huge numbers.

So you can appreciate that I keep myself very busy avoiding my predators...

<sup>3</sup> Adapted from the Edithvale-Seafood Wetlands Ramsar Site Management Plan prepared for Melbourne Water in 2016. Accessed from <https://www.melbournewater.com.au/whatwedo/protectrivers/improving-river-health/Documents/Edithvale-Seafood-Management-Plan.pdf> on 7 February 2017













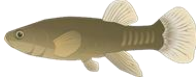










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## Worksheet 2

### Food web symbols

 <p>frog</p>	 <p>bittern</p> <p><small>By John Gould - nzbirds.com Public Domain, &lt;<a href="https://commons.wikimedia.org/w/index.php?curid=1718980">https://commons.wikimedia.org/w/index.php?curid=1718980</a>&gt;</small></p>	 <p>tadpole</p>	 <p>fly</p>
 <p>feral cat</p>	 <p>lizard</p>	 <p>bird</p>	 <p>fox</p>
 <p>rat</p>	 <p>snake</p>	 <p>fish</p>	 <p>snake mite</p> <p><small>By Dave Barker, Tracy Barker – &lt;<a href="http://files.gadukin.net/teropordna/parazite/05.jpg">http://files.gadukin.net/teropordna/parazite/05.jpg</a>&gt;, CC BY-SA 3.0, &lt;<a href="https://commons.wikimedia.org/w/index.php?curid=8709826">https://commons.wikimedia.org/w/index.php?curid=8709826</a>&gt;</small></p>
 <p>rakali (water rat)</p> <p><small>By ZooPro - Own work, CC BY-SA 3.0, &lt;<a href="https://commons.wikimedia.org/w/index.php?curid=15816488">https://commons.wikimedia.org/w/index.php?curid=15816488</a>&gt;</small></p>	 <p>crayfish</p>	 <p>turtle</p>	 <p>snail</p>
 <p>detritus (dead plant and animal matter)</p>	 <p>water plant</p>	 <p>Algae</p>	





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The images without attribution were sourced from the Integration and Application Network, University of Maryland Center for Environmental Science (<[ian.umces.edu/imagelibrary/](http://ian.umces.edu/imagelibrary/)>). Tracey Saxby drew all the images except the red fox, snake, lizard and bird which were authored by Kim Kraeer and Lucy Van Essen-Fishman and the dead matte of seagrass (detritus) was drawn by Diana Kleine.





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### Activity 4: Visualising local frog data

Students investigate how the Atlas of Living Australia (ALA) stores and visualises biodiversity data. They devise a fictional dataset of frog species in a mythical Melbourne suburb, design a data table in Microsoft Excel and visualise the data using Google My Maps.

Visualising data using spatial technologies is a key inquiry skill for ecologists and natural resource managers. This activity provides students with a simple introduction to spatial technologies.

#### Equipment

Interactive whiteboard or digital projector with computer or device

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

For each student or pair of students:

One copy of the relevant pages of *Visualise your data on a custom map using Google My Maps* tutorial from  
<[https://www.google.com/intl/en/earth/outreach/tutorials/mapseng\\_lite.html](https://www.google.com/intl/en/earth/outreach/tutorials/mapseng_lite.html)>

#### Preparation

Source image/s of a local waterway in healthy condition.

Download a dataset from the ALA to display to students. Search for your school location in the 'Explore Your Area' page and display the records for a 5 km radius. Select the 'Amphibians'. Click the 'Downloads' button and complete the Download dialogue box with your email address. The Download type is 'education'. Then 'Start Download'. The zipped file will save to your Downloads folder. Extract the files. Open the 'data.csv' file in Microsoft Excel. Scan the column headings and note those heading that will be suitable for class discussion as below.

You and your students will need a Google account to create a custom Google map.

If you are unfamiliar with Google My Maps, you can complete the *Visualise your data on a custom map using Google My Maps* tutorial at  
<[https://www.google.com/intl/en/earth/outreach/tutorials/mapseng\\_lite.html](https://www.google.com/intl/en/earth/outreach/tutorials/mapseng_lite.html)>

There are also a number of YouTube videos that show how you make a custom map, for example <<https://www.youtube.com/watch?v=AFnMjYUe7sM>>

#### Activity steps

##### What is biodiversity data?

1. Ask students to define the term 'biodiversity' and devise a class definition e.g. the variety of all organisms found in a habitat. Emphasise that the biodiversity of a habitat also includes microorganisms.
2. Display an image of a local waterway and ask students to suggest questions that biologists might ask about the biodiversity of that habitat.

For example:

What plants and animals (including microorganisms) are found there?

What times of the year might they be found?





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Does the population of a particular organism change over time? If so, why?

3. Explain that biologists devise research questions and design scientific investigations to answer many different research questions. In their research they gather lots of biodiversity data from which they draw conclusions and make recommendations for the sustainable management of natural environments.

In addition, many community members collect biodiversity data in their local area. For instance, the Frog Census—managed by Melbourne Water—gathers recordings of frog calls at locations across the Greater Melbourne area. Frog species are identified from their call. For more information go to

<<https://www.melbournewater.com.au/getinvolved/protecttheenvironment/Pages/Frog-Census.aspx>>.

#### Where does biodiversity data go?

4. Discuss the idea that biodiversity data is critically important for answering research questions and for making evidence-based decisions about how habitats should be managed and species conserved for the future. Biologists share their data by uploading it to online information systems such as the Victorian Biodiversity Atlas (VBA).

The VBA is an online system that collects information from Victorian habitats. It can be accessed from <<http://www.depi.vic.gov.au/environment-and-wildlife/biodiversity/victorian-biodiversity-atlas>>. The VBA dataset is linked to national Atlas of Living Australia (ALA) which includes data from institutions such as governments and universities, individuals and community groups. The ALA can be found at <<http://www.ala.org.au/>>.

#### How can you find local biodiversity data in the Atlas of Living Australia?

5. Demonstrate how to use the ALA by displaying the home page on an interactive whiteboard or screen. Select 'Browse by location' and enter the address of your school in the search box. Note the different types of organisms listed on the left hand column of the results. (Sometimes the results can be a bit slow to load.)
6. Explain that you are going to focus on amphibians (frogs). On the 'Explore Your Area' page, double click 'Amphibians' under the 'Group' heading and discuss these results e.g. which species are common, which species are rare, where are the frogs found—in wetlands? Along creek lines? Or in the middle of a paddock?
7. Show the students how to change the 'Display records' option (1, 5 or 10 kilometre radius): select '5 km radius'. What happens if you double click on an individual species?
8. Students open the ALA home page and add an address or a suburb of their choosing. Ask them to find out how many frog species have been found in that area and the types of locations that the frogs were found in. Share their findings with the class.

#### How does the Atlas of Living Australia work?

9. Display the ALA 5 kilometre radius map around the school as an example. Ask the students what each dot on the map means.

Zoom in to the map to separate the dots and select a dot. View the record/s for that dot. What types of data are associated with that dot? Select 'View record' to find out.





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10. Start a class list of some of the data categories used in the ALA on the whiteboard i.e. date, who submitted the data, the species of frog, the location that the frog was found.
11. Display a data.csv file (see Preparation) for a location in Excel. Discuss some of the column headings and what they mean. Ask students to suggest additional data categories to add to the list on the whiteboard.

Ask students to evaluate the data in the csv file. What are the advantages and limitations of the data? How old is the data?

Students should appreciate that the data can be incomplete—it depends on people to gather and upload the data; some of the data may not be accurate; some sites have been well-studied by ecologists and students while other sites have not been well-surveyed; many sites aren't surveyed consistently from year to year. This is a good opportunity to reinforce the importance of contributing to well-designed citizen science projects such as the Frog Census.

#### Creating a fictional Frog Census dataset

12. Explain that students will work in pairs to create a fictional Frog Census dataset for a suburb in the Greater Melbourne area. They will design a table for their biodiversity data using Excel and then upload the fictional data to Google My Maps to create their own biodiversity map.
13. Discuss the class list of data categories previously recorded on the whiteboard. The class could come to a consensus about the data categories they will use or each pair of students can design their own data table. As a minimum, the table should include:
  - Species name (this could be the scientific name or common name)
  - Date (of recording)
  - Time (of recording)
  - Latitude (in decimal degrees)
  - Longitude (in decimal degrees)
  - Observer (name)
14. Students create an Excel spreadsheet with the agreed column headings. They add data to the table for at least five frog species (Figure 1).
15. Demonstrate how to locate and name a fictional suburb and select a list of frog species that could be found in that area. The list could be based on an actual list of frogs from a Melbourne suburb in the ALA.

To find a geographical location of each frog species, open Google Maps for the Melbourne suburb you are using: a wetland would be more authentic. Double click on the selected spot and record the geographical coordinates for that point in decimal degrees e.g. -37.813608, 145.23883 (latitude, longitude). Note: Finding the coordinates of a place in Google Maps is not currently available on iPhone and iPad devices so this will need to be done on a computer or Android device.

Complete one or two entries as an example and save the file as a CSV (comma delimited) file.







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Common name	Date	Time	Latitude	Longitude	Observer
Eastern froglet	18/10/2016	7.30 pm	-37.777	145.2236	Joe Blow
Spotted marsh frog	19/10/2016	7.45 pm	-37.7945	145.2635	Sue Jones
Brown tree frog					
Eastern banjo frog					
Cane toad					

Figure 1 Example of a Frog Census data table

16. Students complete their data tables and save them as CSV files.

#### Visualising frog data using Google My Maps

17. Demonstrate how to import the data using the instructions in the 'Import your data' section of the *Visualise your data on a custom map using Google My Maps* tutorial from <[https://www.google.com/intl/en/earth/outreach/tutorials/mapseng\\_lite.html](https://www.google.com/intl/en/earth/outreach/tutorials/mapseng_lite.html)>
18. Students import their data table into Google My Maps and create a layer on the map. They can also change the display of their data points using the *Customise the points on your map Google My Maps* instructions. For instance they could upload a custom icon of frog.
19. Student pairs could share data tables with other pairs to create additional layers on their map—customising the points in each dataset so they can be distinguished.
20. Finished maps can be saved into a shared folder and displayed to the class.
21. Discuss how data visualisation can be used to analyse data. Ask students to suggest research questions about frog distribution that could be explored using this method e.g. comparing data across different sites across Melbourne.

#### Extension activity

Students could use Google My Maps or other spatial software to answer research questions about the distribution of frog populations.

