

# FILL THE BILL

## Introduction

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This activity is aimed to introduce students to the ways in which scientists use modelling, data generation and citizen science to obtain knowledge. Students will learn about evolutionary adaptations by working individually and will use different tools to determine what bird beak type works best to pick up different types of bird “food”. Using the Atlas of Living Australia, students will investigate the distribution of local bird species by becoming aware of the power of citizen science contribution to conservation.

## Curriculum Outcomes: Victorian Curriculum F-10

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Levels 10

### Science Understanding: Biological sciences

- The theory of evolution by natural selection explains the diversity of living things and is supported by a range of scientific evidence (VCSSU120)

### Science Inquiry Skills:

- Planning and Conducting: select and use appropriate equipment and technologies to systematically collect and record accurate and reliable data, and use repeat trials to improve accuracy, precision and reliability (VCSIS136)
- Analysing: analyse patterns and trends in data, including describing relationships between variables, identifying inconsistencies in data and sources of uncertainty, and drawing conclusions that are consistent with evidence (VCSIS138)
- Evaluating: evaluate conclusions, including identifying sources of uncertainty and possible alternative explanations, and describe specific ways to improve the quality of the data (VCSIS139)

### Target Audience

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Students in Year 9 and 10

### Duration of Activity

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It takes 2 x 45-minute lessons to complete the teaching materials

## Teaching and learning concept for the laboratory learning activity

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Students use different tools to identify why different bird species have unique shaped beaks perfectly adapted to the food that they eat. They can test different tools representing different beak adaptations for the food sources in order to understand why specific bird species have certain beak adaptations as a result of evolutionary change.

There are 3 activities produced for the teaching:

Activity 1: The best tools to use for different food sources

Activity 2: Atlas of Living Australia Practice

Activity 3: Case study

## Learning outcomes

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Atlas of Living Australia (ALA): search for the distribution and habitats of bird species.

Natural selection: Theory that individuals within a population that have favourable traits will have a higher chance of survival than those who do not.

Adaptations: Alteration in structure or function of an organism that results from natural selection, so the organism becomes better fitted to survive.

Species niche: A species specific role in its environment.

## Background information

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Atlas of Living Australia (ALA) is a freely available online resource that is a collaborative collection of biodiversity data from multiple sources. By completing this activity, students are learning about natural selection and how animals have evolved to have different characteristics to fit their own niche and enable them to access differing food sources. Students will practise and learn about how scientists often use modelling to generate knowledge.

Students will be learning about the importance of citizen science in data collection and analysis and how to use this data to advise conservation initiatives.

Students will develop science inquiry skills using the Atlas of Living Australia (ALA), while learning about endangered/rare species of birds within their local area.

## Key concept

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### Activity 2: Atlas of Living Australia Practice

In this activity, student will learn and practice how to use the Atlas of Living Australia (ALA) program on [ala.org.au](http://ala.org.au) website. The task is to search for the distribution and identify how many recorded sightings there have been of particular bird species in the Geelong area.

## Materials

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Please refer to the 'laboratory technician activity notes' for a list of the required materials and resources needed for this activity.

## Methods

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1. Go to the ALA website: <https://www.ala.org.au/>
2. Select 'Explore by location', then 'Explore your area'

This function allows you to identify what animals have been recorded within a certain radius of a particular area. In the student activity, the location will be Geelong with a radius set at 10km.

3. Enter the location you would like to explore by typing in the town name or address into the search bar. Underneath the search bar you can set the location radius to either 1, 5 or 10km. This is set via the drop-down arrow next to 'Display records in a km radius'. You will see a satellite image of the

location with a circle outlining the set radius. After your desired radius and location has been entered, click 'Search'.

4. Data will then appear underneath the headings 'Group', 'Species', 'Species: Common Name' and 'Records'. For the student activity, you will need to select 'Birds' underneath the heading 'Group'. It will show that there have been 397 species of birds spotted in the 10km Geelong radius (seen under the heading 'Species').
5. Under the heading 'Species: Common Name' will appear all of the 397 species of birds that have been spotted in the 10km Geelong radius. Under the heading 'Records' shows the number of times a particular species has been sighted and recorded within the area. Example: Spiny-cheeked Honeyeater has been recorded in the Geelong 10km radius 262 times.
6. By clicking on a species name under the heading 'Species: Common Name' you can access that particular 'species profile' and 'list of records'.
7. When undertaking activity 2, students will need to enter the bird species scientific or common name into the 'Search' bar at the top of the page. After they have clicked on the searched species, they will need to click on 'Records'. A pie chart (charts showing breakdown of occurrence records) will then appear with the types of habitats that the species has been recorded in.
8. For activity 3, students will need to click on the bird species that they want information on in the Geelong 10km radius homepage. Students will then need to click on 'list of records' which will then open up a new page which gives information about the recorded sightings of the species in the area and the dates of the sightings.

The ALA ‘Explore Your Area’ web page with the location set to Geelong with a radius of 10km.

**Atlas of Living Australia**  
ala.org.au

Search the Atlas ...

Log in

Start exploring - Search & analyse - Participate - Learn about the ALA -

Home > Explore by location > Explore your area

## Explore Your Area

Enter your location or address:

Search E.g. a street address, place name, postcode or GPS coordinates (as lat, long)

Showing records for: 216 Ryrie St, Geelong VIC 3220, Australia

Display records in a  km radius

Group	Species	Species : Common Name	Records
All species	2081		
Animals	991	1. <i>Acacia acinacaea</i>	1
Mammals	35	2. <i>Acacia baileyana</i> : Bailey's wattle	1
Birds	397	3. <i>Acacia dealbata</i> subsp. <i>dealbata</i>	6
Reptiles	12	4. <i>Acacia dealbata</i> : Mimosa	14
Amphibians	8	5. <i>Acacia decora</i>	1
Fishes	103	6. <i>Acacia planifloricarpa</i>	1
Molluscs	95	7. <i>Acacia implexa</i>	17
Arthropods	276	8. <i>Acacia ligulata</i>	1
Crustaceans	51	9. <i>Acacia longifolia</i> subsp. <i>longifolia</i>	5
Insects	198	10. <i>Acacia longifolia</i> subsp. <i>aphorae</i>	1
Plants	1022	11. <i>Acacia meunieri</i> : Black wattle	32
Bryophytes	9	12. <i>Acacia melanoxylon</i> : Blackwood	11
Gymnosperms	6	13. <i>Acacia mollifolia</i>	1
Ferns and Allies	14	14. <i>Acacia myrtilloides</i>	3
Angiosperms	961	15. <i>Acacia nigricans</i>	1
Monocots	292	16. <i>Acacia paradoxa</i> : Kangaroo acacia	35
Dicots	669	17. <i>Acacia ptiliglandula</i>	1
Fung	33	18. <i>Acacia pravissima</i>	1
Chromista	9	19. <i>Acacia prominens</i> : Golden Rain Wattle	1
Protozoa	0	20. <i>Acacia pycnantha</i>	32
Bacteria	1	21. <i>Acacia rugicarpa</i> : Rock Wattle	1
Algae	13	22. <i>Acacia saxeoclada</i>	1
		23. <i>Acacia uniolifolia</i> : Coast Wattle	5

**Atlas of Living Australia**  
Sharing biodiversity knowledge to shape our future

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**Explore the Spatial Portal**  
 Explore species occurrence records in the context of their environment. Find records and model species distributions. Export reports, maps and data.

**Join a Citizen Science Project**  
 Find out how you can contribute to a citizen science project in your area, or explore one of the many citizen science projects supported by the ALA.

**Record a sighting**  
 Did you see something? Photograph something? Contribute your sighting to the Atlas of Living Australia.

**Acknowledgement of Traditional Owners and Country**  
 The Atlas of Living Australia acknowledges Australia's Traditional Owners and pays respect to the past and present Elders of the nation's Aboriginal and Torres Strait Islander communities. We honour and celebrate the spiritual, cultural and customary connections of Traditional Owners to country and the biodiversity that forms part of that country.

The ALA is made possible by contributions from its partners, is supported by NCRIS and hosted by CSIRO

It is acknowledged that this photo was provided and sourced from the Atlas of Living Australia (<http://www.ala.org.au/>)

## Risk management

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The laboratory learning activity 'Fill the Bill' has extremely minimal risk to student health and safety, although it is essential that students are taught how to correctly use the tools required prior to starting the activity.

It is highly advised that students are instructed to not run under any circumstance while completing the activity to prevent injuries that may incur from running with tools in their hands.

## Further information

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More information about natural selection and biological adaptations can be found at:

'FuseSchool - Global Education Biology for All'

A Youtube series which teaches keep biological concepts.

<https://www.youtube.com/watch?v=s64Y8sVYfFY>

BBC Earth - This article shows a few examples of bird beak adaptation

<http://www.bbc.com/earth/story/20150223-the-weird-world-of-bird-beaks>

## Acknowledgments

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The moral rights of the authors, Kieran Lim, Ian Bentley, Peta White, John Long, Maria Vamvakas with the support of Michael Arnold, Stella Baziotopoulos, Mika Sutawan, Arya Kutti and Josie Lam (as part of the Community Science Project unit with the Faculty of Science - 2018) have been asserted under the Australian Copyright Act 1968 (Cth).

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