

## Teaching About Flying Foxes and Microbats: Maths

### About this teaching resource:

The following are teacher resources that align with Foundation Year to Year 10 Australian Curriculum Maths. This is one of ten educational resources that provide detailed, teacher-friendly discipline content knowledge and pedagogical content knowledge for all discipline areas (Maths, English, Science, Humanities and the Social Sciences). The goal of these resources is to help teachers, who are already competent, experienced and skilled in teaching, develop the knowledge and confidence to increase awareness and build capacity of communities to understand and effectively live with local Microbats and Flying Foxes (FF), including the nationally vulnerable Grey-Headed Flying Fox (GHFF).



The teaching resources all offer student-centred, constructivist-based teaching suggestions and have been developed by teachers and overseen by a University academic who specialises in the teaching and learning of Science. Even though school-based education is identified as a key factor in building community capacity, there are few online educational resources promoting the teaching and learning of bats. Those that are available, rarely link to all discipline areas within the Australian Curriculum. Bats Qld believes that any formal education teaching resources must be directly linked to the National Australian Curriculum. This resource provides teacher and student friendly lesson suggestions and resources that directly link to the Australian Curriculum. This teaching resource mobilises expertise and knowledge of Flying Foxes and Microbats in relation to the latest Scientific and Statistical information and Health and Safety information. It improves awareness and understanding of the changing migratory paths of bats and offers support to Scientists' belief that Australian forests will only survive Climate Change with the help of Flying Foxes.

Because of their importance in Australia's ecosystems, and general misunderstandings within the populous, it is imperative that people are informed and well educated around Flying Foxes, so they can support the aim of finding the balance between reducing conflict associated with Flying Foxes roosting in urban areas, and the conservation and the conservation and welfare of these important native species.



### The purpose and structure of this teaching resource

Education plays a significant and unique role in constructing public understanding and opinion about Bats, as well as informing policy. Therefore, we developed this teaching resource to support educators who would like to introduce 'Bats' (Flying Foxes and Microbats) to their students while teaching required aspects of the Australian Curriculum. Our goal is to assist you with teaching suggestions: linked to the Australian Curriculum; that provide background Scientific information; that offer activity specific teaching resources; and that present a vast array of web-links all relating to the teaching and learning of Bats.

As you will see in our *Notes for Teachers* (below), Flying Foxes are considered by scientists to be a keystone species (one of the most important species in an ecosystem), and yet in Australian culture, Flying Foxes [are misunderstood and vilified](#). Therefore, we developed these educational resources to promote scientific, as well as Health & Safety knowledge about Bats, and we invite students to challenge erroneous social stereotypes promoted in Australian media and wider society.

This educational resource is structured in the following way:

- An overview of each activity and their links to the Australian Curriculum (our curricular links are not definitive, as you may identify other Content Descriptors these activities are transferable to);
- Scientifically-based background *Notes for Teachers* about Flying Foxes and Microbats;
- A detailed outline of each activity that includes resources and discussion points to guide learning;
- An extensive online resource list; and Attachments of the printable resources suggested for the activities.

This teaching resource was developed by Australian teachers, for Australian teachers, and so we *do* understand that it can be difficult introducing controversial concepts into classrooms. We celebrate your commitment to ecological sustainability, and we stand beside you in your decision to advocate and education for change, not only for these important and wonderful mammals, but for wider Australian Ecosystem. Even though these teaching suggestions present factual information, we believe it is essential for students to emotionally connect with bats in order for them to be open to learning and making a difference. The following video illustrate how cute and wonderful Flying Foxes and Microbats are! We hope you enjoy this resource.

<https://www.youtube.com/watch?v=T84jdO8YrYA> <https://www.youtube.com/watch?v=Uuvaos1WHTk>

<https://www.youtube.com/watch?v=T84jdO8YrYA> <https://www.youtube.com/watch?v=aMuWgN2DVD4>

<https://www.youtube.com/watch?v=Io3yl00hTSY> <https://www.youtube.com/watch?v=2GncgfPNNms>



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Dr. Sammel would like to thank the Gold Coast City Council (for the K-10 curriculum) and the Logan City Council (the 11 & 12 curriculum) for supporting this project and the creative teachers who collaborated on the following teaching suggestions for every subject of the Australian Curriculum from Foundation Year to Year 10 and for selected subjects within the Year 11 and 12 curriculum. Thank you Merima Celahmetovic, Cherise Davis, Bonnie Gibson, Tara Hart and Carolyn Keepa.

## Notes for Teachers about Flying Foxes and Microbats

For far too long, bats have instilled fear and inspired bad omens in many cultures around the world. Vilified in the media, these deeply misunderstood and misrepresented creatures are incredibly unique animals that play a vital role in Australia's ecosystem. In a world where attitudes towards sustainability are continuously changing and evolving, it is vital that students of today move away from misinformed historical stereotypes in order to develop a strong understanding and appreciation for this amazing creature, the only mammal capable of sustained flight.



There are over 1000 different species of bats worldwide. Bats are classified into two major groups: Flying Foxes and Microbats. Both share many similarities with humans: they have a similar skeletal structure (they have elongated fingers, not wings that they fly with), are warm-blooded, give birth and suckle their young, are devoted and caring mothers and even leave their children (called pups) at 'childcare' as they go in search of food! Most species can only give birth to one pup per year. Infants are carried everywhere by their mothers and suckled for up to five months.

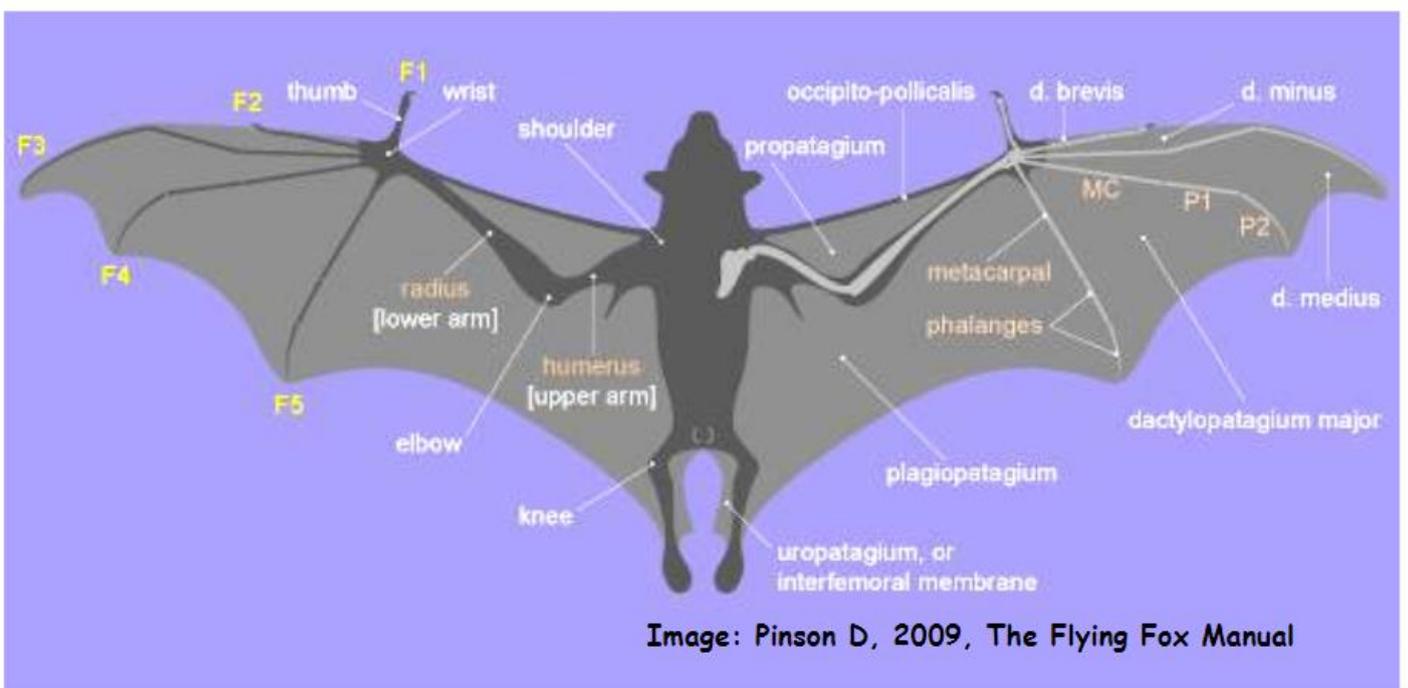
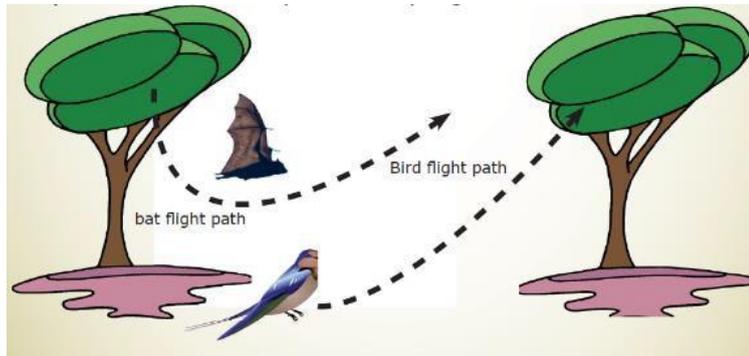


Image: Pinson D, 2009, The Flying Fox Manual

Bats are not aggressive animals. Bats do not ‘swoop’ or ‘attack’. If spooked, a bat will fly away but because they have hands and fingers rather than wings, they must drop or fall in order to catch the wind that will provide them with the lift necessary to sustain their flight.

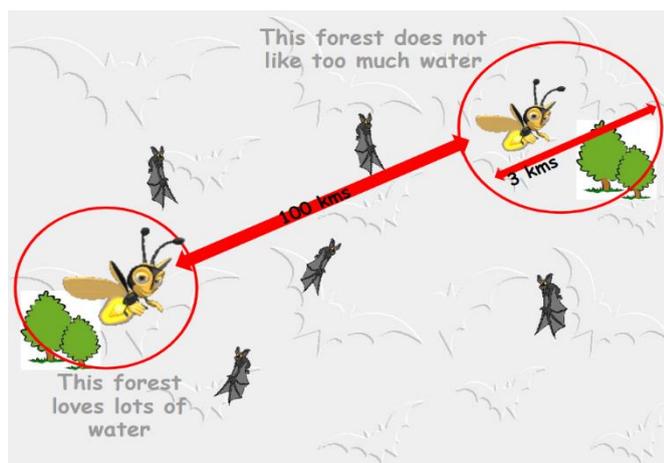


Flying Foxes or Megabats, are the largest sized bats (they also used to be known as Fruit Bats, but Flying Fox is the term that is used today). A Flying Fox has extremely good eyesight (the same as ours during the day and 25% better at night) and hearing and use these, and their strong sense of smell, to navigate the world. They are not blind and do not use echolocation. Flying Foxes are a keystone species in Australia meaning they are one of the most vital animals in our ecosystem.

Flying Foxes play a key role in ensuring we have healthy coastal forests. Australian native trees reproduce by releasing and accepting pollen for fertilisation. After a flower on a tree is fertilised via pollination, the new genetic materials combine to produce seeds that then need to be distributed to other locations, away from the parent trees. Flying Foxes play an essential role in these processes. The study of science reveals that Flying Foxes and our native forests work together in an amazing and unique way that enhances the process of forest reproduction. Our native trees only release their flowers' pollen at night, specifically for the Flying Foxes to pick up. Flying Foxes have the exact soft belly fur needed to collect and carry as much pollen as possible while they fly from flower to flower. As the Flying Foxes move from flower to flower, drinking nectar, they pass along the pollen they collect on their bellies. This process fertilises the plant's flowers. Bees also do this role: however, as pollination occurs at night, Flying Foxes are more effective.



Furthermore, bees can only travel up to three kilometres and so cannot introduce new genetic material from other forest locations. The Flying Fox can travel over 100 kilometres per night and can fly from one forest to another, introducing new genetic material that will strengthen the resilience of the new generation of forests. Indeed, it is predicted that Australia's forests will only survive climate change due to Flying Foxes introducing new genetic material to the next generation of trees. For example, one forest might not like much water, and a bee will keep that gene pool the



same, but a Flying Fox might fly from a forest that likes lots of water, 100 kilometres away, and introduce this new gene to the area. In doing so, the new generation of trees in that forest will be resilient to both drought or flood conditions.



Not only do Flying Foxes pollinate our native forests, they also eat the seeds from the fruit and disperse them to new areas so that the young trees can grow. Other animals do this, but a Flying Fox can digest the seed in a way that does not harm the seed, and when it is excreted, it can grow into a new plant. The process of chewing and digestion in other animals can ruin the seed, making it unviable for growth. A Flying Fox can distribute up to 3000 seeds in a single night! Their role as a keystone species means that Australian tree species, all Australian mammals such as koalas who seek shelter and food in these trees, Australian fruit trees and the Australian hardwood industry are all reliant upon the existence of the Flying Fox. In this way, humans are also dependent on Flying Foxes via the forests they sustain, as the forests supply us with oxygen, food and resources.

The second category of bat in Australia is the Microbat. This small bat plays an equally important role in the Australian ecosystem. Unlike the Flying Fox, the Microbat has extremely bad eyesight and relies on echolocation for travel and food. Microbats are insectivorous and can catch up to 500 insects per hour. The Microbats' incredible ability to consume large numbers of insects such as mosquitos and fruit flies means that life would be far less tolerable for both humans and plant species without them. It is interesting to know that Microbat boxes are being installed by universities, schools, farmers and the general public to reduce the use of pesticides within the environment and eradicate mosquito related diseases such as ross-river fever.



Considering the key role both Flying Foxes and Microbats play in Australia's ecosystem, it is unfortunate that the biggest threats to the species are habitat loss and ignorance and misinformation leading to poor human perception. People usually hold the misconception that bats carry lots of diseases. This is untrue. Science shows that there is only ONE disease that a human can catch from a bat: the Australian Bat Lyssavirus (ABLV). It is a form of rabies, but it is really, really rare. There have only been three reported cases in Australia. ABLV is very rare in the bat community, and most bats that contract this disease leave the colony and die within a few days. A person would have to be bitten by a bat within a small window of time (within those few days) to become infected. Therefore, the World Health Organisation considers it one of the rarest diseases on the planet! Contact with bat excrement, bat-eaten fruit, or having a bat fly above you will NOT transmit this disease. However, if bitten or scratched by ANY bat, all Australian government departments and bat groups strongly recommend people go to the hospital where they will receive a series of three post-bite injections (free of charge) that will ensure they do not get ABLV. There is no reason why any person should contract or die of ABLV as injections are available in Australia to stop this disease. If you do catch ABLV and do not receive the injections, you WILL die. It is important that students learn that if bitten or scratched by ANY animal, they must tell an adult, and if it is a bat, they should get the injections from the hospital.

It would be interesting to look at the Australian Bureau of Statistics to see the statistics associated with animal related deaths. This investigation would highlight that horses, cows, dogs and cats are dramatically more likely to cause human deaths than bats are. However, the most important message that students need to learn is: never touch a sick or injured bat, tell an adult if you get bitten or scratched by a bat and if you find a bat, it is best to notify your local bat (or animal) rescue and conservation organisation.



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This summary was written by Dr. Alison Sammel. If you have any questions, please email [a.sammel@griffith.edu.au](mailto:a.sammel@griffith.edu.au)



## Australian Curriculum (Maths): Foundation Year

### Foundation Year Content Descriptions

#### *Statistics and Probability*

Answer yes/no questions to collect information and make simple inferences (ACMSP011)

- posing questions about themselves and familiar objects and events
- representing responses to questions using simple displays, including grouping students according to their answers
- using data displays to answer simple questions such as ‘how many students answered “yes” to having brown hair?’

#### *Number and Algebra*

Establish understanding of the language and processes of counting by naming numbers in sequences, initially to and from 20, moving from any starting point (ACMNA001)

- developing fluency with forwards and backwards counting in meaningful contexts, including stories and rhymes
- understanding that numbers are said in a particular order and there are patterns in the way we say them

Sort and classify familiar objects and explain the basis for these classifications. Copy, continue and create patterns with objects and drawings (ACMNA005)

- observing natural patterns in the world around us
- creating and describing patterns using materials, sounds, movements or drawings

#### Teaching Suggestions linked to curriculum

Pose this question to your students - Are you frightened of bats? Record the data (ACMSP011)

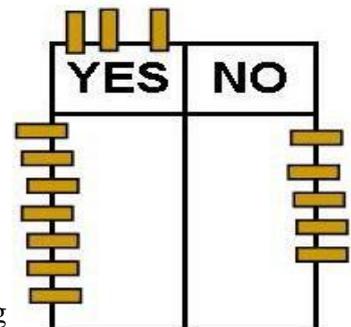
Peg Graph: Students develop a peg graph, pictured below, to record whether or not they are frightened by bats. Each student is given a peg to place on the graph.

Students count out loud the pegs in each section to make totals for the data. (ACMNA001)

Pay particular attention to the students’ perceptions of “bats” at this time and any feelings that they may have towards them. It is quite common for people to have negative images of Flying Foxes or Microbats due to Halloween, movies or the media.

Picture retrieved from <http://mathwire.com/themes/themebat.html#math>

Follow this discussion with some facts about how bats are good for the environment. Flying Foxes are crucial to keeping native forests healthy. They play an important role in dispersing seeds and pollinating flowering plants. Because Flying Foxes are highly mobile, seeds can be moved locally and over great distances. When seeds can germinate away from their parent plant, they can have a greater chance of surviving and growing into a mature plant. Seed dispersal also expands the gene pool within forests. Mature trees then share their genes with neighbouring trees of the same species and this transfer strengthens forests against environmental changes. High mobility also makes Flying Foxes very effective as forest pollinators. Pollen sticks to their furry bodies and as they crawl from flower to flower, and fly from tree to tree, they pollinate the flowers and aid in the production of honey. This reinforces the gene pool and health of native forests. In turn, native forests provide valuable timber, act as carbon sinks, and stabilise river systems and water catchments, and provide recreational and tourism opportunities worth millions of dollars each year.



Ehp.qld.gov.au, (2016). Wildlife and ecosystems (Department of Environment and Heritage Protection). Retrieved 12 February 2016, from <https://www.ehp.qld.gov.au/wildlife-ecosystems/index.html>

Sydney Wildlife Conservationists discuss the importance of Flying Foxes as a keystone species in our ecosystem: [https://www.youtube.com/watch?v=e-K\\_L9xmyU](https://www.youtube.com/watch?v=e-K_L9xmyU)

Students will learn a lot from the educational information discussed in this video. They will also enjoy the adorable images of rescued Flying Foxes feeding on little bottles of milk - ensure your students understand that they should never handle an injured bat, but rather contact their local bat rescue organisation as soon as possible.

Meet the world's biggest bat (National Geographic) <https://www.youtube.com/watch?v=5FK9tWT5pA4>

The Australian Bat Society offers some very informative, student friendly information packs which you may choose to share with your students in their investigation of the abovementioned issues. The information packs and many other resources can be accessed at [www.ausbats.org.au](http://www.ausbats.org.au).

Contact your local bat conservation and rescue organisation to obtain resources and information about how they raise and care for orphaned. Invite a member of a local bat group to come in and talk with the students, they might even bring an orphaned bat in for the students to meet. Your students will love this link to real world situations. By conducting a Google or YouTube search of "Bat conservation and rescue", you will easily find a wide range of images, stories and videos to share with your students.

Note: Now is a good time to ensure your students know what to do if they ever find a Flying Fox or Microbat who is in trouble. Students need to understand that their health and safety is paramount and that a bat should never be picked up with bare hands. If a bat is on the ground or on barbed wire, it can be covered carefully with a towel and rescue services should be contacted immediately. Students must know that if they are scratched or bitten by a bat, they should always tell an adult and they will need to go to the hospital to review a series of 3 post bite injections. This ensures they do not catch the only disease a human can catch from a bat: ABLV. Your local bat conservation organisation will have further information should you require it. What to do if you find a bat:

<http://www.bats.org.au/rescue.php>

After reviewing the information, have students take an exit poll to see if students have changed their minds, now they know more about Microbats and Flying Foxes. Analyse the differences between the graphs. As the students change their minds, the data can be used to introduce simple addition and subtraction ideas.

Once the class has an interest in bats, this enthusiasm can be used to continue teaching patterns.

Teachers can find these great bat themed worksheets for (ACMNA005) at the links below.

[http://www.math-drills.com/halloween/picture\\_pattern\\_halloween2\\_size\\_001.php#printable](http://www.math-drills.com/halloween/picture_pattern_halloween2_size_001.php#printable)[http://www.math-drills.com/halloween/picture\\_pattern\\_halloween2\\_ghost\\_size\\_rotation\\_001.php#printable](http://www.math-drills.com/halloween/picture_pattern_halloween2_ghost_size_rotation_001.php#printable)

Teachers can download these A4 bat numbers to use when teaching number or simply as a classroom display idea <http://www.twinkl.co.uk/resource/t-w-19864-numbers-0-31-on-bats>

## Australian Curriculum (Maths): Year 1 Year One Content Descriptions

### *Number and Algebra*

Represent and solve simple addition and subtraction problems using a range of strategies including counting on, partitioning and rearranging parts (ACMNA015)

- developing a range of mental strategies for addition and subtraction problems

### *Statistics and Probability*

Choose simple questions and gather responses and make simple inferences (ACMSP262)

- determining which questions will gather appropriate responses for a simple investigation

Represent data with objects and drawings where one object or drawing represents one data value. Describe the displays (ACMSP263)

- understanding one-to-one correspondence
- describing displays by identifying categories with the greatest or least number of objects

### Teaching Suggestions linked to curriculum

In raising awareness about Flying Foxes and Microbats, the teacher may wish to ask students what they know about bats. What type of Bats are there? Do bats need food and water? What sorts of food do you think the different types bats may eat? Where do the different types of bats sleep? Do they need warmth? Have students ever seen a bat or have they only ever seen them on television or in books? Teachers may ask students to draw a picture of what they think bats may eat or what other needs they may have. Use this opportunity to make observations of student alternative conceptions of Flying Foxes and Microbats.

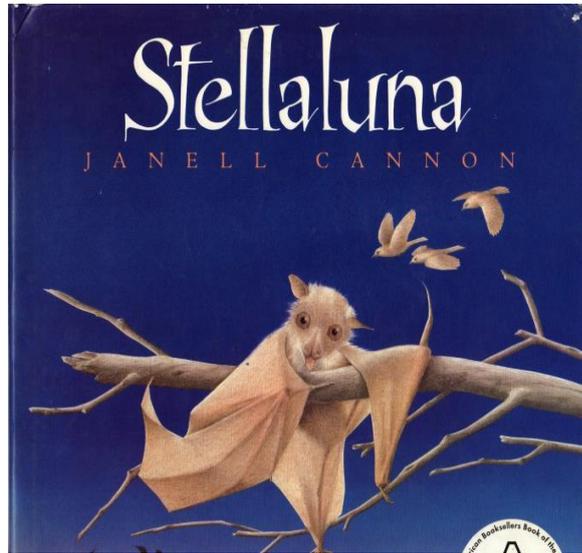


Image Retrieved from <http://www.abc.net.au/local/stories/2011/08/16/3294635.htm> (Kevin Tait)

The teacher may want to ask students to take a quiz to see how much they know about bats. These resources are about “bats” in general, but it is important to model the correct terminology of Flying Foxes and Microbats to your students. You can find these basic online quizzes at <http://www.lawrencehallofscience.org/kidsite/portfolio/bat-quiz/> or another one at <http://www.incrediblebats.com/interactive.html#quiz> or perhaps create your own.

Students will then record and graph the results of the class. This graph will be a picture graph with one-to-one correspondence. (ACMSP263) Each bat picture on the graph will represent one student with a correct answer. Students will gather the results of the class members and graph the number of correct answers for each question.

It is quite common for young students to have developed a negative image of bats through cartoons or even representations of bats during Halloween festivities. To build a more empathetic standing, it is a good idea to read books such as *Stellaluna* by Janell Cannon. Whilst reading the book, stop and make note of science concepts. Ensure students understand that *Stellaluna* is a Flying Fox. What needs does *Stellaluna* have?



What sorts of food does Stellaluna like to eat? How did Stellaluna feel when she lost her mother and had to live with the family of birds? Did Stellaluna like eating the new food? Why did she eat it? Relate students' personal experiences to those of Stellaluna's. Ask students if they have ever had to stay with another family like Stellaluna. Was everything different? How did it feel having to eat different food or sleep in a different bed?

As a class, discuss the answers the students initially gave in the quiz. Would they now change their answer? Have their views changed? Will they need to change the graph of their results? What have they learned about Flying Foxes?

Cannon, J. (1993). *Stellaluna*. San Diego: Harcourt Brace Jovanovich

YouTube Stellaluna read aloud by Pamela Reed [www.youtube.com/watch?=-VLRlvyWUzxs](http://www.youtube.com/watch?=-VLRlvyWUzxs)

Now that your students have a better understanding of Flying Foxes and Microbats, they can each create a moon and Microbat number fact display, as in the picture below. (ACMNA015) The number fact triangle is displayed on the moon. The Microbats below have the corresponding addition and subtraction facts. Teachers can get basic bat cut out shapes by a quick search on google images. This activity should open up a discussion about where children might see Flying Foxes and Microbats.

Picture retrieved from <https://www.pinterest.com/pin/29484572534298454/>



## Australian Curriculum (Maths) Year 2

### *Measurement and Geometry*

Interpret simple maps of familiar locations and identify the relative positions of key features  
(ACMMG044)

- understanding that we use representations of objects and their positions, such as on maps, to allow us to receive and give directions and to describe place

### *Data and Statistics*

Identify a question of interest based on one categorical variable. Gather data relevant to the question  
(ACMSP048)

- determining the variety of birdlife in the playground and using a prepared table to record observations

### **Teaching Suggestions linked to curriculum**

By combining the 2 maths content descriptions (ACMMG044) and (ACMSP048)

You can create a mini Flying Fox project with your year 2 class. To engage the students' interest, ask the students what wildlife they have living near their homes. As the students make suggestions, drive them to think about animals that they might not see in the daylight. The conversation should lead to Flying Foxes.

Image Retrieved from: <http://www.abc.net.au/local/stories/2011/08/16/3294635.htm> (Kevin Tait)

In raising awareness about Flying Foxes and Microbats, the teacher may wish to ask students what they know about bats. Do bats need food and water? What sorts of food do you think bats may eat? Where do bats sleep? Do they need warmth? Have students ever seen a bat or have they only ever seen them on television or in books? Teachers may ask students to draw a picture of what they think bats may eat or what other needs they may have. Use this opportunity to make observations of student alternative conceptions of Flying Foxes and Microbats. You can then show your students the above close-up image of a Flying Fox hanging from a tree.



Students may or may not know that they probably have Flying Foxes around their homes. This might spark an interesting debate in the classroom. Ask the students to go home that night and go outside just after sundown. Set up an observation table or observation sheet for the students to record their results.

For homework students will be on 'Flying Fox watch'. Advise students to look closely at what they think might be "birds". By conducting a Google or YouTube search of "Flying Foxes Gold Coast", (or your local area) you will easily find a wide range of images, stories and videos to share with your students to ensure they know what they are looking for (please see links at the end of this teaching suggestion).



<http://www.couriermail.com.au/news/queensland/bat-experts-warn-urban-councils-they-face-losing-battle-to-get-rid-of-Flying-Foxes/story-e6freoof-1226653917842>

Students need to record: if they see any Flying Foxes, where they see them, (in trees, near street lamps, flying away etc.) and what time they see them. Other information that can be recorded is; are the bats alone or in groups, how many were there in the group, were they large or small, were they looking for food? Encourage the students to come up with their own questions they can answer within their observations. Invite a member of a local bat group to come in and talk with the students, they might even bring an orphaned bat in for the students to meet.

Teachers and students can encourage Flying Foxes to come to your backyard by planting Lillipillies, small Eucalypts such as the Plunket mallee, *Eucalyptus curtisii*; Bloodwood, *Corymbia intermedia* and other nectar-rich trees and shrubs.



Note: Now is a good time to ensure your students know what to do if they ever find a Flying Fox or Microbat who is in trouble. Students need to understand that their health and safety is paramount and that a bat should never be picked up with bare hands. If a bat is on the ground or on barbed wire, it can be covered carefully with a towel and rescue services should be contacted immediately. Students must know that if they are scratched or bitten by a bat, they should always tell an adult and they will need to go to the hospital to review a series of 3 post bite injections. This ensures they do not catch the only disease a human can catch

from a bat: ABLV. Your local bat conservation organisation will have further information should you require it.

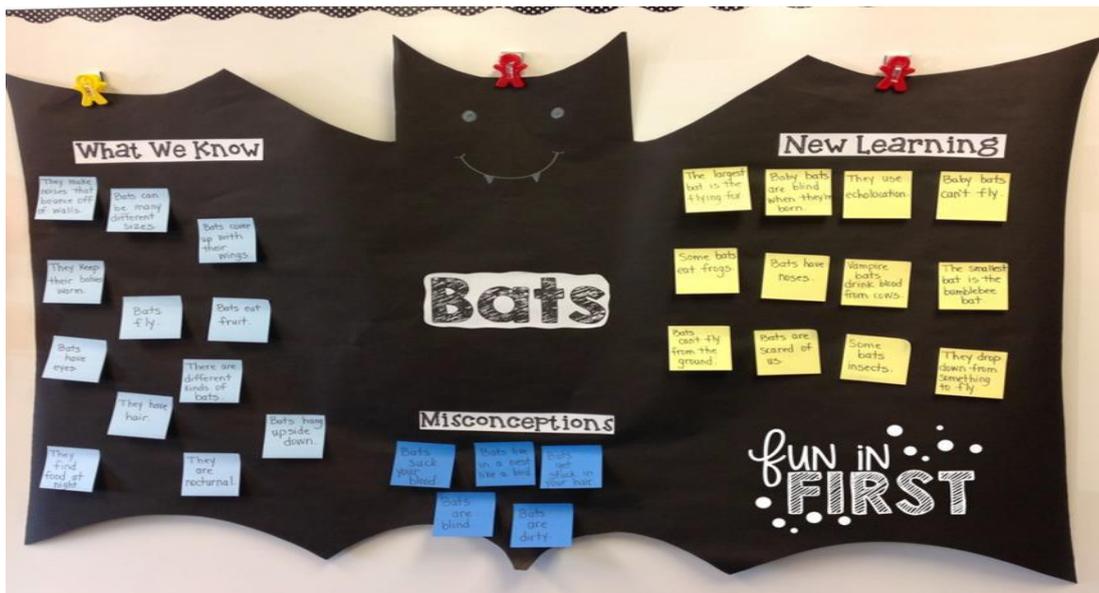
During class time the students will discuss their observations. The students will draw a simple map of the area they observed. (ACMMG044). This might be a simple representation of their house, the tree/lamp/area they saw the bats and any other relevant objects (road, footpath, shed, etc.) they think they should place on the map. These maps can be discussed or presented to the class or in groups, so the students gain an understanding of the other students' maps. By sharing these ideas students should gain a better understanding of how many Flying

Foxes and Microbats, they have living in their local area.

Picture retrieved and adapted from <http://www.conceptdraw.com/mosaic/point-of-interest>

The class will then pose their question based on what they have observed. E.g. “Where do Flying Foxes live?” “What do Flying Foxes eat?” The students now need to gather data. This can be done in a whole class project or in groups.

Students will gather data from their maps they have drawn from their observations, they could also do some independent research. The students will then represent the data in a prepared table or graph. (ACMSP048)



Retrieved from: <http://fun-in-first.blogspot.com.au/2014/10/we-are-going-batty.html>

A great place to start is the Australian Government, Department of Environment National Flying Fox Monitoring Program. This can be found at [https://www.environment.gov.au/biodiversity/threatened/species/Flying\\_Fox-monitoring](https://www.environment.gov.au/biodiversity/threatened/species/Flying_Fox-monitoring)

Qld Government Department of Environment and Heritage Website <https://www.ehp.qld.gov.au/wildlife/livingwith/flyingfoxes/index.html>

NSW Government Department of Environment and Heritage Website <http://www.environment.nsw.gov.au/animals/flyingfoxes.htm>

VIC Government Department of Environment, Land, Water and Planning [http://www.depi.vic.gov.au/environment-and-wildlife/wildlife/Flying\\_Foxes](http://www.depi.vic.gov.au/environment-and-wildlife/wildlife/Flying_Foxes)

SA Government Department of Environment Water and Natural Resources [http://www.environment.sa.gov.au/managing-natural-resources/Plants\\_Animals/Living\\_with\\_wildlife/Grey-headed\\_flying\\_foxes](http://www.environment.sa.gov.au/managing-natural-resources/Plants_Animals/Living_with_wildlife/Grey-headed_flying_foxes)

Parks and Wildlife Commission NT <http://www.parksandwildlife.nt.gov.au/wildlife/living-with-animals/flyingfox#.VrAXpvl95pk>

Parks and Wildlife Service Tasmania <http://www.parks.tas.gov.au/indeX.aspX?base=4905>

## Australian Curriculum (Maths) Year 3

### *Measurement and Geometry*

Measure, order and compare objects using familiar metric units of length, mass and capacity (ACMMG061)

- recognising the importance of using common units of measurement
- recognising and using centimetres and metres, grams and kilograms, and millilitres and litres

### *Statistics and Probability*

Collect data, organise into categories and create displays using lists, tables, picture graphs and simple column graphs, with and without the use of digital technologies (ACMSP069)

- exploring meaningful and increasingly efficient ways to record data, and representing and reporting the results of investigations
- collecting data to investigate features in the natural environment

Interpret and compare data displays (ACMSP070)

- comparing various student-generated data representations and describing their similarities and differences

### **Teaching Suggestions linked to curriculum**

The year 3 maths curriculum provides many opportunities to incorporate Flying Foxes into the classroom. During this unit the focus will start on comparing and ordering (ACMMG061) the Australian Flying Foxes by forearm length and by weight. The following table provides length and weight measurements taken from Hall, L. (2008). *Bats*. Archerfield, Qld: Steve Parish Pub.

Image Retrieved from

<http://www.abc.net.au/local/stories/2011/08/16/3294635.htm> (Kevin Tait)

Further detailed information can be found at The Australian Government National Monitoring Program. This information is based on accurate science and statistical information, rather than fun interesting facts. <https://www.environment.gov.au/biodiversity/threatened/species/Flying-Fox-monitoring>

Common Name	Scientific Name	Forearm span (mm)	Weight (grams)
Black Flying Fox	<i>Pteropus Alecto</i>	150 – 191 mm	500 – 950 g
Grey-headed Flying Fox	<i>Pteropus poliocephalus</i>	138 – 180 mm	300 – 1100 g
Spectacled Flying Fox	<i>Pteropus conspicillatus</i>	160 – 189 mm (males) 149 – 182 – mm(females)	480 – 1000 g (males) 440 – 800 g (females)
Little Red Flying Fox	<i>Pteropus scapulatus</i>	125 – 156 mm (males) 125 – 148 mm (females)	350 – 604 g (males) 310 – 560 g (females)
Torresian Flying Fox	<i>Pteropus banakrisi</i>	128 – 141 mm (males) 149 – 182 mm (females)	210 – 240 g

Christmas Island Flying Fox	<i>Pteropus natalis</i> (Extinct in 2013)	117 – 134 mm	250 – 500 g
Percy Island Flying Fox	<i>Pteropus brunneus</i>	118 mm	200 g
Large-eared Flying Fox	<i>Pteropus macrotis</i>	128 – 141 mm (males) 149 – 182 mm (females)	210 – 240 g

Information taken from Hall, L. (2008). *Bats*. Archerfield, Qld: Steve Parish Pub.

Students will create picture cards with the measurements written on a label. They can then order and compare the sizes of the Australian Flying Foxes. The students can order the Flying Foxes using the minimum sizes guides and then using the maximum size guides. Students can then compare the difference between male and female sizes. Students can also calculate the largest and smallest ranges in size. The Discussion can lead to why the Christmas Island Flying Fox, and how it became listed as extinct in 2013. Teachers may wish to share the following Sydney Morning Herald article with their class to lead the discussion.

Picture and article retrieved from

<http://www.smh.com.au/environment/conservation/unmourned-death-of-a-sole-survivor-20121116-29hbg.html>

Christmas Island pipistrelle (*Pipistrellus murrayi*)

This should lead to a class discussion on what extinct means and why, in their lifetime are animals and plants becoming extinct. And why is this important to stop? Students can then use this data to make their own displays (ACMSP069), e.g. posters, number line pictorial, lists, tables, picture graphs or infographic Give the students the choice about how they could display this information.

Students will be exploring meaningful and increasingly efficient ways to record data and will interpret and compare the displays describing their similarities and differences. (ACMSP070)



Picture Retrieved from:

<http://fun-in-first.blogspot.com.au/2014/10/w-e-are-going-batty.html>



## Australian Curriculum (Maths) Year 4

### *Measurement and Geometry*

Compare the areas of regular and irregular shapes by informal means (ACMMG087)

- comparing areas using metric units, such as counting the number of square centimetres required to cover two areas by overlaying the areas with a grid of centimetre squares

Compare objects using familiar metric units of area and volume (ACMMG290)

- comparing areas using grid paper

Use scaled instruments to measure and compare lengths, masses, capacities and temperatures (ACMMG084)

- reading and interpreting the graduated scales on a range of measuring instruments to the nearest graduation

### **Teaching Suggestions linked to curriculum**

To start this unit students will be looking closely at 4 types of Australian Flying Foxes. These are the Black Flying Fox, the Grey Headed Flying Fox, The Little Red Flying Fox and the Spectacled Flying Fox. The links below take you to the information required for this unit.

Looking at the maps of Australia, students can use grid paper (2cm) to informally measure the areas each type of Flying Fox inhabits. (ACMMG087)

Students can work in pairs or individually.



Grey-Headed flying foxes.  
Photo © Vivien Jones

Picture retrieved from: [http://www.wildlife.org.au/wildlife/speciesprofile/mammals/flyingfox/greyheaded\\_flyingfox.html](http://www.wildlife.org.au/wildlife/speciesprofile/mammals/flyingfox/greyheaded_flyingfox.html)



Black Flying Fox Distribution in Australia

Discuss with the class which type of Flying Fox has more or less roosting area. This unit can be linked to a Geography unit to discuss the climate features of each area, including similarities and differences.

Students can now use a scaled map and ruler to estimate the area of each of the roosting areas. (ACMMG084) This is great practice for reading measurements as the areas are not standard shapes.

Picture retrieved from [http://www.wildlife.org.au/wildlife/speciesprofile/mammals/flyingfox/black\\_flyingfox.html](http://www.wildlife.org.au/wildlife/speciesprofile/mammals/flyingfox/black_flyingfox.html)

Students can compare their answers with the class and discuss the reasonableness of each answer. This is a great time to introduce scale and estimation, for instance if the map is 2cm = 200km, students need to convert their measurements into appropriate units of measure.

Picture retrieved from [http://www.wildlife.org.au/wildlife/speciesprofile/mammals/flyingfox/greyheaded\\_flyingfox.html](http://www.wildlife.org.au/wildlife/speciesprofile/mammals/flyingfox/greyheaded_flyingfox.html)



Grey-Headed Flying Fox Distribution in Australia

Use the following links for maps of Australia detailing roosting area for each of the four Flying Fox species listed. You may also like to research your own.

A great place to start is the Australian Government, Department of Environment National Flying Fox Monitoring Program. This can be found at [https://www.environment.gov.au/biodiversity/threatened/species/Flying Fox-monitoring](https://www.environment.gov.au/biodiversity/threatened/species/Flying_Fox-monitoring)

Qld Government Department of Environment and Heritage Website <https://www.ehp.qld.gov.au/wildlife/livingwith/flyingfoxes/index.html>

NSW Government Department of Environment and Heritage Website <http://www.environment.nsw.gov.au/animals/flyingfoxes.htm>

VIC Government Department of Environment, Land, Water and Planning [http://www.depi.vic.gov.au/environment-and-wildlife/wildlife/Flying Foxes](http://www.depi.vic.gov.au/environment-and-wildlife/wildlife/Flying_Foxes)

SA Government Department of Environment Water and Natural Resources [http://www.environment.sa.gov.au/managing-natural-resources/Plants\\_Animals/Living\\_with\\_wildlife/Grey-headed\\_flying\\_foxes](http://www.environment.sa.gov.au/managing-natural-resources/Plants_Animals/Living_with_wildlife/Grey-headed_flying_foxes)

Parks and Wildlife Commission NT <http://www.parksandwildlife.nt.gov.au/wildlife/living-with-animals/flyingfox#.VrAXpv195pk>

Parks and Wildlife Service Tasmania <http://www.parks.tas.gov.au/index.aspx?base=4905>

The Wildlife Preservation Society of Qld has some student friendly fact sheets available at:

- [http://www.wildlife.org.au/wildlife/speciesprofile/mammals/flyingfox/black\\_flyingfox.html](http://www.wildlife.org.au/wildlife/speciesprofile/mammals/flyingfox/black_flyingfox.html)
- [http://www.wildlife.org.au/wildlife/speciesprofile/mammals/flyingfox/greyheaded\\_flyingfox.html](http://www.wildlife.org.au/wildlife/speciesprofile/mammals/flyingfox/greyheaded_flyingfox.html)
- [http://www.wildlife.org.au/wildlife/speciesprofile/mammals/flyingfox/littlered\\_flyingfox.html](http://www.wildlife.org.au/wildlife/speciesprofile/mammals/flyingfox/littlered_flyingfox.html)
- [http://www.wildlife.org.au/wildlife/speciesprofile/mammals/flyingfox/spectacled\\_flyingfox.html](http://www.wildlife.org.au/wildlife/speciesprofile/mammals/flyingfox/spectacled_flyingfox.html)

## Australian Curriculum (Maths) Year 5

### *Data and Statistics*

Construct displays, including column graphs, dot plots and tables, appropriate for data type, with and without the use of digital technologies ([ACMSP119](#))

- identifying the best methods of presenting data to illustrate the results of investigations and justifying the choice of representations

Describe and interpret different data sets in context ([ACMSP120](#))

- using and comparing data representations for different data sets to help decision making

### Teaching Suggestions linked to curriculum

To start this unit students will be looking closely at 4 types of Australian Flying Foxes. These are the Black Flying Fox, the Grey Headed Flying Fox, The Little Red Flying Fox and the Spectacled Flying Fox. The links below take you to the information required for this unit. The National and State Governments offer accurate and easy to understand information which students may be able to use in their data representations. Links to this information is provided below.

Flying Foxes are crucial to keeping native forests healthy. They play an important role in dispersing seeds and pollinating flowering plants. Because Flying Foxes are highly mobile, seeds can be moved locally and over great distances.



Little Red flying fox.  
Photo © Vivien Jones

Picture retrieved from

[http://www.wildlife.org.au/wildlife/speciesprofile/mammals/flyingfox/littlered\\_flyingfox.htm](http://www.wildlife.org.au/wildlife/speciesprofile/mammals/flyingfox/littlered_flyingfox.htm)

When seeds can germinate away from their parent plant, they can have a greater chance of surviving and growing into a mature plant. Seed dispersal also expands the gene pool within forests. Mature trees then share their genes with neighbouring trees of the same species and this transfer strengthens forests against environmental changes.

High mobility also makes Flying Foxes very effective as forest pollinators. Pollen sticks to their furry bodies and as they crawl from flower to flower, and fly from tree to tree, they pollinate the flowers and aid in the production of honey. This reinforces the gene pool and health of native forests.

In turn, native forests provide valuable timber, act as carbon sinks, and stabilise river systems and water catchments, and provide recreational and tourism opportunities worth millions of dollars each year. Ehp.qld.gov.au, (2016). Wildlife and ecosystems (Department of Environment and Heritage Protection). Retrieved 12 February 2016, from <https://www.ehp.qld.gov.au/wildlife-ecosystems/index.html>

This unit is all about data displays. In year 5 students are expected to identify the best methods of presenting data to illustrate the results of investigations and justify the choice of representations. Creating an infographic is a fantastic way for students to learn how data can be represented in various ways. Infographics are designed to give the viewer lots of information at a single glance. Each student will create an infographic poster on one of the Flying Fox species. ([ACMSP119](#))

There is a fantastic free infographic website at <http://piktochart.com/>. These can also be displayed around the school or library to share this information with students in other grades.

Picture Retrieved from <http://canada.wcs.org/Wildlife/Bats.aspx>

Please note: both examples are from North America where they only have microbats – so when they refer to ‘bats’ they are really only speaking about Microbats. They really should make this distinction as this information is not true for all bats (Flying Foxes and Microbats).

Australia has both Flying Foxes and Microbats.

Students will choose information from these fact pages to display on their infographic chart. Explain to the students that these posters will be displayed in the library for other classes and grades to see. Ask the students what type of information would these students need to know?

What information do the students want to give to their peers about Flying Foxes?

How can the students display these answers in their pictograph?

**WHAT YOU NEED TO KNOW ABOUT BATS**

**WHAT'S GOING ON**

- 6.7 MILLION BATS KILLED** (WNS) IN CANADA BY WHITE-NOSE SYNDROME
- WHITE-NOSE SYNDROME (WNS) IS CAUSED BY A FUNGUS THAT GROWS ON BATS WHILE THEY HIBERNATE
- WNS HAS SPREAD TO 5 PROVINCES** AND IS SPREADING AT A RATE OF 200 KM/YEAR
- CANADA'S EXPERT PANEL CONSIDERED 3 BAT SPECIES AS **ENDANGERED** IN FEBRUARY 2012
- BATS ARE IMPORTANT BECAUSE THEY FEED ON INSECTS, KEEPING THEM FROM DESTROYING CROPS AND FORESTS
- BUT THEY STILL HAVEN'T BEEN LISTED AS AT RISK IN CANADA**

**WHAT YOU CAN DO**

- If you live close to a body of water: **BUILD OR BUY A BAT HOUSE**. [CLICK HERE FOR INSTRUCTIONS](#)
- If you own a **CAVITY**: Make sure you close all of the roof off your gut & open doors with a strong fanblade before and after entering cove.

**THE AMAZING WORLD OF BATS**

**22% of mammals are bats**

**Bat misconceptions**

- BLIND AS A BAT**: Bats get caught in your hair. Bats are very capable nocturnal navigators, adapted to flying in cluttered environments such as woodland.
- Most bats are Vampires**: Actually, only three species use blood as a food source, and all are found in the Americas.
- Bats are the only flying mammals**

**Bats and cetaceans co-evolved echolocation to navigate and find food**

**The largest bat is the Giant golden-crowned flying fox (*Acerodon jubatus*)** (1.7m)

**The humbird bat (*Chiroscopus bergii*) is the smallest species of bat.** (0.7m)

**1240 SPECIES OF BAT**

**Bats are found worldwide**

ECO Tipover | [www.ecosystem.org](http://www.ecosystem.org)

Links have been provided below:

<http://ecosapienshow.tumblr.com/post/100305092764/our-latest-infographic-see-the-episode- here>

Australian Government, Department of Environment National Flying Fox Monitoring Program. This can be found at:

<https://www.environment.gov.au/biodiversity/threatened/species/Flying Fox-monitoring>

Qld Government Department of Environment and Heritage Website

<https://www.ehp.qld.gov.au/wildlife/livingwith/flyingfoxes/index.html>

NSW Government Department of Environment and Heritage Website

<http://www.environment.nsw.gov.au/animals/flyingfoxes.htm>

VIC Government Department of Environment, Land, Water and Planning

<http://www.depi.vic.gov.au/environment-and-wildlife/wildlife/Flying Foxes>

SA Government Department of Environment Water and Natural Resources

[http://www.environment.sa.gov.au/managing-natural-resources/Plants\\_Animals/Living\\_with\\_wildlife/Grey-headed\\_flying\\_foxes](http://www.environment.sa.gov.au/managing-natural-resources/Plants_Animals/Living_with_wildlife/Grey-headed_flying_foxes)

Parks and Wildlife Commission NT

<http://www.parksandwildlife.nt.gov.au/wildlife/living-with-animals/flyingfox#.VrAXpv195pk>

Parks and Wildlife Service Tasmania

<http://www.parks.tas.gov.au/indeX.aspX?base=4905>

The Wildlife Preservation Society of Qld has some student friendly fact sheets available at:

- [http://www.wildlife.org.au/wildlife/speciesprofile/mammals/flyingfox/black\\_flyingfox.html](http://www.wildlife.org.au/wildlife/speciesprofile/mammals/flyingfox/black_flyingfox.html)
- [http://www.wildlife.org.au/wildlife/speciesprofile/mammals/flyingfox/greyheaded\\_flyingfox.html](http://www.wildlife.org.au/wildlife/speciesprofile/mammals/flyingfox/greyheaded_flyingfox.html)
- [http://www.wildlife.org.au/wildlife/speciesprofile/mammals/flyingfox/littlered\\_flyingfox.html](http://www.wildlife.org.au/wildlife/speciesprofile/mammals/flyingfox/littlered_flyingfox.html)
- [http://www.wildlife.org.au/wildlife/speciesprofile/mammals/flyingfox/spectacled\\_flyingfox.html](http://www.wildlife.org.au/wildlife/speciesprofile/mammals/flyingfox/spectacled_flyingfox.html)

## Australian Curriculum (Maths) Year 6

### *Number and Algebra*

Select and apply efficient mental and written strategies and appropriate digital technologies to solve problems involving all four operations with whole numbers ([ACMNA123](#))

- applying strategies already developed for solving problems involving small numbers to those involving large numbers
- applying a range of strategies to solve realistic problems and commenting on the efficiency of different strategies

### **Teaching Suggestions linked to curriculum**

You may want to use this teaching suggestion following a unit on Flying Foxes or Microbats from another subject area, or you may want to introduce your students to these beautiful creatures through this maths problem solving unit. This activity gives the students the opportunity to use statistical facts about Microbats to create 1 or 2 maths problem solving questions. This is a really nice way to incorporate Flying Foxes and Microbats into the year 6 Maths curriculum. Start by sharing these Microbat facts with your students, asking them to think about maths word problems that they could create using the statistics.

Retrieved from

[http://www.pittwater.nsw.gov.au/environment/native\\_animals/the\\_importance\\_of\\_microbats\\_in\\_pittwater](http://www.pittwater.nsw.gov.au/environment/native_animals/the_importance_of_microbats_in_pittwater)

### **What are Microbats?**

- Microbats are mammals, their body weight varies. In Australia microbats can weigh between 2 grams and 170 grams.
- There are 33 species of microbats (Harry Parnaby, 1992) in South Eastern Australia.
- Their diet includes: moths, flying and terrestrial insects, spiders and beetles. The larger micro bats diet includes: frogs, lizards, mice and other small bats.
- Some species roost in caves and large water pipes, while others prefer tree hollows, under bark in old large trees or in the eaves or roofs of houses.



- Microbats use echolocation (high frequency sounds) to navigate and find food. They emit pulses of sound (made in their voice box) from their mouth or nose. The returning echo is picked up by their ears and the message is transmitted to their brain. When looking for food they emit approximately 10 pulses per second, when they locate their prey this can rise up to over 150 pulses per second, till they catch their prey.
- Microbats become torpid (lower their body temperature to within 1 or 2 degrees of the ambient air temperature) when at rest. During the winter months they hibernate (extended torpor). If they are disturbed during this period, they will exhaust their body fats and because of the scarcity of insects they will die.
- Microbats can catch up to 500 insects in an hour and can consume up to 40% of their body weight.
- Microbats usually mate in South Eastern Australia during Autumn and early Winter; the sperm is stored in the male's reproductive tract till spring. Once fertilization has occurred the length of the pregnancy is determined by the climatic conditions at the time, usually the gestation period is approx. 12 weeks. It is common in some microbats to have a twin pregnancy.
- The young are born furless (they are called pups) with eyes closed. They are usually approx. 10% of their mother's body weight. Within a few weeks they develop fur and will commence flying at approximately 6 weeks of age.
- The mother Microbat carries her hairless pup with her for the first three days after that time it becomes too big for her to carry so she leaves it in the colony.



Picture retrieved from <http://www.smh.com.au/environment/conservation/unmourned-death-of-a-sole-survivor-20121116-29hbg.html>

Information Retrieved from Hawkins, G, (2008) Rescue, Rehabilitate, & Release  
<http://www.wildcarent.org.au/factsheets/doc/microbat-manual.pdf>

The following link has already prepared bat facts, mathematical problems relating to the facts and a teacher's answer sheet. However, it must be noted that the terminology is not correct. It is important as a teacher to model the correct language even if the resources do not. To avoid using resources with incorrect terminology, you could display the following link as an example and have your student create their own maths questions using accurate facts and correct language about Microbats. The students will love this higher order thinking opportunity and you will then have a class set of maths problems using accurate Flying Fox and Microbat statistics. For example: if Microbats emit sound pulses at 150 pulses per second when they are hunting their prey, how many pulses would they emit in 30 seconds and 1 minute?

#### **Example of maths problems relating to Microbats**

[http://glenwoodcaverns.com/pdfs/Bats\\_Math\\_Quiz.pdf](http://glenwoodcaverns.com/pdfs/Bats_Math_Quiz.pdf)

<http://mathwire.com/problemsolving/nightbat.pdf>

<http://mathwire.com/problemsolving/flyingbats.pdf>

## Australian Curriculum (Maths) Year 7

### Content Descriptors

#### *Data and Statistics*

Identify and investigate issues involving numerical data collected from primary and secondary sources (ACMSP169)

- obtaining secondary data from newspapers, the Internet and the Australian Bureau of Statistics

Construct and compare a range of data displays including stem-and-leaf plots and dot plots (ACMSP170)

- understanding that some data representations are more appropriate than others for particular data sets, and answering questions about those data sets

Calculate mean, median, mode and range for sets of data. Interpret these statistics in the context of data (ACMSP171)

- understanding that summarising data by calculating measures of centre and spread can help make sense of the data

Describe and interpret data displays using median, mean and range (ACMSP172)

- using mean and median to compare data sets and explaining how outliers may affect the comparison
- locating mean, median and range on graphs and connecting them to real life.

### Teaching Suggestions Linked to Curriculum

The year 7 maths curriculum provides a great data representation and interpretation section in the Data and Statistics strand. This provides an excellent opportunity to incorporate Flying Foxes into the maths curriculum as the Australian Government Department of Environment has an interactive Flying Fox web viewer that has been developed to visually present the camp census data collected via the National Flying Fox Monitoring Programme.

The viewer shows the camp occurrence of the Grey-headed and Spectacled Flying Fox. Within the eastern coastal belt, the viewer also shows Black Flying Fox and Little Red Flying Fox camps. The Grey-headed and Spectacled Flying Fox are listed threatened under the Environment Protection and Biodiversity Conservation Act 1999. See the 'Environment Law' tab above for more information on Australia's Flying Foxes and their legal status.

The viewer allows users to explore Flying Fox camps and the numbers of each species counted over time. This information spans the data gathered from November 2012 to present. Environment.gov.au, (2016). *Monitoring Flying Fox Populations | Department of the Environment*.

Retrieved 12 February 2016, from

[https://www.environment.gov.au/biodiversity/threatened/species/Flying\\_Fox-monitoring](https://www.environment.gov.au/biodiversity/threatened/species/Flying_Fox-monitoring)



Retrieved from <http://www.nationalparks.nsw.gov.au/plants-and-animals/grey-headed-flying-fox>

The National Flying Fox Monitoring Program presents some very informative and accurate information about Australian Flying Foxes (see the links at the end of this teaching suggestion).

The following activity has been taken from the All about Bats website Year 9 Science Unit. The unit can be found at [http://www.allaboutbats.org.au/images/upload\\_images/file/AAB\\_Year9\\_Unit9-2.pdf](http://www.allaboutbats.org.au/images/upload_images/file/AAB_Year9_Unit9-2.pdf)

Activity 9.2D is an excellent graphing activity that would be appropriate for year 7 Maths.

In Activity 9.2 D on page 11, there is a table of data which students are required to graph and analyse. To extend on this activity, as well as the line graph, students could be asked to construct a stem and leaf plot and dot plot. (ACMSP170)

The population of flying-foxes at the Fake Creek camp in southern Queensland has been monitored over a number of years. The following data was taken between 2004 and 2007.

2004		2005		2006		2007	
Jan	26743	Jan	27893	Jan	28040	Jan	29875
Feb	33455	Feb	32323	Feb	35976	Feb	32467
Mar	38975	Mar	42457	Mar	39755	Mar	39064
Apr	31466	Apr	35200	Apr	45787	Apr	37543
May	21342	May	20349	May	78966	May	25674
Jun	14566	Jun	14780	Jun	76443	Jun	14788
Jul	12457	Jul	12457	Jul	75432	Jul	13453
Aug	12453	Aug	11780	Aug	56433	Aug	13455
Sep	16753	Sep	17700	Sep	43215	Sep	17865
Oct	21954	Oct	22178	Oct	19873	Oct	25964
Nov	26873	Nov	25890	Nov	22334	Nov	27855
Dec	27235	Dec	26380	Dec	21860	Dec	1379

Plot the roost population data on a line graph with the months on the x-axis and the population on the y-axis (using a program like Excel is suggested).

Table retrieved from [http://www.allaboutbats.org.au/images/upload\\_images/file/AAB\\_Year9\\_Unit9-2.pdf](http://www.allaboutbats.org.au/images/upload_images/file/AAB_Year9_Unit9-2.pdf)

Although the data is fictional the analysis questions are very specific and lend to a full data analysis on Flying Foxes. (ACMSP172)

The activity gives the students some extra information about Flying Foxes to help answer the questions (Bottom of page 11) You could extend these questions to include some mean and median questions from the stem and leaf plot, such as what is the average (mean) population in 2004, 2005, 2006, 2007. What is the median or middle score of the data? Looking at the data, which months have higher and lower populations? Can you explain why this might be? (ACMSP172)

When analysing your data, consider the following questions.

1. In what months are there usually the most flying-foxes at Fake Creek camp (not including the 2006 outlier)?  
.....  
.....
2. Why do you think the numbers are largest during this period?  
.....  
.....  
.....
3. During what months is Fake Creek camp usually the quietest?  
.....
4. What species of flying-foxes do you think are not present at the time of year when there are the lowest numbers?  
.....  
.....  
.....
5. Why do you think there was a massive increase in flying-fox numbers at Fake Creek camp during the middle of 2006?  
.....  
.....
6. What pressures do you think this increase would have put on Fake Creek camp?  
.....  
.....  
.....
7. The last entry in 2007 showed a huge decrease in population. Why do you think this occurred?  
.....  
.....  
.....
8. What other events could affect the population of flying-foxes at Fake Creek camp each year? Write down a list of your ideas.  
.....  
.....  
.....

Retrieved from [http://www.allaboutbats.org.au/images/upload\\_images/file/AAB\\_Year9\\_Unit9-2.pdf](http://www.allaboutbats.org.au/images/upload_images/file/AAB_Year9_Unit9-2.pdf)

For accurate and student information you can have a look at the following Government Websites.

Qld Government Department of Environment and Heritage Website  
<https://www.ehp.qld.gov.au/wildlife/livingwith/flyingfoxes/index.html>

NSW Government Department of Environment and Heritage Website  
<http://www.environment.nsw.gov.au/animals/flyingfoxes.htm>

VIC Government Department of Environment, Land, Water and planning [http://www.depi.vic.gov.au/environment-and-wildlife/wildlife/Flying\\_Foxes](http://www.depi.vic.gov.au/environment-and-wildlife/wildlife/Flying_Foxes)

SA Government Department of Environment Water and Natural Resources  
[http://www.environment.sa.gov.au/managing-natural-resources/Plants\\_Animals/Living\\_with\\_wildlife/Grey-headed\\_flying\\_foxes](http://www.environment.sa.gov.au/managing-natural-resources/Plants_Animals/Living_with_wildlife/Grey-headed_flying_foxes)

Parks and Wildlife Commission NT  
<http://www.parksandwildlife.nt.gov.au/wildlife/living-with-animals/flyingfox#.VrAXpv195pk>

Parks and Wildlife Service Tasmania  
<http://www.parks.tas.gov.au/indeX.aspX?base=4905>

## Australian Curriculum (Maths) Year 8

### *Number and Algebra*

Solve problems involving the use of percentages, including percentage increases and decreases, with and without digital technologies ([ACMNA187](#))

- using percentages to calculate population increases and decreases

#### **Teaching Suggestions Linked to Curriculum**

The year 8 maths curriculum requires students to solve problems involving the use of percentages. This is an excellent area to incorporate Flying Foxes and the percentage increases and decreases in population over the years.

There are four mainland species of Flying Fox: Black, Grey headed, Spectacled and Little Red. Tragically, populations of Flying Foxes across Queensland, NSW and Victoria are in decline. Both the Grey-headed Flying Fox and Spectacled Flying Fox have declined by at least 95% in the past century, with massive losses in the past 30 years. Some researchers believe they could be functionally extinct by 2050. (To understand more about what functionally extinct means, please see <http://arstechnica.com/science/2013/07/not-yet-gone-but-effectively-extinct/>)

The causes include habitat loss (land clearing), camp disturbance, starvation, increased heat events, legal and illegal shooting, and human-made hazards like power lines, barbed wire and backyard fruit tree netting.

It would be interesting to explore how human populations have grown and how bat populations have changed. Ask students to use this information to comment on what is happening to the health of our native forests if Flying Fox populations decrease or become extinct.



Images of Spectacled Flying Foxes retrieved from: <https://www.theguardian.com/environment/2019/feb/19/spectacled-flying-fox-declared-endangered-after-queensland-heatwave-wipeout> and <https://www.youtube.com/watch?v=PBaahDhXuPY>

The Victorian State Government says:

Flying Fox numbers in Australia have changed markedly since European settlement. Loss of natural habitat and food supply in New South Wales and Queensland due to land clearing and human culling has rapidly reduced numbers of some species in eastern Australia. Grey-headed Flying Fox and Spectacled Flying Fox numbers have decreased to such an extent that they are both listed as vulnerable under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999.

Flying Fox distribution has also changed over the past 30 years due to loss of habitat, the creation of new habitat and the year-round food supply in suburban areas.

For example, the range of the grey-headed Flying Fox has contracted in the northern area (southern Queensland and northern New South Wales) and expanded southwards into Victoria. Depi.vic.gov.au, (2016). DEPI - Flying Foxes.

Retrieved 12 February 2016, from [http://www.depi.vic.gov.au/environment-and-wildlife/wildlife/Flying Foxes](http://www.depi.vic.gov.au/environment-and-wildlife/wildlife/Flying%20Foxes)



Retrieved from:

[http://www.nationalparks.nsw.gov.au/plants-and-animals/grey-headed-Flying Fox](http://www.nationalparks.nsw.gov.au/plants-and-animals/grey-headed-Flying%20Fox)

The Australian Government Department of Environment has an interactive Flying Fox web viewer that has been developed to visually present the camp census data collected via the National Flying Fox Monitoring Programme.

[https://www.environment.gov.au/biodiversity/threatened/species/Flying Fox-monitoring](https://www.environment.gov.au/biodiversity/threatened/species/Flying%20Fox-monitoring)

The viewer shows the camp occurrence of the Grey-headed and Spectacled Flying Fox. Within the eastern coastal belt, the viewer also shows Black Flying Fox and Little Red Flying Fox camps. The Grey-headed and Spectacled Flying Fox are listed threatened under the Environment Protection and Biodiversity Conservation Act 1999. See the 'Environment Law' tab above for more information on Australia's Flying Foxes and their legal status.

It would be fascinating to link this researching to searching for Flying Foxes that have been listed as endangered through to extinct. Ask students to investigate these distinctions and how the designations are all based on population numbers, ask students to think about what they can do with this information. This might be a nice opportunity to look at working with a local bat group and inviting them in to do an education activity based on extinction. The discussion should lead to why, currently, are animals still becoming extinct and what can we do about it?

The viewer allows users to explore Flying Fox camps and the numbers of each species counted over time. This information spans the data gathered from November 2012 to present.

Environment.gov.au, (2016). *Monitoring Flying Fox Populations | Department of the Environment.*

Retrieved 12 February 2016, from

[https://www.environment.gov.au/biodiversity/threatened/species/Flying Fox-monitoring](https://www.environment.gov.au/biodiversity/threatened/species/Flying%20Fox-monitoring)

The National Flying Fox Monitoring Program presents some very informative and accurate information about Australian Flying Foxes. For more accurate and student information you can have a look at the following Government Websites.

Qld Government Department of Environment and Heritage Website

<https://www.ehp.qld.gov.au/wildlife/livingwith/flyingfoxes/index.html>

NSW Government Department of Environment and Heritage Website

<http://www.environment.nsw.gov.au/animals/flyingfoxes.htm>

VIC Government Department of Environment, Land, Water and Planning  
[http://www.depi.vic.gov.au/environment-and-wildlife/wildlife/Flying Foxes](http://www.depi.vic.gov.au/environment-and-wildlife/wildlife/Flying%20Foxes)

SA Government Department of Environment Water and Natural Resources  
[http://www.environment.sa.gov.au/managing-natural-resources/Plants Animals/Living with wildlife/Grey-headed flying foxes](http://www.environment.sa.gov.au/managing-natural-resources/Plants_Animals/Living_with_wildlife/Grey-headed_flying_foxes)

Parks and Wildlife Commission NT  
<http://www.parksandwildlife.nt.gov.au/wildlife/living-with-animals/flyingfox#.VrAXpv195pk>

Parks and Wildlife Service Tasmania  
<http://www.parks.tas.gov.au/indeX.aspX?base=4905>

The screenshot shows a web browser window with the URL [www.environment.gov.au/biodiversity/threatened/species/flying-fox-monitoring](http://www.environment.gov.au/biodiversity/threatened/species/flying-fox-monitoring). The page features a navigation menu on the left with categories like 'Biodiversity', 'Threatened species & ecological communities', and 'Threatened species'. The main content area is titled 'Monitoring Flying-Fox Populations' and includes tabs for 'Policy statement', 'Monitoring Programme', 'Environment law', and 'Hendra virus'. Below the tabs are four images: a flying fox on a branch, a close-up of a flying fox's face, a flying fox in flight, and a flying fox roosting in a tree. The page also includes a section for 'Interactive Flying-fox Web Viewer' with a map of Australia showing roosting areas and a text description of the interactive tool.

Image retrieved from [http://www.environment.gov.au/biodiversity/threatened/species/Flying Fox-monitoring](http://www.environment.gov.au/biodiversity/threatened/species/Flying%20Fox-monitoring)

This map is an interactive map which can generate graphs of the population of various Flying Fox species. Students may become more involved if they can choose their own data. This can be done by clicking on the map and choosing the roost area. The following link is a help page with steps to finding the data. <http://www.environment.gov.au/webgis-framework/apps/ffc-wide/ffc-wide-help.jsf>

Students can look for local Flying Fox camps or find camps in areas they know or grew up in. Students can calculate the percentage increase and decrease of populations over the years and compare these statistics or they can look at various roosting areas and compare the difference in patterns around the country.

Retrieved from  
<http://www.environment.gov.au/webgis-framework/apps/ffc-wide/ffc-wide.jsf>





## Australian Curriculum (Maths) Year 9

### *Data and Statistics*

Identify everyday questions and issues involving at least one numerical and at least one categorical variable, and collect data directly and from secondary sources ([ACMSP228](#))

Construct back-to-back stem-and-leaf plots and histograms and describe data, using terms including 'skewed', 'symmetric' and 'bi modal' ([ACMSP282](#))

Compare data displays using mean, median and range to describe and interpret numerical datasets in terms of location (centre) and spread ([ACMSP283](#))

### Teaching Suggestions Linked to Curriculum

By the end of Year 9, the Australian Curriculum expects Students to compare techniques for collecting data from primary and secondary sources. They make sense of the position of the mean and median in skewed, symmetric and bi-modal displays to describe and interpret data. This provides an excellent opportunity to incorporate Flying Foxes into the maths curriculum. To begin, ensure that your students understand that Flying Foxes are vital to our environment as they are a long-range pollinator as they travel up to 100 km a night, ensuring the long-range pollination of trees that only pollinate at night. While bees can only travel 3 km per day. If there were no Flying Foxes, what effect would this have on Australia's hardwood industry? While we advocate for Koalas that if there is no tree there is no koala but if there are no Flying Foxes, who would pollinate the Eucalyptus trees? "No me [Flying Fox], no tree."

To continue you may wish to show your students the first one and half minutes of [Tim Pearson's No me, no tree video](#), ensuring you stop just before he reveals what group in society it is. Discuss with the students are there groups in our school or society who are persecuted like Tim Pearson describes? Is this a human group or could it be an animal group? If it could be a group of animal species, what species would it be? Now show the students the next few moments where he reveals what group in society it is, the Flying Foxes. Pause it there and discuss their response.

- What do they think about Flying Foxes?
- Why do they feel like this?
- Is it because of what their parents or friends think?
- Is it from something they read or saw on the television?



If you believe Hollywood bats have a pretty creepy image.

When they're not hanging upside-down screeching at each other they're flying silently at night, under orders from blood-sucking vampires.

But of course reality's a bit different. Bats are delicate creatures and many are under threat.

Next ask the students if they know what a Microbat is? Get them to note down their opinions on an opinions chart again and why they have this opinion. Then get them to view [BTN's report Mini Bats](#) making sure they note down any facts. Once they have finished this, ask the students if they had to correct many of their opinions. Where did they develop these opinions? Did a friend of a friend say it? How reliable was that source of information?

The information in this report can also be coupled with the pdf Wildlife Preservation Society of Australia resource suggested by the site which is found at:

<http://www.australianwildlife.net.au/pdf/school/Microbats.pdf>.

Flying Fox numbers in Australia have changed markedly since European settlement. Loss of natural habitat and food supply in New South Wales and Queensland due to land clearing and human culling has rapidly reduced numbers of some species in eastern Australia.

Grey-headed Flying Fox and spectacled Flying Fox numbers have decreased to such an extent that they are both listed as vulnerable under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999.

Flying Fox distribution has also changed over the past 30 years due to loss of habitat, the creation of new habitat and the year-round food supply in suburban areas. Depi.vic.gov.au, (2016). *DEPI - Flying Foxes*. Retrieved 12 February 2016, from:  
[http://www.depi.vic.gov.au/environment-and-wildlife/wildlife/Flying\\_Foxes](http://www.depi.vic.gov.au/environment-and-wildlife/wildlife/Flying_Foxes)

For example, the range of the grey-headed Flying Fox has contracted in the northern area (southern Queensland and northern New South Wales) and expanded southwards into Victoria. Students could investigate these distinctions and how they the designations are all based on population numbers, and then link to which bats are classified as what through to extinct and resources to explore this...ask them to think about what they can do with this information. Look at working with a local bat rescue or education group to do some kind of school or community or social media educational activity.

The Australian Curriculum Maths requires students to identify everyday questions and issues involving at least one numerical and at least one categorical variable, and collect data directly and from secondary sources. Teachers may wish to ask students to research their own data (ACMSP228) at any of the following Government Websites. Students could link this activity to searching for Flying Foxes that have been listed as endangered, through to extinct. Ask students to investigate these distinctions and how they the designations are all based on population numbers, and then link to which bats are classified as endangered through to extinct. You might also ask students to think about what they can do with this information. This might be a nice opportunity to look at working with a local bat group and inviting them in to do an education activity based on the importance of bats for your local community and how they are threatened due to human activity, and what they can do to help. The discussion should lead to why, currently, are animals still becoming extinct and what can we do about it? (To understand more about what functionally extinct means, please see <http://arstechnica.com/science/2013/07/not-yet-gone-but-effectively-extinct/>)

It is also a good idea to invite your local bat group to do educational activities, to consolidate the learning and bring an authentic link to the data students have been working with.

The following activity has been taken from the All about Bats website Year 9 Science Unit. The unit can be found at [http://www.allaboutbats.org.au/images/upload\\_images/file/AAB\\_Year9\\_Unit9-2.pdf](http://www.allaboutbats.org.au/images/upload_images/file/AAB_Year9_Unit9-2.pdf) Activity 9.2D is an excellent graphing activity that would be appropriate for year 9 maths.(ACMSP228)

In Activity 9.2 D on page 11, there is a table of data which students are required to graph and analyse. To extend on this activity, as well as the line graph, students could be asked to construct a stem and leaf plot and dot plot.(ACMSP282)

The population of flying-foxes at the Fake Creek camp in southern Queensland has been monitored over a number of years. The following data was taken between 2004 and 2007.

2004		2005		2006		2007	
Jan	26743	Jan	27893	Jan	28040	Jan	29875
Feb	33455	Feb	32323	Feb	35976	Feb	32467
Mar	38975	Mar	42457	Mar	39755	Mar	39064
Apr	31466	Apr	35200	Apr	45787	Apr	37543
May	21342	May	20349	May	78966	May	25674
Jun	14566	Jun	14780	Jun	76443	Jun	14788
Jul	12457	Jul	12457	Jul	75432	Jul	13453
Aug	12453	Aug	11780	Aug	56433	Aug	13455
Sep	16753	Sep	17700	Sep	43215	Sep	17865
Oct	21954	Oct	22178	Oct	19873	Oct	25964
Nov	26873	Nov	25890	Nov	22334	Nov	27855
Dec	27235	Dec	26380	Dec	21860	Dec	1379

Plot the roost population data on a line graph with the months on the x-axis and the population on the y-axis (using a program like Excel is suggested).

Table retrieved from

[http://www.allaboutbats.org.au/images/upload\\_images/file/AAB\\_Year9\\_Unit9-2.pdf](http://www.allaboutbats.org.au/images/upload_images/file/AAB_Year9_Unit9-2.pdf)

Although the data is fictional the analysis questions are very specific and lend to a full data analysis on Flying Foxes. (ACMSP283)

The activity gives the students some extra information about Flying Foxes to help answer the questions (Bottom of page 11) You could extend these questions to include some mean, median and mode calculation questions from the stem and leaf plots the students also created.

When analysing your data, consider the following questions.

1. In what months are there usually the most flying-foxes at Fake Creek camp (not including the 2006 outlier)?

.....  
 .....

2. Why do you think the numbers are largest during this period?

.....  
 .....  
 .....

3. During what months is Fake Creek camp usually the quietest?

.....

4. What species of flying-foxes do you think are not present at the time of year when there are the lowest numbers?

.....  
 .....

5. Why do you think there was a massive increase in flying-fox numbers at Fake Creek camp during the middle of 2006?

.....

6. What pressures do you think this increase would have put on Fake Creek camp?

.....  
 .....

7. The last entry in 2007 showed a huge decrease in population. Why do you think this occurred?

.....  
 .....

8. What other events could affect the population of flying-foxes at Fake Creek camp each year? Write down a list of your ideas.

.....  
 .....

Retrieved from: [http://www.allaboutbats.org.au/images/upload\\_images/file/AAB\\_Year9\\_Unit9-2.pdf](http://www.allaboutbats.org.au/images/upload_images/file/AAB_Year9_Unit9-2.pdf)

These websites use information based on accurate scientific and statistical data rather than fun interesting facts.

Australian Government, Department of Environment National Flying Fox Monitoring Program. This can be found at  
[https://www.environment.gov.au/biodiversity/threatened/species/Flying Fox-monitoring](https://www.environment.gov.au/biodiversity/threatened/species/Flying-Fox-monitoring)

Qld Government Department of Environment and Heritage Website  
<https://www.ehp.qld.gov.au/wildlife/livingwith/flyingfoxes/index.html>

NSW Government Department of Environment and Heritage Website  
<http://www.environment.nsw.gov.au/animals/flyingfoxes.htm>

VIC Government Department of Environment, Land, Water and planning  
[http://www.depi.vic.gov.au/environment-and-wildlife/wildlife/Flying Foxes](http://www.depi.vic.gov.au/environment-and-wildlife/wildlife/Flying-Foxes)

SA Government Department of Environment Water and Natural Resources  
[http://www.environment.sa.gov.au/managing-natural-resources/Plants Animals/Living with wildlife/Grey-headed flying foxes](http://www.environment.sa.gov.au/managing-natural-resources/Plants_Animals/Living_with_wildlife/Grey-headed_flying_foxes)

Parks and Wildlife Commission NT  
<http://www.parksandwildlife.nt.gov.au/wildlife/living-with-animals/flyingfox#.VrAXpv195pk>

Parks and Wildlife Service Tasmania  
<http://www.parks.tas.gov.au/index.aspx?base=4905>

## Australian Curriculum (Maths) Year 10

### Statistics and Probability

Evaluate statistical reports in the media and other places by linking claims to displays, statistics and representative data ([ACMSP253](#))

#### Teaching Suggestions Linked to Curriculum

The year 10 maths curriculum requires students to evaluate statistical reports. To begin this unit, ensure that your students understand that Flying Foxes are vital to our environment as they are a long-range pollinator as they travel up to 100 km a night, ensuring the long-range pollination of trees that only pollinate at night. While bees can only travel 3 km per day. If there were no Flying Foxes, what effect would this have on Australia's hardwood industry? While we advocate for Koalas that if there is no tree there is no koala but if there are no Flying Foxes, who would pollinate the Eucalyptus trees? "No me [Flying Fox], no tree." To continue you may wish to show your students the first one and half minutes of [Tim Pearson's No me, no tree video](#), ensuring you stop just before he reveals what group in society it is. Discuss with the students are there groups in our school or society who are persecuted like Tim Pearson describes? Is this a human group or could it be an animal group? If it could be a group of animal species, what species would it be? Now show the students the next few moments where he reveals what group in society it is: the Flying Foxes. Pause it there and discuss their response.

- What do they think about Flying Foxes?
- Why do they feel like this?
- Is it because of what their parents or friends think?
- Is it from something they read or saw on the television?

Next ask the students if they know what a Microbat is? Get them to note down their opinions on an opinions chart again and why they have this opinion.



If you believe Hollywood bats have a pretty creepy image.

When they're not hanging upside-down screeching at each other they're flying silently at night, under orders from blood-sucking vampires.

But of course reality's a bit different. Bats are delicate creatures and many are under threat.

Then get them to view [BTN's report Mini Bats](#) making sure they note down any facts. Once they have finished this, ask the students if they had to correct many of their opinions. Where did they develop these opinions? Did a friend of a friend say it? How reliable was that source of information?

The information in this report can also be coupled with the pdf Wildlife Preservation Society of Australia resource suggested by the site which is found at: (<http://www.australianwildlife.net.au/pdf/school/Microbats.pdf>).

Flying Fox numbers in Australia have changed markedly since European settlement.

Loss of natural habitat and food supply in New South Wales and Queensland due to land clearing and human culling has rapidly reduced numbers of some species in eastern Australia. Grey-headed Flying Fox and spectacled Flying Fox numbers have decreased to such an extent that they are both listed as vulnerable under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999.

Flying Fox distribution has also changed over the past 30 years due to loss of habitat, the creation of new habitat and the year-round food supply in suburban areas. [Depi.vic.gov.au](#), (2016). *DEPI - Flying Foxes*.

Retrieved 12 February 2016, from [http://www.depi.vic.gov.au/environment-and-wildlife/wildlife/Flying Foxes](http://www.depi.vic.gov.au/environment-and-wildlife/wildlife/Flying_Foxes)

For example, the range of the grey-headed Flying Fox has contracted in the northern area (southern Queensland and northern New South Wales) and expanded southwards into Victoria. Students could investigate these distinctions and how they the designations are all based on population numbers, and then link to which bats are classified as what through to extinct and resources to explore this...ask them to think about what they can do with this information. Maybe look at working with a local bat group to do some kind of empowerment or education activity.

The following activity asks students to evaluate a media article that reports “The Gayndah Flying Fox colony contains about 250,000 animals, made up of black and little red Flying Foxes.” Find the full article at <http://www.smh.com.au/environment/conservation/bat-colony-to-be-removed-20110812-1iqcm.html#ixzz3wbchja3J>

Students can use the National Flying Fox Monitoring Website to confirm or deny this information. The National Flying Fox Monitoring program has an interactive Flying Fox web Viewer. This can be found at [http://www.environment.gov.au/biodiversity/threatened/species/Flying Fox-monitoring](http://www.environment.gov.au/biodiversity/threatened/species/Flying_Fox-monitoring)



The screenshot shows a web browser window with the URL [www.environment.gov.au/biodiversity/threatened/species/flying-fox-monitoring](http://www.environment.gov.au/biodiversity/threatened/species/flying-fox-monitoring). The page is titled "Monitoring Flying-Fox Populations" and features a navigation menu on the left with categories like "Biodiversity", "Threatened species & ecological communities", and "Threatened species". The main content area has four tabs: "Policy statement", "Monitoring Programme", "Environment law", and "Hendra virus". Below the tabs are four images: a bat on a branch, a close-up of a bat's face, a bat in flight, and a sunset over water. Below the images is the "Interactive Flying-fox Web Viewer" section, which includes a map of Australia showing the distribution of Flying Foxes and a text description of the viewer's functionality.

Retrieved from [http://www.environment.gov.au/biodiversity/threatened/species/Flying Fox-monitoring](http://www.environment.gov.au/biodiversity/threatened/species/Flying_Fox-monitoring)

This map is an interactive map which can generate graphs of the population of various Flying Fox species. Students may become more involved if they can choose their own data. This can be done by clicking on the map and choosing the roost area. The following link is a help page with steps to finding the data. <http://www.environment.gov.au/webgis-framework/apps/ffc-wide/ffc-wide-help.jsf>

The following article also claims Inverell to have “a large colony of Flying Foxes” [http://www.abc.net.au/news/2013-11-27/inverell-sc-discusses-Flying Fox-infestation-with-oe/5121278](http://www.abc.net.au/news/2013-11-27/inverell-sc-discusses-Flying-Fox-infestation-with-oe/5121278)

Students can use the National Flying Fox monitoring website to confirm or deny these reports of large colonies. A discussion can be had over what constitutes a “large” colony, and what numbers are needed to ensure the species survives. Encourage students to research more articles regarding the number of Flying Foxes in colonies and evaluate the claims in the reports.

Please Note: For accurate results students will need to look at the date of the articles and ensure they are looking at the same time period in their research.

These websites use information based on accurate scientific and statistical data rather than fun interesting facts.

Australian Government, Department of Environment National Flying Fox Monitoring Program. This can be found at  
[https://www.environment.gov.au/biodiversity/threatened/species/Flying Fox-monitoring](https://www.environment.gov.au/biodiversity/threatened/species/Flying_Fox-monitoring)

Qld Government Department of Environment and Heritage Website  
<https://www.ehp.qld.gov.au/wildlife/livingwith/flyingfoxes/index.html>

NSW Government Department of Environment and Heritage Website  
<http://www.environment.nsw.gov.au/animals/flyingfoxes.htm>

VIC Government Department of Environment, Land, Water and Planning  
[http://www.depi.vic.gov.au/environment-and-wildlife/wildlife/Flying Foxes](http://www.depi.vic.gov.au/environment-and-wildlife/wildlife/Flying_Foxes)

SA Government Department of Environment Water and Natural Resources  
[http://www.environment.sa.gov.au/managing-natural-resources/Plants\\_Animals/Living\\_with\\_wildlife/Grey-headed\\_flying\\_foxes](http://www.environment.sa.gov.au/managing-natural-resources/Plants_Animals/Living_with_wildlife/Grey-headed_flying_foxes)

Parks and Wildlife Commission NT  
<http://www.parksandwildlife.nt.gov.au/wildlife/living-with-animals/flyingfox#.VrAXpv195pk>

Parks and Wildlife Service Tasmania  
<http://www.parks.tas.gov.au/indeX.aspX?base=4905>