Teaching About Flying Foxes and Microbats: HPE

About this teaching resource:

The following are teacher resources that align with Year 8 to Year 10 Australian Curriculum HPE. 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=Io3yl0OhTSY
https://www.youtube.com/watch?v=2GncgfPNNms

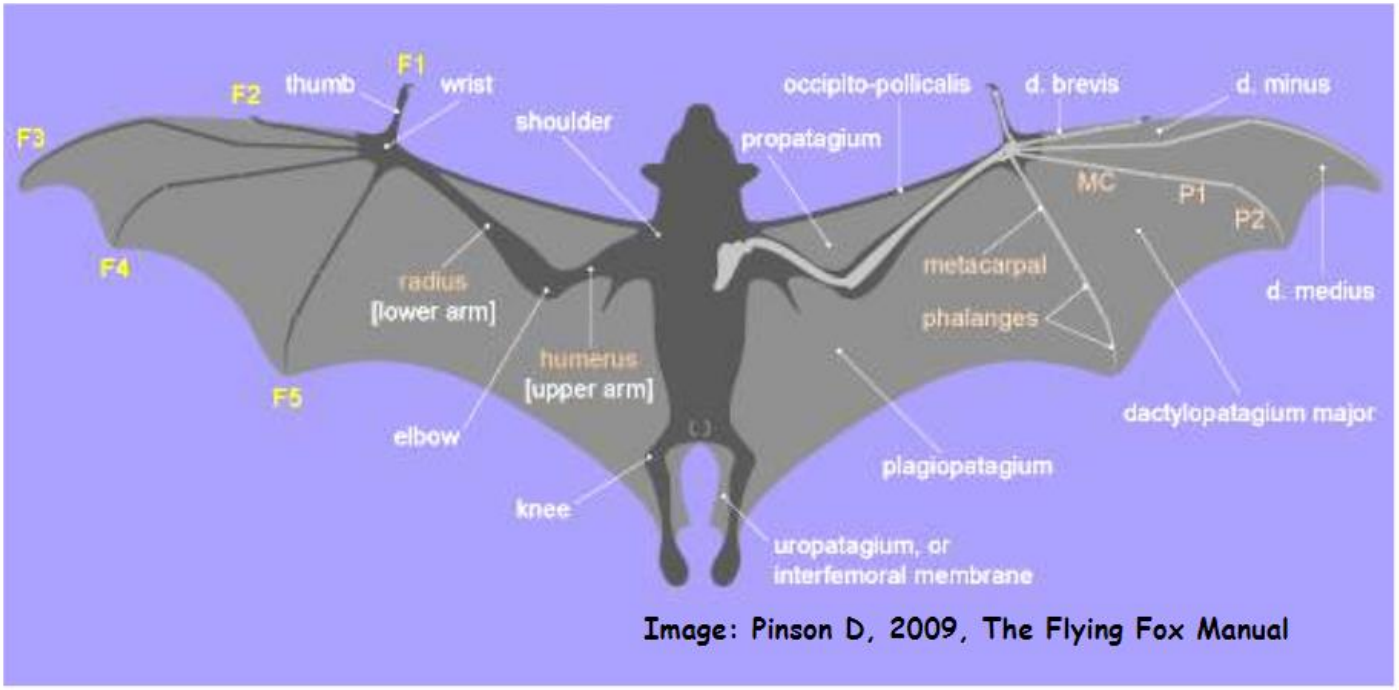
Project Leader and Head developer/writer: Dr. Alison Sammel. *Please reference Dr Alison Sammel when using this material*. Please direct questions to: a.sammel@griffith.edu.au

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.

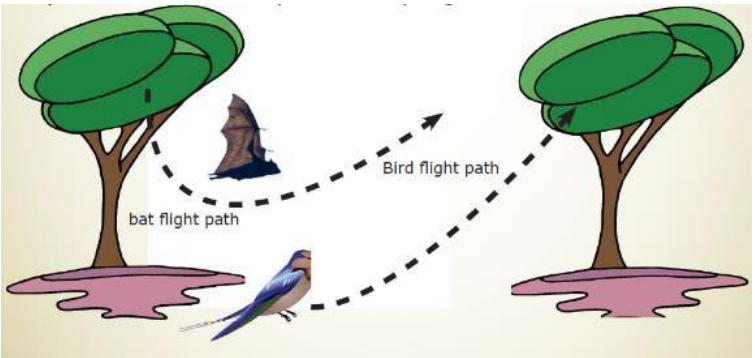
Notes for Teachers about Flying Foxes and Microbats

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.



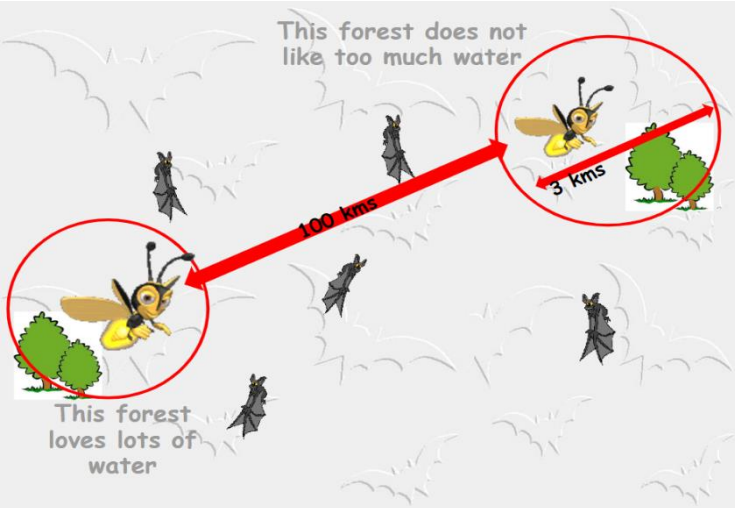
Bats are not aggressive animals. Bats do not ‘swoop’ or ‘attack’. If spooked, a bat will fly away but because they have hands and fingers rather than wings, they must drop or fall in order to catch the wind that will provide them with the lift necessary to sustain their flight.



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

Teaching About Flying Foxes and Microbats

Australian Curriculum (Health and Physical Education): Foundation

Communicating and interacting for health and wellbeing:

Identify and describe emotional responses people may experience in different situations (ACPPS005)

- identifying and describing the emotions of people who are happy, sad, excited, tired, angry, scared or confused (RS, MH)
- learning and using appropriate language and actions to communicate their feelings in different situations (MH, RS)
- recalling and sharing emotional responses to different situations and representing this in a variety of ways (RS, MH)
- reading and viewing stories about adventures and talking about how characters feel and react when taking risks
- talking about connections between feelings, body reactions and body language
- exploring how someone might think and feel during an emergency

Teaching suggestions and links to the curriculum:

In exploring this unit of health education, foundation students will be provided with the opportunity to identify and describe different emotional responses and help students build empathy towards others. It is quite common for young students to have developed a negative image of either a Microbat or Flying Fox through cartoons or even representations of bats (usually viewed as a Microbat with its teeth showing) during Halloween festivities.

To begin, explicitly teach students about empathy as the ability to understand and share the feelings of another. Then complete an activity where there will be several boxes with different scenarios, for instance, "this little boy has to go to the dentist and is feeling scared. Put yourself in his shoes, how might you be feeling? What could you say to do or make him feel better?" Have several of these scenarios for the students to discuss, including one about a small child losing their mother. Pose the question to the students if we should feel empathy to animals? Would their feelings change if it was a kitten or a puppy? What about if it was a bat? What are the images that come to mind when they think about these animals? Is the kitten cute and fluffy? Does the puppy have big brown eyes? What do they think about the bat?

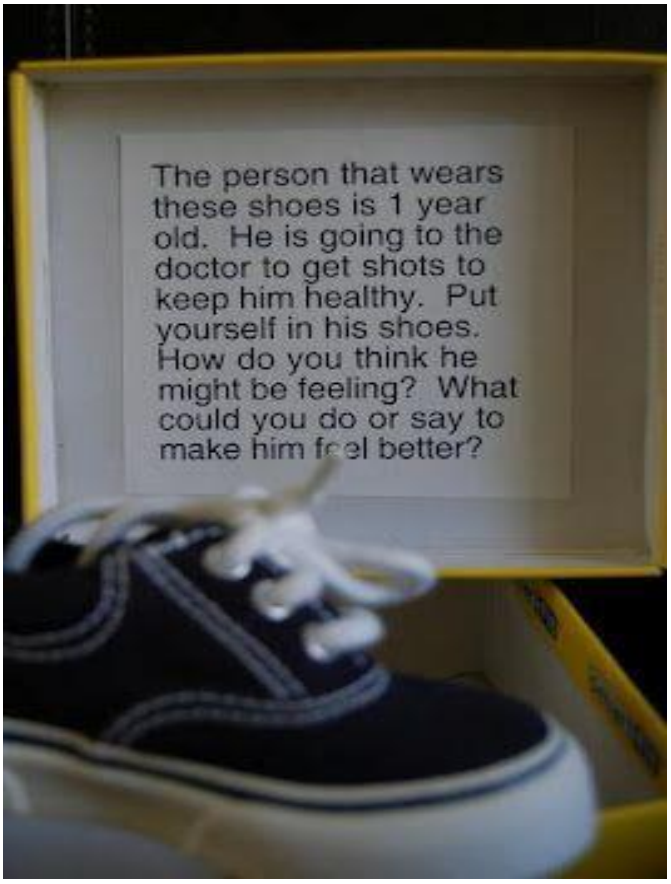
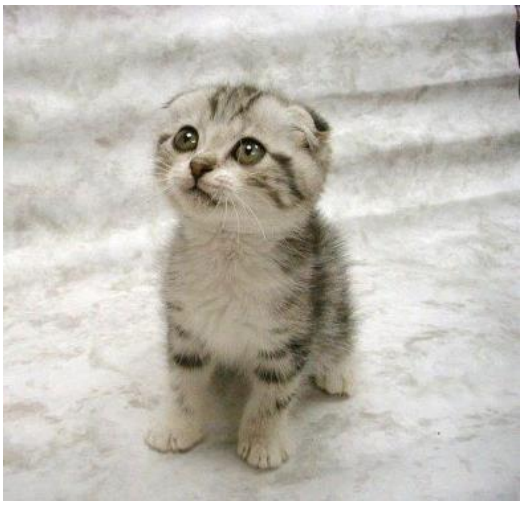


Image retrieved from: http://corneroncharacter.blogspot.com.au/2012/07/empathy-in- shoe-box-guest-post.html



Is this what comes to their mind when they think of a puppy or kitten?

Image retrieved from: http://www.bbc.co.uk/newsbeat/article/32536857/puppy-room-offered- to-relax-stressed-students

Image Retrieved from: http://img2.wikia.nocookie.net/cb20080410164923/uncyclopedia/images/0/0a/Cute_kitten. p.jpg

What about when they think of bats (this is a picture of a Microbat)?

Is this image to the right, what they imagine? Something that is 'scary'? And why does the media always picture a Microbat with their mouths open and their teeth showing? A Microbat will open its mouth like this if it is scared and trying to look big, bold and intimidating. They are very tiny, only the size of your little finger, so showing their teeth might scare their predator. But 99% of the time, they are just like us and have their mouths closed and their teeth hidden.

Why do the students imagine puppies and kittens to be cute and fluffy but not a Microbat?

If you look at the image to the right, you can see that they are actually very soft and furry too. If kittens or puppies were shown with their mouths open and their teeth showing, would that also change the student's minds?

Discuss how often they are given a bad representation due to Halloween and the media.

Images retrieved from: http://www.dailymail.co.uk/femail/article-2657036/Meet-Bat-Man-Mexico-loves-vampire-bats-lets-drink-BLOOD.html

https://s-media-cache-ak0.pinimg.com/736x/23/20/26/232026e2ffadf128312ec97099a0a35d.jpg

Here are more images of a Microbat and from both images you can see that they are tiny in comparison to the hand of their carer, not to mention cute!

Photo credit: Bats QLD

Show the students these images of Lana (left) and Bruce (right) who are a Megabat (Flying Fox) orphans. Does this image change their perceptions about a ‘bat’ now?

Discuss what compassion for other looks like to them? What compassion do they need? How might they extend this compassion to Lana and Bruce? What would you say them?

Images retrieved from: https://www.facebook.com/BatsQLD/

Discuss with students the importance of being empathetic and compassionate towards other humans, as well as non-human animals, including Flying Foxes and Microbats, and plants.

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 is to ensure 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

Additional links:

Video on orphan bat pups: https://www.youtube.com/watch?v=bbTWWWtFFUs

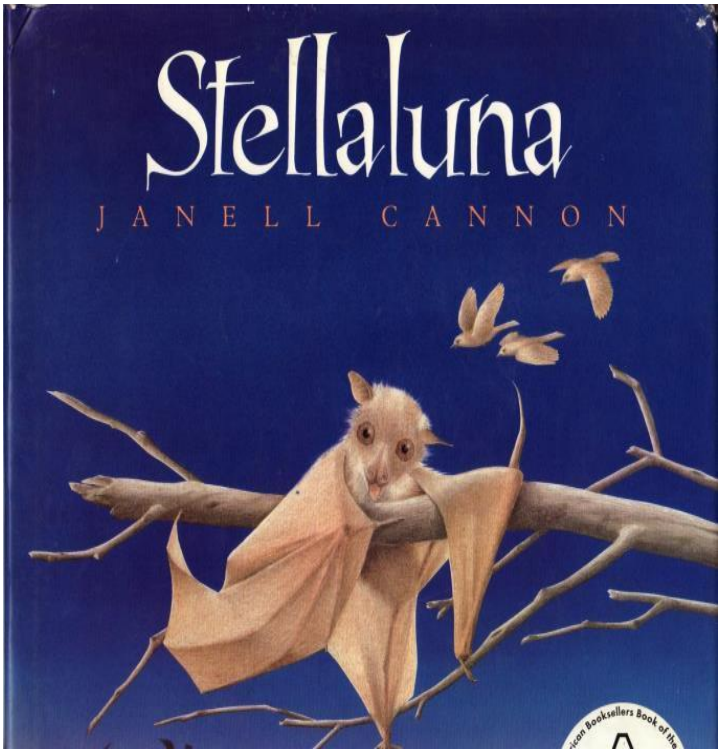
Video showing a mother bat responding to her pup's cries and coming to the rescue http://blogs.discovery.com/bites-animal-planet/2015/10/bat-mom-hears-babys-cries-for-help- swoops-in-to-save-the-day.html

Empathy in a shoe box activity http://corneroncharacter.blogspot.com.au/2012/07/empathy- in-shoe-box-guest-post.html

Behind the News offers a student friendly report about how Microbats are often misunderstood. The report can be found at the following link: https://www.google.com/url?q=http%3A%2F%2Fwww.abc.net.au%2Fbtn%2Fstory%2Fs284 8332.htm

Additional information:

To build a more empathetic standing, it is a good idea to read books such as *Stellaluna* by Janell Cannon. This will enable the students to develop empathy towards bats as they are able to relate that the emotional responses they feel are felt by bats (Flying Foxes and Microbats) as well. When reading the book to the students, take time to reflect on different emotional responses presented throughout the book such as love, scared, fear, curious, anxious, embarrassed, ashamed or happy and why they are experiencing them.



Have they ever been lost or felt like they might get lost? How did that make them feel? Have they ever had to stay at someone else's house? What was it like sleeping in a different bed or eating different food? As you read through the book think aloud posing questions such as, "I wonder how I would feel if I was Stellaluna and I lost my mum?"

Stellaluna and this activity also provides links for cross curricular opportunities as students can learn about how Flying Foxes and Microbats lose their mothers and often become orphans due to heat stress (refer to the links below). This will also provide opportunities to discuss the effects of loss of habitat as when trees are cut down for humans to build houses or farms, as we often use the most suitable and fertile land. This leaves a habitat where the trees and land are not suitable as the area may be too hot, lack water, shade or a breeze.
Discuss the effects that this would have on Flying Foxes and Microbats if this is the only place that is left for them to live. They will find shade in trees but if there is little trees and it gets too hot they are often trapped there as there as it is too hot in the day to fly. They will move from the safe, top of the tree to follow the shade to the lower levels where the air is cooler; however, this often leaves them vulnerable to predators at this height. Mothers who are carrying their pups often suffer as they become too exhausted and heat stressed to fly to cooler areas or find water. What can we do to reduce the effects of culling and deforestation?

While the video of a lost pup crying for her mother will show students that a mother bat will use her hearing and sense of smell to locate her lost pup, just like a human mother would try finding her lost child.

Links for further information:

- An article that discusses the effects of the 'killer climate' on bats http://ausbats.org.au/australias-flying-foxes/4583295057
- http://www.hindustantimes.com/bhopal/bhopal-bats-belly-dip-in-upper-lake-to-beat- the-heat-and-survive/story-cxJB3SPKTUjpPRlPafDtpM.html
- Managing heat stress in Flying Fox colonies http://www.fourthcrossingwildlife.com/HeatStress-StanvicMcDonaldCollins.pdf
- https://vimeo.com/86222807

Note: There are two kinds of Bats - Flying Foxes and Microbats and it is important to model the correct use of terms, even if the videos do not.

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

YouTube Stellaluna read aloud by Pamela Reed
www.youtube.com/watch?=VLRlvyWUzxs

Links to animals demonstrating emotions

- http://www.buzzfeed.com/expresident/stories-that-prove-animals-have- souls#.cm3Lpb6vY0
- http://www.livescience.com/49093-animals-have-feelings.html
- http://www.onegreenplanet.org/animalsandnature/amazing-displays-of- animal-emotion/
- Cat trying to save another cat https://www.youtube.com/watch?v=YYs0BMcS0b4
- A hungry stray dog saves a newborn baby's life https://www.youtube.com/watch?v=1jXTfxF-Eyk

Teaching About Flying Foxes and Microbats

<u>Australian Curriculum (Health and Physical Education): Foundation</u>

Movement and Physical Activity:

Participate in games with and without equipment (ACPMP009)

Contributing to Healthy and Active Communities:

Participate in play that promotes engagement with outdoor settings and the natural environment (ACPPS007)

- exploring a range of ways to play and be active in outdoor or natural settings (HBPA, RE, AP)
- understanding how to be safe in the outdoors through play in natural environments (S, AP, FMS, HBPA)

Teaching suggestions and links to the curriculum:

In exploring this unit of physical education, foundation students will be provided with the opportunity to engage in learning about bats, while participating in play in an outdoor setting. The game that students will play is 'Sly Fox and Wise Owl' where the sly fox lives under one tree and the wise owl lives under another tree. The teacher will read out a fact about bats and the students decide whether it is a fact, and if it is, they will run to the wise owl tree.

However, if they decide that it is not a fact they will run to the sly fox. The teacher can then discuss with the students why they made that selection. Once they have done this, the students meet again in the middle and a new statement is said, and the process repeats itself.

This activity could be used to check the students' understanding or it could be used to introduce the topic of Flying Foxes and Microbats through creating discussion from their responses. Use this time to observe any misconceptions or perceptions that the students have about bats. Discuss why they may fear bats and why they may think they swoop at people. See teachers notes at the beginning of this document for the correct information.

Refer to the links below in the resource section for additional information. It is important to address these misconceptions that often people have developed due to negative images of bats through cartoon and media representations, for example, Halloween. Therefore, this activity will help enable students to recognise that bats are not bad and to establish a more empathetic and accurate understanding of bats.

An adapted KWL chart can be utilised to record what the students know, what they learnt and any misconceptions that were addressed.

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

Resources:

- Two trees – this could be cut outs or a pole or something to represent a tree. A sly fox cut out or toy
- A wise owl – cut out or toy
- Statements- a list of true and false statements. These could be derived from the notes for teachers at the start of this document.

- http://ausbats.org.au/bat-fact-packs/4562894228
- This presentation aimed at Primary Schools offers information on the importance of bats, their physical structure and how they fly.
- Bat and Flying Fox presentation for Primary Schools
- This blog offers 8 things that you may not know about bats: http://blogs.discovery.com/bites-animal-planet/2015/10/8-things-you-might-not-know- about-bats.html
- Behind the News offers a student friendly report about how Microbats are often misunderstood. The report can be found at the following link: https://www.google.com/url?q=http%3A%2F%2Fwww.abc.net.au%2Fbtn%2Fstory% 2Fs2848332.htm
- 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).
- http://ausbats.org.au/bat-fact-packs/4562894228

Teaching About Flying Foxes and Microbats

<u>Australian Curriculum (Health and Physical Education): Year One and Two</u>

Movement and Physical Activity:

Create and participate in games with and without equipment (ACPMP027)

- inventing games with rules using one or two pieces of equipment (FMS, AP)
- participating in games that use a number of different fundamental movement skills (AP, FMS)
- using stimuli such as equipment, rhythm, music and words to create games (FMS, AP, RE)

Learning through movement:

Use strategies to work in group situations when participating in physical activities (ACPMP030)

- working cooperatively with a partner when practising new skills (RS, FMS)
- describing and demonstrating how to include others in physical activity (FMS, RE, AP, RS)
- suggesting and trialling how a game can be changed so that everyone can be involved (AP, RS)

Teaching suggestions and links to the curriculum:

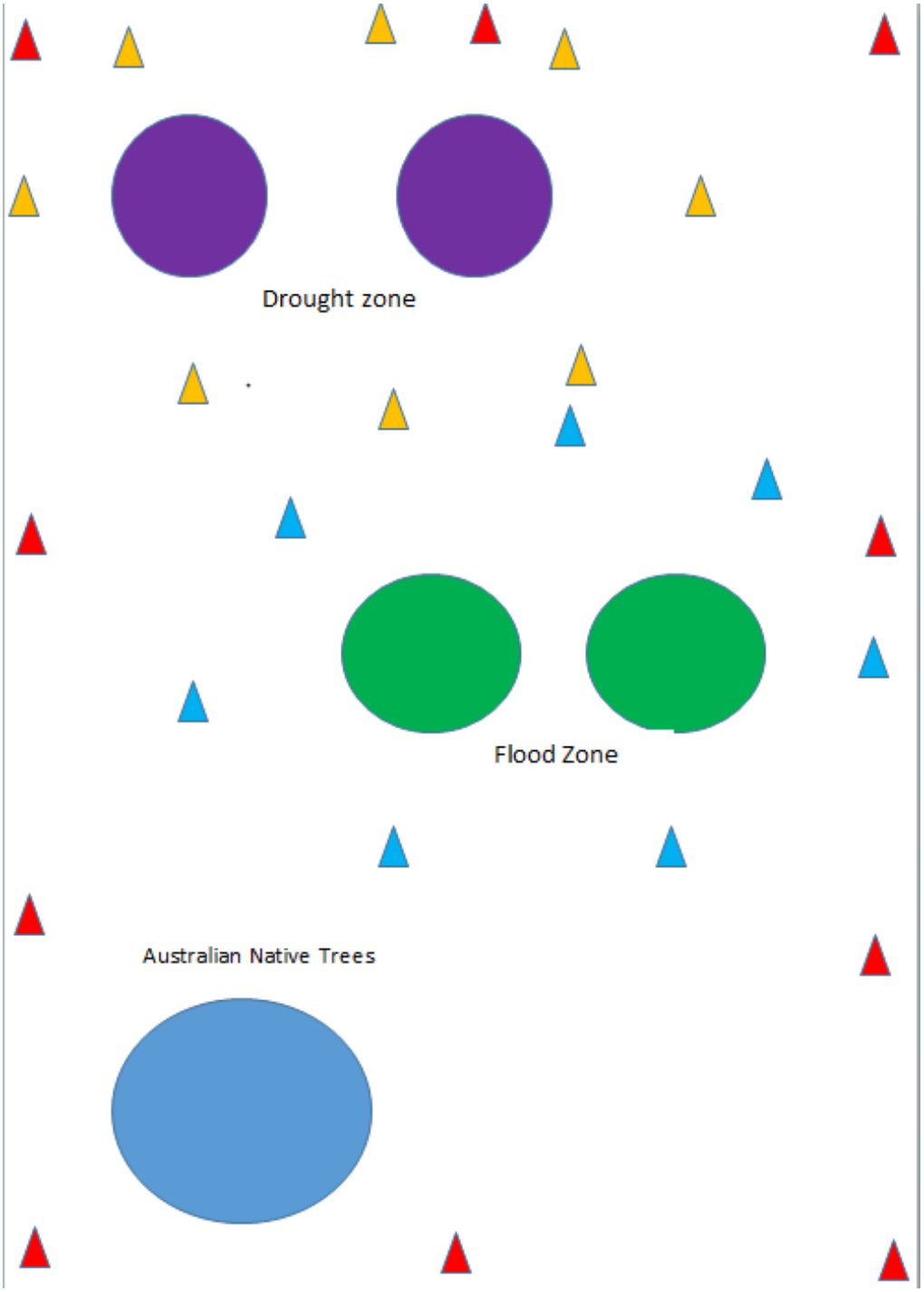
In exploring this unit of physical education, foundation students will be provided with the opportunity to engage in learning about Flying Foxes, while participating in play in an outdoor setting. The game that students will play is a pollination game where there will be 3- 4 different pollination zones and students will be divided into 3 groups. Two groups will be bees and these can have two different coloured bibs on. The third group can be the Flying Foxes who can have no bib on. Each group will have a team bucket where they collect the 'pollen'. Each zone will have different coloured balls or items to correspond to that zone. While each team had to stay within their allocated zone that is marked out with coloured cones. In this example the Flying Foxes are allowed within the red cone zone, which allows them access to all three zones.

When signalled the teams work together, collecting one 'pollen' at a time into their team's bucket which is located within their zone. After some time signal the students to bring their buckets and to sit down facing the teacher in their groups.

Discuss with the students if they had any difficulty? Did they get a variety of different coloured balls? Here the bees will mention they could only collect from the one colour because they had to stay within their allocated zone.

This will enable you to discuss how bees although they are great pollinators, they often only travel up to 3 km where Flying Foxes are a long-range pollinator as they travel up to 100 km a night, ensuring the long-range pollination of most native trees that only open their flowers to pollinate at night. Therefore, Flying Foxes ensure a great genetic diversity among trees of the same species as they spread the genomes those trees from both flood prone areas and drought zones. This results in the existence of trees that can survive Australia's harsh climatic variations as it is able to tolerate both flood and drought. Where, bees can not to achieve this due to their short pollination range. Ensure that students understand the importance of Flying Foxes to our native environment.

However, it is also important to mention that this game was constructed to magnify Flying Foxes importance as a long-range pollinator and is not a true representation of how pollination occurs.



There are some useful videos and links that will provide you with further information on this topic:

- A great video discussing this issue was commissioned by Flying Fox Rescue Release Noosa Inc. and can be found at https://vimeo.com/86222807. (Please note that there are 2 kinds of Bats - Flying Foxes and Microbats. It is important to model the correct use of terms, even if the videos do not)
- https://www.youtube.com/watch?v=e-KL9xmyU (Please ensure your students understand never to touch an injured bat. If they are to see an injured bat, they must contact a local bat rescue organisation immediately).
- No me, no tree: Tim Pearson at TedxCanberra
- https://www.youtube.com/watch?v=qnOhS5jVBFk
- http://www.batworlds.com/bat-role-in-pollination/
- http://www.bats.org.uk/pages/why_bats_matter.html
- This presentation aimed at Primary Schools offers information on the importance of bats, their physical structure and how they fly: Bat and Flying Fox presentation for Primary Schools

Teaching About Flying Foxes and Microbats

<u>Australian Curriculum (Health and Physical Education): Year One and Year Two</u>

Contributing to Healthy and Active Communities:

Recognise similarities and differences in individuals and groups, and explore how these are celebrated and respected (ACPPS024)

- examining images or descriptions of different families, communities and cultural groups to identify the features that make them similar and different (RS)
- sharing the things that make them similar to and different from others in the class (FN, RS)
- exploring the importance to different cultures of storytelling through dance, music and song, including Aboriginal Dreaming/Creation stories (RS, RE)

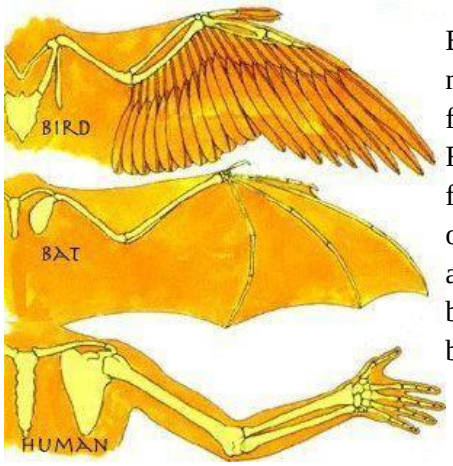
Teaching suggestions and links to the curriculum:

In exploring this unit of health education, students will recognise the similarities and differences in people and explore how these can be celebrated and respected. To achieve this, the popular children's book *Stellaluna* will be incorporated to enable students to develop a sense of respect and ability to celebrate the importance of one another, including Flying Foxes.

To begin, discuss with the students what are similarities and differences between the students in the class, for instance their eye colour or hair colour? Are there any differences? Discuss with the students if they can think of any other differences and similarities between human and other animals.

Read *Stellaluna* to the students, taking time to discuss the similarities and differences between Stellaluna (bats) and birds and discussing how Stellaluna might have felt about not being able to do the things the birds could. Should she feel bad because she can't so the things birds could do or that she didn't like the taste of insects? Use a bat Venn diagram to list the differences and similarities between Flying Foxes like Stellaluna and birds, initially using the book for comparisons, such as fur or feathers, how they sleep and what they like to eat. Birds eat insects and worms, but Flying Foxes enjoy eating pollen or fruit.

Begin extending from this to discuss the features of a mammal or a bird, for instance, birds have feathers and lay eggs while bats have fur give birth to live pups. Flying Foxes are a placental mammal so once they are born, they cling to their mother.



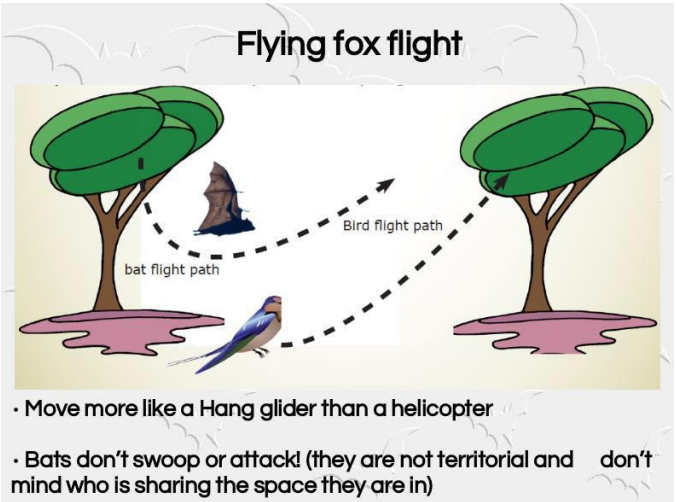
Baby birds are fed worms and insects while bat pups drink milk from their mother. Although a Flying Fox can fly it is the only mammal capable of true flight, they have a large chest and thin legs, making them aerodynamic. Flying Foxes have hands (not wings) just like a human but they have longer fingers and are covered with a membrane (the same membrane material as our eyelids). Their hands can be folded in between strokes as they fly, allowing them to make sudden swift turns or suddenly rest upside down on a branch. Whereas birds fly by flapping their wings and the do not have finger bones like a human.

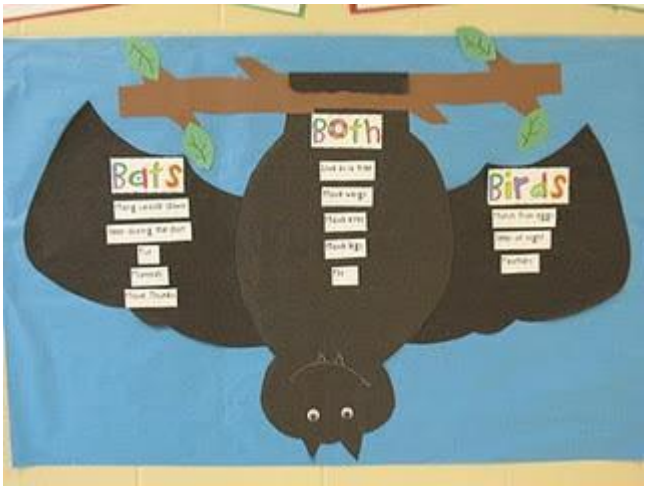
Due to being top-heavy a bat cannot take off standing like a bird, rather they fall from a tree in an action like a hang glider, which makes it seem as though they are swooping us but that is just how they fly (see the teachers notes at the start of this resource for further information).

Unlike birds, bats have elongated fingers that are covered in a membrane rather than feathers.

For further information on the difference between birds and bats refer to the links below.

Image retrieved from: http://mrsmorrowskindergarteners.blogspot.com/ (bat Venn diagram) Image retrieved from: http://mrsgebauer.com/bats/birds/bird.html (bone structure)

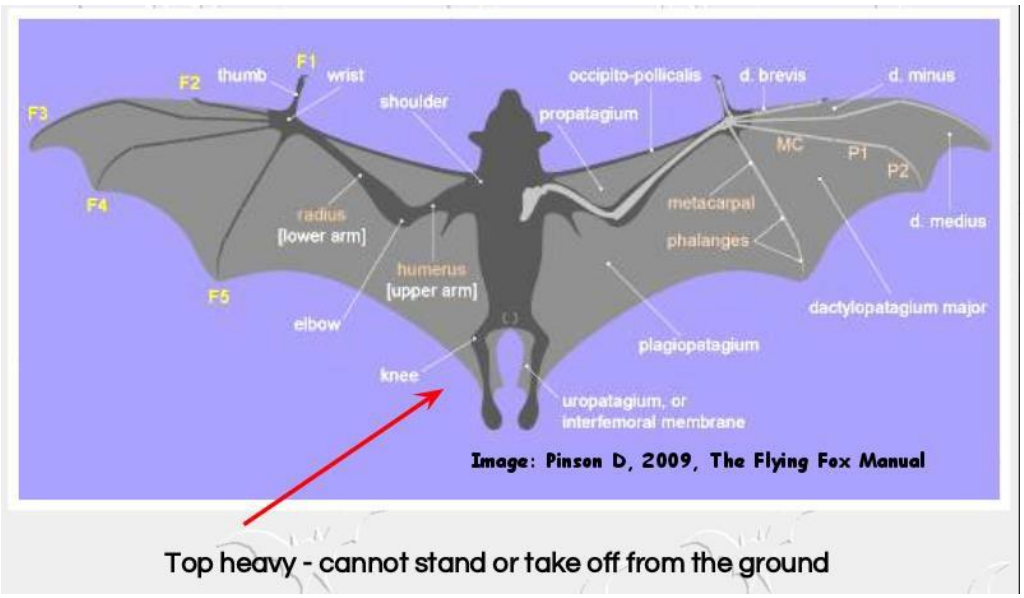




Links to further information:

https://www.youtube.com/watch?v=2LHUNLkmwbc
https://www.youtube.com/watch?v=9FVoTMOorXA
http://ausbats.org.au/cool-facts-about-bats/4569172153
http://mrsgebauer.com/bats/birds/bird.html
http://www.differencebetween.com/difference-between- bats-and-vs-birds/

Photo credit: Bats QLD



Get the students to think about how Stellaluna felt when she was trying to be a bird, was she happy? Compare this with how she felt once she was with her family and doing this a Flying Fox does. Discuss how it is important that Stellaluna eat fruit and pollen as many of Australia's native trees rely on them for pollination. Relate these to similarities and differences that can occur in individuals and groups and why these are important. What would it be like if we were all the same? How can these be celebrated and respected?

Using a large roll of butcher paper, pin it on the wall to create a 'graffiti wall' where students can draw and list similarities and differences, taking the time to celebrate the importance of similarities and differences in individuals and groups, including animals.

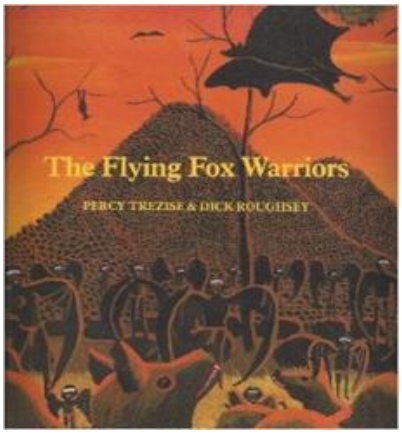
Note: *The Flying Fox Warriors* can also be utilised to incorporate Australia's First peoples' perspectives, using a similar approach as listed above. However, the similarities and differences between the Bird people and the Joonging people, birds and Flying Foxes will be discussed. It would be a great time to touch base with your local Aboriginal or Torres Straits Islander community and/or Elders and find out more about the traditional people who lived in your area. To share this valuable knowledge, when appropriate, and to build relationships, you could invite someone from your local Aboriginal or Torres Straits Islander community to come and speak with your students about the local knowledge of the importance of celebrating and recognising differences between each other and connecting with nature.

Resources:

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

YouTube Stellaluna read aloud by Pamela Reed
www.youtube.com/watch?=VLRlvyW

Trezise, P & Roughsey, D. (2000). *The flying fox warriors.* Sydney: Collins Publisher Australia



For further information: https://www.youtube.com/watch?v=9FVoTMOorXA
http://www.differencebetween.com/difference-between-bats-and-vs-birds/
http://ausbats.org.au/cool-facts-about-bats/4569172153
http://mrsgebauer.com/bats/birds/bird.html

Teaching About Flying Foxes and Microbats

Australian Curriculum (Health and Physical Education): Year 3 and Year 4

Communicating and interacting for health and wellbeing:

Investigate how emotional responses vary in depth and strength (ACPPS038)

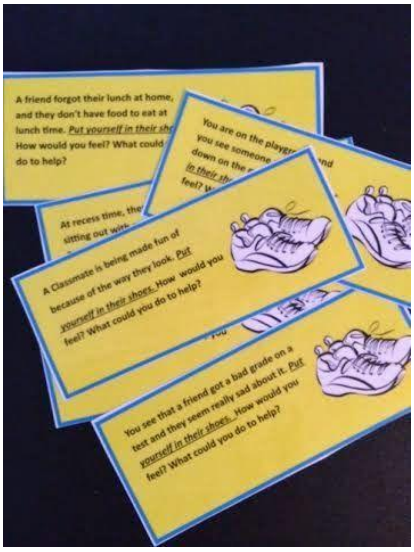
- recognising own emotional responses and levels of their response in different situations (RS, MH)
- understanding that emotional responses vary across cultures and differ between people and different situations (MH, RS)
- analysing scenarios and identifying possible triggers and warning signs to predict emotional responses (MH, RS)

Teaching suggestions and links to the curriculum:

In exploring this unit of health education, students will be provided with the opportunity to identify and describe different emotional responses and recognise how these can vary in depth and strength. The aim of this unit is to enable the students to recognise different emotions and to be able to understand the differences between these emotions. This requires unit requires students to recognise their emotions and apply this knowledge to
understand how others might feel, developing their empathy and ability to handle their emotions.

To begin ask the students what an 'emotional response", who has emotional responses and are they always the same? Next brainstorm different emotional responses with the students and how they can be different. Introduce the 'emotional thermometer' (refer to the link below) to the students and discuss where some of these would fall on the thermometer.
Ensure that you note that different people can have different levels of emotions for the same emotional response to a situation like being told you can't play with your friends at lunch time or having extra homework.

Image Retrieved from: http://sapsp7.weebly.com/uploads/2/4/7/3/24735495/emotional_thermometer.jpg (emotional thermometer)

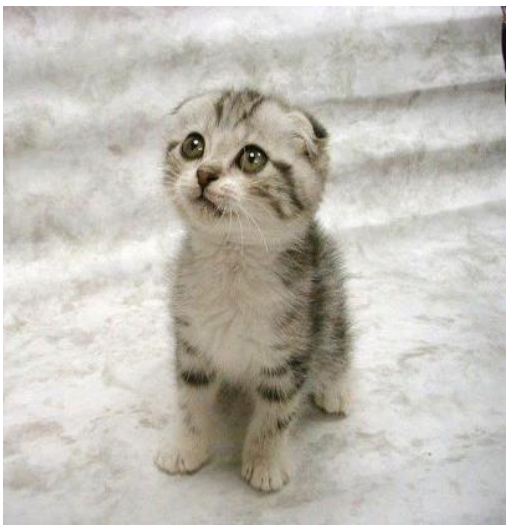


Get the students to complete the empathy scenario activity in pairs or small group. Further information at this activity can be found using the links below. Also ensure that students use the emotional thermometer to gauge their level of emotional response. Once students have completed this activity as a whole class discuss what they felt about the different scenarios. Then as a whole class discuss scenarios such as a small child is lost and can't find their way home and a small child has lost their mother. What are their emotional responses to this situation? What emotion would they feel?
What level would it be on the emotional thermometer? What could they do to help the small child? Ask the students would their response or level of emotion change if it were an animal like a puppy or a kitten? Would they feel sad for the kitten or puppy and would they want to help it? What about if it was a Microbat or a Flying Fox?
Image retrieved from: http://cheerfulcounseling.blogspot.com.au/2014/03/spring-freebie- week.html

Further information on the empathy activity:
http://cheerfulcounseling.blogspot.com.au/2014/03/spring-freebie-week.html

Direct link to download the activity cards: https://www.teacherspayteachers.com/Product/In- Someone-elses-shoes-Empathy-Activity-1078698

Here is it important to note that 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. Why is it that the following images come to mind when we think about these animals?



Images retrieved from:
http://www.bbc.co.uk/newsbeat/article/3 2536857/puppy-room-offered-to-relax- stressed-students
http://img2.wikia.nocookie.net/ cb200 80410164923/uncyclopedia/images/0/0 a/Cute_kitten.p.jpg
http://www.dailymail.co.uk/femail/article-2657036/Meet-Bat-Man-Mexico-loves- vampire-bats-lets-drink-BLOOD.html

What about when they think of Microbats or Flying Foxes? Is this what they picture? Something that is ‘scary’? Why do the students picture cute and fluffy puppies and kittens but not a bat?

Do they picture a dog growling and showing its teeth, or do they picture a cute big-eyed puppy? Discuss how often they are given a bad representation due to Halloween and the media.

Show the students these images. Do these image change their perceptions about bats?

Image retrieved from: https://www.facebook.com/BatsQLD/

While the following images are a Microbat, students can compare these Microbats to the "scary" image of a Microbat above. Microbats will open its mouth like this if it is scared and trying to look big, bold and intimidating. They are very tiny, only the size of your little finger, so showing their teeth might scare their predator. But 99% of the time, they are just like us and have their mouths closed and their teeth hidden. As you can see, they are also fluffy and cute, like a puppy or a kitten.

Photo credit: Bats QLD
Image retrieved from: https://s-media-cache-ak0.pinimg.com/736x/23/20/26/232026e2ffadf128312ec97099a0a35d.jpg

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 is to ensure 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

Links to videos:

Video on orphan bat pups:

https://www.pinterest.com/pin/85568461646109671/

https://www.youtube.com/watch?v=bbTWWWtFFUs

Video showing a mother bat responding to her pup's cries and coming to the rescue http://blogs.discovery.com/bites-animal-planet/2015/10/bat-mom-hears-babys-cries-for-help- swoops-in-to-save-the-day.html

Behind the News offers a student friendly report about how Microbats are often misunderstood. The report can be found at the following link: https://www.google.com/url?q=http%3A%2F%2Fwww.abc.net.au%2Fbtn%2Fstory%2Fs2848332.htm

Show the students the videos to address any misconceptions that the students may have about bats. How did they feel for the lost pup who was crying for its mother? Have their perception of bats changed? What if "the small child" who lost its mother was Bruce or Lana, what would you feel? What level of emotion would you feel? Is this the same as you felt for the small human child? What would you say them? Do they feel empathetic towards the baby bat? It is essential that we build the understanding that animals have feelings and that just as we should recognise our feelings and be empathetic to other humans' feelings, we should do the same for animals, including bats. It is important to enable students to understand the importance of recognising and dealing with their emotions. Ensure that the students understand that through finding out accurate information we can deal with our emotional responses in a more accurate way. For example, if a student fears 'bats' they can deal with this emotional response by finding out more about Flying Foxes and Microbats. Through doing so they might learn that they do not swoop at us or want to make a nest out of our hair or that they are not Dracula. This will give the students a sense of empowerment. Furthermore, your local bat group will help with providing students with more information, please refer to the links mentioned above.

Note: This unit would provide a fantastic cross curricular opportunity, particularly with the Science unit as it will provide an opportunity for students to further develop an understanding of why many bats become orphans due to heat stress from the effects of human impacts on the environment. Together these units can enable students to develop empathy towards bats and work together with a local bat conservation group to help support Flying Foxes and Microbats and how we react to situations such as deforestation or culling.

Resources:

- Emotional Thermometer chart http://sapsp7.weebly.com/uploads/2/4/7/3/24735495/emotional_thermometer.jpg
- Further information on the empathy activity: http://cheerfulcounseling.blogspot.com.au/2014/03/spring-freebie-week.html
- Direct link to download the activity cards: https://www.teacherspayteachers.com/Product/In- Someone-elses-shoes-Empathy-Activity-1078698
- Video on orphan bat pups: https://www.pinterest.com/pin/85568461646109671/
- Video on orphan bat pups: https://www.youtube.com/watch?v=bbTWWWtFFUs
- Video showing a mother bat responding to her pup's cries and coming to the rescue http://blogs.discovery.com/bites-animal-planet/2015/10/bat-mom-hears-babys-cries-for-help- swoops-in-to-save-the-day.html
- Behind the News offers a student friendly report about how Microbats are often misunderstood. The report can be found at the following link: https://www.google.com/url?q=http%3A%2F%2Fwww.abc.net.au%2Fbtn%2Fstory%2Fs2848332.htm

Teaching About Flying Foxes and Microbats

<u>Australian Curriculum (Health and Physical Education): Year 3 and Year 4</u>

Moving our body:

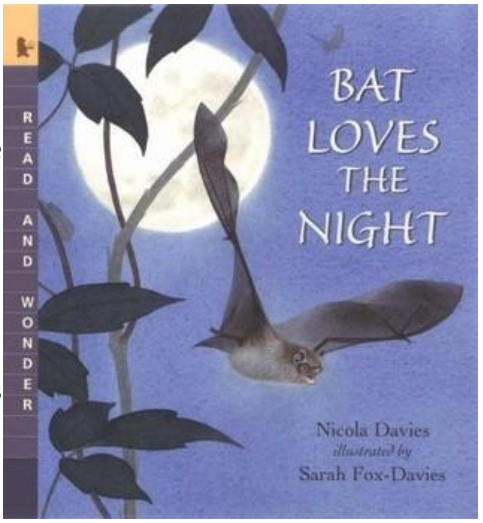
Practise and apply movement concepts and strategies with and without equipment (ACPMP045)

- participating in physical activities which require problem-solving to achieve a goal (CA, RS, AP)
  Learning through movement:

Adopt inclusive practices when participating in physical activities (ACPMP048)

- using cooperative skills to complete a movement task, such as a partner balance, partner passing strategy or team strategy (RE, RS,AP, FMS, CA)
- working cooperatively with team members to maintain possession in a game by passing to other players and listening to teammates (AP,RS)
- modifying physical activities to ensure that everyone is included, such as changing equipment, rules or playing space (RS, RE, FMS,AP)

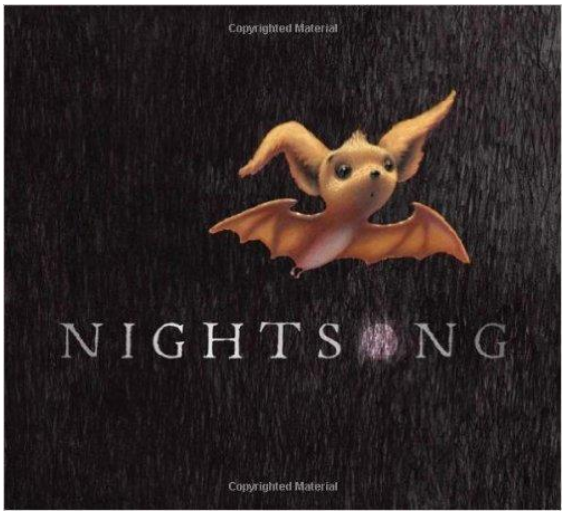
Teaching suggestions and links to the curriculum:



During this unit students will develop an understanding that although we "hear" sound, both bats (mostly Flying foxes) and humans can use sound in order to navigate around objects when they are not able to use their vision. Students will be given the opportunity to apply this knowledge to simple movement tasks. This topic can be introduced by reading "Night Song" by Ari Berk, a picture book to spark discussion about how Microbats use echolocation to allow them to measure the size or location of the object.

You may also wish to read "Bat Loves the Night" by Nicola Davies to the students as it is a more informational children's text which that describes the way in which Microbats will use echolocation to navigate and catch insects. They may also enjoy viewing and listening to the Jumpstart "Bat Echolocation" song.

Ensure that the students understand that it is not true that bats are blind but rather Microbats use echolocation to navigate and find their prey. Therefore, structurally Microbats have large ears and small eyes, which are adapted to its ability to use echolocation; however, they are not blind as they can still see but their vision is bad. While Flying Foxes or primates like in the image to the left have much larger eyes and smaller ears, meaning they can rely on their sight and do not echolocate as Microbats do. It is important to note that Flying Foxes have the same vision and hearing as humans, but their vision is 25% better at night.



Links to information:
http://animals.howstuffworks.com/animal-facts/echolocation-info.htm
Echolocation song - https://www.youtube.com/watch?v=Hr-Y2Tt8gFE
http://bats.org.au/about-bats/microbats.php
https://www.youtube.com/watch?v=2LHUNLkmwbc
http://www.bats4kids.org/echo.htm

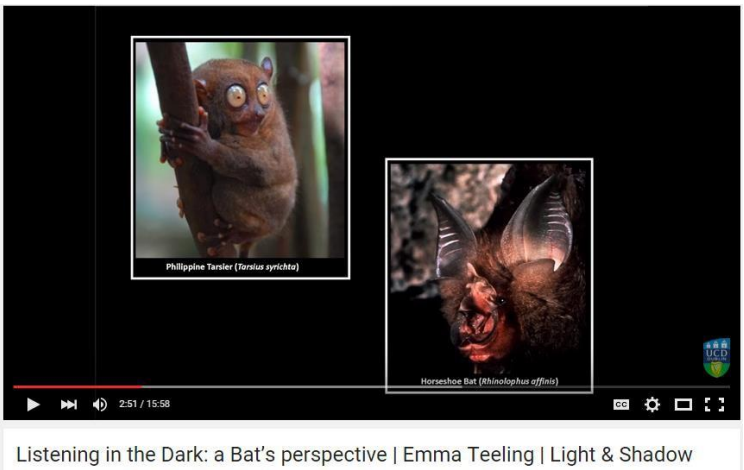


Image retrieved from: https://www.youtube.com/watch?v=2LHUNLkmwbc (view this video for further information on echolocation)

You may wish to show them a video on how Microbats use echolocation on YouTube: https://www.youtube.com/watch?v=p08Y0oRAX3g. However, please note that the video refers to them as "bats", but it is important to model the correct language and refer to them as Microbats. As previously mentioned not all bats use echolocation, Microbats use echolocation while Flying Foxes do not.

To get the students thinking about how echolocation works get them to do an activity where they break up into teams of two. One person wears a blindfold and guesses where the sound is coming from as the other person makes snapping or clapping noises in front of them, behind them or to their side.

Information for the students:

1. Go over the activity Introduction.
2. Ask the students to predict from which location the sound will be most accurately reported (front, side back) and explain why they think this.
3. Break the students into groups of two.
4. For each team, have one student sit in a chair and the other stand nearby with the Echolocation Worksheet.
5. Have students gently blindfold their partner so that they are unable to see. Remind them not to peek!
6. Have the non-blindfolded student snap or clap their fingers while the other student guesses the location from where the snap came.
7. Students should record their partner's response on the Echolocation Worksheet after each snap/clap.
8. Have students follow the Echolocation Worksheet for all nine snaps or claps, and record all responses on the sheet. Students should put a check mark if their partner guessed correctly and an X if they guessed incorrectly.
9. Ask students to write down the number of times they guessed correctly for each location (side, behind or in front).
10. Have students switch places and repeat the procedures. Once both students have guessed, have them give each other their worksheets, so they can use them to create their own bar graphs.
11. Help students' colour in their Echolocation Bar Graph Worksheet with the number of times that they guessed correctly for each location.
12. Talk as a class about the results! Discuss why some locations may be harder to guess than others. (Be aware that noise from other teams will likely be a contributing factor to erroneous guesses.)

Safety Issues

To ensure groups do not trip over and bump into one another, conduct this activity in an area with plenty of space. Remind students to stay seated while blindfolded.

Troubleshooting Tips

Some students may not feel comfortable being blindfolded; if this is the case, allow them to complete the experiment with their eyes closed.

Teacher Observation: Walk around while students are completing the activity and assist them as needed. Talk with students about how challenging or simple it is to locate the sounds. Remind students that some animals are great at echolocation, and engineers mimic (in Sonar) this natural animal response.

Post-Activity Assessment

Results Analysis: Have several students share their bar graphs (if you have time, you can make one giant bar graph for the entire class). Talk about the results, and discuss why some locations were perhaps harder to guess than others. Encourage students to think about why noise from other teams may have made it harder to guess the location of the snaps or claps.

For further information on this activity please refer to https://www.teachengineering.org/view_activity.php?url=collection/cub_/activities/cub_soundandlight/cub_soundandlight_lesson4_activity1.xml

Discuss with the students what implication does this have for humans? There are many blind people who are using the echolocation skills that Microbats use to move around. The BTN report 'Bat Man" states that "scientists have scanned Daniel's brain and discovered the clicks actually trigger the visual part of his brain, rather than the sound part, meaning his brain is weaving the information together to form a picture in his head." This skill has enabled many blind people to move around and even do things like riding a bike. Get the students to view the BTN report "Bat Man". Spend time discussing with the students how beneficial this is to the blind community as now people like Daniel are able to "participate in a wider range of activities with greater levels of comfort and confidence. They can conduct themselves with more poise." Get the students to form into pairs and try to navigate around like Daniel did using echolocation, first click in front of a wall and listen to the sound that bounces back. Next click in front of an open door and listen to the sound the bounces back, forming pictures in your mind of this. Then try to navigate around using echolocation. While the other student will ensure that they do not bump into things or hurt themselves. Then they will swap.

Once the students have completed this activity discuss with them if they found it difficult and remind them that this is a skill that would take a lot of practice and that animals like Microbats are structurally built for using echolocation as they have large ears and use echolocation to catch up to 1,200 insects an hour!

Resources:

BTN Report on Echolocation for blind people: http://www.abc.net.au/btn/story/s3440826.htm
Blind Man uses sonar to 'see' http://www.abc.net.au/news/2012-02-22/blind-man- sees-with-sound/3844270
http://www.dailymail.co.uk/sciencetech/article-3096607/The-blind-using-echoes- Humans-navigate-like-bats-using-vision-brain-hear-sound-says-study.html
Berk, A. (2012). *Nightsong.* New York, NY: Simon & Schuster Books for Young Readers
Davies, N. (2001). *Bat loves the night.* Candlewick Press.

Teaching About Flying Foxes and Microbats

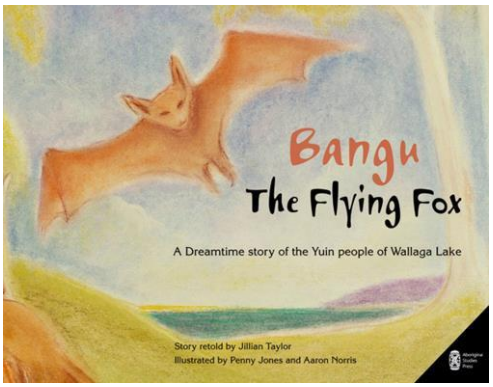
<u>Australian Curriculum (Health and Physical Education): Year 5 and Year 6</u>

Communicating and interacting for health and wellbeing:

Practise skills to establish and manage relationships (ACPPS055)

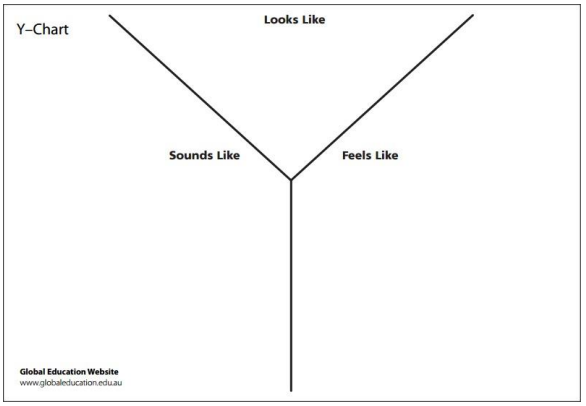
- proposing strategies for managing the changing nature of relationships, including dealing with bullying and harassment and building new friendships (S, RS)
- selecting and practising appropriate ways to share power within relationships

Teaching suggestions and links to the curriculum:



In exploring this unit of health education, students will be provided with the opportunity to identify and describe different skills needed to establish and manage relationships, and what it means to be a good friend. The use of *Bangu the Flying Fox* will provide a rich context that will enable the students to use their prior knowledge and insight for students to construct a deeper understanding of relationships with self, others and nature This will enable the students to discuss the implications that failing to be a good friend had on Bangu and the implication this had on Bangu.

It would be a great time to touch base with your local Aboriginal or Torres Straits Islander community and/or Elders and find out more about the traditional people who lived in your area. To share this valuable knowledge, when appropriate, and to build relationships, you could invite someone from your local Aboriginal or Torres Straits Islander community to come and speak with your students about the local knowledge of their traditional dreamtime stories and the importance of building and maintaining solid relationships with self, others and nature.



To begin brainstorming ask the students what makes someone a good friend and record their different responses. Use a Y-chart to go through what a good friend looks, feels and sounds like. Ask the students whether a good friend would need to do this all the time, sometimes or rarely ever. After this discussion read *Bangu the Flying Fox* to the students, taking time to reflect if Bangu is being a good friend. As you read through the book think aloud posing questions such as, "I wonder how I would feel in that situation if my friend kept doing that to me?"

Image retrieved from: http://www.globaleducation.edu.au/verve/_resources/ychart.pdf

At the end discuss with the students how they would feel if their friend was like Bangu and kept changing sides? What could Bangu have done instead? How they think Bangu felt? What implication did Bangu's actions have on Flying Foxes? After reading this story and talking with someone from your local Aboriginal or Torres Straits Islander community, get the students to review their Y-chart and make any changes. After they have made their changes, discuss what changes did they make and why? It is important to note that being a good friend is essential to not only maintaining solid relationships with others and our self but with nature as well. While we should be kind to other humans, we should also be kind and respectful to animals, including Flying Foxes like Bangu as well.

What can we do to support Flying Foxes and Microbats? First, we can begin to remove the stigma and negative images we have of bats from Halloween festivities and negative appearances in the media by teaching students about these misunderstood animals and why they are such a vital part of our ecosystem. It is important to discuss with the students why it is important that we be respectful and support Flying Foxes and Microbats.

Flying Foxes are an integral part of our ecosystem as they are the one of the most efficient pollinators and seed dispersers of native Australian trees. Often, they cross-pollinate or disperse seeds from a substantial distance away, which is important as many seeds do not grow unless they are a certain distance from their parent tree. While a single Microbat can eat up to 1,200 mosquitos and small insects in an hour! In a major grain-growing region of Australia, 100% of a Microbat's diet were grain weevils, showing their importance for crop protection. Therefore, they could save our economy and even our health by removing disease carrying mosquitoes without the use of harmful pesticides.

Links to videos:

Behind the News offers a student friendly report about how Microbats are often misunderstood. The report can be found at the following link:
https://www.google.com/url?q=http%3A%2F%2Fwww.abc.net.au%2Fbtn%2Fstory%2Fs284 8332.htm

An eye-opening video by Tim Pearson that discusses how Flying Foxes are vilified, common misconceptions and their importance to our environment. No me, no tree: Tim Pearson at TED X Canberra
https://youtu.be/qnOhS5jVBFk

This unit would provide the perfect opportunity to discuss how we can build and maintain relationships with nature by supporting Flying Foxes and Microbats. As Ted Pearson closes his video, he asks "what are you doing to help them?" This is a powerful to send to students, that we can and should do something. There are links below which suggest ways we can do this from planting plants to attract wildlife, building bat boxes for Microbats or working alongside a local conservation group.

Links for further information:

Read about what to plant to attract wildlife and keep bats happy:
http://bats.org.au/uploads/about-bats/native_food_for_wildlife.pdf

Organisations that can be contacted for more information about bats or to locate someone who could come to the classroom to discuss what they are doing to conserve our wildlife: http://www.allaboutbats.org.au/15/Flying-fox+Education+Kit/41/Working+with+bats

List of Australia wide bat carers/organisations:
https://www.tolgabathospital.org/links_batrescue.htm

Boxes for bats: http://ausbats.org.au/bat-boxes/4569171999

Tips to make, install and monitor a bat box: http://ausbats.org.au/install-a-microbat- house/4582876246

Resources:

Taylor, J. (1994). *A Dreamtime story of the Yuin people of Wallaga Lake*. Canberra, A.C.T: Aboriginal Studies Press.

(Further Bangu the Flying Fox curriculum suggestions can be found at:
http://aiatsis.gov.au/sites/default/files/docs/asp/education/bangu-the-flying-fox-teachers.pdf

Teaching About Flying Foxes and Microbats

<u>Australian Curriculum (Health and Physical Education): Year 5 and Year 6</u>

Communicating and interacting for health and wellbeing:

Recognise how media and important people in the community influence personal attitudes, beliefs, decisions and behaviours (ACPPS057)

- examining how media and public identities influence the way people act and the choices they make (MH, HBPA, FN, S, AD, RS)
- sharing how important people in their life influence them to act or behave in a healthy or safe way (MH, RS, S, FN, AD, HBPA)

Contributing to healthy and active communities:

Identify how valuing diversity positively influences the wellbeing of the community (ACPPS060)

- discussing how the actions of bystanders, friends and family can prevent and/or stop bullying and other forms of discrimination and harassment (RS, MH)
- proposing strategies to help others understand points of view that differ from their own and to encourage further discussion about individual and cultural similarities and differences in order to tackle racism (RS)
- exploring ways to create safe and inclusive schools for minority groups

Teaching suggestions and links to the curriculum:

In exploring this unit of health education, students will be presented with information that will enable them to understand points of view that differ from their own, through discussion and examining how our point of view and the way we act is influenced by others in order to tackle issues such as racism. To achieve this, students will be provided with the opportunity to discuss how a group in our society is often ignored, vilified or persecuted. While using Flying Foxes as the group in society will enable students to recognise how often there are groups who are segregated but through a point of view where we look at Flying Foxes and how they are often seen negatively due to the negative features in the media or images of Halloween or Dracula. Yet they play a vital role in our ecosystem and without Flying Foxes, there would be no tree.

To begin watch 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? Get the students to view 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? Ensure that you record this information on the board. Show the students the image on the right. Is this what they picture bats (Flying Foxes) are like? Take note of whether students agree or disagree, for example "yes I saw it in a movie one". Go through the image with the students and remind them that this is not even a real bat; it is a "scary prop" that someone might use for a Halloween display. Yet this is something many of us think of when we think about bats. Often Halloween or movies like Dracula will make bats look like they are scary and want to suck our blood when in reality, Flying Foxes only eat pollen and fruit.

Image Retrieved from: http://jennettethehedgehog.deviantart.com/art/scary-bat-thing- 183705303

Compare this image with a real photo of a Microbat. Photo credit: Bats QLD

Have a look at the board and note to students that this is often how we are influenced, by important people in our life or the media. Is the media always unbiased and factual? Watch Landline's *Bat Crazy* and discuss with students is this report was unbiased? Did it use subjective or objective language? Think about whom they interviewed; are all the residents unhappy about the bats? There are other communities such as Gordon in Sydney's northern suburbs has the Gordon bat camp that has been there from the mid-60s and is part of a conservation that is supported from the local residents as described in the Catalyst's *In defence of the Flying Fox* report. While when the man suggests he has a respiratory problem from an airborne disease, could it be from the bats (a Flying Fox)? There is no scientific proof to suggest that bats can cause respiratory problems.

The only known disease that humans have contracted from bats is the Australian Bat Lyssavirus (ABLV) (please see notes for teachers at the start of this resource); however, in Australia's recorded history, only 3 people have been known to die from it. The world health organisation considers it a very rare disease. Also, there is a post bite vaccine that all hospitals in Australia carry, and this vaccine will ensure you will not be infected. So, there is no reason why anyone in Australia should die from ABLV, if they receive the vaccine. However, all bat groups will stress the importance that unvaccinated people, i.e., students that they should avoid handling wild animals and if they are bitten or scratched from a bat that they tell an adult immediately so they can get the post bite injection. While at the end Reg Baldwin suggests that "It'd be good if they did move on to other places where they came from…" However, Flying Foxes have lived down the east coast of Australia, far longer than we have and they are in search of places to camp due to loss of habitat for housing and farm land. Furthermore, in the process of removing trees not only did they lose their habitat, they also lost many of the native trees that they eat the pollen from.

Links to videos:

- No me, no tree: Tim Pearson at TED X Canberra https://youtu.be/qnOhS5jVBFk
- Landline report titled "Bat Crazy". The story and its transcript can be accessed at http://www.abc.net.au/landline/content/2014/s4091737.htm.
- The Catalyst titled "In defence of the Flying Fox" http://www.abc.net.au/catalyst/stories/3000668.htm.
- Behind the News offers a student friendly report about how Microbats are often misunderstood. The report can be found at the following link: https://www.google.com/url?q=http%3A%2F%2Fwww.abc.net.au%2Fbtn%2Fstory%2Fs284 8332.htm

Continue to watch Tim Pearson's video and get the students to note how he effectively dispels common myths and misconceptions of Flying Foxes and highlights their importance, while personifying them and successfully comparing them to humans. Who is the noisy group, Flying Foxes or humans in a mall or students when they are

playing at lunch? Link this back to the board and discuss how we are influenced by important people in our life but who are the influenced by? Are they always given the correct information? Sadly, often they are not given the correct facts when it comes to bats.

This unit intends to place the students in a position where they can engage and act as informed global citizens. Therefore, remind the students of the following quote from Tim Pearson's video, "every night they are working to preserve our forest and environment, an environment that we all depend on not just the Flying Foxes, not just the Koalas but you and I as well. I would like you to ask yourself what are you doing to help them?" What can we do? Students and teachers can begin to positively influence others and educate them about the importance of bats so as a society we can accept and support them, rather than prosecuting them.

Ask the student to think about how to promote animal friendly spaces in their local environment. Local bat groups will offer the statistics about how many rescues they do and how fruit netting tends to be the number one urban rescue call. Ask students to explore why bats and other animals get caught in fruit netting. Investigate how animal friendly fruit netting works (see http://www.animalsaustralia.org/issues/flying-foxes.php), i.e. safe netting: You cannot poke your finger through safe netting — the holes are too small. Any netting you CAN'T poke your finger through is safe for Flying Foxes and other animals.

Note: This unit would provide a fantastic cross curricular opportunity, particularly with the English Year 6 unit as it will provide an opportunity for students to further develop an understanding of how bats are misrepresented in the media. Together these units can enable students to develop a deeper understanding of bats and how we are influenced by bias in the media; however, often this does not represent bats in a positive light or using all the facts.

Invite a member of a local bat group to come in and talk with the students, they might even bring an injured or orphaned bat in for the students to meet. Your students will love this link to real world situations. It would also be beneficial to work together with a local bat conservation group to help support Flying Foxes and Microbats and to learn how we react to situations such as deforestation or culling (refer to the links in the resources section below for more information).

Resources:

- No me, no tree: Tim Pearson at TED X Canberra https://youtu.be/qnOhS5jVBFk
- Landline report titled "Bat Crazy". The story and its transcript can be accessed at http://www.abc.net.au/landline/content/2014/s4091737.htm.
- The Catalyst titled "In defence of the Flying Fox" http://www.abc.net.au/catalyst/stories/3000668.htm.
- Behind the News offers a student friendly report about how Microbats are often misunderstood. The report can be found at the following link: https://www.google.com/url?q=http%3A%2F%2Fwww.abc.net.au%2Fbtn%2Fstory%2Fs284 8332.htm
- Read about what to plant to attract wildlife and keep bats happy: http://bats.org.au/uploads/about-bats/native_food_for_wildlife.pdfOrganisations that can be contacted for more information about bats or to locate someone who could come to the classroom to discuss what they are doing to conserve our wildlife: http://www.allaboutbats.org.au/15/Flying-fox+Education+Kit/41/Working+with+bats
- List of Australia wide bat carers/organisations: https://www.tolgabathospital.org/links_batrescue.htm
- Boxes for bats: http://ausbats.org.au/bat-boxes/4569171999
- Tips to make, install and monitor a bat box: http://ausbats.org.au/install-a-microbat- house/4582876246

Teaching About Flying Foxes and Microbats

Australian Curriculum (Health and Physical Education): Year 7 and Year 8

Communicating and interacting for health and wellbeing:

Analyse factors that influence emotions, and develop strategies to demonstrate empathy and sensitivity (ACPPS075)

- investigating personal, social and cultural factors that influence the way individuals respond emotionally to different situations (MH, RS)
- exploring different viewpoints, practising being empathetic and considering alternative ways to respond (RS, S, MH)

Contributing to healthy and active communities:

Investigate the benefits to individuals and communities of valuing diversity and promoting inclusivity (ACPPS079)

- investigating how respecting diversity and challenging racism, sexism, disability discrimination and homophobia influence individual and community health and wellbeing (MH, RS, S)
- examining values and beliefs about cultural and social issues such as gender, race, violence, sexuality and ability and how resisting stereotypes can help students be themselves (MH, RS, S)
- developing strategies to challenge narrow views of gender, race, violence, sexuality, gender diversity and ability to contribute to inclusive communities

Teaching suggestions and links to the curriculum:

In exploring this unit of health education, students will be presented with information that will enable them to understand points of view that differ from their own, through discussion and examining how our point of view and the way we act is influenced by others in order to tackle issues such as racism. To achieve this students will be provided with the opportunity to discuss how a group in our society is often ignored, vilified or persecuted. While using Flying Foxes as the group in society will enable students to recognise how often there are groups who are segregated through examining how we often think negatively of Flying Foxes and Microbats, yet they play a vital role in our ecosystem.

To begin watch 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? Ensure that you record this information on the board. Show the students the image on the right. Is this what they picture bats (Flying Foxes) are like? Take note of whether students agree or disagree, for example "yes I saw it in a movie one". Go through the image with the students and remind them that this is not even a real bat, it is a "scary prop" that someone might use for a Halloween display.

Yet this is something many of us think of when we think about bats. Often Halloween or movies like Dracula will make bats look like they are scary and want to suck our blood when in reality, Flying Foxes only eat pollen and fruit.

Image Retrieved from: http://jennettethehedgehog.deviantart.com/art/scary-bat-thing- 183705303

As compared to this real photo/ image of a Microbat. Photo credit: Bats QLD

Fact	Opinion	Why?

Before the students continue watching the rest of the video, get them to record Continue watching Tim Pearson's video and get students to take note on their 'fact, opinion, why chart' any opinions they have about Flying Foxes and why they have these. Continue watching the movie and get students to record the facts, for example, an opinion is that they fly into our hair but the fact is that they do not fly into our hair but only appear as though they swoop due

to the way they fly. 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?

Image retrieved from: http://www.enchantedlearning.com/graphicorganizers/fact/how.sht ml

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.

Ensure that they 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."

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).

Ensure that students understand how important Microbats are as a single Microbat can eat up to 1,200 mosquitos and small insects in an hour! In a major grain-growing region of Australia, 100% of a Microbats diet was grain weevils, showing their importance for crop protection. Therefore, they could save our economy and even our health by removing disease carrying mosquitoes without the use of harmful pesticides. Students could even view an article which shows how Griffith University is endeavouring to help reduce the incidence of Ross River Fever by installing homes for Microbats on its campus.

Links to videos:

No me, no tree: Tim Pearson at TED X Canberra https://youtu.be/qnOhS5jVBFk

Behind the News offers a student friendly report about how Microbats are often misunderstood. The report can be found at the following link: https://www.google.com/url?q=http%3A%2F%2Fwww.abc.net.au%2Fbtn%2Fstory%2Fs284 8332.htm

Get the students to continue investigating how Flying Foxes and Microbats are often misrepresented and develop strategies that will challenge the narrow or negative view that people commonly have of bats so that we can begin to positively influence others and educate them about the importance of bats, so that as a society we can accept and support them, rather than prosecuting them. Here students can develop videos, multimodal presentations or anything that will enable them to challenge the narrow or negative view that people commonly have of bats and to inform others that bats are in fact vital to our environment and forests. For more information and links that students or teacher can use, refer to the resource section below. It would also be beneficial to get in contact with a local bat rescue group to come in and talk to the students. Organisations that can be contacted for more information about bats or to locate someone who could come to the classroom to discuss what they are doing to conserve our wildlife: http://www.allaboutbats.org.au/15/Flying-fox+Education+Kit/41/Working+with+bats

Ask students to explore what happened to the Resources:

Links to further information

- This presentation aimed at Primary Schools offers information on the importance of bats, their physical structure and how they fly. Bat and Flying Fox presentation for Primary Schools
- This blog offers 8 things that you may not know about bats: http://blogs.discovery.com/bites-animal-planet/2015/10/8-things-you-might-not-know- about-bats.html
- The BTN report used during the lesson 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).
- 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 above mentioned issues. The information packs and many other resources can be accessed at www.ausbats.org.au.
- The following article which shows how Griffith University is endeavouring to help reduce the incidence of Ross River Fever by installing homes for Microbats on its campus. (https://app.griffith.edu.au/news/2015/06/04/microbats-find-home-at-griffiths- new-car-park/).

Links for further information on conservation:

- Read about what to plant to attract wildlife and keep bats happy: http://bats.org.au/uploads/about-bats/native_food_for_wildlife.pdf
- Organisations that can be contacted for more information about bats or to locate someone who could come to the classroom to discuss what they are doing to conserve our wildlife: http://www.allaboutbats.org.au/15/Flying-fox+Education+Kit/41/Working+with+bats
- List of Australia wide bat carers/organisations: https://www.tolgabathospital.org/links_batrescue.htm
- Boxes for bats: http://ausbats.org.au/bat-boxes/4569171999
- Tips to make, install and monitor a bat box: http://ausbats.org.au/install-a-microbat- house/4582876246

Teaching About Flying Foxes and Microbats

<u>Australian Curriculum (Health and Physical Education): Year 9 and Year 10</u>

Moving our body:

Develop, implement and evaluate movement concepts and strategies for successful outcomes with and without equipment (ACPMP101)

- using established criteria to apply and evaluate the effectiveness of movement concepts and strategies (GS, RE, CA)
- developing and implementing appropriate movement concepts and strategies for selected movement scenarios (LLPA, RE, CA, GS)
- reviewing, proposing and implementing alternative responses to movement situations based on the outcome of previous performances (CA, GS, RE)

Contributing to healthy and active communities:

Plan, implement and critique strategies to enhance health, safety and wellbeing of their communities (ACPPS096)

- investigating community-action initiatives young people have instigated that have had a positive influence on the health and wellbeing of their communities (MH, S, FN, RS, AD, HBPA)
- Plan and evaluate new and creative interventions that promote their own and others' connection to community and natural and built environments (ACPPS097)
- creating and evaluating proposals to promote the use of natural settings within the local community for physical activity (CA, LLPA,HBPA)
- designing and critiquing a strategy to involve family, friends and members of the community in cultural celebrations to promote a sense of connection with and belonging to the community (RS, MH)
- designing and adopting actions which promote healthy, active and sustainable lifestyles (HBPA, S, MH, RS, AD, FN)

Teaching suggestions and links to the curriculum:

In this unit students will investigate the importance of Flying Foxes as a keystone species due to being a long-range pollinator (see notes for teachers at the start of this resource). The will compare this knowledge to bees, who we typically think of as a pollinator and develop a game for younger students that teaches them about the importance of Flying Foxes. Once students have developed their game, they can go in to the younger class to teach them the game that demonstrates the importance of Flying Foxes to Australia's forests and how we can support them while answering any questions the younger students may have. In the Year 1 and 2 teaching suggestions for HPE there is a very basic game suited to that age level that you may wish to view as an example. However, students would need to make a game that is suitable for their selected age group.

Ensure that they 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. Flying Foxes ensure a great genetic diversity among trees as they spread the genomes of trees from both flood prone areas and drought zones. This results in the existence of trees that can survive Australia's harsh climatic variations as it is able to tolerate both flood and drought. Where, bees are unlikely to achieve this due to their short pollination range.

A great video discussing this issue was commissioned by Flying Fox Rescue Release Noosa Inc. and can be found at https://vimeo.com/86222807. (Please note that there are 2 kinds of Bats - Flying Foxes and Microbats. It is important to model the correct use of terms, even if the videos do not)

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? Would we need to pollinate these ourselves? Why pay someone to do it when the Flying Foxes are doing it for free! Discuss the "no me [Flying Fox], no tree" campaign using the following videos.

Image retrieved from: https://www.youtube.com/watch?v=qnOhS5jVBFk

Links to videos:

Note: There are two kinds of Bats - Flying Foxes and Microbats and it is important to model the correct use of terms, even if the videos do not.

- Sydney Wildlife Conservationists discuss the importance of Flying Foxes as a keystone species in our ecosystem: https://www.youtube.com/watch?v=e-KL9xmyU
- (Please ensure your students understand never to touch an injured bat. If they are to see an injured bat, they must contact a local bat rescue organisation immediately).
- No me, no tree: Tim Pearson at Ted X Canberra: https://www.youtube.com/watch?v=qnOhS5jVBFk

Additional information:

- http://www.batworlds.com/bat-role-in-pollination/
- http://www.bats.org.uk/pages/why_bats_matter.html
- This presentation aimed at Primary Schools offers information on the importance of bats, their physical structure and how they fly.
- Bat and Flying Fox presentation for Primary Schools

Using this information, get students to do further research in order to develop a simple game that will teach others about the importance of Flying Foxes to the environment and forest as a nocturnal long-range pollinator, opposed to only relying on bees for pollination. Students can then develop their game and teach it to younger students so that they can help others recognise the importance of Flying Foxes. This activity is designed to not only emphasise the importance of Flying Foxes but to help others recognise that we need to support Flying Foxes.

This activity will also enable students to teach other students about the effects climate change is having on Flying Foxes. While also teaching others about the importance of Flying Foxes they can discuss the effects of loss of habitat as when trees are cut down for humans to build houses or farms, as we often use the most suitable and fertile land. This leaves a habitat where the trees and land are not suitable as the area may be too hot, lack water, shade or a breeze. Discuss the effects that this would have on Flying Foxes if this is the only place that is left for them to live. They will find shade in trees but if there is little trees and it gets too hot they are often trapped there as there as it is too hot in the day to fly. They will move from the safe, top of the tree to follow the shade to the lower levels where the air is cooler; however, this often leaves them vulnerable to predators at this height. Mothers who are carrying their pups often suffer as they become too exhausted and heat stressed to fly to cooler areas or find water. Therefore, what can we do to reduce the effects of climate change, culling and deforestation?

Links for further information:

- An article that discusses the effects of the 'killer climate' on bats http://ausbats.org.au/australias-flying-foxes/4583295057
- http://www.hindustantimes.com/bhopal/bhopal-bats-belly-dip-in-upper-lake-to-beat- the-heat-and-survive/story-cxJB3SPKTUjpPRlPafDtpM.html
- Managing heat stress in Flying Fox colonies http://www.fourthcrossingwildlife.com/HeatStress-StanvicMcDonaldCollins.pdf and https://vimeo.com/86222807