

Teaching About Flying Foxes and Microbats: Humanities F-7

About this teaching resource:

The following are teacher resources that align with Foundation Year to Year 7 Australian Curriculum Humanities. In total there are ten educational resources 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

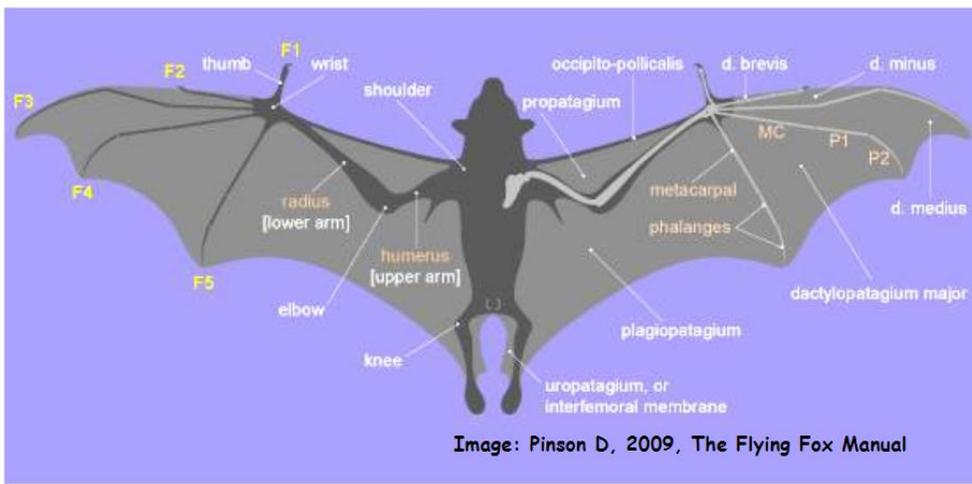
Dr. Sammel would like to thank the Gold Coast City Council (for the K-10 curriculum) and the Logan City Council (the 11 & 12 curriculum) for supporting this project and the creative teachers who collaborated on the following teaching suggestions for every subject of the Australian Curriculum from Foundation 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

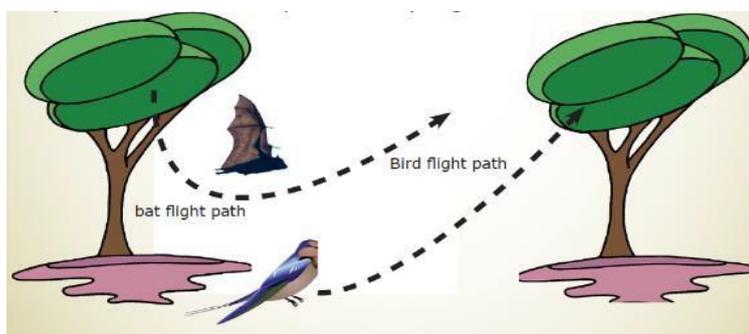
For far too long, bats have instilled fear and inspired bad omens in many cultures around the world. Vilified in the media, these deeply misunderstood and misrepresented creatures are incredibly unique animals that play a vital role in Australia's ecosystem. In a world where attitudes towards sustainability 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.



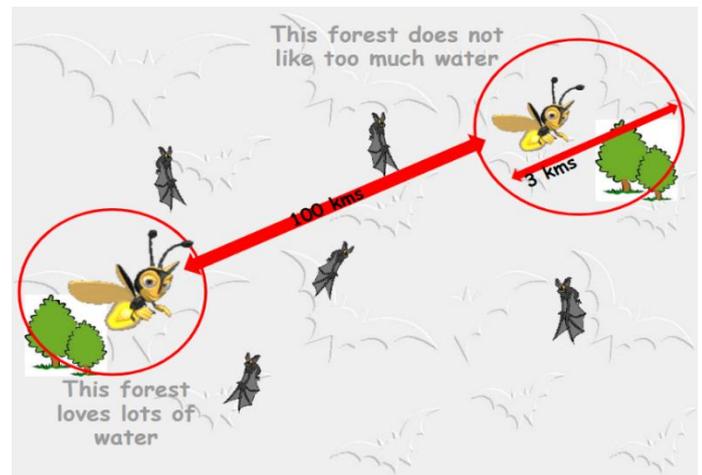
Bats are not aggressive animals. Bats do not 'swoop' or 'attack'. If spooked, a bat will fly away but because they have hands and fingers rather than wings, they must drop or fall in order to catch the wind that will provide them with the lift necessary to sustain their flight.



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.

Do the maths:

no bats = no native forest

no native hardwood + no koalas = If you love koalas, bananas or even your hardwood floor - you can thank a bat!

⁴ Low T. (2011) *Climate Change and Terrestrial Biodiversity in Queensland*. Dept Environment & Resource Management, Brisbane.

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

Australian Curriculum HASS (Humanities & Social Sciences): Foundation

Knowledge & Understanding - History:

How the stories of families and the past can be communicated, for example, through photographs, artefacts, books, oral histories, digital media and museums ([ACHASSK013](#)).

Knowledge & Understanding - Geography:

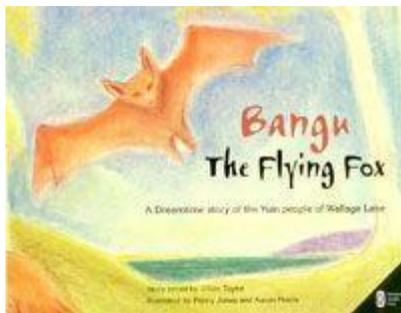
The reasons why some places are special to people, and how they can be looked after ([ACHASSK017](#)).

Inquiry & Skills:

A number of Inquiry & Skills Content Descriptors are referenced in this learning sequence. They cover areas including Questioning ([ACHASSI001](#)), Researching ([ACHASSI002](#)) ([ACHASSI003](#)), Analysing ([ACHASSI005](#)), Evaluating & Reflecting ([ACHASSI008](#)) ([ACHASSI009](#)) and Communicating ([ACHASSI010](#)).

Teaching suggestions linked to the curriculum:

In HASS students are developing Inquiry Skills whilst interconnecting their learning in Geography and History. This learning sequence guides students through recognising Indigenous Australians passed stories across generations through 'Dreaming Stories' and explore, through the eyes of a Flying Fox, what makes a place important and how it can be better cared for .



Read aloud to students 'Bangu' a Dreaming story about the uniqueness of the Flying Fox ([ACHASSI002](#)). Dreaming and Creation stories are how Indigenous people communicate stories of their families and the past, so provides the perfect correlation between the ([ACHASSK013](#)) and the cross curricular priority area of Aboriginal and Torres Strait Islander histories and cultures. Explain to students that Dreaming Stories are the Indigenous way of teaching a lesson or explaining the creation of

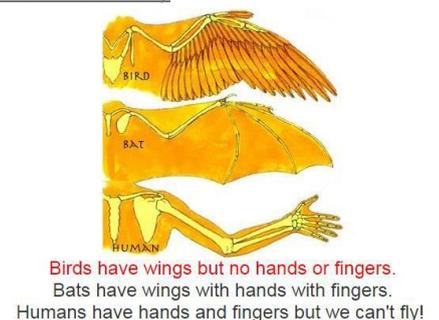
something. The Dreaming embraces the past, present and the future. Students may know other Dreaming stories.

Bats are the only mammals capable of active flight. In the story the animals had never experienced this unique trait of Bangu's and they did not understand that he was actually like both the birds and the other animals. Before reading the story talk about how a point of view is formed based on the information a person has available to them. Do this by asking them how they feel about Flying Foxes. Most students will have some knowledge or an opinion about Flying Foxes. At the end of the lesson ask them if their feelings about Flying Foxes have changed with the information they have learned ([ACHASSI005](#)).

Read the story and discuss with students how in the beginning of time Bangu was friends with both the animals and the birds, and by the end of the story, Bangu was flying around by himself because his friends didn't understand him. When engaging students recall of the story, have them practice time contexts using words such as before, then and after. Talk to students about how this story may connect with an aspect of their family history (e.g. racial/religious segregation) ([ACHASSI008](#)).

Sometimes people may seem different to us, but really, underneath we

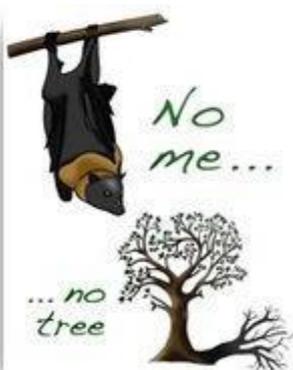
are all very similar. It is like people and Flying Foxes, as shown by the bone structure (image retrieved from MrsGebauer.com). Birds have wings, and they flap their wings to fly whereas bats have hands and fingers, like a human. They fall and use their wings to catch the wind to allow them to stay airborne (see the above notes for teachers).



Birds have wings but no hands or fingers.

Bats have wings with hands with fingers.

Humans have hands and fingers but we can't fly!



It's not just how they fly that makes Flying Foxes so interesting. They are also very important in how they provide for our ecosystem:

- Flying Foxes are responsible for pollinating Australia's native forest trees and they move the pollen between trees, travelling up to 100km and this ensures ongoing cross pollination and healthy tree populations.

- With the decreasing numbers in Flying Foxes, there are some places where people are actually having to do the job of collecting the seeds, transferring and planting them.
- By looking after the habitats of Flying Foxes we are making sure they will be around to continue to help our trees grow.

Ask students how things have changed for Flying Foxes since the story's starting time ([ACHASSI001](#)). Some things would include:

CHANGES FOR FLYING FOXES	PAST	PRESENT
PREDATORS/ THREATS	Goannas, pythons, sea eagles, owls.	Humans, feral cats and foxes, land clearing/urbanisation, orchard/tree netting, open cut mining.
FOOD	Nectar, pollen and fruit of native Lily Pillies, Moreton Bay Figs, Banksias, Melaleucas and Eucalypts	When no native food available they will eat mangos, peaches and pawpaw
HABITATS	Formed camps in native forests.	May live in treed urban areas if no native forest remains.
CONSERVATION STATUS	Australia has lost a number of species of Flying Foxes since colonisation, including the Dusky Flying Fox which was last seen in 1878 near Mackay in Queensland.	There are presently only 7 species of Flying Fox still alive in Australia. The Christmas Island Flying Fox is Critically Endangered and the Grey Headed Flying Fox and Spectacled Flying Fox are listed as endangered and at risk of extinction.

Because we need Flying Foxes to sustain our native tree population, we need to protect their habitats to ensure their survival as a species. Have students collect leaves to make a natural materials collages of a local place with trees native to your area that Flying Foxes feed from ([ACHASSI003](#)). Display the trees in the classroom as a reminder of the importance of our Flying Fox friends on our local environment. Students can paint the trunk in brown tones and glue the leaves to the top of the tree. Remember to add flowers such as on the banksia or berries like the Lily Pilly to feed the Flying Foxes.



Image: <http://jess-clothes4acause.blogspot.com.au/>



To close, ask students to reflect on what they know now ([ACHASSI010](#)) and ask them whether they believe the other animals would have been kinder to Bangu if they had taken the time to understand him better? Are Flying Foxes important to our environment - and why? Do they feel differently about Flying Foxes now that they have learned what an important part they play in our environment? Why do they believe we need to protect the habitats of Flying Fox populations ([ACHASSI009](#)).

Resources

- Australasian Bat Society - Bat Facts Pack <http://ausbats.org.au/bat-fact-packs/4562894228>
- Mrs Gebauer - Bats and Birds are Different: <http://mrsgebauer.com/bats/birds/bird.html>
- Bat Conservation & Rescue Qld - No Me No Tree - <http://www.bats.org.au/>
- Bangu the Flying Fox video <https://www.youtube.com/watch?v=8WPdKdwjHFc>

Here are some answers to common questions or misconceptions about Flying Foxes your students may raise. There is a lot of good information available through sites such as those listed below:

- One of the reasons Flying Foxes fly at night is because these trees only flower at night.
- Flying Foxes DO NOT drink blood.
- Flying Foxes only eat fruit from fruit trees because the native trees are no longer available within their habitat. Native trees they like include the Lily Pilly, Moreton Bay Fig, Banksias, Melaleucas and Eucalypts. One bat can disperse up to 60,000 seeds in one night!
- At night Flying Foxes have eye sight 25 times better than humans. They also have a very strong sense of smell. They do not use echolocation to find their way (unlike the small, insectivorous Microbats).
- Students may have heard that Flying Foxes carry dangerous diseases. A very small proportion of bats carry the Lyssavirus; however, they do not survive long when contaminated. You cannot get it from their droppings - only from deep tissue bites or scratches. It is exceptionally rare and there is a vaccine available if infected, but the rule is:

NO TOUCH = NO RISK.

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

What to do if you find a bat:

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

Teaching About Flying Foxes and Microbats

Australian Curriculum (HASS - Humanities & Social Sciences): Year 1

Knowledge & Understanding - History:

Differences and similarities between students' daily lives and life during their parents' and grandparents' childhoods ([ACHASSK030](#))

Knowledge & Understanding - Geography:

The natural, managed and constructed features of places, their location, how they change and how they can be cared for ([ACHASSK031](#))

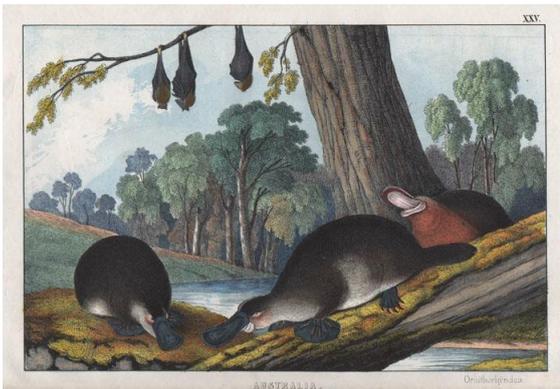
Inquiry & Skills:

A number of Inquiry & Skills Content Descriptors are referenced in this learning sequence. They cover areas including Questioning ([ACHASSI018](#)), Analysing ([ACHASSI022](#)) ([ACHASSI023](#)) and Communicating ([ACHASSI027](#)).

Teaching suggestions linked to the curriculum:

In Year 1 HASS students study the recent past, present and near future within the context of the student's own world. This learning sequence extends students thinking about how things have changed not just for people, but also for the native animals that live in their community such as the Flying Fox. Students experience ways stories of the past are communicated and learn to recognise that people describe features differently.

Introduce students to your Flying Fox friend, Terry. Explain that Terry got his name from the name, Pteropus, that scientists gave to his category of animals a few hundred years ago. It's like how you have your surname that gets passed down from parents to children. We know Pteropus is the name for Flying Foxes (which are also known as Megabats) because early scientists passed their information on. Ask students to come up with questions about how information was passed on 150 years ago and what they think it might look like ([ACHASSI018](#))? Information was recorded in books/journals and drawings/lithographs. Scientists still write what they learn in books-but those books are now written on computer, not by hand or printing press, and now they are able to take photos instead of having to draw everything by hand ([ACHASSK030](#)). This is a modern day photograph and a colour lithograph from 1860 and retrieved from <http://www.sebraprints.com.au/individual.php?category=Australiana&id=5262> ([ACHASSI023](#)).

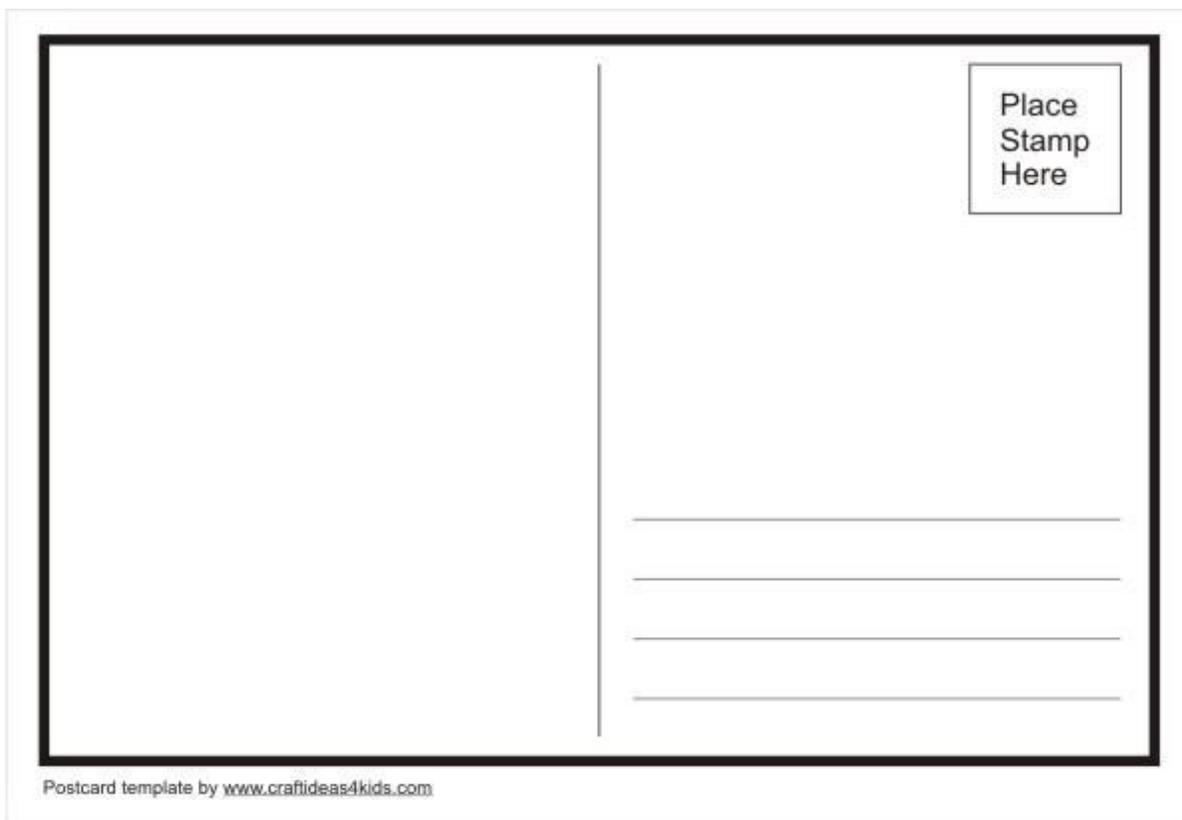
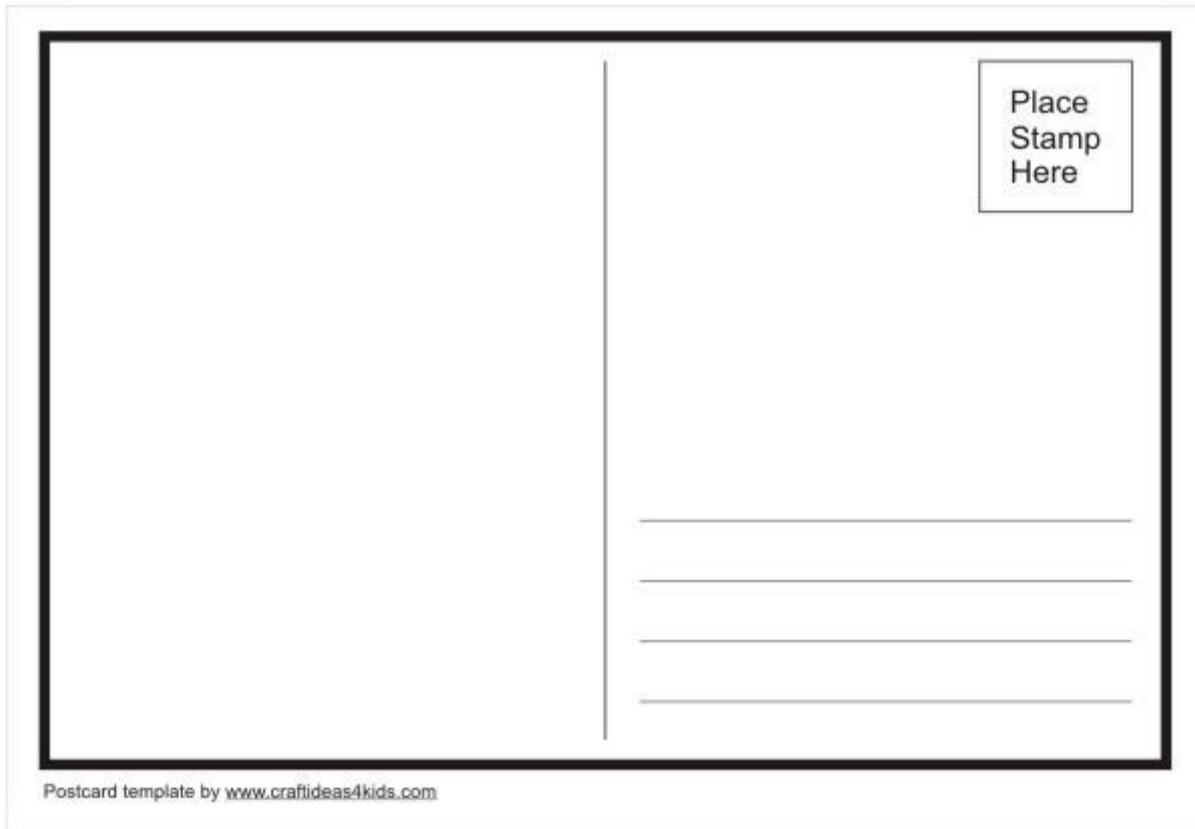


Tell students Terry has asked you to watch two short videos about Flying Foxes because they have a very important job of sharing the seeds of our big trees so our forests continue to grow but sadly they are endangered - which means at risk of become extinct if we don't help them by not killing them or cutting down the trees they feed from ([ACHASSK031](#)).

Tell students they will be making a postcard after the video ([ACHASSI027](#)). They will draw a picture on one side and write something they have learned about Flying Foxes on the other, so they will need to pay attention to the videos. Do a class walk around afterward to highlight the way they all watched the same video but people describe things differently, whether in words or pictures ([ACHASSI022](#)).

Postcard Templates

By printing these on cardstock students will be able to create a postcard that they can send to a friend or family member who may not live close by.



Teaching About Flying Foxes and Microbats

Australian Curriculum (HASS - Humanities & Social Sciences): Year 2

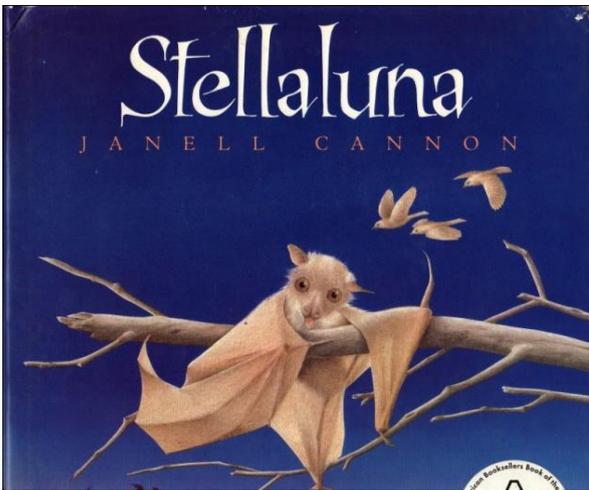
Knowledge & Understanding - History:

The history of a significant person, building, site and/or part of the natural environment in the local community and what it reveals about the past (ACHASSK044)

Inquiry & Skills:

A number of Inquiry & Skills Content Descriptors are also referenced in this learning sequence. They cover areas including Questioning (ACHASSI034), Researching (ACHASSI035), Analysing (ACHASSI038) (ACHASSI039), Evaluating & Reflecting (ACHASSI041) (ACHASSI042) and Communicating (ACHASSI043).

Teaching suggestions linked to the curriculum:



The HASS focus in Year 2 is on students' past and present connections to people and places. The stimuli for this learning sequence is the fictional story, Stellaluna, about a Megabats (Flying Fox) who, when separated from her mother during an owl attack and finds herself being raised by a family of birds. We see Stellaluna outside her comfort zone as she tries to strengthen her connections with this new place, she calls home and her new, adopted family.

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

Before reading, talk to students about how we connect with people and places in different ways. There are connections with our family and our home, but in our lives, we also make connections with people - like friends or teachers and places - like our friends home or our school. Sometimes we can feel connected to a person or a place, even if we haven't seen them for a long time.

When reading ask students to think about the connections Stellaluna is making to the other animals and places around her and why she may be making them (ACHASSI038). (*She needs food and somewhere to live. She is still young; does she need someone looking after her?*)

After the story, have a discussion with students about Stellaluna's connections with animals and places (habitats). Whilst doing this encourage students to share simple conclusions they may have drawn from the story about Stellaluna's relationships with the animals and places (ACHASSI041).

Has the passing of time affected Stellaluna's connection with the birds and their habitat? Do you think she would have as strong a connection if she had been there for less time or if the mother bird had not fed and saved her? How did Stellaluna feel a connection to her mother even though she didn't remember her? Do you think that even as her lifestyle changes back to that of a bat she will always feel connected to the birds and their ways?

Having looked at Stellaluna's connections to people and places have students think about themselves and their local area. In the same way that Stellaluna was better suited to a branch that let her sleep upside down, rather than build a nest. Year 2 ask questions about some activities of people in their local area - why they are suited to their particular environment and how these activities have impacted on local Flying Fox and Microbat populations (ACHASSI034)

Ask questions such as:

- What was at this place before this activity? What native habitats would have been cleared to allow this activity to happen? (ACHASSI039) Why would this have been the best place around here to do this activity? What grows around here that bats eat now? (*Flying Foxes will eat mangos, peaches and other fruits when their preferred native feed is unavailable; Microbats are insectivores*). Would these things always have grown here? How may they have got here? What would the bats have eaten here previously? (*Flying Foxes like Native trees they like include the Lily Pilly, Moreton Bay Fig, Banksias, Melaleucas and Eucalypts whilst Microbats are insectivores*).
- Remember Flying Foxes feed on the nectar of large native trees that flower of a night. If they are now feeding on fruits from orchards, ask questions about whether food is only available at night still? Will we continue to get new native trees growing if Flying Foxes are not around to pollinate them?
- How is this human activity and environment change impacting the activity of local bat populations? (ACHASSI039)
- In consultation with Council or your local Bat Society, identify a natural local area that is of significant importance to Flying Foxes or Microbats, reflect on newly found knowledge about local bat requirements (ACHASSI042) and
 - **Create a poster** to educate people in how and why they should look after this significant area (ACHASSI043).

Organisations or resources that discuss habitat requirements of Flying Foxes include....

Bats Queensland <http://www.batsqld.org.au/>

Bat Rescue Inc <http://www.batrescue.org.au/>

Bat Conservation & Rescue Qld <http://www.bats.org.au/>

Australian Bat Clinic <http://australianbatclinic.com.au/>

Animals Town <http://www.animalstown.com/animals/f/flying-fox/flying-fox.php>

Australian Curriculum (HASS - Humanities & Social Sciences): Year 2

Knowledge & Understanding - Geography:

The idea that places are parts of Earth's surface that have been named by people, and how places can be defined at a variety of scales (ACHASSK048)

The ways in which Aboriginal and Torres Strait Islander Peoples maintain special connections to particular Country/Place (ACHASSK049)

Inquiry & Skills:

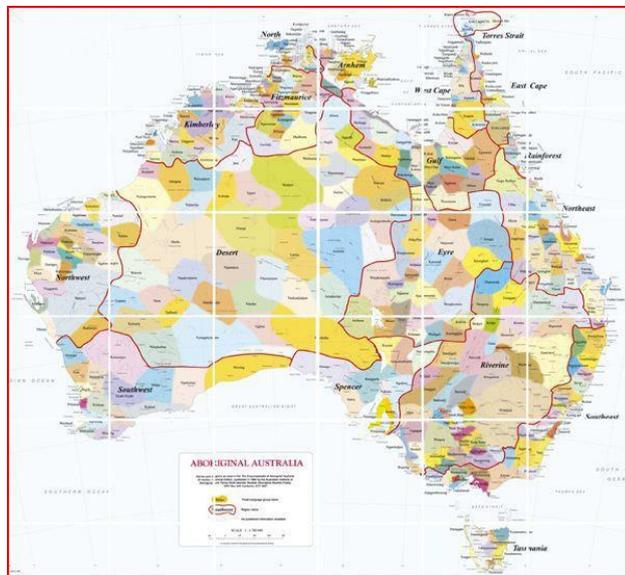
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Teaching suggestions linked to the curriculum:

The HASS focus in Year 2 is on students' past and present connections to people and places. Students identify that places can be described at different scales and that place names are often influenced by locally important factors. Flying Foxes are important throughout Australia for the ongoing growth of our native trees. Provide students with the example of Bilinga on the Gold Coast as an example of a place name derived from the local indigenous word meaning bat.

Show students a map of Indigenous Australian Nations as well as a map of the gazetted States and Territories to demonstrate how places can be defined in a variety of ways and scales (ACHASSK048). This map has been sourced from <http://www.abc.net.au/indigenous/map/>

Have students search for local placenames that link to indigenous animal names (ACHASSI034) record and locate them on this map (ACHASSI036). Do those animals still live in the area? Have they been forced away through development or other factors? You may choose to use one enlarged map for the whole class or several smaller ones for each group of students. There are numerous variations of this map, however this one has been selected as it provides a nice introduction to reading a map through the context of grid referencing.



Aboriginal Australia Map: <http://riaus.org.au/articles/exploring-the-history-and-culture-of-indigenous-australians/>

Did you find particular language regions that used a lot of animal names? Were there some in which you could not find any names referencing animal names (ACHASSK049).



For information specific to your local area, speak with your Local Aboriginal Land Council (LALC), Local Aboriginal Education Consultative Group (AECG) or local council. This link provides advice and direction for engaging with Aboriginal communities.

<http://files.acecqa.gov.au/files/NEL/engaging-with-aboriginal-communities1.pdf>

You can search your state or local Government or Indigenous language area for listings of Indigenous place names for your area. Here are some examples:

Government of Western Australia - Landgate - Place name history <http://www0.landgate.wa.gov.au/maps-and-imagery/wa-geographic-names/name-history/historical-town-names> State Library of Queensland -

Southeast Queensland Placenames

<http://www.slq.qld.gov.au/resources/atsi/languages/queensland/southeast-queensland-placenames>

Teaching About Flying Foxes and Microbats

Australian Curriculum (HASS - Humanities & Social Sciences): Year 3

Inquiry & Skills - Questioning:

Pose questions about past and present objects, people, places and events ([ACHASSI052](#))

Inquiry & Skills - Researching:

Locate and collect information and data from different sources, including observations ([ACHASSI053](#))

Record, sort and represent data and the location of places and their characteristics in different formats, including simple graphs, tables and maps, using discipline-appropriate conventions ([ACHASSI054](#))

Inquiry & Skills - Analysing:

Examine information to identify different points of view and distinguish facts from opinions ([ACHASSI056](#))

Interpret data and information displayed in different formats, to identify and describe distributions and simple patterns ([ACHASSI057](#))

Inquiry & Skills - Evaluating & Reflecting:

Draw simple conclusions based on analysis of information and data ([ACHASSI058](#))

Interact with others with respect to share points of view ([ACHASSI059](#))

Reflect on learning to propose actions in response to an issue or challenge and consider possible effects of proposed actions ([ACHASSI060](#))

Inquiry & Skills - Communicating:

Present ideas, findings and conclusions in texts and modes that incorporate digital and non-digital representations and discipline-specific terms ([ACHASSI061](#))

Teaching suggestions linked to the curriculum:

Flying Foxes are a very important part of our native and natural environment and are listed as in danger of extinction. Many people are unaware of the vital role they play in pollinating our large native trees and so they often greatly misunderstood. Large portions of the community consider Flying Foxes to be nothing more than problematic because of their noise, defaecation and feeding habits. As a consequence there is great diversity in both public perception and preferred management solutions. This learning sequence addresses the HASS focus of diverse communities through conflicting points of view about Flying Foxes.

Start by creating a KWL (*What I KNOW, What I WANT to know, What I have LEARNED*) chart on the board with students to record what they think they already know about Flying Foxes.

Watch this video about Flying Foxes in Tannum Sands <http://www.gladstoneobserver.com.au/news/its-raining-bat-poo-on-walkers-at-tannum-pathway/2523787/>.

This a YouTube video about Flying Foxes (Megabats) in South East Asia. Although this video talks about South East Asia, the information is relevant to Australia's Flying Foxes also. The video will help that allows you to explore the importance of bats whilst providing opportunities to establish prior knowledge to ascertain gains in knowledge. <https://drive.google.com/drive/folders/0B7D0WpxigulEbUIhSGRuLVNLVDA>



Attached is a diagram that explains to students that when Flying Foxes cross pollinate trees from forests with different water requirements it helps to make the new trees more tolerant of the conditions from the

other forest. This will make our native trees more drought and flood hardy.

After the videos and forest picture return to the KWL chart and see if the students wish to make amendments to their knowledge - this can be recorded in the 'L' - Learned column.

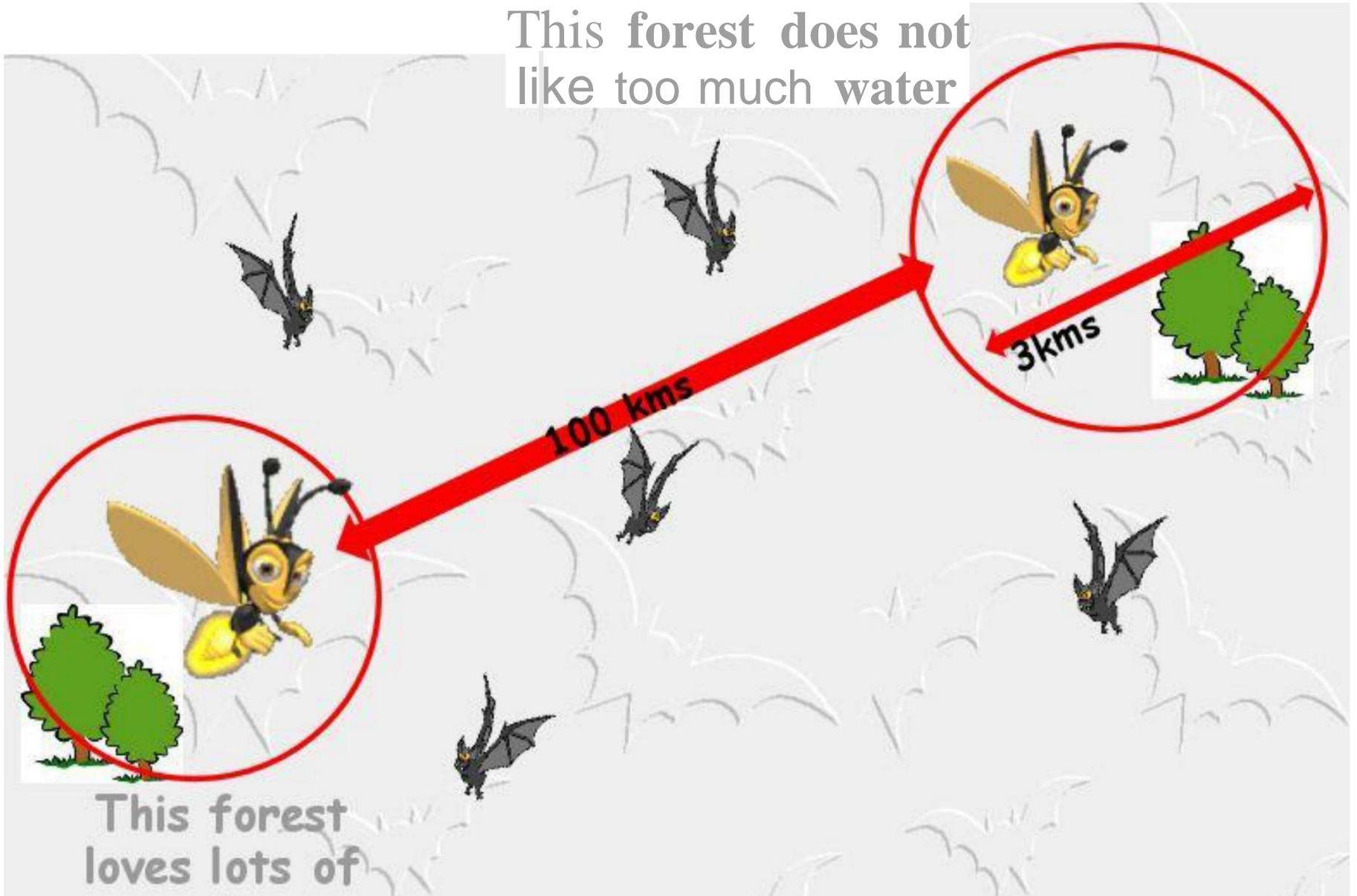
To further understand the diversity in public knowledge and points of view, get students to develop questions ([ACHASSI052](#)) to do a survey of family members and neighbours to establish what they think ([ACHASSI053](#)) and whether their points of view change once educated in the facts about Flying Foxes ([ACHASSI056](#)). It is important for students to understand that people may have a different point of view to themselves and they must be respectful of the opinions of others ([ACHASSI059](#)).

Having gathered the information, students create graphs ([ACHASSI054](#)) to identify patterns occurring in the data ([ACHASSI057](#)). Having identified any data distribution patterns students draw conclusions based on this information ([ACHASSI058](#)) and reflect on their learning with a proposal that will result in a preferred future ([ACHASSI060](#)) for both the Flying Foxes and residents in a written statement that will accompany their graph ([ACHASSI061](#)).

EXAMPLE QUESTIONNAIRE TO GAUGE CHANGES IN POINTS OF VIEW				
FLYING FOX KNOWLEDGE AND PERCEPTIONS		YES	MAYBE	NO
1	Do you like Flying Foxes?			
2	Are you scared of Flying Foxes?			
3	Is living near Flying Foxes dangerous?			
	Do Flying Foxes and their habitats need to be protected?			
4	Are you aware that Flying Foxes have a similar skeletal structure to humans? <i>(They have arms and fingers, not wings)</i>			
5	Did you know that a mother Flying Fox can only have 1 baby a year?			
6	Are you aware Flying Foxes have better eye sight than humans, have really good hearing and DO NOT use echolocation to navigate at night?			
7	Did you know Flying Foxes travel about 100km per night sharing the seeds of trees to ensure cross pollination?			
8	Did you know one Flying Fox can disperse 3,000 tree seeds in one night?			
9	Flying Foxes only eat our fruits when their preferred native tree nectars and pollens are unavailable (due to destruction of bushland, forests and natural habitats). Did you know that?			
10	Are you aware there is only ONE disease humans can catch from Bats and the World Health Organisation say it is one of the rarest diseases on Earth? <i>(It is the Lyssa Virus - ABLV. Bats die shortly after getting it. You would have to be deeply scratched/bitten by an infected bat before it dies. There is a free vaccine to stop the disease if bitten. However without the vaccine you would die. There have only been 3 cases of ABLV in humans recorded)</i>			
11	Did you know that without Flying Foxes we would not have the trees for Koalas to live in?			
12	Did you know that just recently, in 2012, an Australian native bat became listed as extinct? <i>(It was the Christmas Island Pipistrelle)</i>			
13	Now that you know the above information... Do you like Flying Foxes more?			
14	Are you scared of Flying Foxes?			
15	Is living near Flying Foxes dangerous?			
16	Do Flying Foxes and their habitats need to be protected?			

The following pages are an article about the now extinct Christmas Island Pipistrelle for your reference

This forest does not like too much water



This forest loves lots of water



The Sydney Morning Herald

Unmourned death of a sole survivor



Gone ... the pipistrelle.

Published: November 17, 2012 - 3:00AM

In late August 2009 a tiny, solitary bat fluttered about in the rainforest near Australia's infamous Christmas Island detention camp. We don't know precisely what happened to it. Perhaps it landed on a leaf at dawn after a night feeding on moths and mosquitoes, and was torn to pieces by fire ants; perhaps it succumbed to a mounting toxic burden placed on its tiny body by insecticide spraying. Or maybe it was simply worn out with age and ceaseless activity, and died quietly in its tree hollow. But there is one important thing we do know: it was the last Christmas Island pipistrelle (*Pipistrellus murrayi*). With its passing, an entire species winked out of existence.

Two decades earlier the island's population of pipistrelles had been healthy. A few scientists had watched the species' decline with concern, until, after the million or more years that it had played a part in keeping the ecological balance of the island, they could see that without action its demise was imminent. They had done their best to warn the federal government about the looming catastrophe, but they might as well have been talking to a brick wall. The bureaucrats and politicians prevaricated for three years, until it was too late.

Nothing effective was done to help the bats. Indeed, except for those watching scientists, few seemed to give a thought to the passing of the species, nor what it might mean for Christmas Island or our country.

The pipistrelle's extinction was painful for me. In an attempt to avert it I met Peter Garrett, then the environment minister, and warned him of the impending loss. I had brought offers of assistance and expertise from the Australian Mammal Society to his attention. The society was confident the species could be saved - at a cost of perhaps only a few hundred thousand dollars. But Garrett was convinced by the orthodoxy that ecosystems rather than species should be the focus of the national conservation effort, and I got the message that nothing would be done. Saving the bat wasn't an impossible mission. It's just that the government and the people of Australia - one of the richest countries on earth - decided it wasn't worth doing.

What really shook me was that it was the first extinction of a mammal in Australia for 60 years - and the first in my lifetime. My original professional expertise lies in mammalogy and palaeontology, and before the pipistrelle's demise I believed the worst of Australia's extinction crisis was behind us - that somehow my generation was wiser and more caring, and would not tolerate any more losses of Australia's unique mammals. It's now clear that those 60 years were a lull in the storm, and that the pipistrelle's demise marked the beginning of a new extinction wave.

Australia's first extinction wave began almost as soon as the First Fleeters stepped ashore, and by the 1940s it had carried away 10 per cent of the continent's mammal species. In 1791, a convict wrote about the white-footed rabbit rat, saying it was a pest in the colony's food stores. The soft-furred, grey and white kitten-sized creature was arguably the most beautiful of Australia's 70-odd native rodent species, yet it was destined to be one of the earliest victims of European settlement. Two hundred years ago it could be found in woodlands from near Brisbane to Adelaide, but the last record of it dates to the 1850s.

The thylacine and the toolache wallaby were the largest creatures to succumb in the first extinction wave. These extinctions were, however, atypical. Indeed, one of the most astonishing aspects of the first extinction wave was that its victims included what had been the most abundant and seemingly secure mammals in Australia.

The causes of these extraordinary extinctions were varied. The cessation of Aboriginal burning doubtless had its effect, and until the 1930s bounties were paid by many state governments for the scalps of now-extinct creatures. But the depredations of foxes (which were spreading quickly by the early 20th century) and feral cats, and the wholesale destruction of native vegetation by livestock and rabbits, must have been important causes. While the causes are disputed, the effect of the first extinction wave is clear: it gutted the biodiversity of the drier parts of the continent, and few native mammals larger than a rat and smaller than a kangaroo can be found on Australia's inland plains today. It's the absence of such species - the so-called critical-weight-range mammals (which weigh between 500 grams and 5 kilograms), which were once among the most abundant of creatures - that has led me to characterise the national parks of Australia's southern inland as "marsupial ghost towns".

The gathering second extinction wave is now mopping up the few surviving medium-sized mammals in Australia's south and inland. It's not difficult to predict what will be the next to become extinct, for, like the pipistrelle, their decline has been charted for years. There are 15 frogs, 16 reptiles, 44 birds, 35 mammals and 531 plants on Australia's endangered species list, and among those closest to the brink are three mammals: the central rock rat, the bridled naitail wallaby and the numbat. All hang by a thread, and next to nothing effective is being done to halt their slide into oblivion.

The most dismaying aspect of the second extinction wave is that it is emptying vast swathes of the continent that were untouched by the first wave. Australia's Top End and Kimberley were, until recently, a paradise for medium-sized mammals, among them a close relative of the white-footed rabbit rat. The last two decades have resulted in this fauna all but exterminated in the Top End, even in our most-valued and best-resourced national parks.

Perhaps it is excusable that Australians are unaware of the extinctions now occurring in distant places such as Arnhem Land and other regions of our far north. But astonishingly, we also seem blind to the perils facing species much closer to home - for example, the sand flathead of Port Phillip Bay. A fish familiar to every Melburnian who has ever dangled a line, its population has declined by 97 per cent over the past decade.

Why should the extinction of Australian organisms concern us? The answer is almost precisely the same as to the question of why human rights are important, even when they concern people we'll never meet. First and foremost, it is a matter of values. The demise of a bat may not weigh greatly in the balance of human wellbeing, but it speaks volumes about the human soul.

As with human rights, extinctions beg the question of where we draw the line. If we can stand by as a species of bat is snuffed out, then why not other species as well? Can we really expect poor Indian villagers to heed our pleas to conserve the tigers that menace their livestock if we do nothing to prevent the extinction of Australian species? As with the question of torture, to open the door to the practice of extinction is to contemplate the horrific becoming routine.

At the heart of this nation's efforts to save its endangered species is a register of subspecies, species and ecological communities threatened with extinction. By law, each entity included on the list should have a detailed recovery plan written for it, which when implemented should save it from extinction. These plans classify species on a sliding scale - from vulnerable to critically endangered or extinct. The federal legislation governing these plans states: "Recovery plans are binding on the Australian government - once a recovery plan is in place, Australian government agencies must act in accordance with that plan."

What a wonderful reassurance. It's a pity, then, the system underpinning the promise is rotten. By their fruit ye shall know them: since the legislation mandating action plans was enacted in 1992, only a single vertebrate species has become so abundant as to merit being taken off the threatened species register. But saltwater crocs are atypical of Australia's endangered species in that the threat they faced was simple: when the shooting for skins was stopped, the species recovered.

Why are we failing so abjectly in protecting our threatened species? The pitifully slow rate at which recovery plans are being drafted is one factor. In NSW, for example, in the past 20 years, recovery plans have been completed for only around 10 per cent of all species listed as vulnerable to extinction. Things get worse. In 2006, the federal government excused itself from the obligation to draft plans for species listed as vulnerable to extinction. As a result, if the Minister for the Environment decides not to draft a plan, then it simply isn't done. And even if a plan is completed, there's no guarantee it will receive funding.

Why are action plans so often failing to help species recover? The glacially slow development of the plans, along with the lack of obligation to fund and report back on them, are clearly impediments. There are other problems as well. Some plans do not describe how species might be saved. Instead, they often stated that more money is required for research before appropriate action is taken.

Such is the depth of public ignorance about Australia's extinction crisis that most people are unaware it is occurring, while those who do know of it commonly believe our national parks and reserves are safe places for threatened species. In fact the second extinction wave is in full swing, and it's emptying our national parks and wildlife reserves as ruthlessly as other landscapes. This is disturbing. National parks exist explicitly to conserve biodiversity, and their failure to do so is a failure both of government policy and our collective will to protect our natural heritage.

The problem lies not with the parks' staff, who are often dedicated and skilled at their work. Nor does it lie solely with budgets, although more funding rather than more cuts would always be welcome. Instead, the difficulties are at least threefold. First, the problem stems from the delusion that the simple act of proclaiming a national park or nature reserve will result in the protection of biodiversity. Parks must be proclaimed and effectively managed if biodiversity is to be protected.

Second, the various government agencies responsible for biodiversity protection have allowed their scientific capacity to erode to the point where it's hard to be sure how many individuals of most endangered species survive; and third, the attempt to save endangered species involves risks that bureaucracies are increasingly unwilling to take.

The first duty of the bureaucrat these days seems to be to protect their minister from criticism. Thus it often seems preferable to let a species die out quietly, seemingly a victim of natural change, than to institute a recovery program that carries a risk of failure, however small.

Australian politics, and the bureaucracy that supports it, is failing in one of its most fundamental obligations to future generations: the conservation of our natural heritage. The times also suit cynical self-interest. Cash-starved state governments, ever more desperate for income and political support, are rolling back even the inadequate protections that presently exist, and economic pressures are making it difficult for not-for-profit organisations that focus on nature protection to make ends meet.

What to do? As this saga of ignorance, folly and malice unfolds, it has become clear those working outside government have a crucial role to play in conserving our biodiversity. I believe it is action by the private and not-for-profit sectors, working with government, that holds the key to protecting our endangered species in a competent and affordable manner. Australians need to take a look at ourselves.

This is an edited extract from *Australia's New Extinction Crisis* by Tim Flannery, published in the latest *Quarterly Essay*.

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

Teaching About Flying Foxes and Microbats

Australian Curriculum (HASS - Humanities & Social Sciences): Year 3

Knowledge & Understanding - Geography:

The location of Australia's neighbouring countries and the diverse characteristics of their places ([ACHASSK067](#)) similarities / differences between countries

The main climate types of the world and the similarities and differences between the climates of different places ([ACHASSK068](#))

The similarities and differences between places in terms of their type of settlement, demographic characteristics and the lives of the people who live there, and people's perceptions of these places ([ACHASSK069](#))

Inquiry & Skills:

A number of Inquiry & Skills Content Descriptors are also referenced in this learning sequence. They cover areas including Questioning ([ACHASSI052](#)), Researching ([ACHASSI053](#)) ([ACHASSI054](#)), Analysing ([ACHASSI057](#)), Evaluating & Reflecting ([ACHASSI058](#)) ([ACHASSI060](#)) and Communicating ([ACHASSI061](#)) .

Teaching suggestions linked to the curriculum:

Whilst Australia's Flying Foxes are endemic or unique to Australia, there are other species of Flying Foxes in other parts of the world. Primarily they are located amongst our neighbouring Asian nations. This provides an opportunity to look at those countries who, like Australia, are home to Flying Foxes, and compare and contrast ([ACHASSI054](#)) them with the parts of Australia in which Flying Foxes are found ([ACHASSK067](#)).

Aspects being considered will include identifying climate ([ACHASSK068](#)) and weather similarities and differences as well as possibly investigating environmental protective measures each country has in place as an extension task. Using data collected from a range of sources ([ACHASSI053](#)) as outlined below, students develop 3 geographical questions ([ACHASSI052](#)) then conduct research into the answers of these questions. Students interpret the data ([ACHASSI057](#)) then represent their information in Venn diagrams and/or graphs ([ACHASSI054](#)) and draw conclusions ([ACHASSI058](#)) from the data which they write as a paragraph ([ACHASSI061](#)) about the differences and similarities they found in their research ([ACHASSK069](#)) ([ACHASSI060](#)). A Flying Fox shaped Venn diagram is attached.

NEIGHBOURING COUNTRIES that are home to Flying Foxes include: South-east Asia, Philippines, Papua New Guinea, Indonesia, Islands of the Western Pacific ocean.

FLYING FOX SPECIES - Whilst Australia has only a handful of Flying Fox species remaining, there are still 1,300+ species across the globe, with at least 448 being at home in the Asian region. Some sites for students to choose a bat species from include:

<http://www.batcon.org/our-work/regions/asia>

<http://www.ecologyasia.com/verts/bats.htm>

<http://www.batworlds.com/category/species/>

Whilst Wikipedia is not considered a reliable research tool, it does have an extensive listing of Flying Fox species. I would only recommend using this if you are encouraging students to work in the direction of first finding a species, then country. <https://en.wikipedia.org/wiki/Pteropus>

CONSERVATION STATUS indicates a species likelihood of extinction. The IUCN Red List of Threatened Species provides information on animals facing a high risk of global extinction. Students can access this site to learn more about their selected Flying Fox.

<http://www.iucnredlist.org/>

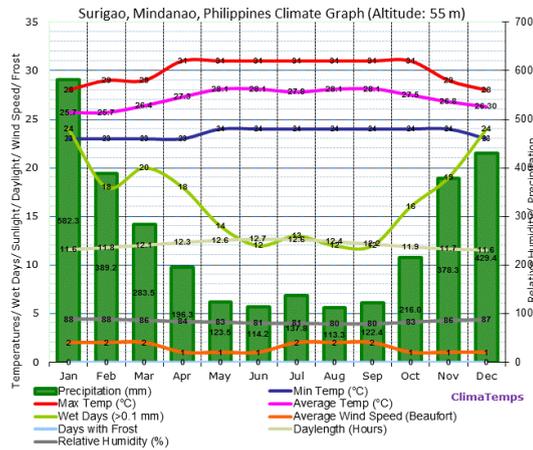


FLYING FOX PROTECTION In Australia Local, State and Federal Governments all impose laws and guidelines regarding the management of Flying Foxes. There are also many active bat advocacy groups. As part of their research, have students find a protection law or advocacy group working to protect their countries Flying Fox population. i.e. the Philippines

http://www.sospecies.org/sos_projects/mammals/filipinos_for_flying_foxes/?13746/CommunityengagementFilipinosforFlyingFoxes

Indonesia http://blogs.discovery.com/animal_news/2009/11/saving-malayan-flying-foxes.html

CLIMATE & WEATHER



Students need to also look at the climate and Temperature of both locations as part of their contrast and compare activity. Climatemps.com is a site that provides climate, temperature and rainfall data globally. <http://www.climatemps.com/>

CULTURALLY UNIQUE FINDINGS

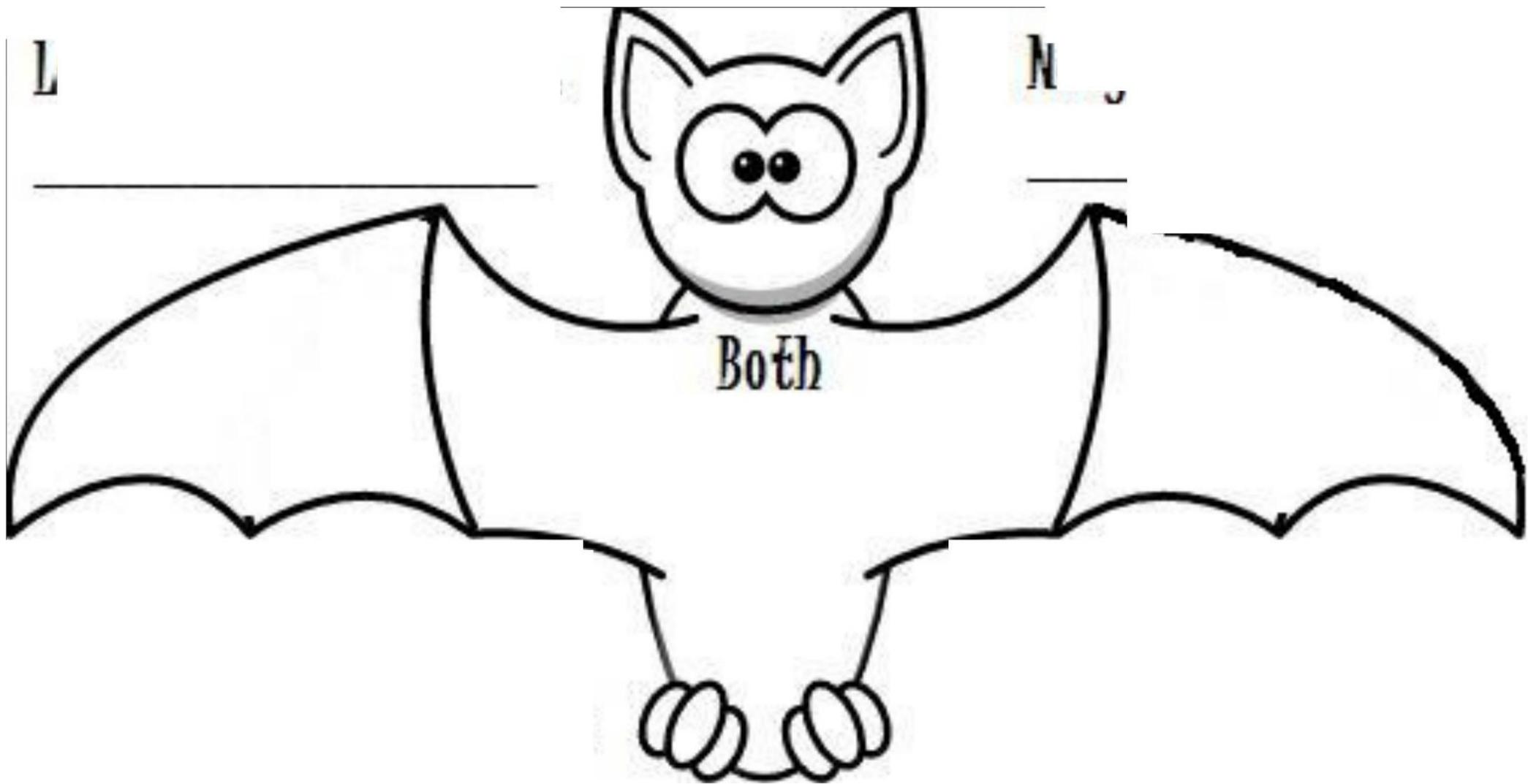
that students may encounter along the way are important and worth retaining for use in their comparative

summary. For example, in Australia Flying Foxes are not poached for their meat or pelts, and some places like Zoo Negara, Malaysia and the Singapore Zoological Gardens, celebrated them in 2011-Year of the Bat.



http://www.batworlds.com/eating_bats_in_papua_new_guinea/

http://www.waza.org/files/webcontent/1_public_site/5_conservation/2011_2012_year_of_the_bat/YOB%20Overview%20of%20activities%20Nov%202011.pdf



Teaching About Flying Foxes and Microbats

Australian Curriculum (HASS - Humanities & Social Sciences): Year 3

Knowledge & Understanding - History:

How the community has changed and remained the same over time and the role that people of diverse backgrounds have played in the development and character of the local community ([ACHASSK063](#))

Inquiry & Skills:

A number of Inquiry & Skills Content Descriptors are also referenced in this learning sequence. They cover areas including Questioning ([ACHASSI052](#)), Evaluating & Reflecting ([ACHASSI060](#)) and Communicating ([ACHASSI061](#)).

Teaching suggestions linked to the curriculum:

In this lesson students locate and collect information from sources, including observations, about how aspects of life have changed in their local area. By looking at photos of the past students will see the changes that have occurred in the local community over time. Engage students in a discussion about things that are new in your area over the last year, then two. Ask them do they know of something that was not around when their parents were young? Ask them to name a bushland area that has disappeared in their lifetime due to development. Do they think those trees can be replaced? If so, how? It is Flying Foxes who have the job of replenishing bushland trees and forests. If we have taken away the trees where will they live? And if we don't have Flying Foxes will we keep getting new trees? What questions do they have about the people involved in these community ventures ([ACHASSI052](#))?

Bat conservation groups offer good information about bats and their habitats. Because different bats (Flying Foxes and Microbats) live in different areas around Australia, it is best to check for information relevant to your local area. Here are a few sites to start with:

Bats Queensland <http://www.batsqld.org.au/>

Bat Rescue Inc <http://www.batrescue.org.au/>

Bat Conservation & Rescue Qld <http://www.bats.org.au/>

Australian Bat Clinic <http://australianbatclinic.com.au/>

Students **create an model of a local environment** and modify it so it would accommodate the needs of Flying Foxes in a way that would encourage them to inhabit (or re-inhabit) it ([ACHASSI061](#)):

- Reflect on your learning to consider what would make it special and how could you ensure it will be looked after so it stays special ([ACHASSI060](#))?
- Have students **build a shoebox diorama** to communicate important features of a site for it to be a Flying Fox habitat.
 - There are many great web based instructions for creating dioramas. Here are a couple to get you started: <http://hubpages.com/art/shoebox-diorama>
http://www.firstpalette.com/Craft_themes/Animals/habitatdiorama/habitatdiorama.html

http://smartsyandartsy.blogspot.com.a u/2012_05_01_archive.html



Teaching About Flying Foxes and Microbats

Australian Curriculum (HASS - Humanities & Social Sciences): Year 4

Knowledge & Understanding - History:

The diversity of Australia's first peoples and the long and continuous connection of Aboriginal and Torres Strait Islander Peoples to Country/Place (land, sea, waterways and skies) ([ACHASSK083](#))

Knowledge & Understanding - Geography:

The importance of environments, including natural vegetation, to animals and people ([ACHASSK088](#))

The use and management of natural resources and waste, and the different views on how to do this sustainably ([ACHASSK090](#))

Knowledge & Understanding - Civics & Citizenship:

The role of local government and the decisions it makes on behalf of the community ([ACHASSK091](#))

The different cultural, religious and/or social groups to which they and others in the community belong ([ACHASSK093](#))

Inquiry & Skills:

A number of Inquiry & Skills Content Descriptors are also referenced in this learning sequence. They cover areas including Questioning ([ACHASSI073](#)), Researching ([ACHASSI074](#)), Analysing ([ACHASSI077](#)) ([ACHASSI078](#)), Evaluating & Reflecting ([ACHASSI079](#)) ([ACHASSI080](#)) ([ACHASSI081](#)) and Communicating ([ACHASSI082](#)).

Teaching suggestions linked to the curriculum:

This lesson sequence addresses interactions between people, places and environments through a visualisation exercise in which they are seeing life from the point of view of a Flying Fox who is discovering his habitat and food sources are disappearing due to increased development. This exercise may generate an emotive response in some students - please support them and reassure them that the learning intention is to elicit a proactive response from students in which they are empowered to generate change on behalf of the Flying Foxes ([ACHASSI080](#)).

Students develop their Inquiry Skills through the development of a question about the place ([ACHASSK088](#)) and why it impacts the habitat and dietary needs of Flying Foxes ([ACHASSI073](#)) and then research the answer their question using a variety of resources ([ACHASSI074](#)). Students will analyse the research, then evaluate and reflect upon the information and data before they present their persuasive through their preferred means of communication.

Sustaining Local Bat Communities

INTRODUCE TOPIC: The importance of natural vegetation to Flying Foxes in sustaining native tree growth.

INTRAPERSONAL / VISUAL-SPATIAL LEARNING: Students find a comfortable spot where they close their eyes as they work through this visualisation.

" You are a Flying Fox. You have just enjoyed a lovely big sleep. You stretch and listen to the songs of your familiar surroundings. You hear the wind through the trees. The grasses rustling. A bird is calling in the distance. There are these old make you feel rested, calm. But have been hearing them for a few disrupt the peace. There is a car sure, that sounds like a lawn mower. awakening and you are feeling drop between branches you wave high into the tree. It is like magic. sweet, juicy, fruity nectar to drink night. But you can't find any. Where are street lights.



You have good eyesight and the lights make it even clearer to you there is no longer food for you here. You know you need to move on. You call to your friends in a high-pitched screech. As you are powerfully waving your hands in figures of eight you are able to lift yourself into the sky so you fly overhead, searching for native trees upon which you can feed as you pass by. You feel worried as you look for trees in the places they used to be. A little voice inside you is asking, "Where are the trees? If there are no trees, there is no me!" You miss the nectar of the big eucalypt trees that you would feed upon; then spread their seeds through your droppings from which new trees would grow. You know you have a very important job, sharing the seeds of the big trees up and down the East coast of Australia, but the trees are disappearing as new roads and buildings take their place. You find a mango tree. It's not your favourite, but when all your food and shelter is disappearing, you are happy to take whatever you can get. Hanging from the tree you break the skin of the mango, gnaw at the fruit to drink the juice and leave the fibre and pulp as they will weigh you down too much for flying. As you drink the mango nectar you think about how the changes the humans are making have changed the way you and many other native Australian animals now live."

Photo courtesy of Nick Edards at <http://deborahbirdrose.com/tag/predator-friendly-pastoralism/>

Let students sit quietly to contemplate these changes before directing them to slowly open their eyes.

LOGICAL-MATHEMATICAL/ VERBAL-LINGUISTIC/ VISUAL-SPATIAL/ INTERPERSONAL LEARNING:

Create a class KWL (Already KNOW; WANT to know; What I have LEARNED) chart about Flying Foxes. Ensure you are able to keep it up for the duration of the unit so students can add anything new they discover they want to know, or reflect upon what they are seeking to learn. Using Post-It notes, have them record everything they *already know* about the animals, writing one thing on each note. Using different coloured Post-It notes, have students repeat the process, this time writing down what they *want to know* about Flying Foxes. Have students bring their 'already know' and 'want to know' notes to the front. With students seated and focused on the chart, the teacher works with the students to sort the notes into common topics in each column. This great KWL chart was found at http://eberhartsexplorers.blogspot.com.au/2014_10_01_archive.html.



MAIN TASK:(ALL INTELLIGENCES CAN BE INCORPORATED IN THIS TASK).

In groups of 3 students pose a question they think people may want to ask about bats in relation to their diet and habitat. Working with this topic list, encourage students to think about questions surrounding ethical behaviours, sustainability and preferred futures in relation to Flying Foxes and Microbats. They will be required to research their question and create a persuasive response to their question.

. Topics:

- Draw upon similarities between changes being experienced by Flying Foxes and other native animals since colonisation. The Australian Government has over 1,600 species and ecological communities as in threat of extinction. There are mammals, reptiles, frogs and birds - see if you can find a threatened species in your local area for a comparison. You can use this link to get you started or contact your local council or wildlife support groups. *World Wildlife Fund: Australia's responsibility for its species* http://www.wwf.org.au/our_work/saving_the_natural_world/wildlife_and_habitats/threats_to_species/australias_responsibility_for_its_species/
- Aboriginal and Torres Strait Islander Peoples have strong connections to their Country_ ([ACHASSK083](#)) and recognise the importance of sustaining native animals. Explore stories about other local groups who work to save injured bats and promote bat education ([ACHASSK093](#)). *Bats Queensland* <http://www.batsqld.org.au/>; *Australasian Bat Society* <http://ausbats.org.au/>; *Bat Conservation and Rescue* <http://bats.org.au/>
- Using data from non-digital sources such as maps, and digital sources identify where Flying Foxes roost in your area ([ACHASSI078](#)) (e.g. *National Flying Fox Monitoring Viewer*)_ <http://www.environment.gov.au/webgis-framework/apps/ffc-wide/ffc-wide.jsf>
- Why is the environment important to the survival of the Flying Fox? Examining information and distinguishing fact from fiction ([ACHASSI077](#)) - Can we live in harmony with the Flying Fox_ ([ACHASSK088](#))? *Collective Views of Scientists, Wildlife Carers and Animal-rights Groups over the culling of Grey Headed Flying Foxes in the Royal Melbourne Botanical Gardens*_ <http://austrop.org.au/ArchiveOldSite/ghff/home.htm>
- Look at sustainability in relation to natural resources, vegetation and the environment and draw conclusions as to the effect sustainable practices will have on the endangered Flying Fox populations ([ACHASSI079](#)) ([ACHASSK090](#)). Do you think Indigenous Australian's take sustainability issues more seriously because of their custodial responsibilities ([ACHASSK083](#))?
- The making of community decisions around their point of view and the role of local government in these decisions ([ACHASSK091](#)).

- How and why people can actively participate in supporting their point of view within the community_ (ACHASSK093). *Bats Queensland* <http://www.batsqld.org.au/>; *Australasian Bat Society* <http://ausbats.org.au/>; *Bat Conservation and Rescue* <http://bats.org.au/>

Having decided on their question from the above topics, students locate information and sort data that allows them to choose a perspective from which they will persuade their audience in favour of their point of view. A list of resources is provided at the end of this paper.

Students have the option to present their persuasive as an essay, a video, poster, song, or any other medium that allows them to communicate their message whilst fulfilling all areas of the task's brief (ACHASSI082).



They are to use both digital and non-digital means of representing their information and data; and their conclusion is to include a call to action in support of their point of view.

**Within their groups, have students discuss the personal strengths they bring to the group. Allow them planning time to ensure they all have the opportunity to share what they do well so the groups have the chance to showcase the skills and abilities of each student.*

LOGICAL-MATHEMATICAL/ VERBAL-LINGUISTIC/ VISUAL-SPATIAL/ INTERPERSONAL LEARNING:

Completing the KWL Chart. Whether you choose to teach this as a single lesson or a unit, revisit the KWL chart reflecting as a group of the last column, 'What I have LEARNED' (ACHASSI081).

EXTENSION OF LEARNING:

These presentations could be shared in a class presentation to families or other class groups to expand upon community understanding about the importance of bats to our ecosystem.

Teaching About Flying Foxes and Microbats

Australian Curriculum (HASS - Humanities & Social Sciences): Year 5

Knowledge & Understanding - History:

The nature of convict or colonial presence, including the factors that influenced patterns of development, aspects of the daily life of the inhabitants (including Aboriginal Peoples and Torres Strait Islander Peoples) and how the environment changed ([ACHASSK107](#))

Knowledge & Understanding - Geography:

The influence of people, including Aboriginal and Torres Strait Islander Peoples, on the environmental characteristics of Australian places ([ACHASSK112](#))

The environmental and human influences on the location and characteristics of a place and the management of spaces within them([ACHASSK113](#))

Knowledge & Understanding - Economics & Business:

The difference between needs and wants and why choices need to be made about how limited resources are used ([ACHASSK119](#))

Types of resources (natural, human, capital) and the ways societies use them to satisfy the needs and wants of present and future generations ([ACHASSK120](#))

Inquiry & Skills:

A number of Inquiry & Skills Content Descriptors are also referenced in this learning sequence. They cover areas including Questioning ([ACHASSI094](#)), Researching ([ACHASSI097](#)), Analysing ([ACHASSI098](#)) ([ACHASSI099](#)), Evaluating & Reflecting ([ACHASSI101](#)) ([ACHASSI102](#)) ([ACHASSI103](#)) ([ACHASSI104](#)) and Communicating ([ACHASSI105](#)).

Teaching suggestions linked to the curriculum:

Year 5 HASS focuses on Australian Communities This learning sequence will have students addressing Australian Curriculum Achievement Standards of developing questions for an investigation, locating and collecting data from a range of sources and examining sources to determine the purpose and point of view. They will describe experiences of inhabitants around the time of colonisation (including Aboriginal and Torres Strait Islander People as well as colonists) in relation to Flying Foxes. They will identify and describe the interconnections between people and Flying Foxes, explaining how/why Flying Foxes are an integral component of the environment due to their role in regenerating our forests.

Divide students into three groups ([ACHASSI102](#)), using the following stimulus articles, allocate each group one of these topics that have affected Flying Foxes over the last 250 years:

1. Flying Foxes should be used as a sustainable 'bush meat' food source.

In the same way people eat cows or chickens - if they are out bush and there are no cows/chickens and they wanted to eat meat what other choices might they have? This was the situation faced by Aboriginal people and early explorers. Where would they get their food from? Where do you get your food from?

2. The killing off of Flying Foxes should be banned or they will be forced into extinction.
3. We should be allowed to keep Flying Foxes as pets.

For people who are vaccinated for ABLV what is different about keeping a bird or a bat?

They are to **read all of the following perspectives** then have a short group discussion about how these articles relate to their topic ([ACHASSI101](#)). Students are to develop appropriate questions for other group members so as to guide their inquiry([ACHASSI094](#)). This will give students the opportunity to hear other

people's point of view ([ACHASSI099](#)) before returning to their desks to reflect on their learning ([ACHASSI104](#)) and write a persuasive letter to the editor of their local newspaper about their topic ([ACHASSI105](#)).

In their groups, students should **discuss the following matters**:

1. Are the articles they are looking at primary or secondary sources and what are their origins and purposes ([ACHASSI098](#))?
2. Are the opinions of group members based on wants or needs?
3. As Flying Foxes are officially an endangered species, discuss what this means in terms of their scarcity.
4. To ensure the a positive future for our natural environment and native trees, how can society now, and into the future, continue with their urban growth whilst protecting Flying Foxes ([ACHASSK120](#))?
5. How has the public view or management of Flying Foxes has changed over time in relation to their topic? **Provide each group with paper** on which they can **record a timeline** from information in the articles ([ACHASSI097](#)).

To write an authentic and personal letter of persuasion students will need to establish their own personal criteria to make personal judgements about the evidence provided in the articles ([ACHASSI103](#)).

Letter to the Editor - Perspectives for Consideration

The Colonist's Perspective - 1793 <https://learnearnandreturn.wordpress.com/tag/flying-foxes/>

Watkin Tench, in *A Complete Account of the Settlement at Port Jackson* (1793), reports that Governor Phillip saw one which measured upwards of four feet from the tip of each wing. Some were taken alive, and would eat boiled rice, or other food readily out of the hand, and in a few days were as domestic as if they had been bred in the house: the governor had one, a female, that would hang by one leg a whole day without changing its position; and in that pendant situation, with its breast neatly covered with one of its wings, it ate whatever was offered it, lapping out of the hand like a cat. (ACHASSK107)

The Inland Explorer's Perspective - 1845 <https://learnearnandreturn.wordpress.com/tag/flying-foxes/>

In his *Journal of an Overland Expedition in Australia* in 1845, Ludwig Leichhardt and his companions ate a lot of them as they northern Australia, from the Darling Downs to Port Essington. On 30 October, for instance, "Charley shot three, and we made a late but welcome supper of them. They were not so fat as those we had eaten before, and tasted a little strong; but, in messes made at night, it was always difficult to find out the cause of any particular taste, as Master Brown wished to get a quickly as possible over his work, and was not over particular in cleaning them..."

Yuck. The following day they had better luck by daylight – less so for the bats:

Charley and Brown went to shoot flying-foxes, and returned at luncheon with twelve; during the afternoon, they went again and brought in thirty more; having left about fifty hanging, wounded, on the trees.

The Indigenous Perspective - 1998 <http://www.aibiol.org.au/news/journal/flying.html>

Charles Missi from the Northern Territory University writes "Flying Foxes are one traditional food and medicine which could be sustainably harvested these animals and others sustainably in the past, and have traditional knowledge of their interaction with the environment. Of course studies would have to be done to determine the best place for this to occur and to develop appropriate management techniques for sustainable harvesting (Vardon & Tidemann, 1995). But Flying Foxes are just one of a number of species which could form a larger wildlife industry."

The Conservationist's Perspective ≥ 2011 <http://www.dontshootbats.com/conservation.html>

Flying-foxes as threatened species

There have been massive declines in flying-fox populations since European colonisation due to land clearing and large-scale slaughter. Two species, Grey-headed and Spectacled flying-foxes, are listed as nationally threatened (vulnerable under the *Environmental Protection and Biodiversity Conservation Act 1999*).

In 1938 biologist Francis Ratcliffe estimated there were "many millions" of Grey-headed flying-foxes, and that they had already suffered a 50% decline. Now there are an estimated 400,000 or so. They were listed in 2002 due to evidence of a 30% decline in numbers in the decade from 1989.

Significant threats for both the Spectacled and Grey-headed flying-foxes include habitat loss, mortality in orchards and camp harassment.

Because of low reproductive rates, flying-foxes are susceptible to population declines. With females able to bear only one young a year and generally not reproducing until they are 3 years old, they have a low capacity for population increase. It is biologically impossible for flying-foxes to build up to "plague" numbers. Population stability requires high survival rates of adults and juveniles. A mortality rate exceeding 12 percent may cause the population to decline. An imposed mortality as low as 10% in addition to natural mortality can lead to rapid decline of a large population.

In addition to orchard killing and habitat destruction, flying-foxes suffer from seasonal or climatic food shortages, entanglements in barbed wire and backyard netting, power-line electrocutions, heat stress (Grey-headed flying foxes), and paralysis ticks (Spectacled flying foxes).

Teaching About Flying Foxes and Microbats

Australian Curriculum Humanities and Social Sciences [HASS]: Year 6

Knowledge & Understanding - History:

The contribution of individuals and groups to the development of Australian society since Federation (ACHASSK137)

Knowledge & Understanding - Economics & Business:

The effect that consumer and financial decisions can have on the individual, the broader community and the environment (ACHASSK150)

Inquiry & Skills:

A number of Inquiry & Skills Content Descriptors are also referenced in this learning sequence. They cover areas including Questioning (ACHASSI122), Researching (ACHASSI123), Evaluating & Reflecting (ACHASSI132) and Communicating (ACHASSI133).

Teaching suggestions linked to the curriculum:

Watch these 2 short videos with your students. It is talking about the Flying Foxes, and whilst it does refer to South East Asia, the information is relevant to Australia's Megabats as well. The video not only talks about the characteristics and dietary preferences of the Flying Foxes, it also addresses the growing problem facing these animals, of loss of habitat due to environmental changes resulting from increasing human populations and destruction of forests/bushland.



Megabats! Flying Fox - Species Spotlight: <https://youtu.be/TnZKh8h2zCY>

In Defence of the Flying Fox <http://www.abc.net.au/catalyst/stories/3000668.htm>

Thinking about the types of environmental changes mentioned in the video, make a class list of local area changes that may have impacted on Flying Foxes in your local area. Changes may include:

- New buildings and construction; destruction of bushland or farmland for urban development; the repurposing of buildings or parcels of land; transportation changes (e.g. trams removed, train lines built, roads redirected or widened).
- Talk about how these changes affect both the people and wildlife in their community (e.g. Pacific Highway has been redirected to bypass many small towns. These towns lose business and land that was reclaimed to build the new road was previously farm or bushland, thus reducing native wildlife habitats and farming opportunities)

Create a mind map. Students then pose questions and engage in a managed discussion to identify the whether they believe the financial gains to the community are worth the effects of the changes on the local Flying Foxes and in turn, the native tree population (ACHASSK150). From information on the mind map predict probable effects on the Flying Foxes, our environment and our community (ACHASSI132).



Some local area changes may include:

- Destruction of native forests/bush and food supply
- Planting of easily accessible, year-round food supplies (e.g. orchards)
- Loss of habitats
- Intentional reduction of Flying Fox populations by some farmers and/or local government bodies.
Farmers need both bees and Flying Foxes to pollinate their trees so their fruit will grow, but they also have concerns about crop damage the Flying Foxes cause.
- Pets and feral animals that have been introduced to the area.
- Human population growth and density
e.g. Increased housing = Increased population = more jobs = more pollution = less trees

Have students research the different organisations available to support Flying Fox preservation and compare their services.

There are many organisations and they all provide a valuable contribution to our community and our environment. Whilst they all have a primary focus of the recognising the importance of protecting and standing up for our native animals, they all go about it in slightly different ways.

Have students spend time looking at the different organisations and what they have done to contribute to the development of Flying Fox welfare strategies or awareness campaigns ([ACHASSI123](#)).

Some include:

Bats Queensland <http://www.batsqld.org.au/>

Bat Rescue Inc <http://www.batrescue.org.au/>

Bat Conservation & Rescue Qld <http://www.bats.org.au/>

Australian Bat Clinic <http://australianbatclinic.com.au/>

Teaching About Flying Foxes and Microbats

Australian Curriculum Humanities and Social Sciences [HASS]: Year 7 and Humanities 7-10: Year 7

Knowledge & Understanding - Civics & Citizenship:

How values, including freedom, respect, inclusion, civility, responsibility, compassion, equality and a 'fair go', can promote cohesion within Australian society ([ACHASSK197](#)) ([ACHCK052](#))

How groups, such as religious and cultural groups, express their particular identities; and how this influences their perceptions of others and vice versa ([ACHASSK198](#)) ([ACHCK053](#))

Knowledge & Understanding - Economics & Business:

The ways consumers and producers interact and respond to each other in the market ([ACHASSK199](#)) ([ACHEK017](#))

Inquiry & Skills:

A number of Inquiry & Skills Content Descriptors are also referenced in this learning sequence. They cover areas including Evaluating & Reflecting ([ACHASSI159](#)) ([ACHASSI162](#)) and Communicating ([ACHASSI163](#)).

Teaching suggestions linked to the curriculum:

This learning sequence aligns with the Australian Curriculum as it requires students to explain the role of particular groups in protecting Flying Foxes. Students will look at the interconnection, through businesses such as an airport, and the environment with regard to the debate about culling Flying Foxes. Flying Foxes are a keystone species vital to ensuring the ongoing reproduction of many native tree species.

With the two attached articles as stimuli, have students **debate the importance of Flying Fox habitats** ([ACHASSI163](#)). One argument is that Flying Fox habitats need to be destroyed because of the consumer and financial implications on society, whilst the other is that they are a vital part of the natural infrastructure that businesses and community organisations need to make accommodations for when planning and developing different areas. Students are to research and provide data and statistics to support their arguments ([ACHASSI159](#)).

Students need to reflect on their learning to justify their conclusions ([ACHASSI162](#)). Within their argument students need to address:

- How their recommendation will affect the interactions between businesses/producers and the ongoing survival of Flying Foxes? Can these recommendations be implemented without adversely affecting business or community members ([ACHASSK199](#)) ([ACHEK017](#))?
- What community or environmental groups are available to support the protection of Flying Foxes and their habitats? How do they work to influence the perceptions of others in favour of the Flying Fox ([ACHASSK198](#)) ([ACHCK053](#))? Research to see if these values are reflected by Australia's political or legal system (are there laws or political arguments supporting their causes)?
- Which values they address would be shared by all Australian, and could they also be considered universal values ([ACHASSK197](#)) ([ACHCK052](#))?

The Importance of Flying Foxes and their Habitats



Airports to destroy Flying Foxes as part of safety plans.

<http://www.couriermail.com.au/news/queensland/australian-airports-association-recommends-destruction-of-flying-fox-habitats-to-better-manage-high-number-of-dangerous-strikes-on-queensland-runways/story-fnihsrf2-1227618306276>

Flying Foxes are just doing their job.

<http://www.frasercoastchronicle.com.au/news/flying-foxes-are-just-doing-their-job/1287075/>



How can flying-foxes be managed in accordance with national environmental law?

Flying-fox camps can be large and may occur in trees that are close to houses and livestock. Residents who live near camps often have concerns regarding noise, damage to vegetation and hygiene.

Activities that are likely to have a significant impact on a nationally threatened species need to be referred to the Australian Government to ensure they are consistent with national environment law. In regards to nationally-listed flying-fox species, this may include proposals to disperse camps, move or shift camp boundaries, or clearance of important roosting or foraging habitat.

Some activities to manage problematic flying-fox camps may be considered unlikely to have a significant impact and may not need to be submitted to the Australian Government for approval. Examples may include minor modifications to habitat, such as creating buffers by trimming or removing vegetation using appropriate timing and methodology, planting non-roost plant species, or re-vegetating key areas to improve or create additional habitat away from affected areas.

Measures can also be implemented to deter colonies from establishing in inappropriate areas by using noise and visual methods. However, once a camp is established at a site, disturbance using noise and visual methods may result in a significant impact and may require a referral to the Australian Government.

It is recommended that you seek advice from the Department before undertaking major habitat modifications or other activities.

To help inform the public about how to live with flying-foxes, the state government websites listed above may also help to answer any questions you have.

<http://www.environment.gov.au/biodiversity/threatened/species/flying-fox-law>

Teaching About Flying Foxes and Microbats

Australian Curriculum Humanities and Social Sciences [HASS]: Year 7 and Humanities 7-10: Year 7

Knowledge & Understanding - History:

INVESTIGATING THE ANCIENT PAST

The importance of conserving the remains of the ancient past, including the heritage of Aboriginal and Torres Strait Islander Peoples ([ACHASSK171](#)) ([ACDSEH148](#))

Teaching suggestions linked to the curriculum:

Many species of Australia's Flying Foxes and Microbats are at risk of extinction. Just as recently 2012 Australia lost one of its remaining native bat species to extinction. It was the Christmas Island Pipistrelle (*Pipistrellus murrayi*). Read the attached article with students about the passing of this species into history in spite of it being identified as critically endangered. Both Megabats, like Flying Foxes, and Microbats play an important role in our environment, but through climate change, urbanisation and other factors we are still losing species.

This learning sequence looks at the importance of recording information and conserving remains from the past ([ACHASSK171](#)) ([ACDSEH148](#)) and specifically looks at two Australian bats that have been extinct for millions of years. Students are to generate a letter to the editor in response to the newspaper article and link the loss of the Christmas Island Pipistrelle to the extinction of one of these Australian Bats tens of millions of years ago.

The report shall include:

- A pictorial reference
- Facts about the bat
- Details about the era in which the bat lived
- Information about where in Australia the bat lived and whether it was the same (e.g. climatically, physically, etc) there today.



Here are two of the Australian Bats that are now extinct:

Australonycteris clarkae

Brachiposideros nooraleebus

<http://australianmuseum.net.au/australonycteris-clarkae> ;

<http://australianmuseum.net.au/brachiposideros-nooraleebus>

These links provide information about how the physiological structure of the animals provide information about how they lived and the eras from which they date.

The *Australonycteris clarkae* is from the Eocene Epoch time: <http://www.britannica.com/science/Eocene-Epoch>

The *Brachiposideros nooraleebus* is from the Oligocene Epoch and Miocene Epoch times:

<http://www.britannica.com/science/Oligocene-Epoch>; <http://www.britannica.com/science/Miocene-Epoch>

Both are from fossil sites in Queensland, with the *Brachiposideros nooraleebus* coming from the Riverleigh World Heritage Fossil Site in northwest Queensland. It is one of the richest historical bat sites in the world. <https://www.environment.gov.au/heritage/places/world/australian-fossil-mammal-sites> ; <http://www.riversleigh.com/>

Have students conclude by generating an argument for the importance of conservation of ancient artefacts.

As an extension, students may do further research to identify a source from the same era of ancient Australia (for example, a shell – where it was found, how long it was used for, what it reveals about technology and the use of environmental resources) and reporting on different approaches to historical investigation such as the use of excavation and stratigraphy, oral history and use of data derived from radiocarbon dating.

Another extension opportunity is to develop links with your local Aboriginal community and invite an elder to come in to speak with the students about Flying Foxes. If your school does not already have connections



to your local Aboriginal community this link provides good advice and suggestions about how to contact with these communities. <http://files.acecqa.gov.au/files/NEL/engaging-with-aboriginal-communities1.pdf>

Further information on bats throughout history can be found in this article, <http://www.scientificamerican.com/article/bats-in-history-and-world/>.

The Sydney Morning Herald

Unmourned death of a sole survivor



Gone ... the pipistrelle.

Published: November 17, 2012 - 3:00AM

In late August 2009 a tiny, solitary bat fluttered about in the rainforest near Australia's infamous Christmas Island detention camp. We don't know precisely what happened to it. Perhaps it landed on a leaf at dawn after a night feeding on moths and mosquitoes, and was torn to pieces by fire ants; perhaps it succumbed to a mounting toxic burden placed on its tiny body by insecticide spraying. Or maybe it was simply worn out with age and ceaseless activity, and died quietly in its tree hollow. But there is one important thing we do know: it was the last Christmas Island pipistrelle (*Pipistrellus murrayi*). With its passing, an entire species winked out of existence.

Two decades earlier the island's population of pipistrelles had been healthy. A few scientists had watched the species' decline with concern, until, after the million or more years that it had played a part in keeping the ecological balance of the island, they could see that without action its demise was imminent. They had done their best to warn the federal government about the looming catastrophe, but they might as well have been talking to a brick wall. The bureaucrats and politicians prevaricated for three years, until it was too late.

Nothing effective was done to help the bats. Indeed, except for those watching scientists, few seemed to give a thought to the passing of the species, nor what it might mean for Christmas Island or our country.

The pipistrelle's extinction was painful for me. In an attempt to avert it I met Peter Garrett, then the environment minister, and warned him of the impending loss. I had brought offers of assistance and expertise from the Australian Mammal Society to his attention. The society was confident the species could be saved - at a cost of perhaps only a few hundred thousand dollars. But Garrett was convinced by the orthodoxy that ecosystems rather than species should be the focus of the national conservation effort, and I got the message that nothing would be done. Saving the bat wasn't an impossible mission. It's just that the government and the people of Australia - one of the richest countries on earth - decided it wasn't worth doing.

What really shook me was that it was the first extinction of a mammal in Australia for 60 years - and the first in my lifetime. My original professional expertise lies in mammalogy and palaeontology, and before the pipistrelle's demise I believed the worst of Australia's extinction crisis was behind us - that somehow my generation was wiser and more caring, and would not tolerate any more losses of Australia's unique mammals. It's now clear that those 60 years were a lull in the storm, and that the pipistrelle's demise marked the beginning of a new extinction wave.

Australia's first extinction wave began almost as soon as the First Fleeters stepped ashore, and by the 1940s it had carried away 10 per cent of the continent's mammal species. In 1791, a convict wrote about the white-footed rabbit rat, saying it was a pest in the colony's food stores. The soft-furred, grey and white kitten-sized creature was arguably the most beautiful of Australia's 70-odd native rodent species, yet it was destined to be one of the earliest victims of European settlement. Two hundred years ago it could be found in woodlands from near Brisbane to Adelaide, but the last record of it dates to the 1850s.

The thylacine and the toolache wallaby were the largest creatures to succumb in the first extinction wave. These extinctions were, however, atypical. Indeed, one of the most astonishing aspects of the first extinction wave was that its victims included what had been the most abundant and seemingly secure mammals in Australia.

The causes of these extraordinary extinctions were varied. The cessation of Aboriginal burning doubtless had its effect, and until the 1930s bounties were paid by many state governments for the scalps of now-extinct creatures. But the depredations of foxes (which were spreading quickly by the early 20th century) and feral cats, and the wholesale destruction of native vegetation by livestock and rabbits, must have been important causes. While the causes are disputed, the effect of the first extinction wave is clear: it gutted the biodiversity of the drier parts of the continent, and few native mammals larger than a rat and smaller than a kangaroo can be found on Australia's inland plains today. It's the absence of such species - the so-called critical-weight-range mammals (which weigh between 500 grams and 5 kilograms), which were once among the most abundant of creatures - that has led me to characterise the national parks of Australia's southern inland as "marsupial ghost towns".

The gathering second extinction wave is now mopping up the few surviving medium-sized mammals in Australia's south and inland. It's not difficult to predict what will be the next to become extinct, for, like the pipistrelle, their decline has been charted for years. There are 15 frogs, 16 reptiles, 44 birds, 35 mammals and 531 plants on Australia's endangered species list, and among those closest to the brink are three mammals: the central rock rat, the bridled nailtail wallaby and the numbat. All hang by a thread, and next to nothing effective is being done to halt their slide into oblivion.

The most dismaying aspect of the second extinction wave is that it is emptying vast swathes of the continent that were untouched by the first wave. Australia's Top End and Kimberley were, until recently, a paradise for medium-sized mammals, among them a close relative of the white-footed rabbit rat. The last two decades have resulted in this fauna all but exterminated in the Top End, even in our most-valued and best-resourced national parks.

Perhaps it is excusable that Australians are unaware of the extinctions now occurring in distant places such as Arnhem Land and other regions of our far north. But astonishingly, we also seem blind to the perils facing species much closer to home - for example, the sand flathead of Port Phillip Bay. A fish familiar to every Melburnian who has ever dangled a line, its population has declined by 97 per cent over the past decade.

Why should the extinction of Australian organisms concern us? The answer is almost precisely the same as to the question of why human rights are important, even when they concern people we'll never meet. First and foremost, it is a matter of values. The demise of a bat may not weigh greatly in the balance of human wellbeing, but it speaks volumes about the human soul.

As with human rights, extinctions beg the question of where we draw the line. If we can stand by as a species of bat is snuffed out, then why not other species as well? Can we really expect poor Indian villagers to heed our pleas to conserve the tigers that menace their livestock if we do nothing to prevent the extinction of Australian species? As with the question of torture, to open the door to the practice of extinction is to contemplate the horrific becoming routine.

At the heart of this nation's efforts to save its endangered species is a register of subspecies, species and ecological communities threatened with extinction. By law, each entity included on the list should have a detailed recovery plan written for it, which when implemented should save it from extinction. These plans classify species on a sliding scale - from vulnerable to critically endangered or extinct. The federal legislation governing these plans states: "Recovery plans are binding on the Australian government - once a recovery plan is in place, Australian government agencies must act in accordance with that plan."

What a wonderful reassurance. It's a pity, then, the system underpinning the promise is rotten. By their fruit ye shall know them: since the legislation mandating action plans was enacted in 1992, only a single vertebrate species has become so abundant as to merit being taken off the threatened species register. But saltwater crocs are atypical of Australia's endangered species in that the threat they faced was simple: when the shooting for skins was stopped, the species recovered.

Why are we failing so abjectly in protecting our threatened species? The pitifully slow rate at which recovery plans are being drafted is one factor. In NSW, for example, in the past 20 years, recovery plans have been completed for only around 10 per cent of all species listed as vulnerable to extinction. Things get worse. In 2006, the federal government excused itself from the obligation to draft plans for species listed as vulnerable to extinction. As a result, if the Minister for the Environment decides not to draft a plan, then it simply isn't done. And even if a plan is completed, there's no guarantee it will receive funding.

Why are action plans so often failing to help species recover? The glacially slow development of the plans, along with the lack of obligation to fund and report back on them, are clearly impediments. There are other problems as well. Some plans do not describe how species might be saved. Instead, they often stated that more money is required for research before appropriate action is taken.

Such is the depth of public ignorance about Australia's extinction crisis that most people are unaware it is occurring, while those who do know of it commonly believe our national parks and reserves are safe places for threatened species. In fact the second extinction wave is in full swing, and it's emptying our national parks and wildlife reserves as ruthlessly as other landscapes. This is disturbing. National parks exist explicitly to conserve biodiversity, and their failure to do so is a failure both of government policy and our collective will to protect our natural heritage.

The problem lies not with the parks' staff, who are often dedicated and skilled at their work. Nor does it lie solely with budgets, although more funding rather than more cuts would always be welcome. Instead, the difficulties are at least threefold. First, the problem stems from the delusion that the simple act of proclaiming a national park or nature reserve will result in the protection of biodiversity. Parks must be proclaimed and effectively managed if biodiversity is to be protected.

Second, the various government agencies responsible for biodiversity protection have allowed their scientific capacity to erode to the point where it's hard to be sure how many individuals of most endangered species survive; and third, the attempt to save endangered species involves risks that bureaucracies are increasingly unwilling to take.

The first duty of the bureaucrat these days seems to be to protect their minister from criticism. Thus, it often seems preferable to let a species die out quietly, seemingly a victim of natural change, then to institute a recovery program that carries a risk of failure, however small.

Australian politics, and the bureaucracy that supports it, is failing in one of its most fundamental obligations to future generations: the conservation of our natural heritage. The times also suit cynical self-interest. Cash-starved state governments, ever more desperate for income and political support, are rolling back even the inadequate protections that presently exist, and economic pressures are making it difficult for not-for-profit organisations that focus on nature protection to make ends meet.

What to do? As this saga of ignorance, folly and malice unfolds, it has become clear those working outside government have a crucial role to play in conserving our biodiversity. I believe it is action by the private and not-for-profit sectors, working with government, that holds the key to protecting our endangered species in a competent and affordable manner. Australians need to take a look at ourselves.

This is an edited extract from *Australia's New Extinction Crisis* by Tim Flannery, published in the latest *Quarterly Essay*.

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

Teaching About Flying Foxes and Microbats

Australian Curriculum Humanities and Social Sciences [HASS]: Year 7 and Humanities 7-10: Year 7

Knowledge & Understanding - Geography:

PLACE AND LIVEABILITY

ACHGK043 - Factors that influence the decisions people make about where to live and their perceptions of the liveability of places.

ACHGK045 - The influence of environmental quality on the liveability of places.

ACHGK047 - Strategies used to enhance the liveability of places, especially for young people, including examples from Australia and Europe.

Teaching suggestions linked to the curriculum:

Looking primarily at the geographical concepts of place, environment, interconnection, sustainability and change, the attached texts provide a basis for students to develop their understanding of the elements of liveability using geographical knowledge and skills to develop inquiry questions, interpret information and formulate a point of view which they can communicate through a persuasive essay.

Start with this link to explain the importance of Flying Foxes to our environment.

http://www.animalsaustralia.org/take_action/flying-foxes-queensland/

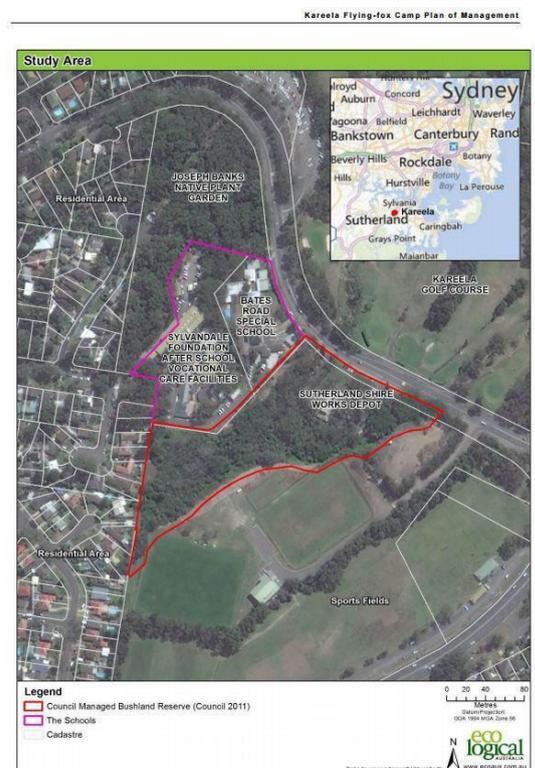
Use the impact of Flying Foxes on the children of Kareela as the catalyst for discussions about liveability and the environment. Ask students to consider that as Flying Foxes are native to Australia, do they think it is acceptable to relocate these animals, that are in danger of extinction, yet vital to the sustainability of our native trees, from their home so people can enhance the liveability of their suburb or area?

The second text addresses government policy responses to managing Flying Foxes. These changes include allowing land managers to undertake dispersal operations using noise, water, smoke and light. They can remove trees, weeds and vegetation. A grant is also in place for orchardist to install netting to protect their crops, whilst they also still have permission to shoot these otherwise protected animals.

Have students research and analyse these various strategies that are intended to enhance liveability and have them respond with a recommendation as to the strategies they believe could be introduced to enhance liveability for the young people in Kareela. Students write a persuasive essay to support their argument. As an extension, they may wish to include geographical resources such as local maps outlining areas affected by similar issues, photographs or tables and data.

This link is the Kareela Flying Fox Camp Draft Plan of Management includes recommendations put forward by environmental professionals. It will be interesting to see what ideas your students come up with.

[https://sscebp.ssc.nsw.gov.au/ebp/webpapr.nsf/0/d138996d8846d2c6ca257bd5007a987c/\\$FILE/ATTBCCR0.pdf/Kareela%20GHFF%20PoM%20v2.pdf](https://sscebp.ssc.nsw.gov.au/ebp/webpapr.nsf/0/d138996d8846d2c6ca257bd5007a987c/$FILE/ATTBCCR0.pdf/Kareela%20GHFF%20PoM%20v2.pdf)



ADDITIONAL RESOURCES

Flying Fox control methods research findings:

https://www.daf.qld.gov.au/_data/assets/pdf_file/0006/71970/Flying-fox-control-methods-research.pdf

Flying Fox Netting Subsidy Program NSW:

<http://www.business.gov.au/grants-and-assistance/grant-finder/Pages/flying-fox-netting-subsidy-program.aspx>

Kareela bats' days numbered: Health concerns prompt parents urge for state government to move them on

By Jim Gainsford

Dec. 4, 2014, 6:45 a.m.

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Out-foxed: The public have been asked to contribute their views on how to handle the impact on their community of the colony of grey-headed flying foxes that live in the bushland reserve at Bates Drive, Kareela. Picture: Lisa McMahon.

"The children have had to have outside play cancelled approximately five times in the last week due to bats," she said. The \$415,000 allocated by the council this week includes the \$250,000 the council already committed towards the problem plus an additional \$165,000.

The council is now working on stage two of its plan of management for the colony, which involves removing vegetation to create a buffer zone.

The council will write to the Environment Minister requesting urgent approval to increase the vegetation buffer to 60 per cent of the site, up from the 20 per cent zone cleared earlier this year.

The council also wrote to the NSW Office of Environment and Heritage asking to start its dispersal plan.

Sutherland Shire mayor Kent Johns said the Kareela flying fox population had become more active during the day and was negatively affecting Sylvanvale, ASPECT, Bates Drive Schools and the community.

"This is unacceptable. Council cannot allow children to be placed at risk by flying foxes," Cr Johns said.

"I am proposing that the funding of these works be shared between the state government, given the flying foxes' movement to Kareela was a direct result of the state government constructing the desalination plant."

The plant was commissioned under the previous state government.

Irrespective of the government's response, the council will allocate immediate funds to tackle the problem.

St. George and Sutherland Shire Leader <http://www.theleader.com.au/story/2740270/kareela-bats-days-numbered-health-concerns-prompt-parents-urge-for-state-government-to-move-them-on/#slide=2>

Orchardists have given the State Government's new flying fox management strategy a mixed response.

It has been announced by the Environment Minister, Rob Stokes, who said it makes the health of communities the top priority.

Mr Stokes said the plan gives councils new powers to resolve issues within their communities and take appropriate local action at the earliest opportunity.

The Minister also announced the finalisation of 'special circumstances' that will allow orchardists to continue to be able to apply for shooting licenses in rural areas.

There is also \$4 million (AUS) to extend the netting subsidy to cover the whole of NSW, not just the Sydney Basin and Central Coast for growers who want to use that as an alternative to shooting.

The Office of Environment and Heritage will assist in forming flying fox management plans under the strategy, but Mr Stokes said implementation assistance will be determined on a case by case basis.

"It'll come down to the local land manager, so in most cases the landowner of areas where these flying camps are located has been the Council, where it's another land manager the Office of Environment and Heritage will assist the other land holder," he said.

The new policy will allow land managers to undertake dispersal operations using noise, water, smoke and light.

They will also be able to remove trees that pose a health and safety risk, remove weeds and trim vegetation.

Once an approval is granted by the Office of Environment and Heritage, the actions can be undertaken for five years.

"Simple things, like creating buffer zones from urban communities and we're also making it easier for farmers to apply for new money in terms of netting subsidies, so they can net their fruit crops from bats, and where that's not practical they'll still be able to apply for shooting licences to shoot or scare bats," the Minister said.

The Chair of the New South Wales Farmers' Horticulture Committee and Orange fruit grower, Peter Darley, has cast doubt over the effectiveness of the flying fox management strategy.

Mr Darley said history has shown flying foxes aren't easily moved but he's concerned that if they are removed from urban areas, they may choose to settle on nearby farms.

"It'll be very, very hard to move them out of their roosts. We've seen that before. It becomes their home of course and you know, to disrupt that roost is very, very hard," Mr Darley said.

"But we don't want to see those flying foxes moved into areas where there is no flying foxes, 'cause I mean that would be devastating for growers that have been able to operate without the threat of flying foxes.

Mr Darley said \$4 million that has been provided to extend the netting scheme is a great start but he's concerned the Government may need to provide more funding.

"The money that's available will run out very very quickly I think. So, I only hope the government can give serious consideration that they may need to extend the scheme if there's a major uptake," he said.

Another Orange district orchardist, Guy Gaeta, who lost 20 acres of cherries to flying foxes last year has welcomed the strategy.

"It's going to get people time to protect their crops and not go into huge debt which can send you broke trying to protect your crops," he said.

"The best part about it is they haven't stopped shooting all together, they've been saying [it's going to be] phased out for the last 15 years."

Mr Gaeta is a horticulture representative with New South Wales Farmers which will discuss the strategy among other issues on Thursday.

People can make comment on the flying fox management policy until December 1 at www.environment.nsw.gov.au/threatenedspecies/flyingfoxcampol.htm

The netting subsidy is available until June 30, 2016.

Subsidies meet half the cost of installing netting, and will be capped at \$20,000 per hectare and orchardists will be responsible for all ongoing maintenance and replacement costs.

Enquires should be made through the Rural Assistance Authority.

ABC Regional News: <http://www.abc.net.au/news/2014-11-04/orchardists-give-new-flying-fox-management-strategy-a-mixed-res/5865070>

