

Teaching About Flying Foxes and Microbats: Humanities Year 8-10

About this teaching resource:

The following are teacher resources that align with Year 8 to Year 10 Australian Curriculum Humanities. This is one of ten educational resources that provide detailed, teacher-friendly discipline content knowledge and pedagogical content knowledge for all discipline areas (Maths, English, Science, Humanities and the Social Sciences). The goal of these resources is to help teachers, who are already competent, experienced and skilled in teaching, develop the knowledge and confidence to increase awareness and build capacity of communities to understand and effectively live with local Microbats and Flying Foxes (FF), including the nationally vulnerable Grey-Headed Flying Fox (GHFF).



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

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



The purpose and structure of this teaching resource

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

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

This educational resource is structured in the following way:

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

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

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

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

<https://www.youtube.com/watch?v=lo3yl0OhTSY> <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 (they are devoted and caring mothers and even leave their children (called pups) at 'childcare' as they go in search of food! Most species can only give birth to one pup per year. Infants are carried everywhere by their mothers and suckled for up to five months.

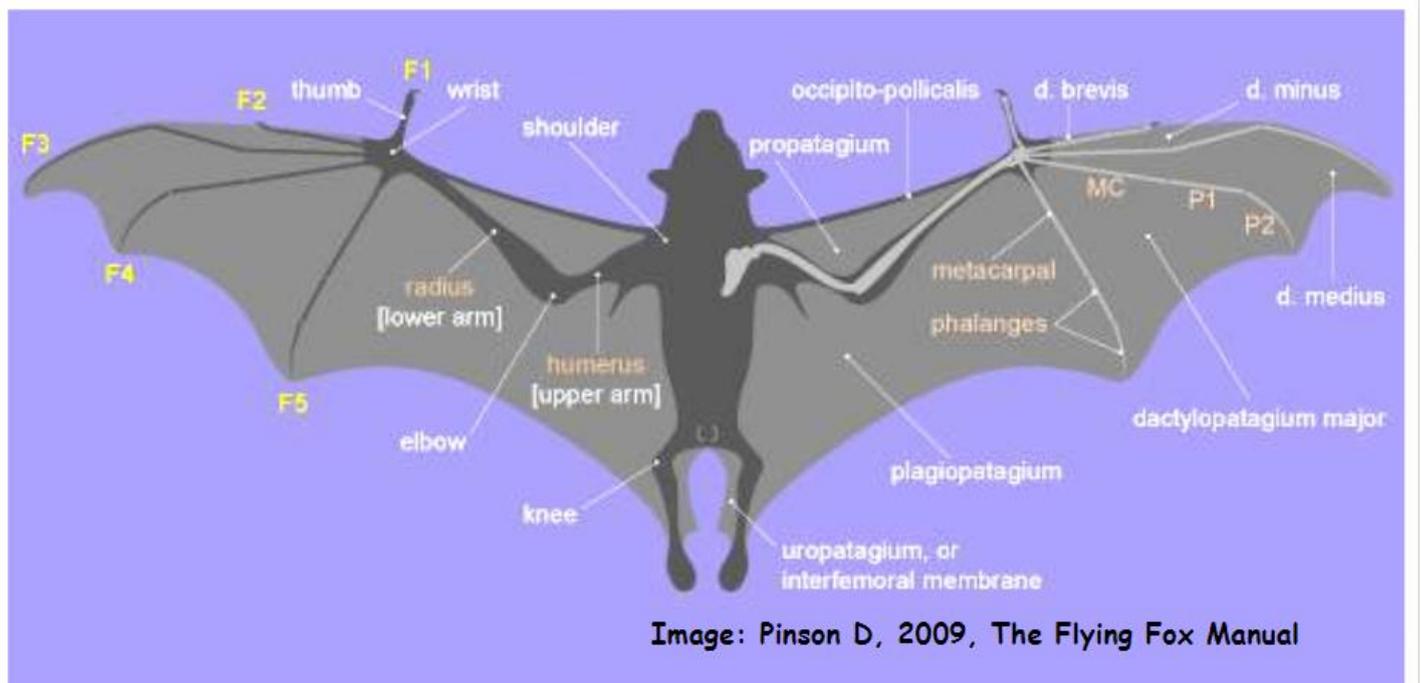
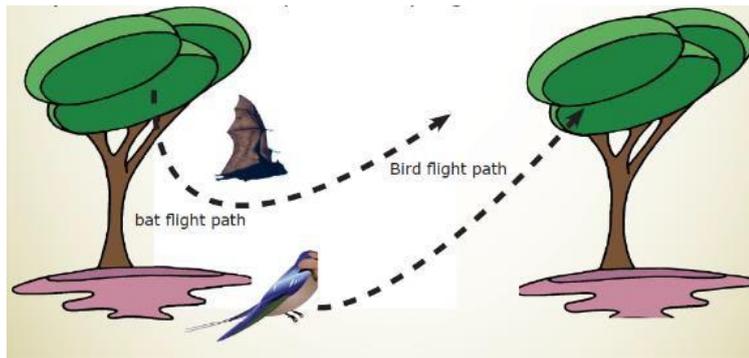


Image: Pinson D, 2009, The Flying Fox Manual

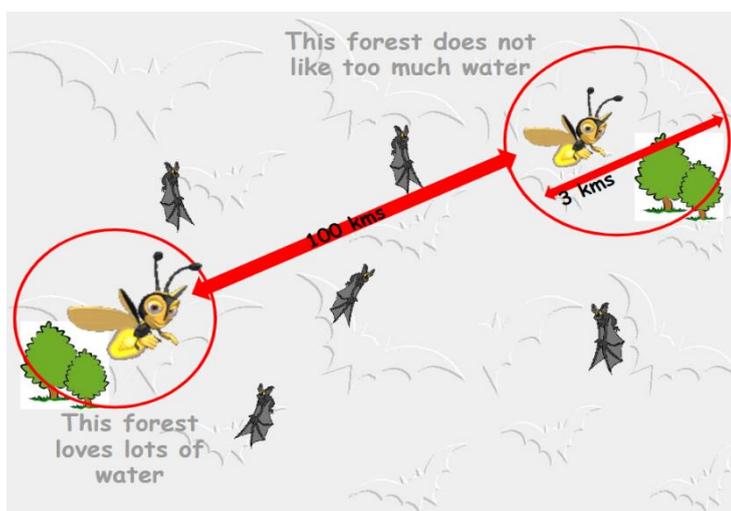
Bats are not aggressive animals. Bats do not 'swoop' or 'attack'. If spooked, a bat will fly away but because they have hands and fingers rather than wings, they must drop or fall in order to catch the wind that will provide them with the lift necessary to sustain their flight.

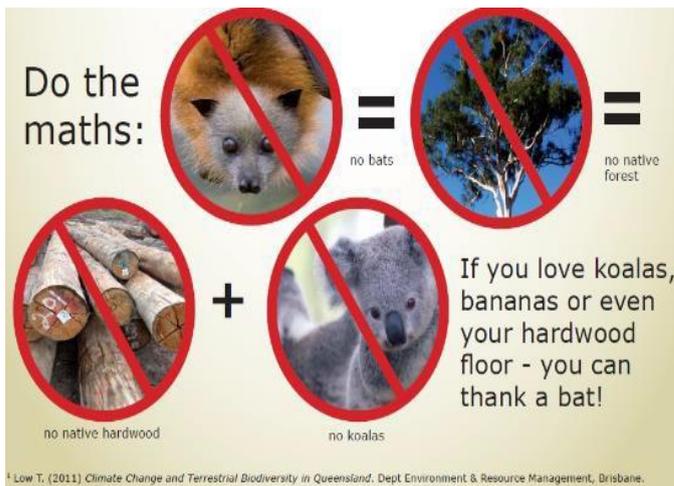


Flying Foxes or Megabats, are the largest sized bats (they also used to be known as Fruit Bats, but Flying Fox is the term that is used today). A Flying Fox has extremely good eyesight (the same as ours during the day and 25% better at night) and hearing and use these, and their strong sense of smell, to navigate the world. They are not blind and do not use echolocation. Flying Foxes are a keystone species in Australia meaning they are one of the most vital animals in our ecosystem. Flying Foxes play a key role in ensuring we have healthy coastal forests. Australian native trees reproduce by releasing and accepting pollen for fertilisation. After a flower on a tree is fertilised via pollination, the new genetic materials combine to produce seeds that then need to be distributed to other locations, away from the parent trees. Flying Foxes play an essential role in these processes. The study of science reveals that Flying Foxes and our native forests work together in an amazing and unique way that enhances the process of forest reproduction. Our native trees only release their flowers' pollen at night, specifically for the Flying Foxes to pick up. Flying Foxes have the exact soft belly fur needed to collect and carry as much pollen as possible while they fly from flower to flower. As the Flying Foxes move from flower to flower, drinking nectar, they pass along the pollen they collect on their bellies. This process fertilises the plant's flowers. Bees also do this role: however, as pollination occurs at night, Flying Foxes are more effective.



Furthermore, bees can only travel up to three kilometres and so cannot introduce new genetic material from other forest locations. The Flying Fox can travel over 100 kilometres per night and can fly from one forest to another, introducing new genetic material that will strengthen the resilience of the new generation of forests. Indeed, it is predicted that Australia's forests will only survive climate change due to Flying Foxes introducing new genetic material to the next generation of trees. For example, one forest might not like much water, and a bee will keep that gene pool the same, but a Flying Fox might fly from a forest that likes lots of water, 100 kilometres away, and introduce this new gene to the area. In doing so, the new generation of trees in that forest will be resilient to both drought or flood conditions.





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

The second category of bat in Australia is the Microbat. This small bat plays an equally important role in the Australian ecosystem. Unlike the Flying Fox, the Microbat has extremely bad eyesight and relies on echolocation for travel and food. Microbats are insectivorous and can catch up to 500 insects per hour. The Microbats' incredible ability to consume large numbers of insects such as mosquitos and fruit flies means that life would be far less tolerable for both humans and plant species without them. It is interesting to know that Microbat boxes are being installed by universities, schools, farmers & 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 Humanities - Economics & Business - Year 8

Economics and Business Skills - Questioning & Research

Develop questions about an economic or business issue or event, and plan and conduct an investigation or project ([ACHES032](#))

Economics and Business Skills - Economic Reasoning, Decision-making & Application

Generate a range of alternatives in response to an observed economic or business issue or event, and evaluate the potential costs and benefits of each alternative ([ACHES035](#))

Economics and Business Skills - Communication & Reflection

Present evidence-based conclusions using economics and business language and concepts in a range of appropriate formats, and reflect on the consequences of alternative actions ([ACHES037](#))

Teaching suggestions linked to the curriculum:

Flying Foxes pollinate forest flowers and trees as they fly and forage for food. They are essential in keeping our ecosystem healthy. Despite the perception of increasing numbers, Flying Foxes and Microbats are classified as endangered species and it is only through funding of research and protective measures that we can ensure their diminishing numbers do not cause them to become extinct. The competition for the philanthropic dollar is strong and students will look at ways to help increase donations to Flying Fox support networks.

In Year 8 students develop research skills to ask questions and identify trends in business or economic relationships so this learning sequence requires students to look at different ways awareness and funds are raised and whether there are possibly better alternatives. This research may be based upon interviewing a sample group to determine what they will donate to (e.g. awareness campaigns, bat rescue services, etc) and through what fundraising programmes (e.g. call for donations, buying a stuffed toy, adopt a bat programme, etc).

With protected species such as Flying Foxes there are a few different challenges lobby groups are seeking to overcome. Some examples include seeking changes to legislation regarding culling; treatment and care of injured or orphaned bats; or developing public awareness campaigns to educate people about the importance of Flying Foxes. These issues require funding, but how do they get the funds to achieve these goals. Every organisation has different ways of achieving this. A list of bat welfare groups is below.

Students **develop targeted questions and conduct research** to determine the most popular means of encouraging financial engagement from the public in support of Flying Fox research and support ([ACHES032](#)). Having determined the most and least popular alternatives, students **provide fundraising recommendations** along with potential costs and benefits of each suggestion ([ACHES035](#)). These recommendations are to be written in an **information report** format using business language and accompanied by any relevant data tables or spreadsheets to support their recommendations ([ACHES037](#)).

Bat rescue and rehabilitation organisations:

Bats Queensland <http://www.batsqld.org.au/> are funded through membership fees and donations. Donations can be made by Paypal as well as credit card options.

Bat Conservation & Rescue <http://www.bats.org.au/get-involved.php> have an 'adopt a bat' program, the opportunity to sponsor a bat in care, a range of merchandise (including calendars, which result in repeat customers annually), membership and donations.

Bat Rescue Inc. <http://www.batrescue.org.au/website/index.php> have an Adopta Bat program and sell 'I ♥ Bats guitar pick earrings'.

Tolga Bat Hospital https://www.tolgabathospital.org/about_funding.htm obtain funding from many sources including visitor centre admission fees and merchandise sales, grants and donations, memberships, volunteers, local community groups and research.

Teaching About Flying Foxes and Microbats

Australian Curriculum Humanities - Civics & Citizenship - Year 8

Civics & Citizenship-Government & Democracy

How citizens can participate in Australia's democracy, including use of the electoral system, contact with their elected representatives, use of lobby groups, and direct action ([ACHCK062](#))

Civics & Citizenship- Questioning & Research

Identify, gather and sort information and ideas from a range of sources ([ACHCS069](#))

Civics & Citizenship-Analysis, Synthesis & Interpretation

Critically analyse information and ideas from a range of sources in relation to civics and citizenship topics and issues ([ACHCS070](#))

Civics & Citizenship-Communication & Reflection

Present evidence-based civics and citizenship arguments using subject-specific language ([ACHCS073](#))

Teaching suggestions linked to the curriculum:

The curriculum requires Year 8 students to be able to identify the diverse believe systems in Australia and analyse issues about national identity along with factors that contribute to people's sense of belonging. Flying Foxes are a highly debated topic in Australia because they are a native animal that is a keystone species, responsible for the pollination of our forest trees, yet they can be destructive to farmers' crops, and noisy and messy in suburbia. There are widespread beliefs about these animals from them having entitlement to their habitat ranging to a variety of culling/relocating options. This learning sequence has students investigate the ways in which Australian citizens can exercise their right to support their beliefs in a fair and democratic manner.

Discuss with students the way Australians can participate in our democracy ([ACHCK062](#)) by using our electoral processes, lobby groups and direct action to stand up for their beliefs. Using the protection of Flying Foxes as an example, show students how people create an electoral party with a standpoint (see Animal Justice Party link); contact your government representative; lobby groups (Ku-ring- gai Flying Fox Reserve) or joining a support organisation (like the Australasian Bat Society). Here are some sources to get students started ([ACHCS069](#)):

Ku-ring-gai Flying-Fox Reserve [file:///C:/Users/Owenr/Downloads/Ku-ring-gai_Flying-fox_Reserve_Report_on_Habitat_Restoration_Project%20\(1\).pdf](file:///C:/Users/Owenr/Downloads/Ku-ring-gai_Flying-fox_Reserve_Report_on_Habitat_Restoration_Project%20(1).pdf)

Animals Australia <http://www.animalsaustralia.org/issues/flying-foxes.php> This site provides links to politicians who hold the role of Minister for Environment as well as politicians who are in favour of shooting Flying Foxes.

Animal Justice Party <http://animaljusticeparty.org/policies/bats-flying-foxes/>

Australasian Bat Society <http://ausbats.org.au/>

Have students **create a table** their once they have **identified** and **critically analysed** how each of these actions have furthered the cause of Flying Fox wellbeing ([ACHCS070](#)), then students can **identify another issue** of their own and in an added row on their table include their issue and how it could be addressed through each of these means.

The table below is a basic example of how students could document their findings. Explanations and details that show greater understanding of each type of involvement (i.e. what would be done by citizens in each instance) shall be in an accompanying essay ([ACHCS073](#)).

ISSUE	ELECTORAL SYSTEM	ELECTED REP	LOBBY	DIRECT ACTION
Flying Fox species preservation	Animal Justice Party - policy	Write to Govt rep	Ku-ring-gai Flying Fox Reserve Lobby	Australasian Bat Society
Habitat protection				
Crop protection				

Teaching About Flying Foxes and Microbats

Australian Curriculum Humanities - Geography- Year 8

Geography - Knowledge & Understanding

Human causes and effects of landscape degradation ([ACHGK051](#))

Ways of protecting significant landscapes ([ACHGK052](#))

Teaching suggestions linked to the curriculum:

In Year 8 Geography students explain the interconnections between people and places and explain how they change places and environments. Whilst change is often for the betterment of the majority of society, it is important students understand certain behaviours result in landscape degradation and be able to identify ways of protecting significant landscapes.

The Australian Curriculum defines 'landscape' as the visible appearance of an area. It includes geological, geomorphic, biological and cultural layers that have evolved over time, and as perceived, portrayed and valued by people. One keystone species responsible for the continuance of Australia's native trees is the Flying Fox. Flying Foxes pollinate native trees. Their natural habitats can be destroyed by built elements, introduced plant and animal species, mining, farming and other human causes.

Have students **investigate** whether Flying Foxes or Microbats live in your area? Do they still? What has changed in your local area that may have driven these endangered animals into or out of your area? Flying Foxes are responsible for the ongoing growth and development of native forests in Australia. What human causes will have impacted on Flying Foxes as an element of your local landscape ([ACHGK051](#))?

Research the threat of human causes on flying Foxes and develop a proposal for the future sustainability of the Flying Fox landscape as well as its effect on liveability for people in your area ([ACHGK052](#)).

Have students **map areas** of native forest in your area and research the changes in forest area over the last 50-100 years and the **reasons for these changes**, then record this data on the appropriate type of maps for their information.

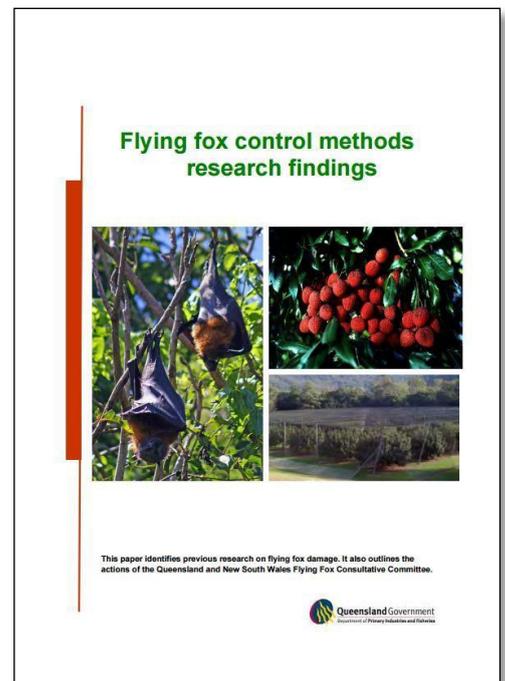
Here are some links to get students started:

Queensland Government - Flying Fox control methods research findings

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

Queensland Government - Living near Flying Foxes

<https://www.ehp.qld.gov.au/wildlife/livingwith/flyingfoxes/living-with-flying-foxes.html>



Teaching About Flying Foxes and Microbats

Australian Curriculum Humanities - History- Year 8

History Knowledge & Understanding- Overview of the ancient to modern world

Key features of the medieval world (feudalism, trade routes, voyages of discovery, contact and conflict) ([ACOKFH009](#))

The emergence of ideas about the world and the place of people in it by the end of the period (such as the Renaissance, the Scientific Revolution and the Enlightenment) ([ACOKFH010](#))

Teaching suggestions linked to the curriculum:

In Year 8 History the Australian Curriculum requires students to recognise and explain patterns of change and continuity over time and explain the cause and effect of events and developments. They identify the motives and actions of people at the time whilst explaining the significance of individuals and groups and how they were influenced by the beliefs and values of their society. This learning sequence looks at Flying Foxes, or generically, bats, which are an integral part of the ecosystem as they distribute seeds to regenerate forests and other flora.

Start with looking at factual information about bats (which is about Australian bats, but the issues are global) with this video link, then move into the second video about bat mythology as a way of linking many cultures over many eras.

In Defence of the Flying Fox <http://www.abc.net.au/catalyst/stories/3000668.htm> (10.13)

The bat: Animal Mythology from Animal Planet <https://vimeo.com/72722206> (0:30)

Bats have long been closely associated with the belief systems of many cultures, from times dating back when scientific knowledge was not available to explain things people looked to magic and the occult as explanations for many occurrences. Given the fact that they are dark in colour, fly only at night and are often in groups so large as to blacken the sky, it could be easy to see why they feature in the folklore of many countries over many hundreds of years. Students are encouraged to look beyond the historical references provided here and find additional reliable sources that show other cultural and symbolic relationships between humans and bats in different countries and over the different centuries. Many of these beliefs are folklore that have been passed through the generations and may have even altered in their telling over the course of time. The examples in this lesson have come from a range of books and sites specialising in folklore and superstitions that are plentiful on the internet. Like all things, check the reliability of your chosen sites if you wish to delve deeper into this subject. Attached are a selection of beliefs from Byzantine ([ACDSEH009](#)), Italian ([ACDSEH010](#)), early European, Polynesian, Asian and other cultures. Break students into groups and give each group a piece of paper outlining a belief from early times. Have them prepare a skit to act out the superstition allocated to their group and perform to the class.



Bat Beliefs, Mythology and Superstitions

In small groups, discuss and or act out these beliefs about bats (note: Europe does not have Flying Foxes, so these myths relate to Microbats).

1. Byzantine people in the Turkish region of Anatolia believed carrying a bat bone was a lucky love charm
2. In parts of Italy it is believed the mere presence of bats will cause a person to have convulsions
3. Chinese culture considers the bat a special creature associated with happiness and longevity.
4. In mid-15th century Europe approximately 200,000 -1 million people were put to death by the Catholic Church on charges of practicing witchcraft (that was a large percentage of the population at the time). It was thought that witches had a connection with bats, so it was considered bad luck to hear a bat's call or see one in flight.
5. In Cornwall, UK, the bad luck of the bats was warded off with a rhyme:
 - Airy mouse, airy mouse, fly over my head.
 - And you shall have a crust of bread. And when I brew and when I bake,
 - You shall have a piece of my wedding cake
6. Celtic folklore stated, "fine weather is certain when bats fly about at sunset".
7. The Welsh believed bats were death-messengers who would flap their wing at the window at night to warn death was coming.
8. In the South of Ireland, the bat could be a fairy (ghost/spirit) in disguise. It is said the Phooka sometimes took the form of a bat and played tricks on people taking their soul for a joy-ride (almost like being possessed).
9. In Ireland it is still said that if a bat gets caught in a woman's hair and escapes with a strand of hair the woman is destined for eternal damnation.
10. In the Polynesian island nation of Tonga Flying Foxes are considered sacred. To have a separable soul. This means they can change their shape.
11. In Egypt parts of bats were prescribed by doctors for curing asthma, rheumatism and even baldness.
12. The bat was a God in Pre-Columbian cultures and often portrayed in paintings and ceramics.

Resources:

Bats: everything you know is wrong <http://www.sdearthtimes.com/et0795/et0795s3.html>

The Bat in Celtic Folklore <http://livinglibraryblog.com/?p=1104>

The symbolism of a bat in the abyss of superstitions <http://www.gothamwdeszczu.com.pl/en/2014/09/29/the-symbolism-of-a-bat-in-the-abyss-of-superstitions/>

Bat medicine http://www.drstandley.com/animalmedicine_bat.shtml

Folklore about bats in buildings most often portends doom— a reflection, perhaps, on the way many cultures have viewed bats through the centuries. . . http://www.batcon.org/resources/media-education/bats-magazine/bat_article/562

Bats in popular culture <http://www.batworlds.com/bats-in-popular-culture/>

Bats <http://superstitionsonline.com/animals-bats/>

Bats in belfries and other places http://www.batcon.org/resources/media-education/bats-magazine/bat_article/562

Teaching About Flying Foxes and Microbats

Australian Curriculum Humanities - Economics and Business: Year 9

Economics and Business Knowledge and Understanding

The nature of innovation and how and why businesses seek to create and maintain a competitive advantage in the market, including the global market ([ACHEK041](#))

Gather relevant and reliable data and information from a range of digital, online and print sources ([ACHES056](#))

Economics and Business Skills - Questioning & Research

Develop questions and hypotheses about an economic or business issue or event, and plan and conduct an investigation ([ACHES055](#))

Economics and Business Skills - Economic Reasoning, Decision-making & Application

Generate a range of viable options in response to an economic or business issue or event, use cost-benefit analysis and appropriate criteria to recommend and justify a course of action and predict the potential consequences of the proposed action ([ACHES058](#))

Apply economics and business knowledge, skills and concepts in familiar, new and hypothetical situations ([ACHES059](#))

Economics and Business Skills - Communication & Reflection

Present reasoned arguments and evidence-based conclusions in a range of appropriate formats using economics and business conventions, language and concepts ([ACHES060](#))

Reflect on the intended and unintended consequences of economic and business decisions ([ACHES061](#))

Teaching suggestions linked to the curriculum:

Year 9 Economics and Business outcomes require students to generate alternative responses to an issue and use cost-benefit analysis and appropriate criteria to propose a course of action. They apply economics and business knowledge, skills and concepts to familiar, unfamiliar and hypothetical problems. Students develop and present evidence-based conclusions and reasoned arguments using appropriate texts, subject-specific language and concepts. They analyse the effects of economic and business decisions and the potential consequences of alternative actions.

HAVE YOUR STUDENTS CREATE A BUSINESS

AND WITH THEIR PROFITS, ADOPT AN ORPHANED BAT!



Flying Foxes and Microbats are native Australian animals. Despite the important ecological roles they play, in pollinating our native trees (Flying Foxes) and keep mosquitoes at bay (Microbats), many of their species are in danger of extinction.

In the 2015 tick season more than 400 orphaned baby Flying Foxes and Microbats were raised and released by the Tolga Bat Hospital in Atherton, Queensland. The hospital is also home to adult bats who are too injured to return to the wild. In most cases these bats cannot fly due to loss of wing membrane, mainly as a result of barbed wire. Costs associated with maintaining animal hospitals like the Tolga Bat Hospital and caring for the animals are covered through donations and fundraising. This is an opportunity for students to learn about business planning and development whilst also helping endangered native Australian animals <https://www.tolgabathospital.org/>.

Other animal organisations who rescue bats face similar challenges. The mission of all local animal organisations is to provide the best medical care to all species of sick, injured and orphaned animals, including bats. They rely on volunteers and donations, of funds and supplies, to continue to provide this valuable service to our native wildlife.

Students develop their own small business using \$20 start-up funding provided through the \$20 Boss Program. Students write a business plan for their concept then launch their business with a view to generating as much income as possible in the allocated time frame. I would run this over a whole term - with business planning being an in class learning opportunity at the commencement of the term and whilst in class learning may move on, students can use the rest of the term to work their business. You may choose to have a couple of lunchtime market days or students may have their own suggestions as to how they would like to market their businesses. Through the \$20 Boss Program students can work individually the \$20 Boss Program is a collaboration between the Foundation for Young Australians (FYA) and National Australia Bank (NAB) in which each student is provided \$20 in start-up funds to create their own business. At the completion of the \$20 Boss Program, students repay the \$20 plus a \$1 legacy to the program and are encouraged to donate their profits to a local community organisation or charity of their choice.

By firstly investigating their fundraising issue, students initially need to decide whether their business will be purely donation driven for their fundraising partner (the care of orphaned and injured Flying Foxes) or whether it will be about an unrelated initiative that donates profits to their fundraising partner ([ACHES055](#)). Their justification and any relevant information/data behind this decision ([ACHES056](#)) ([ACHES060](#)) will form part of their final reflection ([ACHES061](#)).

This project is an authentic learning experience in which students will need to write a business plan ([ACHES058](#)) then throughout the process of developing and running their business, students will be required to apply business knowledge and skills in a variety of new situations ([ACHES059](#)).

Upon completion of the allocated business operation time frame students are to write a reflection of the intended and unintended outcomes of their project ([ACHES061](#)).

Recourses

\$20 Boss Website <http://20boss.fya.org.au/>

20 Things you need to know about \$20 Boss http://20boss.fya.org.au/wp-content/uploads/2015/02/J001656_20-things-to-know-about-20Boss_v2_HR-1.pdf

5 Tips for starting a social enterprise <http://www.fya.org.au/2016/01/05/our-top-5-tips-for-starting-a-social-enterprise/>

Australian Government Business Plan Template <http://www.business.gov.au/business-topics/templates-and-downloads/business-plan-template-and-guide/Pages/default.aspx>

This link from the University of Queensland provides links to free online resources for secondary schools: <http://guides.library.uq.edu.au/cyberschool-students/schools/business>



ENCOURAGING STUDENTS TO RUN A BUSINESS LIKE A BOSS

Teaching About Flying Foxes and Microbats

Australian Curriculum Humanities - Civics & Citizenship - Year 9

Civics and Citizenship Knowledge & Understanding - Laws & Citizens

The key features of Australia's court system and how courts apply and interpret the law, resolve disputes and make law through judgements ([ACHCK077](#))

Civics and Citizenship Knowledge & Understanding - Citizenship, Diversity & Identity

How and why individuals and groups, including religious groups, participate in and contribute to civic life ([ACHCK079](#))

Civics and Citizenship Knowledge & Understanding - Problem solving & Decision making

Recognise and consider multiple perspectives and ambiguities, and use strategies to negotiate and resolve contentious issues ([ACHCS086](#))

Teaching suggestions linked to the curriculum:

The Australian Curriculum requires Year 9 students to develop the skills to compare and account for different interpretations and points of view on civic matters. They are to look at planning for action, democratic processes and the negotiation of solutions. Using the attached links, students review "The Flying Fox case". It looks at conservationist, Dr Carol Booth's experience in taking legal action against lychee farmers who were killing thousands of Flying Foxes. Through the results of this case, the Queensland government was required to make changes to their Environmental Protection and Biodiversity (EPBC) Act ([ACHCK077](#)). A newspaper article is attached for use as a lesson stimulus.

Students are to identify the common issues at play and recognise they need to be seen through diverse lenses ([ACHCS086](#)). The main issues being that Flying Foxes are a keystone species, essential to the ongoing survival of Australian native forests but many farmers perceive them commercially as a nuisance to be removed (without prohibitive costs involved). NSW Netting Subsidy assists farmers in that state <http://www.raa.nsw.gov.au/assistance/flying-fox-netting>. This link takes you to an article that explains the case (it is from the environmental perspective, but it is a great resource as it outlines the key documents, proceedings and appeals that occurred throughout this process of achieving a court decision) <http://envlaw.com.au/fripper-y-case/>. Referring to this document, have students create a mind map about how citizens of Australia are able to use the law to support social and environmental justice ([ACHCK079](#)). There are both positives and negatives addressed in this document - risks of out-of-pocket expenditure in the case of a loss and the lack of available public funds (i.e. Legal Aid) for environmental law issues (except in NSW) along with consideration of the alternate means of funding such action (donations, commercial sponsorship of the case). Have students look at what other ways Dr Booth may have generated public awareness and change in relation to the plight of the Flying Foxes before taking this matter to court. Attached is the link to Dr Booth's submission to change the Environmental Protection and Biodiversity Conservation Act (<file:///C:/Users/Owenr/Downloads/sub113.pdf>). This was her action after winning the court case that brought the case to the attention of government law makers. Create a flow chart to show what process would have been involved in making the changes to the policy/act.

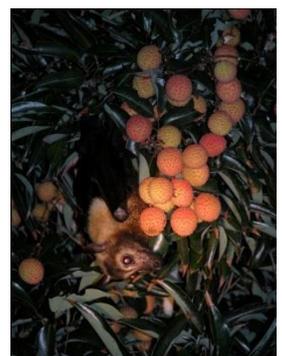
Recourses

Flying Foxes, dams and whales: Using federal environmental laws in the public interest <http://legacy.envlaw.com.au/PIEL.pdf>

Environmental Law Australia: Flying Fox Case <http://envlaw.com.au/flying-fox-case/>

Environmental Defenders Office: Flying Fox Case 1
<http://www.edoqld.org.au/cases/booth-v-bosworth-flying-fox-case-1/>

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



http://www.scienceimage.ro.au/images/cache/detail/739_0_DA3674.jpg



SCENE ... Edenvale Orchards at Mutarnee

Flying fox kill case

By MALCOLM WEATHERUP

IN a first for Queensland environmental law, a private citizen is taking a lychee farmer to court for using electrified fences to protect his crop from flying foxes.

Environmentalist Dr Carol Booth has taken a civil action against grower Merv Thomas when the Environmental Protection Agency failed to act on information she had supplied to them about the electrocution of the bats on the 30 hectare farm near Crystal Creek.

Dr Booth has brought the action under recently enacted third party rights under the Nature Conservation Act.

The matter is being heard before Judge Bob Pack in the Planning and Environment Court.

Barrister Chris McGrath, for Dr Booth and instructed by the Environmental Defenders Office, said his client was seeking three orders from the court.

Dr Booth wants an injunction against further killing or injuring of flying foxes, dismantling of the electric grid, and a financial contribution towards 'the rehabilitation of flying foxes as some recompense'.



POWER ... part of the farm grid

The court saw a nine minute video allegedly taken of dead flying foxes on and under the electrified wire fence on the property, the vision taken secretly by Dr Booth last December.

Under cross-examination by John Baulch SC, for Mr Thomas, Dr Booth admitted she had entered the property on several occasions without consent.

Mr Baulch asked if she

was taking this action because the Environmental Protection Agency, which she had approached with her information, had declined to take any action.

"Yes, that was partly the reason," Dr Booth said.

She also agreed that she had sought backers over the Internet to fund the court action.

She also said she had not sought any information about the grid system on Mr Thomas's farm or how it worked.

University lecturer and wildlife rescuer Dominique Thieriet, who accompanied Dr Booth on her secret video expedition to the farm, said she knew going onto the property without permission was 'a problem'.

But she said even if she had acted in disrespect to another person's property, she thought it was worthwhile 'because we believed flying foxes were being electrocuted there'.

The court also heard that netting as an alternative method of crop protection would cost, in the case of the Thomas property, \$700,000.

The case continues this morning.



CAMPAIGNER ... Dr Carol Booth

Teaching About Flying Foxes and Microbats

Australian Curriculum Humanities - Geography- Year 9

Geographical Knowledge and Understanding - Biomes and Food Security

Human alteration of biomes to produce food, industrial materials and fibres, and the use of systems thinking to analyse the environmental effects of these alterations ([ACHGK061](#))

Environmental, economic and technological factors that influence crop yields in Australia and across the world ([ACHGK062](#))

Geographical Inquiry and Skills - Interpreting, Analysing & Concluding

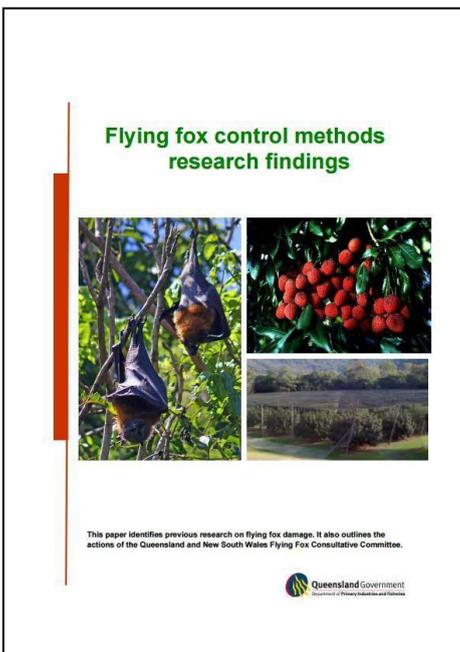
The effects of people's travel, recreational, cultural or leisure choices on places, and the implications for the future of these places ([ACHGK069](#))

Geographical Inquiry and Skills - Reflecting & Responding

Reflect on and evaluate findings of an inquiry to propose individual and collective action in response to a contemporary geographical challenge, taking account of environmental, economic, political and social considerations; and explain the predicted outcomes and consequences of their proposal ([ACHGS071](#))

Teaching suggestions linked to the curriculum:

Students are to respond to the newspaper article, 'The battle brewing over bats, the pariah of Australian wildlife' with a letter to the editor ([ACHGS071](#)). <http://www.theaustralian.com.au/life/weekend-australian-magazine/man-v-bats/story-e6frg8h6-1226158915886> In keeping with their learning requirements for Year 9 Geography, they will need to evaluate their sources to determine if they are relevant and/or reliable, then they will need to synthesise the data to draw reasonable conclusions as to what may be alternate recommendations when seeking to resolve the problem at hand.



Flying Foxes are an integral part of the sustainability of Australian native tree forests, yet as their habitats are eliminated or modified, they are seeking new places to live ([ACHGK061](#)). Have students investigate the ways the urbanisation of the original landscape has impacted on the habitat of the Flying Foxes ([ACHGK069](#)). After reading about the strategies engaged to remove the bats, and the subsequent arrival of a new species to the area, have students analyse the effectiveness of existing strategies. The following page is an article from The Queensland Times that also raises issues for consideration with regard to these native, endangered animals.

They are to use systems thinking to devise ways Flying Fox food production has been altered and seek to present an alternate resolution to the relocation of the Flying Foxes. This document, 'Flying Fox control methods research findings' (Qld Government Department of Primary Industries & Fisheries) looks at control methods in Australia and overseas. Of interest is the use of a style of companion planting used in India on page 7

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

Students should consider the effects of Flying Foxes on farmers and residents when making their recommendations ([ACHGK062](#)). These effects are highlighted in the attached Bat Facts flyer <http://bats.org.au/uploads/about-bats/shooting/batsfacts02.pdf>.

See also 'Living near Flying Foxes' (tips from the Qld Department of Environment and Heritage Protection). <https://www.ehp.qld.gov.au/wildlife/livingwith/flyingfoxes/living-with-flying-foxes.html>



LETTERS:

Let's get the facts right on those bats

12th Feb 2016 12:00 PM

Further to my letter (QT 29th February) "Busting some popular myths" - flying fox numbers are not increasing.

In fact, of the three species in our area, black headed and little red flying fox numbers are currently stable, but the grey headed flying fox is threatened. The perception that their numbers are increasing is due to two main factors.

1. The little red flying fox forms large communities. They follow the availability of food and join nearby camps. So when they do, it looks as though numbers are massively increasing. But this is temporary, and their occupation usually lasts only one or two months.

2. The other is the fragmentation of their habitat. The huge expansion of urban areas with the clearing of large areas of bushland has caused food shortages, which has led to flying foxes moving closer to food trees. This leads to many smaller colonies forming in urban areas.

1. Planting low, dense trees and shrubs around fence lines helps form a barrier that discourages flying foxes.

2. Planting trees or leaving stands of trees that they like to camp in, in areas away from houses encourages them to use these.

3. The noise of flying foxes reaches an acceptable level at only 100 metres away. Leave colonies that are reasonably tolerable alone.

4. Disturbing colonies makes them noisier. Leave them alone for a more peaceful life - for them and us.

5. Culling is liable to cause local extinctions which can lead to extinction of a species.

6. Dispersing them is rarely successful. They usually move only a few hundred metres away, and eventually come back. Or move to somewhere else where they are even less wanted. Dispersing them simply wastes public money.

7. If you come across a flying fox that is injured, sick or tangled in barbed wire or nets, don't attempt to handle it - call a wild-life rescue group (or vet).

8. Educate people so that they can understand the ecological value of flying foxes and the fact that they do not pose a threat to human health.

I believe that it is the responsibility of public officials and politicians to inform themselves by consulting experts and acting on their advice instead of acting on public perceptions.

DR CLARE RUDKIN, Barellan Point

<http://www.qt.com.au/news/lets-get-the-facts-right-on-those-bats/2928729/>

Teaching About Flying Foxes and Microbats

Australian Curriculum Humanities - History- Year 9

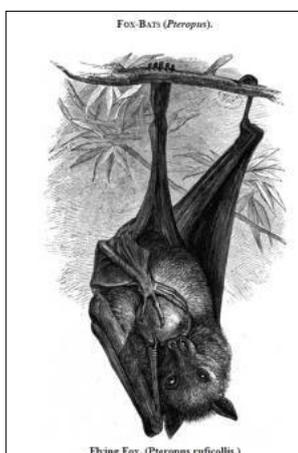
History Knowledge and Understanding - Making A Better World? Movement Of Peoples (1750-1901) Experiences of slaves, convicts and free settlers upon departure, their journey abroad, and their reactions on arrival, including the Australian experience ([ACDSEH083](#))

Teaching suggestions linked to the curriculum:

In History students explain different interpretations of the past whilst explaining the motives and actions of people at the time. In this lesson students look at these two pages of reflections and points of view about Flying Foxes that span the early days of Colonisation, through to current times. They are to write a hypothetical diary entry as a new arrival in Australia after their first sighting of a Flying Fox. Students need to consider their points of view and reactions and align them to what they believe would have been opinions relevant at the time ([ACDSEH083](#)).

The grey-headed flying fox was the first Australian flying fox species discovered by Europeans. The first grey-headed flying fox specimen was reported as collected in New Holland and described by Temminck in 1825. Their numbers have declined drastically since European colonisation from many millions to a few hundred thousand. The known range for grey-headed flying foxes has contracted southwards by about 750 km and their southern limit during winter has expanded into Victoria. They are the largest Australian fruit bat and are endemic to Australia. Grey-headed flying foxes have sophisticated vocal communication, making more than 30 specific calls.

http://www.wildlife.org.au/wildlife/speciesprofile/mammals/flyingfox/greyheaded_flyingfox.html



This picture of a 'fox-bat' as described by Captain Cook and recorded in the 1870 book 'Head and Tales' with an illustration by a Mr Taylor. Look at the way they talk about Australia being 'almost as civilised...as Europe'. The book reflects on " *What progress has the world made since that period! We do not require long periods of ages to alter, to adapt, to develop the customs and knowledge of man.*" Now, less than 150 years since the publication of this book, we are a country that leads the world in many fields - what progress the world has made! 'Heads or Tales'. Selected and compiled by Adam White, 1870.

http://www.digilibraries.com/html_ebooks/107037/25918/www.digilibraries.com@25918@25918-h@25918-h-0.htm

Image retrieved from Sebra Prints

<http://www.sebraprints.com.au/individual.php?category=Australiana&id=5262>



It is curious, now that Australia is almost as civilised, and in parts nearly as populous, as much of Europe, to read "Lieutenant Cook's Voyage Round the World," in vol. iii. of Hawkesworth's quartos, detailing the discoveries of June, July, and August 1770—that is close upon a century ago. What progress has the world made since that period! We do not require long periods of ages to alter, to adapt, to develop the customs and knowledge of man. At p. 156 we get an account of a large bat. On the 23d June 1770 Cook says: *"This day almost everybody had seen the animal which the pigeon-shooters had brought an account of the day before; and one of the seamen, who had been rambling in the woods, told us, at his return, that he verily believed he had seen the devil. We naturally inquired in what form he had appeared, and his answer was in so singular a style that I shall set down his own words. 'He was,' says John, 'as large as a one-gallon keg, and very like it; he had horns and wings, yet he crept so slowly through the grass, that if I had not been afeared I might have touched him.' This formidable apparition we afterwards discovered to have been a bat, and the bats here must be acknowledged to have a frightful appearance, for they are nearly black, and full as large as a partridge; they have indeed no horns, but the fancy of a man who thought he saw the devil might easily supply that defect."*

A Natural History of Australian Bats: Working the Night Shift by Greg Richards, Gregory Richards and Leslie S. Hall.



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 - Economics & Business - Year 10

Economics and Business - Knowledge and Understanding

The ways businesses respond to changing economic conditions and improve productivity through organisational management and workforce management ([ACHEK054](#))

Develop questions and hypotheses about an economic or business issue or event, and plan and conduct an investigation ([ACHES055](#))

Gather relevant and reliable data and information from a range of digital, online and print sources ([ACHES056](#))

Economics and Business - Skills

Present reasoned arguments and evidence-based conclusions in a range of appropriate formats using economics and business conventions, language and concepts ([ACHES060](#))

Teaching suggestions linked to the curriculum:

The Australian Curriculum sees Year 10 Economics and Business students develop questions and formulate hypotheses for a business issue. They are to gather and analyse reliable data and information from a variety of sources, identify trends, explain relationships and make predictions. In this learning sequence, your students are orchardists who are also aware of the importance of protecting our native species of Flying Foxes, as they know Flying Foxes are responsible for spreading the seeds of many of the large trees on the Eastern seaboard of Australia. Have students explore the life cycle of crops. They will see that farmers need Flying Foxes to pollinate, so the flowers will become fruit. However, many farmers do not want the Flying Foxes eating the fruit. It should be noted that Flying Foxes would rather eat the pollen from native flowers than any other food, including fruit. The native forests bloom at different times during the year to ensure the Flying Foxes have enough food. However, when forests are cut down, and there are no native flowers during that time of the year Flying Foxes turn to eating other foods, including native and commercial fruit. If there were native flowers and fruit, Flying Foxes would be less likely to eat commercially grown fruit. In this project, your students must ensure they protect their fruit from the Flying Foxes whilst maintaining financial viability. Students are to write a report using economics and business conventions and provide reasoned arguments and evidence based conclusions ([ACHES060](#)).



This link is a newspaper article that looks at the plight of farmers with regard to the prices they receive for their crops (please note Flying Foxes do not like to eat citrus fruits as shown here - they will only do so if they are starving and there are no other food sources. <http://www.smh.com.au/business/retail/fruit-and-vegies-why-do-they-cost-so-much-and-who-gets-what-20160116-gm6kf8.html>).

Build student awareness of the varying business and economic issues surrounding Flying Foxes and Microbats and have them identify a particular issue or event that resonates with them. Have students develop targeted questions to form the basis of an investigation into this issue ([ACHES055](#)) (e.g. What are cost effective ways orchardists can protect their crops from Flying Foxes? How could you create an eco-tourism business around a local Flying Fox population?) Students the need to devise the steps needed to effectively investigate answers to their targeted questions.



Have students describe ways businesses may improve productivity with regard to their Flying Fox challenges and explore ethical and unethical practices ([ACHEK054](#)), and through the development of research questions, investigate ([ACHES056](#)) and hypothesise about the impact of these

practices on individuals ([ACHES055](#)) (e.g. survey people to gather data about whether people are more/less likely to buy fruit if they know the primary producer's response to the management of Flying Foxes has been humane or fast and cost effective). Of interest is the use of a style of companion planting used in India on page 7 of 'Living near Flying Foxes' (tips from the Qld Department of Environment and Heritage Protection). <https://www.ehp.qld.gov.au/wildlife/livingwith/flyingfoxes/living-with-flying-foxes.html>

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>

Bat Facts <http://bats.org.au/uploads/about-bats/shooting/batsfacts02.pdf>.

Teaching About Flying Foxes and Microbats

Australian Curriculum Humanities - Civics and Citizenship - Year 10

Civics and Citizenship Skills - Analysis, Synthesis & Interpretation

Critically evaluate information and ideas from a range of sources in relation to civics and citizenship topics and issues ([ACHCS097](#))

Account for different interpretations and points of view ([ACHCS098](#))

Civics and Citizenship Skills - Problem-solving & Decision-making

Recognise and consider multiple perspectives and ambiguities, and use strategies to negotiate and resolve contentious issues ([ACHCS099](#))

Civics and Citizenship Skills - Communication & Reflection

Present evidence-based civics and citizenship arguments using subject-specific language ([ACHCS101](#))

Teaching suggestions linked to the curriculum:

The Australian Curriculum's Civics and Citizenship Year 10 Achievement Standards require students to evaluate different interpretations and points of view about civics and citizenship issues, then plan for action, taking into account multiple perspectives whilst using democratic processes to negotiate a solution. This learning sequence looks at articles and letters to the Editor, extracted from a series of engagements with a Queensland newspaper about the future of Flying Foxes. Students will write an information report outlining the different points of view ([ACHCS098](#)) and expectations of different levels of government regarding this issue. Using critically evaluated information from a range of sources ([ACHCS097](#)), students recommend strategies to resolve the matter ([ACHCS099](#)). Students are to present evidenced based arguments and ensure subject-specific language is used ([ACHCS101](#)). The newspaper excerpts are in the three pages attached to the end of this document.

Flying Foxes are an integral element in the sustainability of Australia's native forest trees. Through their digestive and migratory habits they ensure seeds and nectar are spread over vast areas to continue the ongoing propagation of native plant species. Unfortunately for the Flying Foxes, as urbanisation encroaches on their camps, they are subject to complaints in urban areas by citizens who have concerns about their noise, odour, droppings and risk of disease. These issues are all addressed in the linked document, Kareela Flying Fox Camp Plan of Management - Draft:

[https://sscebp.ssc.nsw.gov.au/ebp/webpapr.nsf/0/d138996d8846d2c6ca257bd5007a987c/\\$FILE/ATTTBCR0.pdf/Kareela%20GHFF%20PoM%20v2.pdf](https://sscebp.ssc.nsw.gov.au/ebp/webpapr.nsf/0/d138996d8846d2c6ca257bd5007a987c/$FILE/ATTTBCR0.pdf/Kareela%20GHFF%20PoM%20v2.pdf)

When considering the multiple perspectives in this Letters to the Editor debate, students should also note that Dr Clare Rudkin sat as a Greens candidate for the state Seat of Lockyer and Sean Choat sat as an LNP candidate for the Seat of Ipswich West - both seats are local to the Ipswich region, in the 2015 Queensland state election <http://www.qt.com.au/news/list-state-candidates-finalised-ipswich-region/2509876/>. How does this affect their points of view? What do you think is their purpose - are they disagreeing with the content of the argument or are they looking to maintain a public visibility by engaging in this conversation? Are they demonstrating that they have the best interests of their constituents at heart?

- Bat Facts <http://bats.org.au/uploads/about-bats/shooting/batsfacts02.pdf>.
- Living near Flying Foxes (tips from the Qld Department of Environment and Heritage Protection). <https://www.ehp.qld.gov.au/wildlife/livingwith/flyingfoxes/living-with-flying-foxes.html>
- Animals Australia <http://www.animalsaustralia.org/issues/flying-foxes.php> This site provides links to politicians who hold the role of Minister for Environment as well as politicians who are in favour of shooting Flying Foxes.
- Animal Justice Party <http://animaljusticeparty.org/policies/bats-flying-foxes/>
- Australasian Bat Society <http://ausbats.org.au/>
- Brisbane City Council Conservation Action Statement (n.b. Ipswich is NOT a part of Brisbane City Council area, this is a resource from a neighbouring Council): http://www.brisbane.qld.gov.au/sites/default/files/20140519_-_flying_foxes.doc

Reform reveals our city council can take action

AFTER reading article about time to get rid of bats, I was moved to once again attempt to try and elicit some answers as to why Ipswich City Council or their Environment Department has not come up with any answers in the last five years to alleviate the suffering of residents in our area.

I was shuffled from one department of the environment to another and back to the first one after being told the Ipswich City Council does not have anyone on staff to help us.

I might add this is not the first time I have tried to obtain some answers or at least some form of real action and not just Headline grabbing Batman Stories.

No one wants to take any responsibility.

While searching for answers I came across an article which is very interesting.

I must ask Ipswich City Council if they are aware of a reform which states: an as-of-right authority for local governments to manage - including disperse - flying-fox roosts in defined urban areas without the need for a permit under the Nature Conservation Act 1992, in accordance with a code of practice.

This reform was implemented in 2013.

Am I misinterpreting this article?

Is Ipswich City Council aware of this and if they are why no action?

I and many other residents of Yamanto would like a reply to this.

I did try to access code of practice but was unsuccessful.

When I next phone Ipswich City Council about this problem can they really say it's not their responsibility?

I think not!

M McKIMMON, Yamanto

[HTTP://WWW.QT.COM.AU/NEWS/REFORM-REVEALS-OUR-CITY-COUNCIL-CAN-TAKE-ACTION/2919741/](http://www.qt.com.au/news/reform-reveals-our-city-council-can-take-action/2919741/)

Minister won't face bat mess



CHANGE THE LAWS: Mayor Paul Pisasale says legislation gives the flying fox more rights in urban areas than people.

ENVIRONMENT Minister Steven Miles has turned his back on complaints from Yamanto residents about the growing flying fox colony and will not inspect the site.

After the latest attempts to act on complaints were hampered under strict State Government guidelines protecting the flying fox, Mayor Paul Pisasale invited Dr Miles to a meeting with residents at Yamanto to see the conditions residents had to live with.

A spokesman for Dr Miles confirmed the Minister had received Cr Pisasale's email and said he had no plans to visit the site.

"The Minister has no plans to meet with the mayor or residents about the issue," he said.

He instead referred to departmental advice that "Councils have an as-of right authority under the Nature Conservation Act 1992 to manage flying-fox roosts (including roost dispersal and vegetation modification) in urban flying-fox management areas, provided they comply with a Code of Practice for that activity".

Cr Pisasale said he was disappointed with the Minister's response.

The mayor said he had visited homes at Yamanto late last week and had stepped in to find some solutions to the ongoing issues.

"The residents want to feel that someone cares, someone is concerned and that they have rights as well," Cr Pisasale said.

"When you look at the legislation, all of the legislation is about protecting the rights of bats. There is not one bit of legislation for the people that are affected.

"All I want is an opportunity for the Minister to come out, that is his response and I will be taking it up with the Premier because one thing I know about the Premier - she doesn't ignore residents.

"I just wanted the Minister to come out privately with me to understand and be in their shoes and show some care and compassion.

"I will be working with the residents to make sure that the residents of Yamanto deserve quality of life in this city as well. We will be doing what we can to help the residents if the State Government doesn't want to."

A council spokesman said Council does have a voluntary as-of-right to intervene in flying fox roosts, "however it does come with the state government's own code of practice conditions on management of flying fox roosts".

"There are very limited windows of time throughout the year to move on flying foxes or to limit their impact," he said.

"Action can generally only be taken when the flying foxes are not roosting and are not pregnant or with young."

A Department of Environment and Heritage Protection spokeswoman said the department is available to advise local authorities on matters of flying-foxes and roost management activities if required and will arrange for a wildlife officer to meet with representatives of Ipswich City Council on the issue of flying-foxes at Yamanto.

Latest Comments

wally56 - Yamanto - 10 days ago

What is our local member saying about this? The silence is deafening. The bats need to be moved on or something done. Typical of this say nothing do nothing government.

<http://www.qt.com.au/news/minister-wont-face-bat-mess/2922652/>

LETTERS 7th Feb 2016 6:00 AM

Bats should be left alone to their life

YOU are quite right Sean Choat, flying foxes carry two diseases.

I have rarely heard of someone getting bitten by a bat, so unless you're silly enough to pick up one I think you are pretty safe.

As for the bat s*#t everywhere, they have to go even if you don't.

In defence of Clare Rudkin who you savagely attacked, I see them in the same light as she does "cute little furry mammals with the amazing ability to fly".

Maybe if you listened to her you might learn something.

GREG McALLAN, Ipswich

<http://www.qt.com.au/news/letters-bats-should-be-left-alone-their-life/2922411/>

LETTERS 7th Feb 2016 6:00 AM

Get rid of the bats

I MOST definitely agree with all those who have written to the paper complaining about flying foxes in their area.

The environment minister only appears to make promises about culling or removing the flying foxes and then follows up with masterly inactivity.

If a politician lived close to one of these colonies, I wonder if we'd see quick action.

URSULA McKENZIE, Yamanto

<http://www.qt.com.au/news/letters-get-rid-bats/2922417/>

LETTERS 7th Feb 2016 6:00 AM

Bats across Ipswich a great sight, but not loved by all

MY PHOTO shows what it looks like as the bats take off at Yamanto hunting for their evening meal.

I agree with all those people that something must be done to reduce the numbers.

Perhaps spraying the tops of the trees with some



horrid smelling solution would work, although I doubt the locals would like that.

It is certainly a case here

of not being able to please everyone.

I must say standing under the thousands of bats as they take flight is a marvellous sight, but keep your mouth shut and don't stand there too long.

LYNDALL GARRARD, Yamanto

<http://www.qt.com.au/news/bats-across-ipswich-a-great-sight-but-not-loved-by/2922375/>

LETTERS 8th Feb 2016 9:00 PM

Most don't understand the life of a bat

I WOULD like to address some of the common misconceptions about flying foxes as expressed in the letter from M.McKinnon.

There is absolutely no health risk to children (or larger humans) from exposure to flying fox excreta.

Hundreds of wildlife carers across Australia care for injured and orphaned flying foxes every year, and if there were any ill-effects from waste exposure they would have shown by now.

The one, very rare disease humans can get from flying foxes requires a person to go out of their way to handle and get bitten by a sick bat. They're gentle, intelligent mammals with good eyesight who won't initiate contact with us.

What many people see and assume to be a large "volume of excrement" are really fruit fibre "spats". Flying foxes don't actually eat fruit, they chew it, swallow the juice and spit out the dry pulp (an interesting adaptation that minimises weight for flying).

Culling is cruel and unnecessary. These animals are already declining in numbers.

S. MORRIS, East Ipswich

<http://www.qt.com.au/news/most-dont-understand-what-the-life-of-a-bat-is-all/2923252/>

LETTERS 10th Feb 2016 8:00 PM

Getting rid of the bats has been tried before

BEFORE Mayor Pisasale and his council colleagues make any election commitments to rid residents of the fruit bat colonies around Ipswich, they may want to consult the archives of the QT now conveniently available in searchable form in the online Trove section of the National Library of Australia.

They would find that despite the application of such stern measures as dynamite, poison gas, strychnine laced apples, flame guns and organised shooting parties it was reported that not only did the colonies survive but actually increased substantially in numbers in some years.

Even the formation of the Ipswich and West Moreton Bird Pest Board chaired by the Mayor of the day, the introduction of a bounty and the killing of 3300 fruit bats in one year under their instruction did not rid the city of the menace. My own guess is that dynamite, poison gas, strychnine laced apples, flame guns and organised shooting parties in the back yards of Woodend and Yamanto would not be a vote winner.

I find it instructive that the politicians who undertook these programs are long gone, but the fruit bats remain and in the same locations Queens Park, Woodend and Churchill, now Yamanto.

KEN ALDERTON, One Mile

<http://www.qt.com.au/news/getting-rid-of-the-bats-has-been-tried-before/2926462/>

LETTERS 12th Feb 2016 12:00 PM

Let's get the facts right on those bats

Further to my letter (QT 29th February) "Busting some popular myths" - flying fox numbers are not increasing.

In fact, of the three species in our area, black headed and little red flying fox numbers are currently stable, but the grey headed flying fox is threatened. The perception that their numbers are increasing is due to two main factors.

1. The little red flying fox forms large communities. They follow the availability of food and join nearby camps. So when they do, it looks as though numbers are massively increasing. But this is temporary, and their occupation usually lasts only one or two months.

2. The other is the fragmentation of their habitat. The huge expansion of urban areas with the clearing of large areas of bushland has caused food shortages, which has led to flying foxes moving closer to food trees. This leads to many smaller colonies forming in urban areas.

1. Planting low, dense trees and shrubs around fence lines helps form a barrier that discourages flying foxes.

2. Planting trees or leaving stands of trees that they like to camp in, in areas away from houses encourages them to use these.

3. The noise of flying foxes reaches an acceptable level at only 100 metres away. Leave colonies that are reasonably tolerable alone.

4. Disturbing colonies makes them noisier. Leave them alone for a more peaceful life - for them and us.

5. Culling is liable to cause local extinctions which can lead to extinction of a species.

6. Dispersing them is rarely successful. They usually move only a few hundred metres away, and eventually come back. Or move to somewhere else where they are even less wanted. Dispersing them simply wastes public money.

7. If you come across a flying fox that is injured, sick or tangled in barbed wire or nets, don't attempt to handle it - call a wild-life rescue group (or vet).

8. Educate people so that they can understand the ecological value of flying foxes and the fact that they do not pose a threat to human health.

I believe that it is the responsibility of public officials and politicians to inform themselves by consulting experts and acting on their advice instead of acting on public perceptions.

DR CLARE RUDKIN, Barellan Point

<http://www.qt.com.au/news/lets-get-the-facts-right-on-those-bats/2928729/>

Teaching About Flying Foxes and Microbats

Australian Curriculum Humanities - Geography- Year 10

Geographical Knowledge & Understanding - Environmental Change and Management

Human-induced environmental changes that challenge sustainability ([ACHGK070](#))

The application of systems thinking to understanding the causes and likely consequences of the environmental change being investigated ([ACHGK073](#))

The application of environmental economic and social criteria in evaluating management responses to the change ([ACHGK075](#))

Geographical Inquiry & Skills:

A number of Inquiry & Skills Content Descriptors are also referenced in this learning sequence. They cover areas including Collecting, recording, evaluating & representing ([ACHGS073](#)), ([ACHGS074](#)), Communication ([ACHGS079](#)) and Reflecting & responding ([ACHGS080](#)).

Teaching suggestions linked to the curriculum:

This learning sequence provides students the opportunity to meet Year 10 Australian Curriculum Geography requirements by requiring them to evaluate alternate views and responses to a geographical challenge using environmental, economic, political and social criteria to draw a reasoned conclusion.

Flying Foxes are a keystone species, essential to the ongoing survival of Australian native forests. However human induced changes, such as urbanisation, mean the native trees that have formed the traditional habitat of the Flying Fox are now often spread randomly throughout residential suburbs or clustered in designated forest areas. With this reduction in native forest trees comes a reduction in food supply for these native Australian animals that are in danger of extinction. When traditional food sources are not available Flying Foxes look to places such as orchards as a way of feeding themselves and their young.

Students are to **use systems thinking** as they identify and describe the human induced environmental changes that have affected the Flying Fox population in your local area ([ACHGK070](#)). They are to examine the interconnection between these human actions and the biophysical processes in the area in relation to Flying Foxes ([ACHGK073](#)). Who else have these changes generated challenges for? e.g. Have the Flying Foxes had to set up new camps or find new food? How do local farmers, residents and politicians feel about the Flying Foxes in your area? What do they suggest as a resolution? Are these suggestions feasible - environmentally, ethically and economically? What recommendations do the students have for attempting to resolve the issue of the impact of human induced changes on Flying Fox populations ([ACHGK075](#))?



Having gathered their information from a variety of reliable sources ([ACHGS073](#)), students are to prepare a **10 minute video presentation** ([ACHGS079](#)) using multiple data formats ([ACHGS074](#)) to highlight the causes and effects of human induced environmental changes on the local Flying Fox population. They shall take account of the environmental, economic, political and social considerations of their recommendations and reflect on individual and collective actions in response to their proposal ([ACHGS080](#)).

Resources:

Bat Facts <http://bats.org.au/uploads/about-bats/shooting/batsfacts02.pdf>.

Living near Flying Foxes (tips from the Qld Department of Environment and Heritage Protection).
<https://www.ehp.qld.gov.au/wildlife/livingwith/flyingfoxes/living-with-flying-foxes.html>

Animals Australia <http://www.animalsaustralia.org/issues/flying-foxes.php> This site provides links to politicians

who hold the role of Minister for Environment as well as politicians who are in favour of shooting Flying Foxes.

Australasian Bat Society <http://ausbats.org.au/>

Conservation Action Statement http://www.brisbane.qld.gov.au/sites/default/files/20140519_-_flying_foxes.doc

Flying Fox Archives - Cairns & Far North Environment Centre <http://cafneec.org.au/tag/flying-fox/>

Teaching About Flying Foxes and Microbats

Australian Curriculum Humanities - History- Year 10

Historical Knowledge and Understanding

Developments in technology, public health, longevity and standard of living during the twentieth century, and concern for the environment and sustainability ([ACOKFH024](#))

The growth and influence of the environment movement within Australia and overseas, and developments in ideas about the environment including the concept of 'sustainability' ([ACDSEH126](#))

Historical Skills - Chronology, Terms & Concepts:

Use chronological sequencing to demonstrate the relationship between events and developments in different periods and places ([ACHHS182](#))

Responses of governments, including the Australian Government, and international organisations to environmental threats since the 1960s, including deforestation and climate change ([ACDSEH128](#))

Historical Skills - Explanation & Communication:

Select and use a range of communication forms (oral, graphic, written) and digital technologies ([ACHHS193](#))

Teaching suggestions linked to the curriculum:

Achievement standards for Year 10 History look at the modern world and require students to be able to refer to key events and the actions of individuals and groups to explain patterns of change and continuity over time. They explain the context for people's actions in the past as well as different interpretations of the past and recognise the evidence. This lesson looks at how, through advancements in technology we may be able to protect our native animals and environment and prevent further species from becoming extinct.

In 1900 a microbat weighing just 3.5 grams and endemic to Christmas Island was observed to be prolific in its numbers. In the mid 1980's numbers were dropping and between 1994 and 2006 the population fell by over 80%. It was only then in 2008 the same Christmas Island Pipistrelle (microbat) was listed as Vulnerable to Extinction along with Australia's only endemic Flying Fox species, the Grey Headed Flying Fox. By the time the government gave approval to develop a captive breeding program it was too late and on 26 August 2009 researchers and the International Union for the Conservation of Nature (IUCN) declared the species extinct - lost forever. At this stage it is known that insect levels on the island will increase but it will only be through the course of time researchers will discover what other effects the loss of this species will cause. **Two articles are attached** for students to use in developing their understanding of this environmental crisis.



Have students **develop a timeline** for the population demise of Christmas Island Pipistrelle ([ACHHS182](#)) for inclusion with a **report** about how Australia can learn from the demise of this little microbat to ensure the ongoing survival of another endangered, endemic species - the Grey-headed Flying Fox ([ACHHS193](#)). Students are to address the response of the government to the plight of both the species in their report and provide recommendations to assist minimise the ongoing decline of numbers for the Grey-headed Flying Fox ([ACDSEH128](#)).

When addressing the Grey-headed Flying Fox start with this statement from Victoria's Department of Environment and Primary Industries, "**Humans and their technology are responsibly for more Flying Fox deaths than natural predators.**" <http://www.depi.vic.gov.au/environment-and-wildlife/wildlife/flying-foxes/facts-about-flying-foxes>. Explain to students that we already know

Make students aware of developments in technology ([ACOKFH024](#)) including the Australian Government Department of the Environment - National Flying Fox monitoring viewer <http://www.environment.gov.au/webgis-framework/apps/ffc-wide/ffc-wide.jsf>

RESOURCES SHOWING GROWTH IN CONCERN OF ENVIRONMENTAL ISSUES

Royals weigh into Aussie eco-debate (1973) <http://splash.abc.net.au/home#!/media/28764/>

Conflicts of interest on Wildlife Board? (1973) <http://splash.abc.net.au/home#!/media/28827/>

Camazotz: Smart tech keeping track of bats <http://www.csiro.au/en/Research/D61/Areas/Robotics-and-autonomous-systems/Sensing-and-mapping-our-environment/Camazotz-smart-tech-keeping-track-of-bats>

Australian Government Department of the Environment - Flying Foxes
<https://www.environment.gov.au/biodiversity/threatened/species/flying-fox-law>

Ku-ring-gai Flying-Fox Reserve [file:///C:/Users/Owenr/Downloads/Ku-ring-gai_Flying-fox_Reserve_Report_on_Habitat_Restoration_Project%20\(1\).pdf](file:///C:/Users/Owenr/Downloads/Ku-ring-gai_Flying-fox_Reserve_Report_on_Habitat_Restoration_Project%20(1).pdf)

Animals Australia <http://www.animalsaustralia.org/issues/flying-foxes.php> This site provides links to politicians who hold the role of Minister for Environment as well as politicians who are in favour of shooting Flying Foxes.

Animal Justice Party <http://animaljusticeparty.org/policies/bats-flying-foxes/>

BAT WELFARE ORGANISATIONS

Bats Queensland <http://www.batsqld.org.au/> are funded through membership fees and donations. Donations can be made by Paypal as well as credit card options.

Bat Conservation & Rescue <http://www.bats.org.au/get-involved.php> have an 'adopt a bat' program, the opportunity to sponsor a bat in care, a range of merchandise (including calendars, which result in repeat customers annually), membership and donations.

Bat Rescue Inc. <http://www.batrescue.org.au/website/index.php> have an Adopta Bat program and sell 'I ♥ Bats guitar pick earrings'.

Tolga Bat Hospital https://www.tolgabathospital.org/about_funding.htm obtain funding from many sources including visitor centre admission fees and merchandise sales, grants and donations, memberships, volunteers, local community groups and research.

Australasian Bat Society <http://ausbats.org.au/>

Threat of extinction demands fast and decisive action

July 24, 2012 2.25pm AEST

When it comes to mammal extinctions, Australia's track record over the last 200 years has been abysmal. Since European settlement, nearly half of the world's mammalian extinctions have occurred in Australia – 19 at last count. So, when faced with the additional threat of climate change, how do we turn this around and ensure the trend doesn't continue?

Learning from previous extinctions is a good place to start. A comparison between two Australian species, the recently extinct [Christmas Island pipistrelle](#) and the critically endangered but surviving orange-bellied parrot, provides some insight into the answer to this question. Namely, that acting quickly and decisively in response to evidence of rapid population decline is a key factor in determining the fate of endangered species.

A bat and a parrot

Endemic to Christmas Island, the pipistrelle was a tiny (3.5 gram) insect-eating bat. It was first described in 1900, when numbers were widespread and abundant. In the early 1990s this began to change. The decline was rapid and the exact cause uncertain. By 2006, experts were calling for a captive breeding program to be initiated. These pleas were ignored until 2009 when it was finally given the green light. Sadly the decision came too late, and two months later the Federal Minister of Environment announced that the rescue attempt had failed.



Critically endangered: Orange-bellied Parrot, otherwise known as *Neophema chrysogaster*. John Harrison

Concern about the orange-bellied parrot began in 1917, but it wasn't until 1981 that it was confirmed to be on the brink of extinction. In an attempt to save the parrot, a multi-agency, multi-government recovery team was set up and a captive breeding program began in 1983. Like the bat, threats to the parrot remain poorly understood. In 2010, monitoring showed that the species would become extinct in the wild within three to five years unless drastic action was taken. The recovery

team immediately took action to bolster the captive population as insurance against extinction. There are currently 178 birds in captivity and less than 20 in the wild.

What do these two tales tell us about how we might avoid future Australian extinctions? It seems that one of the main differences, and perhaps the difference over which we have the most control, were the decision-making processes involved.

How we manage endangered species ultimately comes back to the decisions made, including who makes the decisions, who is held accountable, and the timing of these decisions. Examining these cases in the context of decision-making reveals some clear differences and highlights some important recommendations for the future management of endangered species.

Leadership, accountability, and timely action

One of the key differences was in the governance and leadership surrounding the two cases. Experts involved in monitoring the pipistrelle provided recommendations to government bodies, but did not have the authority to make decisions nor was there an effective leader to champion the urgent need to act. Conversely, the Orange-bellied Parrot Recovery Team had the authority to make decisions and act on them. Indeed, thanks to the Recovery Team's broad representation, any failure to act would likely have resulted in public outcry – which raises the issue of accountability.

Management of endangered species requires tough decisions, yet they are decisions we must make. If we monitor declining populations without a process for deciding between different management options, we will only document extinctions. In some cases, the logical decision may be to employ a triage system where priority is given to species with a high likelihood of recovery. Assigning institutional accountability around the management of endangered species could help to ensure that tough decisions are made and that the processes involved are transparent.

Finally, the cases of the bat and the parrot also highlight the need to act quickly when a species is found to be on the brink of extinction. Delaying decisions only narrows our choices and removes opportunities to act. We may not always have all the answers, but this cannot be used as a reason to delay decision making. Based on a triage system a decision to not to act might be the best way forward, but if we delay the decision it becomes the only way forward.



Send in the scientists and heed their advice. Luke Diett

Better decisions with science

It is all well and good to say that we need leaders to be accountable and make timely decisions; but in a world where insufficient conservation resources exist to manage all endangered species, how do we ensure that the decisions we make are the right ones?

This is where science can help.

Scientific analysis can be used to determine how much information we need to inform a good conservation decision. In the case of the Christmas Island pipistrelle, the decision to start a captive breeding program came many years too late. By evaluating the costs, benefits, and feasibility of taking different management actions in the light of what we know about a species' decline (or don't know - i.e. the degree of uncertainty), it is possible to get the timing right.

Research into the methods used to stem species decline is also underway. For example, captive breeding and reintroduction programs are generally regarded as having good success rates. Further investigation into genetic management, habitat restoration, and effective techniques for reintroduction and risk management will help ensure the success of these programs for a variety of species.

Stemming the global loss of biodiversity through recovery planning will require brave decision-making in the face of uncertainty. Monitoring must be linked to decisions, institutions must be accountable for these decisions and decisions to act must be made before critical opportunities, and species, are lost forever.

Particular thanks go to Mark Holdsworth, Stephen Harris, Fiona Henderson, Mark Lonsdale, and my co-authors on the original paper on which this article is based.

<http://theconversation.com/threat-of-extinction-demands-fast-and-decisive-action-7985>

Island bat goes extinct after Australian officials hesitate

23rd May 2012 / Jeremy Hance, Mongabay Correspondent

Nights on Christmas Island in the Indian Ocean will never again be the same. The last echolocation call of a tiny bat native to the island, the Christmas Island pipistrelle (*Pipistrellus murrayi*), was recorded on August 26th 2009, and since then there has been only silence. Perhaps even more alarming is that nothing was done to save the species. According to a [new paper](#) in *Conservation Letters* the bat was lost to extinction while Australian government officials equivocated and delayed action even though they were warned repeatedly that the situation was dire. The Christmas Island pipistrelle is the first mammal to be confirmed extinct in Australia in 50 years.

Weighing less than a U.S. nickel, the Christmas Island pipistrelle fed on insects and roosted in tree hollows and decaying vegetation. Just a few decades ago, the bat was widespread on Christmas Island and roosted in groups of 50 or so animals.

“It is estimated that a single pipistrelle consumes its body weight in insects per night,” Tara Martin lead author with Australia’s national science agency, Commonwealth Scientific and Industrial Research Organisation (CSIRO), told mongabay.com. “While the loss of the pipistrelle is likely to lead to more insects, it is too early to tell what the long term ecological impact of this will be on the island.”

A view to extinction

Once abundant, after the mid-1980s the situation for the Christmas Island pipistrelle took a sudden turn for the worst. Its population began to drop off while the bat vanished from much of its former range. Between 1994 to 2006, the population fell by over 80 percent.



In January 2009 an expedition found only four individuals in a single roost. Bat expert, Lindy Lumsden, at the time warned the Australian government that the population could be as low as 20 bats and “if the current rate of decline continues, this species is likely to be extinct within the next 6 months.”

Lumsden added, “It is critical therefore that a captive breeding program is established immediately as insurance against further decline in numbers and as a source of individuals to reestablish wild populations once the cause of decline has been identified and controlled.”

But the Australian government hesitated and instead established a committee to consider options. Months passed. In August 2009, Lumsden was finally given permission to capture bats for captive breeding. But by then it was too late. Four weeks of surveying located only a single bat through its echolocation. Researchers were unable to catch it and the bat went silent on August 26th, 2009.

“It is quite possible that this is one of the few times that an extinction of species in the wild can be marked to the day,” the entry on the bat for the International Union for the Conservation of Nature (IUCN) notes.

While it is possible a colony of bats remains, it’s unlikely giving the extensive surveying by researchers.

Scientists still don’t know what pushed the bat to extinction, although there are a number of possibilities, including a slew of invasive species such as feral cats, common wolf snake, and a recent invasion of yellow crazy ants. Disease is another possibility, though researchers could find no sign of the bats suffering from illness.

A lack of leadership

So, what went wrong? According to the paper in *Conservation Letters* a lack of leadership doomed the species.

“Leadership has been found to be a key element in the recovery of many endangered species around the world. Without a ‘champion’ to maintain the pressure on governments to act, species will continue to fall through the cracks,” explains Martin, who notes that the leader doesn’t have to be an individual but could be an organization or government team.

Martin says that officials could have decided that a captive breeding program was not worth it given so few individuals remaining, and the bat should be let go with scarce resources devoted elsewhere..

“However no such decision was apparent,” Martin say. Instead officials delayed making any decision whatsoever until eight months after warnings.

In the end “a lack of brave decision making in the face of uncertainty, and a lack of accountability for stalling decisions contributed to the loss of the pipistrelle,” says Martin.

“Monitoring [of endangered species] must be linked to decisions, institutions must be accountable for these decisions and decisions to act must be made before critical opportunities, and species, are lost forever,” Martin says.

Where leadership made the difference: the orange-bellied parrot

The orange-bellied parrot (*Neophema chrysogaster*), according to the paper, shows how bold leadership can make the difference. While the orange-bellied parrot faced a similar situation to the Christmas Island pipistrelle, it has seen a very different, and far more hopeful, outcome.

In 1984, the orange-bellied parrot population dropped to around 150 birds. Two years later the first captive population was established, but the bird continued to vanish from the wild. In 2009, researchers predicted the bird would be extinct in the wild in a few years. A recovery team decided within one day to capture more wild orange-bellied parrots to boost the captive population. Today there are nearly 200 captive orange-bellied parrots, and the species has a chance for reintroduction into the wild and long-term survival, unlike the Christmas Island pipistrelle.



According to Martin the major difference between the orange-bellied parrot and the Christmas Island pipistrelle was that the parrot had a recovery team devoted to its survival, which had been established as far back as 1986. This team closely monitored the parrot over the decades and was capable of taking swift action to save it from extinction.

“Recovery teams are an integral part of species recovery success because they act as the ‘champion’ to ensure the decision process is carried through from the information gathering stage to the implementation of actions and monitoring of success,” explains Martin.

Part of the problem, says Martin, may be that the public simply likes parrots more than bats, regardless of their ecological roles or importance.

“As humans we inevitably place more value on some species than others. In the case of the orange-bellied Parrot, it has had a committed multi-agency, multi-government recovery team including members from universities and NGOs lobbying and working hard for its protection for nearly 30 years. No such recovery team or ‘champion’ existed for the pipistrelle,” she says, adding that, “There is little doubt that if the pipistrelle had of resembled a panda, a captive program would have been established a long time ago.”



While the Christmas Island pipistrelle is gone, Martin says it has left behind lessons for future conservation action.

“The lessons learned here are relevant to the world. Stemming the loss of global biodiversity through recovery planning will require brave, effective governance, leadership and decision making in the face of uncertainty.”

Unfortunately the Christmas Island pipistrelle is now added to an extensive list of mammal extinctions on the island, including Maclear’s rat (*Rattus maclean*), the bulldog rat (*Rattus nativitatis*), and perhaps even the Christmas Island shrew (*Crocidura trichura*), which hasn’t been recorded since the 1980s. With the loss of the Christmas Island pipistrelle, the last remaining endemic mammal may be the Christmas Island fruit bat (*Pteropus melanotus natalis*), a subspecies of a bat found on nearby islands including Sumatra.

<http://news.mongabay.com/2012/05/island-bat-goes-extinct-after-australian-officials-hesitate/>