DISCOVERING PEKAPEKA – NATIVE BATS

SCIENCE/SOCIAL SCIENCE BASED CROSS-CURRICULUM ACTIVITIES

based on the work of the Allan Wilson Centre supported by Pete Handford of Groundtruth. In this unit we focus on our two native bats and what is being done and can be done throughout New Zealand to help prevent their decline and extinction. Assistance with lesson ideas and activities provided by Gillian Dennis, PhD student, working on issues relating to short-tailed bat conservation and management at Massey University.

ALLAN WILSON CENTRE

http:www.allanwilsoncentre.ac.nz

New Zealand Long-Tailed Bat

TEACHER BACKGROUND

On 12-13 February 2015, scientists from the Allan Wilson Centre along with DOC, Gisborne District Council, enthusiastic community members, and most importantly the Tolaga Bay Area School and students undertook a **bioblitz** at Uawa Tolaga Bay. (Term Three, 2015 starters&strategies) One of the most exciting finds was the rare and endangered dotterel on the Kaitawa Estuary. This has led to increased predator trapping and other measures to help save the **dotterel**.

Another equally exciting find was the presence of the endangered long-tailed bats, one of only two species of native bats we have in New Zealand. The short and long-tailed bats are our only native land mammals and they are under severe threat from introduced mammalian predators and competitors. In this unit we introduce students to our bats – pekapeka, the reasons for their severe decline in numbers and explore measures we can take to help protect these fascinating and unique species of mammal.

Short-tailed bat

Long-tailed bat

WHAT IS A MAMMAL?

- What do students think we mean when we talk about the animal kingdom? Have groups spend a minute brainstorming a list of animals that are part of this kingdom. Did they know that animals are divided into two groups? Challenge groups to divide their list of animals into two groups and present to the class. What was the main difference between the two groups that they used? Introduce the word criteria for this difference.
- Did students know that the two main groups we use for animals are 'animals with backbones' called **vertebrates** and animals … … without backbones called **invertebrates**. Have students revisit their list and re-classify the animals using this criteria.
- Tell students that one of the most important groups of vertebrates is called mammals and humans are part of this group. Visit: ***www.zephyrus.co.uk/vertebrates.html*** and have students discover what makes a mammal a mammal and what some of the other groups of vertebrates are called, ***eg*** birds, reptiles, fish, amphibians. How do bats differ from other mammals (they fly)?

Indicative Science and Social Sciences Achievement Objectives

- Students will discover that animals are divided into two main groups called vertebrates and invertebrates, that mammals are an important part of the group of vertebrates and how other groups of vertebrates differ from mammals.
- Through research, students will discover how mammals introduced by humans have caused problems for New Zealand's native species, both flora and fauna, and the reasons why they were introduced.
- Students will discover that three species of New Zealand bats are the only native mammals we have and that one is thought to be extinct.
- Students will conduct extensive bat research to discover their characteristics, physical features, food eaten, areas where they are found, the dangers they face from predators and identify the efforts we are taking to protect them.
- Students will be motivated to take part in local predator control activities.

Best suited Yrs 5-10. Links to Technology, English, Sustainability

INTRODUCED AND NATIVE MAMMALS

- Challenge students to list the mammals found in New Zealand apart from humans. Do they know which mammals were native to New Zealand and which mammals were introduced by humans? Have any of these introduced mammals caused any trouble for native species including forests and birds? Visit: ***www.teara.govt.nz/en/conservation-a-history/page-6*** and ***www.doc.govt.nz/nature/pests-and-threats*** (select animal pests) for shared class reading to research the problems they cause and the reasons they were introduced.

BATS – OUR ONLY NATIVE LAND MAMMALS

- Tell students that before humans arrived in New Zealand, we only had three native land mammals – all species of bats and one is now believed to be extinct. Introduce the class to our short-tailed bats by playing the following video. ***https://www.youtube.com/watch?v=B3S1gc0RDQY*** ***www.doc.govt.nz/nature/native-animals/bats-pekapeka*** > select Pekapeka video.
- In groups or as a class conduct research into the long-tailed and short-tailed bats and discover the following at: ***www.doc.govt.nz/nature/native-animals/bats-pekapeka***

NEW ZEALAND'S ONLY NATIVE LAND MAMMALS

High frequency sound bat detector

- *the probable fate of the greater short-tailed bat?*
- *the areas of New Zealand that still have species of both short and long-tailed bats and where each type of bat is mainly found*
- *what have South Island surveys shown about numbers of long-tailed bats*
- *compare the physical features, weight and size of both bats*
- *what happens to the bats in cold weather and during the day*
- *the differences in diets between short-tailed and long-tailed bats*
- *the factors that have contributed to the decline in numbers of both types of bats and the main reason they are rapidly heading towards extinction if we don't take positive action*
- *what DOC uses to survey and search for bats and what is the encouraging news these surveys have found*
- *locate Kahurangi National Park, Eglinton Valley, Peel Forest, and the areas in South Canterbury where long-tailed bats have been reported and can be seen and where DOC carries out monitoring and conservation work*
- *how learning why bats survive in different areas will help restore bat populations in different parts of New Zealand*
- *why it is so important to protect native forests, cabbage trees on farmland and even old dead trees for bats.*

- Use the following website for further research into our bats. ***www.teara.govt.nz/en/bats/page-1*** Focus on the following:
  - *the speed at which bats can fly and when they are most active*
  - *how bats navigate and why we can't hear these sounds*
  - *what is topor and hibernation and how this helps the bats*
  - *how long ago they came to New Zealand and where they probably came from*
  - *why our short-tailed bats are called a 'biological oddity'*
  - *the key predators of bats, why the short-tailed bat is such an easy target for predators and the work that DOC is carrying out to protect and establish new populations.*

SAVING OUR BAT POPULATIONS – PREDATOR CONTROL

- Did students know that as well as bats, predators kill millions of birds in New Zealand every year. Have students 'guesstimate' the number of birds killed every year by predators such as rats, possums and stoats. How do they react when you tell them it is about 25 million per year. Can the students think of ways or actions we can take to stop such carnage of native birds and native bats in particular. Did they know that DOC uses poisons including 1080 to help control predators and increase bird life?*

TEACHER NOTES ABOUT 1080 POISON

Scientists and conservationists are all united in their view that if we had a better alternative we would not use 1080. The problem is so great that we have to choose between having our native flora and fauna eaten and destroyed by introduced pests or killing the pests so our native species can survive. Trapping and other methods are widely used but we have such a large area of often inaccessible bush and back country that put simply – without the carefully controlled aerial application of 1080 we will just lose the battle. Highly regarded conservation organisations such as Forest & Bird, DOC, and our Parliamentary Commissioner for the Environment support controlled use of 1080. Opponents of 1080 claim that the indiscriminate use of the poison kills all wildlife, including birds and game animals, and threatens human health. Intensive scientific research, rigorous testing and observable results refute the extravagant, and at times, totally false claims made about 1080.

For 1080 teacher and student research, information and videos visit: **www.1080facts.co.nz**

- Visit: ***www.doc.govt.nz/nature/native-animals/bats-pekapeka*** Play the video of Dr Collin O'Donnell talking about how using 1080 helps native bats. Discuss the following:
  - *possible reasons why many people do not know we have bats*
  - *where rats were seen 150 years ago, where they are seen now*
  - *how often rat plagues occur and what this means for bats*
  - *the reasons why rat trapping is not effective*
  - *the success of the 1080 drop for bat numbers compared to areas where it has not been used. Play and discuss* ***www.youtube.com/watch?v=fpwl36QUq60*** for further information on causes and consequences of beech masts.

GETTING STUDENTS INVOLVED

- Did students know that Hamilton is one of the few cities in New Zealand to have a population of long-tailed bats? Carry out investigations into Hamilton's Project Echo and find out what they are doing to discover and protect bats at: ***www.waikatoregion.govt.nz/projectecho*** (Website) and ***https://vimeo.com/36760290*** (Video)
- Make contact with your local DOC office to see if there are any bats in your local area. Ask if there is any way students can help and find out how they can become involved in bat spotting.
- Even if there are no bats in your area, enthuse the students to get involved in predator control at your school and in your area to protect and increase the bird life and help with regeneration of native bush. Find out from DOC or your local council if there are any predator control groups working in your area. Invite them to talk to the class about the work they do and ways that students can help. Also visit: ***www.naturespace.org.nz/groups-page***
- Classes can also consider setting up their own predator control programme at school, at home or locally. Ask DOC to assist.
- Find out about: detector cards to measure the problem at ***www.pestdetective.org.nz;*** the best predator control traps, tools and lures to use; how they will raise funds and consider how they will measure and report their results.

* For additional information on using poisons in bat habitat, Google 'Radio NZ, short-tailed bat, conservation dilemma'.

BECOME BAT EXPERTS - DETAILED BAT RESEARCH

A Megabat – A Giant Fruit Bat – Over 1 Metre Wingspan

SPECIES OF BATS ARE FOUND WORLDWIDE

www.biokids.umich.edu/critters/Chiroptera

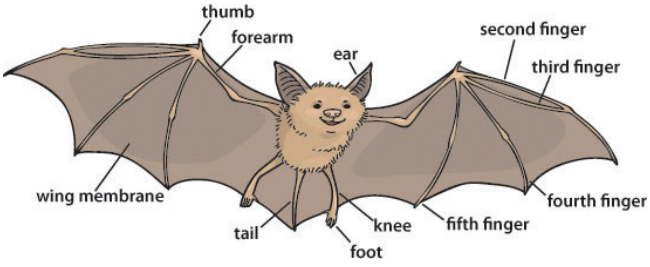
- Tell students that although we only have two species of bats in New Zealand, many bat species are found all over the world and they all have characteristics that are similar. Visit the above website to research the following:
  - *how the forelimbs (like our arms) have been modified to enable the bats to fly*
  - *Compare the size of megabats with our own microbats, where megabats are found and what they are often called, and what they eat*
  - *which type of bats are the most numerous and what do they all use to navigate and find food.*

DIFFERENCES AND SIMILARITIES BETWEEN HUMANS AND BATS

- Remind students that bats are part of the family of animals that have backbones and these animals, including humans are called vertebrates. Introduce students to the idea that because bats are from the mammal family, they are like humans in many ways but they are also very different in many ways. Visit: ***https://askabiologist.asu.edu/explore/bats*** and have groups or individual students construct a two column table to show the similarities and differences between bats and humans. ***eg***

Bats and Humans …	Bats Only …
are warm blooded mammals can see, hear and smell …	have wings and can fly use sound waves to navigate and hunt for food …

- Tell students that although bats look very different from humans on the outside, when we look at the bones on the inside we find that they are very like birds and even human bones. Visit: ***https://askabiologist.asu.edu/human-bird-and-bat-bone-comparison*** and have students compare the bone structure of bats with birds and humans to find similarities and differences.



WHY OUR SHORT-TAILED BAT IS VERY SPECIAL

- Play Part Two of the NZONScreen video (11 minutes) that features our very special short-tailed bats to the students at: ***www.nzonscreen.com/title/ghosts-of-gondwana-2001*** to see 'amazing' footage of the bats. Have the class discover and note down any behaviour or features that make them very special.
- As a class or group have students conduct further research to discover what makes our short-tailed bats unusual and unique creatures at the ***'Just as fast on the forest floor'*** section at: ***http://terranature.org/batShort-tailed.htm*** including: body features and habits that make them different from most other bats; where they get their food; how they move on the ground*; what allows them to burrow and run; thumbs, claws and talons; what they eat compared with other bats and their ability to pollinate a rare ground flower. View the short-tailed bat slideshow at: ***http://terranature.org/batShort-tailed_Lloyd.htm***

* Tell students that the only other bat that can walk on the ground is the vampire bat. Learn more about vampire bats at: ***www.encyclopedia.com/topic/vampire_bat.aspx***

UNDERSTANDING ENDEMIC, NATIVE & INTRODUCED

- Introduce students to the concept that birds (and other animals) found in New Zealand came to be here in three different ways: they occur and breed naturally only in New Zealand; they are also found in other countries and became established in NZ after finding their way here naturally; or they were brought to New Zealand by humans. Tell students that each category has a special name:
  - ***endemic*** (found only in NZ)
  - ***native*** (established naturally)
  - ***introduced*** (brought to New Zealand byhumans).
- Challenge students to name birds in each category. Visit: ***www.sciencelearn.org.nz*** Type ***endemic***, ***native***, ***introduced*** in the Search Box. Download and play the Powerpoint and compare the birds with the class list. Remind students that long-tailed and short-tailed bats are endemic mammals not birds.

CONCLUDING RESEARCH ACTIVITIES

www.batcon.org (use the links under the ***'Why Bats?'*** menu)

- Do students know that many people are scared of bats? Why would people be scared of them? Visit the ***'Misunderstood'*** section to find out the true facts. Also see: ***www.batworld.org/myths_facts_page***
- Have students guesstimate the number of bat species found around the world. Find out at the 'Important' section and have students also discover why bats are so important and how they help the world's environment.
- Visit the 'Everywhere' section to find the distribution of bats around the world. Where are most bats found?
- Have students put their 'bat knowledge' to work by designing a multi-choice bats quiz to teach a ***target audience*** about bats.