

A PENGUIN SPECIES EXTINCT 500 YEARS AGO

SCIENCE/SOCIAL SCIENCE BASED CROSS-CURRICULUM ACTIVITIES

based on the investigations of Professor Jon Waters,
Department of Zoology, Otago University



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AN INTRODUCTION TO PENGUINS

- Do your students know there are 16 different species of penguins? How many species can they name? Have any students seen penguins 'in the wild' or in specially prepared enclosures such as at Kelly Tarlton's or the Christchurch Antarctic Centre?
- Visit: www.penguinworld.com/types/types.html to discover all 16 species. Introduce the concept of genus and the six genera (plural of genus) as a larger group of closely related species.
- Do students know that penguins are only found in the Southern Hemisphere? Have groups explore the interactive map at: www.penguinworld.com/map/map.php to learn where different species of penguins are found. Have students use Google Earth to 'fly' to some of these often inhospitable locations, eg type in *Campbell Island New Zealand*.
- What species of animal are penguins? Play Podcast #1 at: www.penguinworld.com and discuss the following:
 - why some people think penguins are more closely related to fish and humans than to birds
 - the ways that evolution has rewarded penguins and why they are so suited to their environment.

LET'S MEET THE YELLOW-EYED PENGUIN – HOIHO

- Do students know that the yellow-eyed penguin is one of the most rare penguins in the Southern Hemisphere? Revisit www.penguinworld.com/map/map.php to find out where they are located on the New Zealand mainland and offshore islands. Do students know that the Māori word *hoiho* means noisy shouter? Introduce the hoiho to the class with these videos. https://www.youtube.com/watch?v=m44_5_sOVhk <http://tvnz.co.nz/meet-the-locals/s2011-e6-video-4043468>
- Research the yellow-eyed penguin as a class using shared reading (or as group or individual research) at: www.doc.govt.nz type *hoiho* into the search box and > select *Yellow-eyed penguin/hoiho: Sea and shore birds*. Through discussion, have students focus on and discover the following:

Social Science and Science Indicative Achievement Objectives

- Through research students will gain an understanding of the yellow-eyed penguin – its habitat, population, range, myths, facts and threats.
- Understanding how we are able to pinpoint the time of human arrival in New Zealand and its effects on penguin/sea lion populations.
- Discovering the surprising results about extinction and replacement that researchers found when conducting DNA research into the hoiho.
- Discovering where the hoiho previously lived and likely reasons for its survival.
- Finding how researchers discovered a second extinction and replacement – the sea lion, and this implication for discovering further replacements.
- Preparing/giving presentations to educate people about these animals.

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

Facts: Habitat, Population and Range

- the distinctive look that gives the yellow-eyed penguin its name
- how long it takes for chicks to get their full adult plumage
- what the Māori name of hoiho refers to
- the life span of the hoiho and the average size/weight of the birds
- what both the marine and land habitats provide for the hoiho
- where they are located and the estimated total number of penguins we have
- the good news about breeding pairs since 2006.

Threats: Habitat Destruction, Predation, Disease, Humans

- the reason why the hoiho seeks out scrub covered areas to breed rather than open forest areas
 - reasons why these areas have been destroyed and the actions we must take to make sure the hoiho survives
 - the predators that pose serious threats to chicks and to adult hoiho
 - identify the ongoing actions we must take to ensure their survival
 - that diseases also pose a serious threat to the hoiho population
 - how eco-tourism at easily accessible sites provides a negative effect on nest survival rates (refer to *Meet the Locals* video to show how human interaction is kept to a minimum).
- Conclude the yellow-eyed penguin research by examining and discussing 5 yellow-eyed penguin myths at: <http://yellow-eyedpenguin.org.nz/passion/for-kids> Download 'Penguin Myths and Facts' powerpoint presentation.



LEADS TO THE ARRIVAL OF OUR HOIHO



HUMAN ARRIVAL IN NEW ZEALAND

- Do students know that recent research using radiocarbon dating tells us that humans of Polynesian origin (Māori) arrived in New Zealand about 1280 AD. Play the following short videos to the class that explain radiocarbon dating in an easy-to-understand way.
www.youtube.com/watch?v=phZeE7Att_s
www.youtube.com/watch?v=_a0wGtw87FU
- Explain that as we know the kiore rat arrived in New Zealand with Māori, radiocarbon dating of fossils of kiore only go back as far as about 1280 AD – giving us the time of Māori arrival.
- Tell students that it was commonly thought that yellow-eyed penguin were hunted by Māori and later, this, along with farming, land clearance and introduced pests are the reasons for them being endangered today – but recent genetic (DNA) research into the hoiho by a team of scientists from Otago University has found this is not what happened! Explain that research has shown the arrival of humans in New Zealand led to the extinction of a species of penguin already here to the advantage of another that was not here at the time – our yellow-eyed penguin.
- Visit: <http://news.bbc.co.uk/2/hi/7735500.stm> and print out (or project) for student research. Have students answer the following:
 - where did this now extinct penguin live?
 - how long ago is this extinction thought to have occurred?
 - how did the Otago University research team unintentionally find out about this extinction?
 - what did the DNA evidence tell them about this new species?
 - what was the probable cause of the extinction and when did it become extinct?
 - what name was given to this new (and now extinct) species?
 - what had the yellow-eyed penguins done by the time European settlers arrived in the South Island?
 - what reasons are given for the probable survival of the hoiho in the South Island?
- For further information visit: <http://yellow-eyedpenguin.org.nz>
 - > Select Penguins, > Select History of the species to find:
 - how we know the penguin is a 'truly unique and ancient bird'?
 - what did the yellow-eyed penguins take advantage of after the waitaha penguin was hunted to extinction?
 - where were the hoiho living prior to their colonisation of the South Island?
 - how many years ago is it thought that penguins evolved and what other birds have evolved from penguins' distant ancestors?

COULD THIS HAPPEN AGAIN?

- Remind students that the Otago University team were surprised to discover a new species that had become extinct and were replaced by another species in such a short time. Do students think this could happen in the future with another similar animal and bird species or even plant species?
- Tell students that this has happened again. Visit: www.odt.co.nz/news/dunedin/302326/proof-earlier-sealion-species and share the story of the Otago University research team led by Professor Jon Waters, who have just released (15 May, 2014) a paper that shows that the sea lions now recolonising Otago's coastline are a different type from the sea lions found around New Zealand coasts about 600 years ago which are now extinct.
 - how did they prove that they were a different species?
 - what did we think was happening before this research?
 - when did these ancient sea lions become extinct and what was the probable cause of their extinction?
 - what opportunity did this provide for subantarctic sea lions?
 - how is this discovery related to the yellow-eyed penguin discovery?
- Have students conduct research into the threats to the sea lion at: www.doc.govt.nz > type in *sea lion* into the search box and select the first result.



A HAPPY ENDING FOR TWO SAD STORIES

- Develop the idea that although human impact leading to the extinction of both an ancient species of penguin and sea lion is a sad story, their replacement by other species has given us a happy ending to both stories. Do students agree with the researchers that because of their findings, they expect to find further examples of extinction and replacement in the future?
- Introduce the idea that one of the best way helping both the populations of yellow-eyed penguins and sea lions to grow is to tell people their story, learn about them and the threats they face and how to act around them. Using small group or individual group research have students prepare a presentation they can give to give to educate people about these rare species. This can take the form of information sheets, multiple choice quizzes, videos/slideshows, web page, illustrated talks, poster displays ... Use the following web resources for research:
 - www.doc.org.nz (type *sea lion* and *hoiho* in search box)
 - <http://yellow-eyedpenguin.org.nz>
 - www.sealiontrust.org.nz