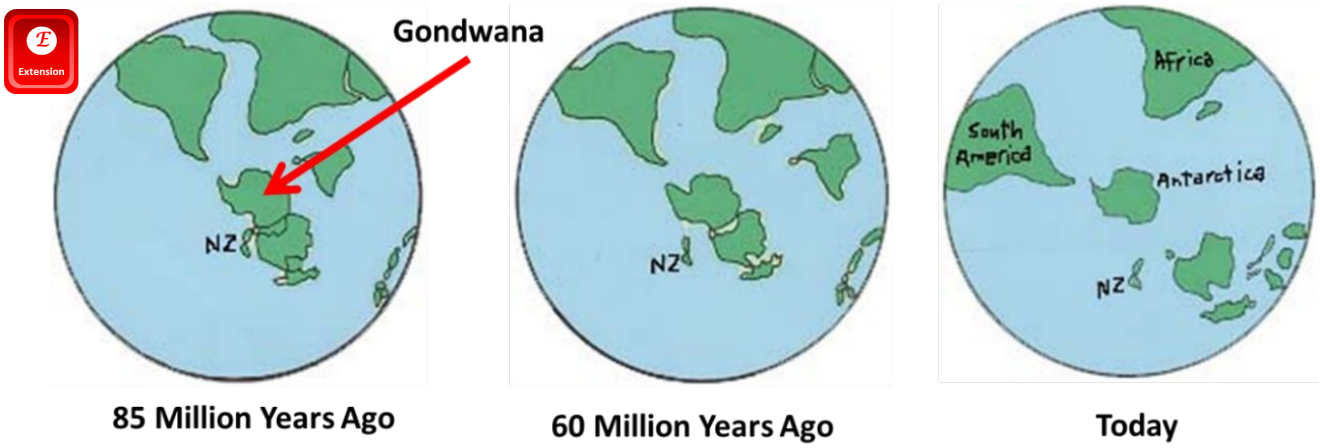
New Zealand plants and animals are unique due to them evolving in geographical isolation

For a long time in New Zealand's geographical history it formed part of a land mass called **Gondwana,** also composed of Australia, and Antarctica (as well as Africa, South America and India at an earlier stage). About 85 million years ago the plate that New Zealand sat on top of broke away from Gondwana and moved North, through the process of **plate tectonics**, and has remained in isolation ever since.



Ancestors of New Zealand's plants and animals arrived at various times in the past

When New Zealand first broke away from Gondwana it was in the form of a giant land mass called Zealandia and populated with animals and plants - all of which had previously evolved on Gondwana. Zealandia sat upon a thin crust and over time scientists believe it almost completely (if not entirely) submerged. Parts of it that we now recognise as New Zealand were raised up from the ocean due to active plate movement under it about 30 million years ago. It was after this time that birds, insects, reptiles and plants that either flew or rafted over from Australia or South America populated New Zealand.

New Zealand's Plants and Animals have had to adapt to its constantly changing conditions

Ever since New Zealand broke away from Gondwana, it has had a very **disruptive geographical history**. At various times in its past New Zealand has been totally (or almost completely) submerged under the ocean, encountered a series of ice ages which covered the country in ice, snow and glaciers as well as had ranges of mountains pushed up due to tectonic plate movement and eroded back down again. During this time New Zealand's animal and plant species have had to adapt and evolve to these changing conditions, some becoming **extinct** but others remaining to the present time.

New Zealand's first arrivals

From the original pioneers that populated New Zealand after it re-emerged from the sea, we now have animals such as tuatara, kākāpō, wrens, moa, primitive frogs, geckos, dinosaurs, primitive groups of insects, spiders and earthworms as well as some types of plants - all of which had evolved and changed in time from their ancestors.

Other species of animals either flew across large distances from surrounding countries or were transported across by the sea at various times in the next 25 million years but **no species of Mammal** (aside from two species of bat that flew) ever made it across to New Zealand until Humans arrived around 700 years ago.

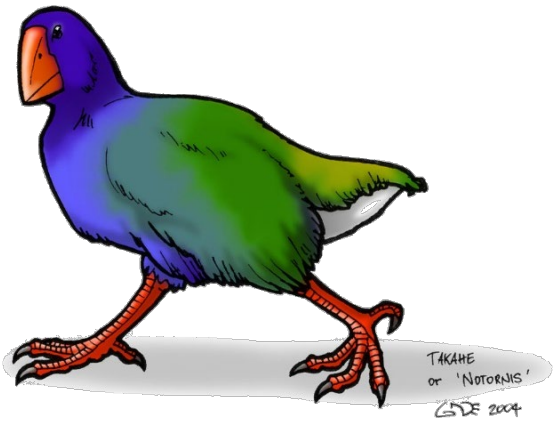
New Zealand's plants and animals have evolved in the absence of Mammals

New Zealand's animals have evolved without the presence of Mammals and any ground predators. This has created some special characteristic features in our animals. Many of our bird species have become flightless because they have not needed to fly away from predators. Niches or lifestyles filled by Mammals in other countries have been filled by birds, insects and reptiles in New Zealand.

For example, the kiwi occupies a niche similar to a badger - lives in burrows, eats worms and other invertebrates (animals without an inside skeleton), the Moa occupied a browsing niche similar to deer, weta and the short-tailed bat occupied a niche that is taken up by mice elsewhere.

Because of this, many of our species look quite different from related groups of animals and plants in other countries.

What is the advantage of not flying?



Flight in birds is an adaptation to escape from predators and move around quickly. It requires a lot of energy, which means birds who fly, must find and eat a lot more food than non-flying birds. Birds who fly also need to be light, so their size and weight is limited.

New Zealand had no mammal predators, so birds did not need to fly to escape. The benefits of not flying out weigh those of flying. Birds that did not fly had a **survival advantage** over those that did and produced more offspring. New Zealand flightless bird species could also become heavier and be suitable for niches (jobs) that were occupied by mammals in other areas of the world.

Endemic or native?

New Zealand has a large number of endemic plants and animals – that means not only are they found in New Zealand (native) but they are also found in no other place. There many thousands of fungi and insect species that are endemic plus around 70 birds, 80 skinks and geckos, 38 freshwater fish, four frogs, three bats and two species of tuatara.

New Zealand Birds

New Zealand has many different types of **habitats** ranging from mountains to forest to coast and marine. All these habitats have bird species which live, feed and breed in them.

Since humans have lived in New Zealand, for at least the past 700 years, introduced mammal pests and habitat destruction have reduced the numbers of these birds. Some like the *Huia* and *Moa* have become extinct. Others like the *kakapo* and the *black robin* have been saved from extinction but have a very small population.

We are now realising how important it is to protect the habitats and the birds that we still have left to stop more being lost forever.

Our unique birds - Kakapo

The Kakapo is the only flightless and nocturnal parrot in the world. The Kakapo is also the heaviest parrot in the world, weighing up to 3.5 kilograms. Due to habitat destruction and predation there are now only approximately **125 Kakapo left**. These remaining birds have been **relocated** to several predator free island habitats, where the birds can breed in safety.

Our unique birds - Kiwi

The kiwi are a flightless, nocturnal group of birds related to the extinct Moa and the still living Emu, which form part of a group called the ratites which now live in countries once forming part of Gondwana. (Africa, Australia, South America etc.) There are five main species of Kiwi in New Zealand: the brown kiwi, the rowi, the tokoeka, the great spotted kiwi or roroa and the little spotted kiwi.

They all eat invertebrates (worms, insects etc.) and fruit. The females produce an enormous egg, which the males incubate. The chicks must survive on their own as soon as they are born.

Our unique birds - Tui

Tūī belong to the **honeyeater** family, which means they feed mainly on **nectar** from flowers of native plants such as kōwhai, pohutukawa, rātā and flax. Occasionally they will eat insects too.

Tūī are important **pollinators** of many native trees and will fly a long way for their favourite foods, especially during winter. Flowers that are red or yellow often indicate that a plant is pollinated by birds.

Our unique birds – New Zealand Black Robin

The New Zealand black robin all live on the Chatham Islands off the coast of New Zealand. They are an endemic species (found nowhere else in the world) and are famous for being one of the World's rarest birds at one stage.

In 1980 there were only five black robins left in the world, and only one female – Old Blue, who was thought to be too old to produce chicks. Fortunately, this was not the case and with the chicks she went on to have, there are now around 250 black robins with Old Blue being the ancestor to all of them.

Our unique birds - kōkako

The North Island kōkako, distantly related to the Tui and the extinct Huia, in found in small populations in the North Island forest. There is also a South Island kōkako with orange wattles (flaps on the chin) but it is thought that that species is now extinct.

The kōkako have a unique way of moving through the forest trees by running and climbing along the branches then gliding from tree to tree. Its song is very particular and the main part of it gave the bird its name – kō – ka – ko.

Environmental changes may occur naturally or be human induced

Natural Environmental factors such as drought leading to lack of food or water, disease, flooding, volcanic activity and sudden climate change have been occurring since living organisms first appeared on Earth. In some cases, these factors have been so extreme that worldwide extinction of many species has occurred.

Environmental factors can also be caused or **induced** by Humans such as the climate change occurring now created in part by human pollution in the atmosphere. Cutting down trees and destroying habitats along with introducing animal and plant pests also have negative impacts on the native life.

The main threats to our native animals

What is killing our Native Animals?

- ❑ Introduced species such as rats, stoats and possums killing the birds and/or their eggs
- ❑ Introduced competing species such as rabbits and possums eating the bird's food
- ❑ Human destruction of bird habitats

Our animals in New Zealand evolved in the **absence** of ground predators or mammals so they have not developed adaptations to defend themselves as well as other species in the rest of the world have. Our birds, that have become flightless, heavy and slow breeding, have been especially vulnerable to **introduced predators**. Large areas of our native forest have been burnt and cut down as well as wetlands drained to convert to farmland, since humans have arrived. Some of our **endangered species** are confined to small marginal areas of land.

The Kakapo case study

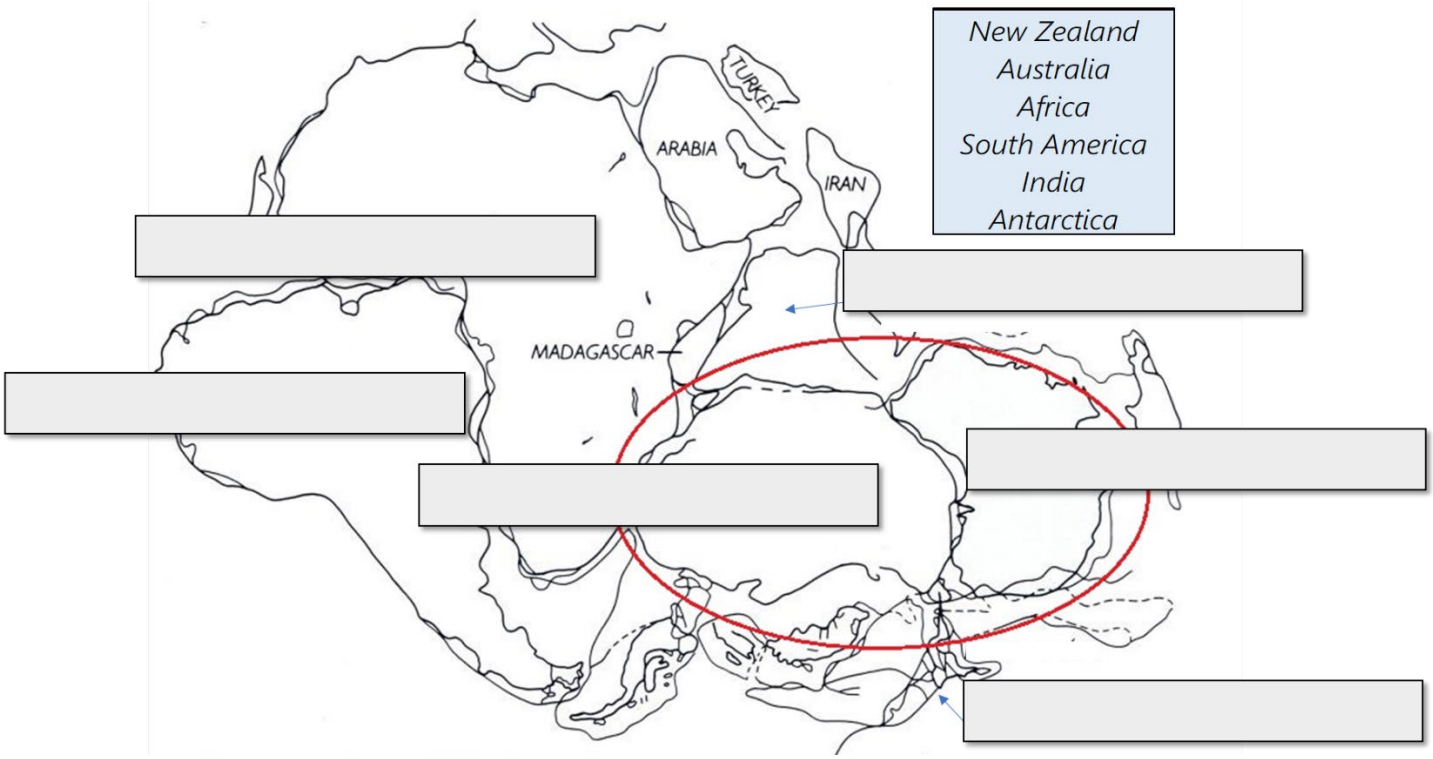
Kakapo were once spread all over New Zealand in large numbers before humans arrived on New Zealand. The species evolved without mammal predators. The nocturnal behaviour (active at night-time) and bush camouflage protected it from its main predator, the giant Haast's eagle – that hunted in the day by sight. The introduction of mammal pests that ate and killed kakapo as well as humans killing and eating kakapo, greatly reduced numbers of kakapo.

The destruction of the habitat and food of the kakapo by humans and pests also had an impact. Kakapo have not evolved to escape predators and they cannot fly to escape. They are more sensitive to predators than birds that have evolved with them. Kakapo are slow breeding and have small numbers of chicks – they cannot replace lost birds quickly. There is low genetic variation and diversity of the remaining birds so there are less healthy chicks produced and a low breeding rate. It is harder for males to find partner to mate with and a limited habitat to live in and get enough food, especially mast rimu required during breeding.

Maungatautari Ecological Island trust – A case study

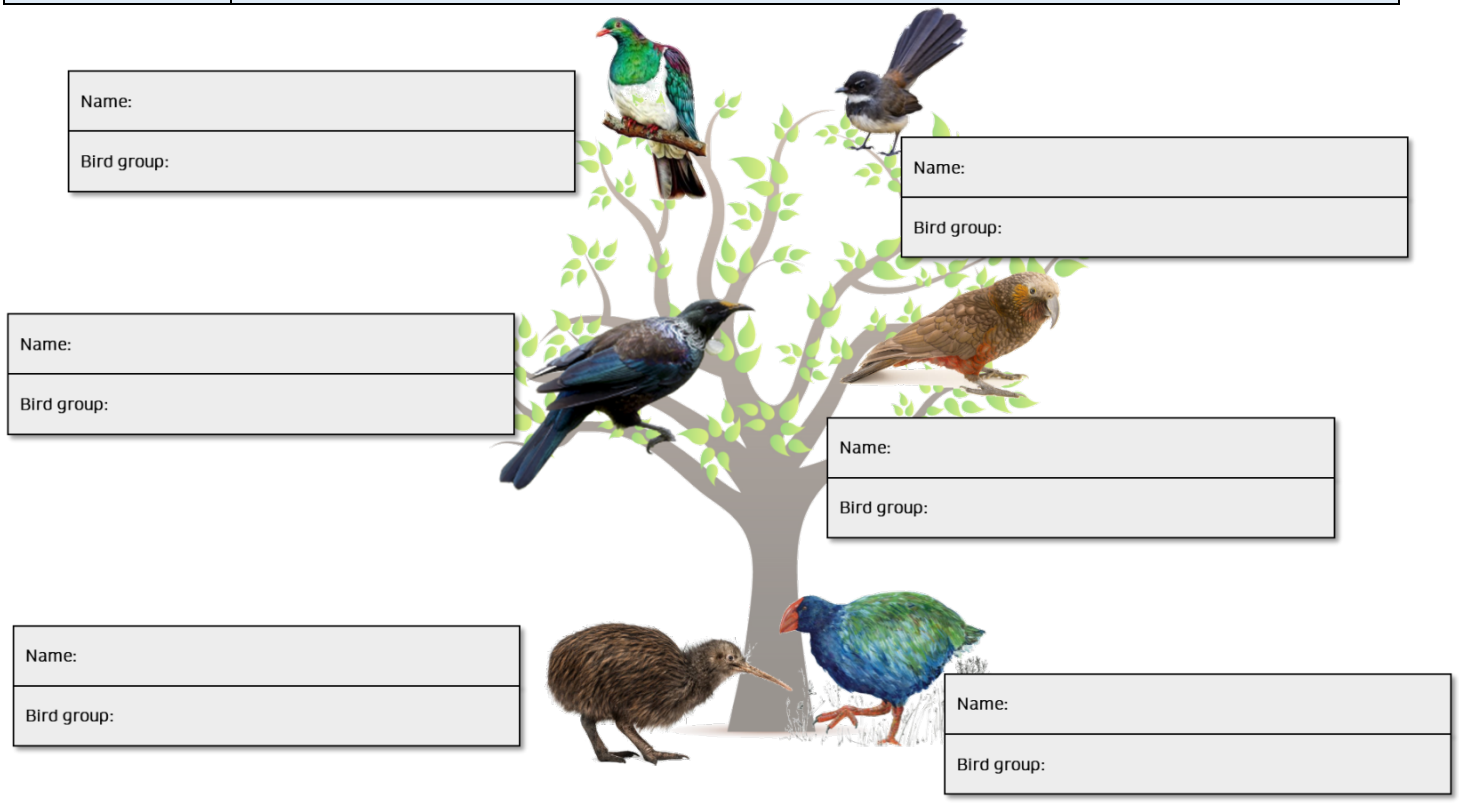
Maungatautari is a bush-covered mountain surrounded by farmland in the Waikato. It was once the home of many New Zealand species but due to introduced predators such as rats, possums and stoats, and habitat destruction, many species became extinct and the mountain became empty. Over a decade ago, several farmers and conservationists came up with an ambitious idea to surround Maungatautari Mountain with predator proof fencing and begin intensive pest control to remove every single mammal pest. Not that many years later, with a huge effort from volunteers and the generosity of local landowners and Iwi, Maungatautari started to come alive once more. The hihi (stitchbird), takahe, tuatara, Kiwi, saddleback and the North Island robin are just some of the species introduced back into the safe predator free sanctuary. Many species of reptile, plants and fungi once thought extinct have also made a remarkable recovery as well. Maungatautari Sanctuary has become Taonga (treasure) for all New Zealanders.

1. Below is a diagram of Gondwana from a time period of around 130 million years ago. Attach the correct labels of today's land mass to each area.



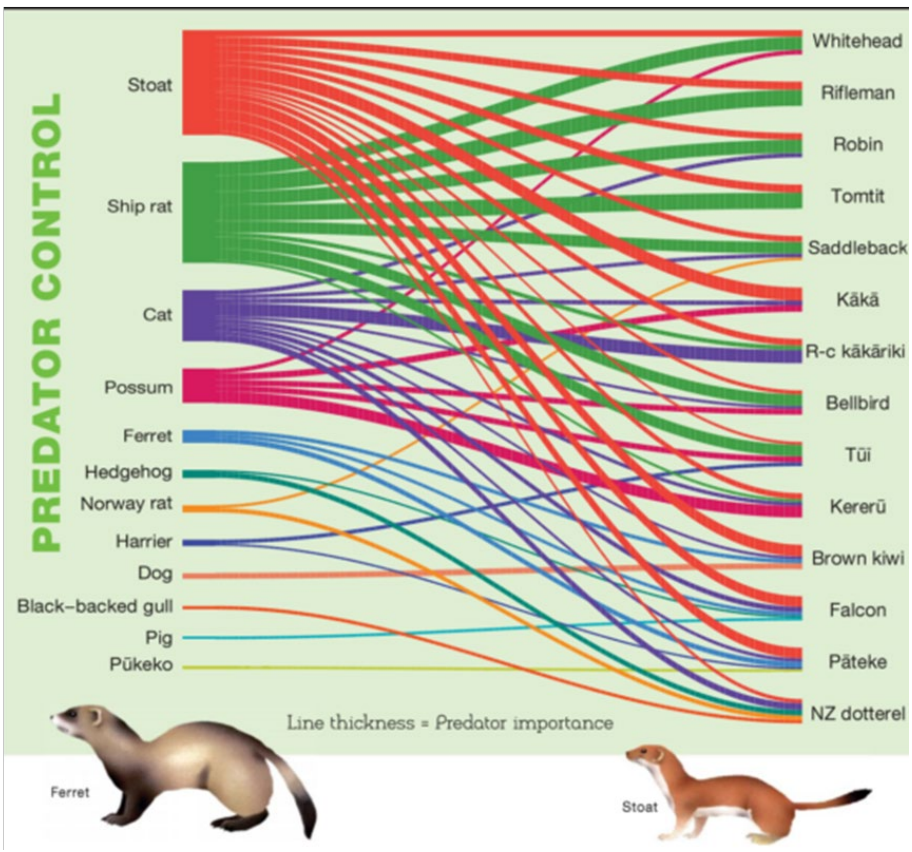
2. Label the following New Zealand birds with their correct names and group of bird they belong in.

Name	tokoeka	kereru	takahē	pīwakawaka	tūī	kākā
Bird group	parrot	rail	honey eater	ratite	pigeon	perching birds (passerines)



3. Use the information graphic to answer the following questions on predators of New Zealand Species

https://predatorfreenz.org/what-bird-populations-need-thrive/



a. Which four pest species are the most important to control?

b. Which birds would benefit the most from possum control? Name at least three

c. Maungatautari Mountain is protected by a predator proof fence. There are several flightless birds that live protected behind the fence such as takahe and kiwi. Use the fishbone below to list **key ideas**, and **details**, for why our endemic (found only in New Zealand) birds need our help for survival.