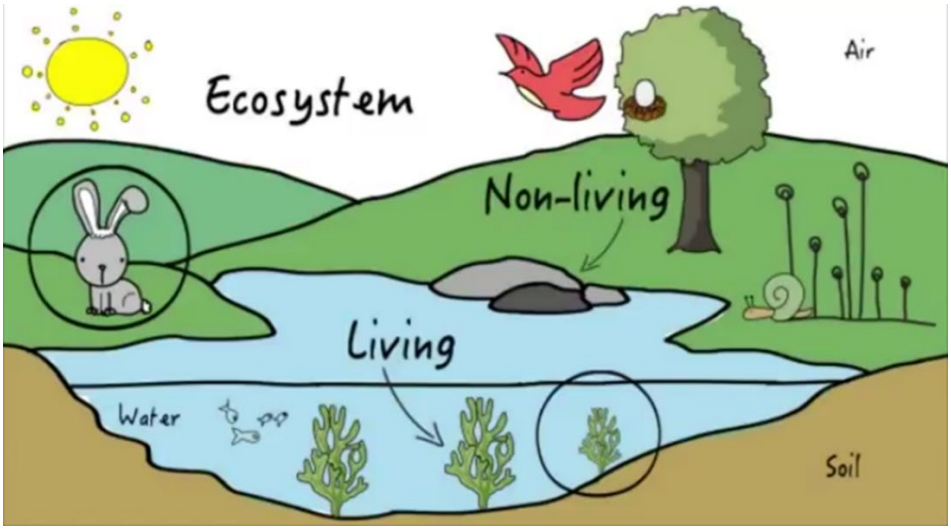
An ecosystem is the habitat and the community considered together.

An **ecosystem** includes all the living organisms in a specific area. These systems consist of a living part called the **community**, made up of all the plants, animals and other living organisms, and the **non-living environment** (weather, rainfall, soil, atmosphere, etc.), determining the **habitats** available.



The niche is the way in which an organism interacts with its environment including its feeding role, type of activity and habitat

The **niche** of a species describes how members "make a living" in the environment in which they are found. Describing the niche of a species would include:

- The **habitat**, which means where the species lives, feeds and reproduces.
- When the organism is **active** (day or night)
- The **feeding role** that the species has in the community. (producer, consumer or decomposer)
- The **adaptations** the organism has, to best survive.

Habitat examples

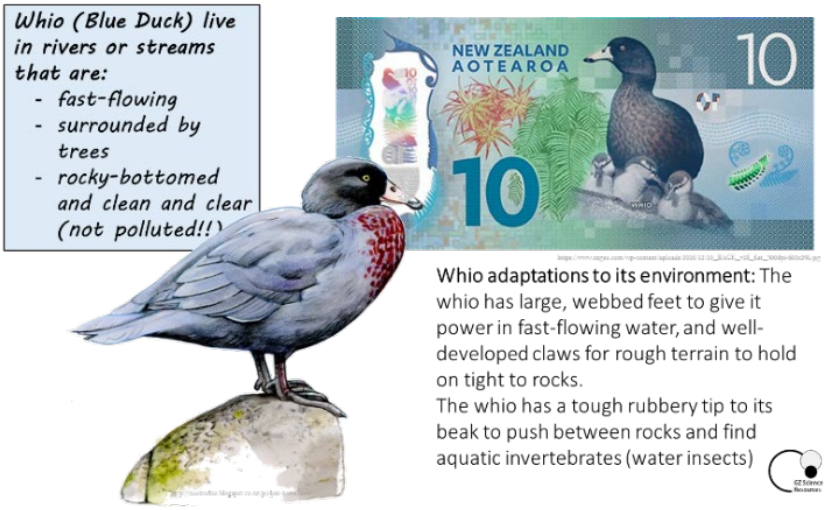
All birds form a separate group of animals that evolved from the same ancestor. Bird species are found across the world in many different habitats. Diversity in a bird's adaptations help each type of species survive in different habitats.

A NZ Keas habitat is in South Island alpine regions

Emperor penguins found only in the Antarctic polar region

Adaptations assist an organism to survive in an ecosystem

An adaptation is a **feature** of an organism that aids the **survival** and reproduction of individuals of that species in its environment.

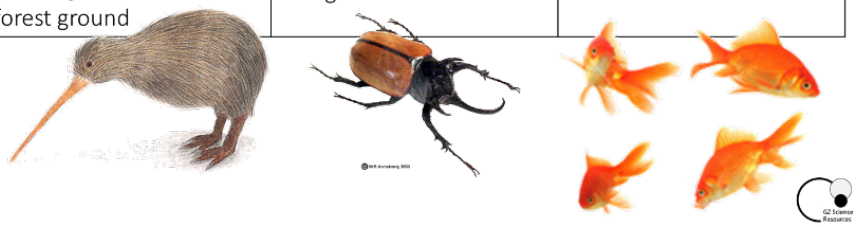


Whio adaptations to its environment: The whio has large, webbed feet to give it power in fast-flowing water, and well-developed claws for rough terrain to hold on tight to rocks.
The whio has a tough rubbery tip to its beak to push between rocks and find aquatic invertebrates (water insects)

Adaptations are genetically inherited traits that allow species to survive better in their habitat

Adaptations can be classified into three main groups. Structural adaptations are often seen as physical characteristics, but all three types are genetically inherited and passed on to the next generation.

Structural	Physiological	Behavioural
A structure/physical feature of an organism that helps it to successfully live in it's habitat. e.g.: the long beak of a kiwi to get food in the soft forest ground	A chemical or process inside an organism that helps it survive. e.g.: bad tasting chemicals inside beetles to stop being eaten	An activity that an organism does that helps it (or its group) to survive. e.g.: fish swimming in groups for safety



Organisms vary and that some variations give advantages over others in a given environment

Individuals of a species occupy a **niche** and they have **adaptations** to survive in their habitats. The adaptations may help them to best obtain food, seek mates, raise offspring, find shelter or escape predators.

Adaptations are physical characteristics (phenotypes) an organism can genetically pass onto their offspring. Because there is variation between individuals of a species, some individuals may have an advantage over others when one or more of their adaptations is better suited for survival in their habitat.

Predator and Prey Adaptations

Predators hunt, catch and eat other animals. The animals they hunt are known as prey. Many animals can also be both – the predator of one type of animal but the prey for another species. Both predator and prey have evolved adaptations to help them survive in their habitat. The predator species has adaptations to help it better catch prey, and the prey species has adaptations to help it better avoid being eaten. The best hunters and the best escapers go on to have the most offspring.

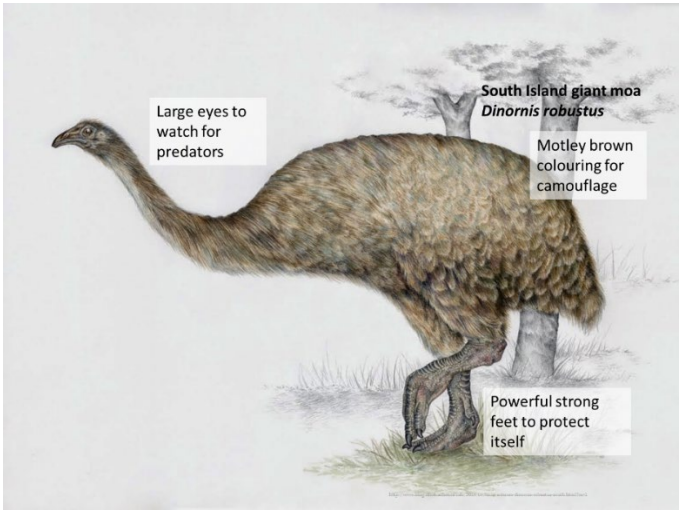
In New Zealand, prior to human arrival, we did not have any Mammal predators, but we did have a very large predator bird called the **Haast's eagle.** Sadly, this giant eagle is now extinct, and we are not entirely sure what colour the feathers were, but the bird was a terrifying sight for species of **Moa** (also extinct) that was its prey.

Predator adaptations - Haast's eagle

Extension

Haast's eagle is the largest, heaviest, eagle species that has ever lived, weighing up to 18 kg and had a wingspan up to 3 metres. The eagle was the predator of moa, such as the South Island giant moa that was nearly 4 m and over 10 times the eagle's weight. The eagle dived on its moa prey from a high spot and killed moa by flying into their hindquarters and grappling the moa with its large feet and talons, which were stronger than a tiger, before crushing the moa's skull. Haast's eagle became extinct 500-600 years ago, around the same time that New Zealand's moa species, its food source, became extinct.

Prey adaptations - South Island Giant Moa



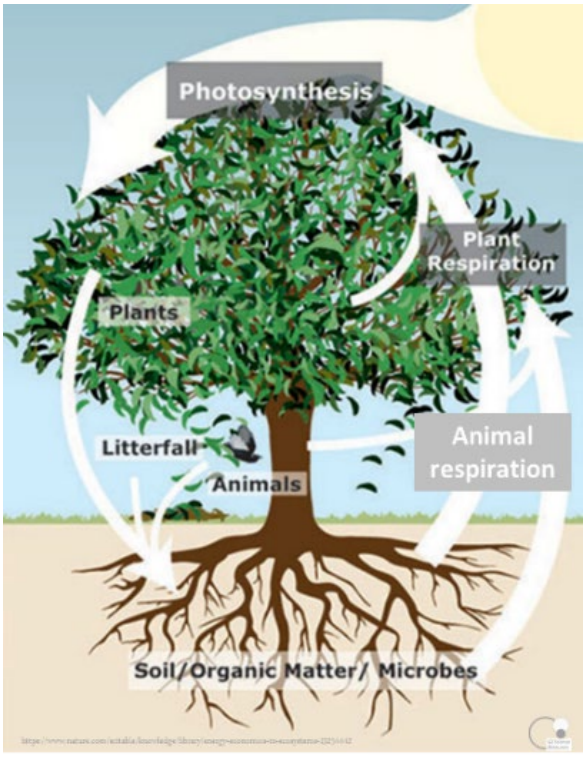
The South Island Giant Moa was a main prey species for Haast's Eagle. It was a herbivore, browsing and eating small shrubs, plants and berries. The eagle needed light to hunt so the moa may have done much of its eating early morning or dusk when it was darker. The large feet could help defend it and long legs to help it run for cover. It also had a very good sense of smell.

Extension

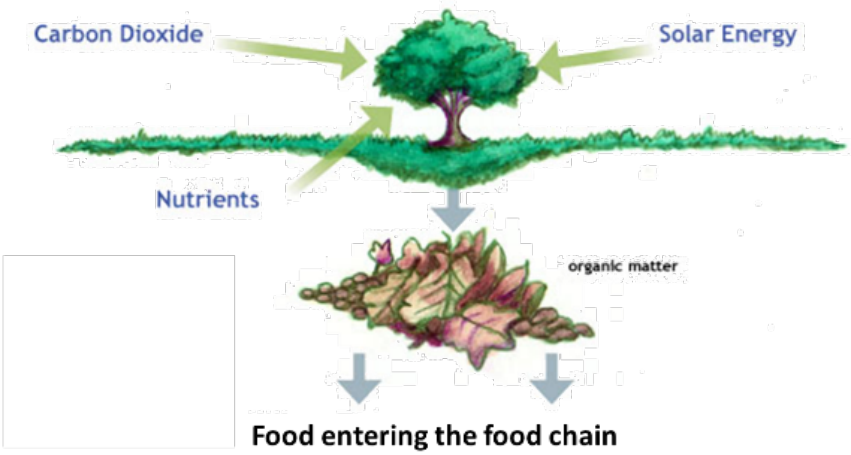
Plants fill the role of Producers in a community

Plants are special because they have leaves, and they can produce their own food by the process of **photosynthesis** from sunlight using raw materials that they get from the air and soil.

Plants can be thought of as 'food factories' which provide most living organisms on Earth with a source of energy and food. They produce the energy that is at the start of any food chain and therefore the group of plants are known as **Producers**. They form part of a **Community** – a group of different species living together and interacting.



The importance of plants as producers.



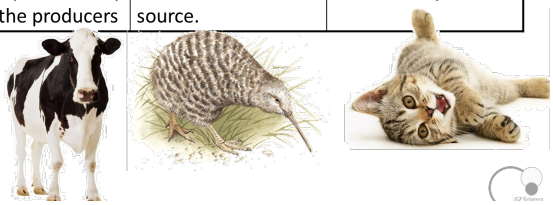
On land, Producers are plants. Plants are at the beginning of every food chain that involves the Sun. All energy comes from the Sun and plants make food with that energy using the process of **photosynthesis**. Energy in the form of nutrients and food are passed onto other organisms when they eat (consume) the plants.

The role of producers, consumers and decomposers in food chains and webs.

Three feeding roles that species can have in a community are as producers, consumers or decomposers. Consumers can be further dived into carnivores, herbivores and omnivores.

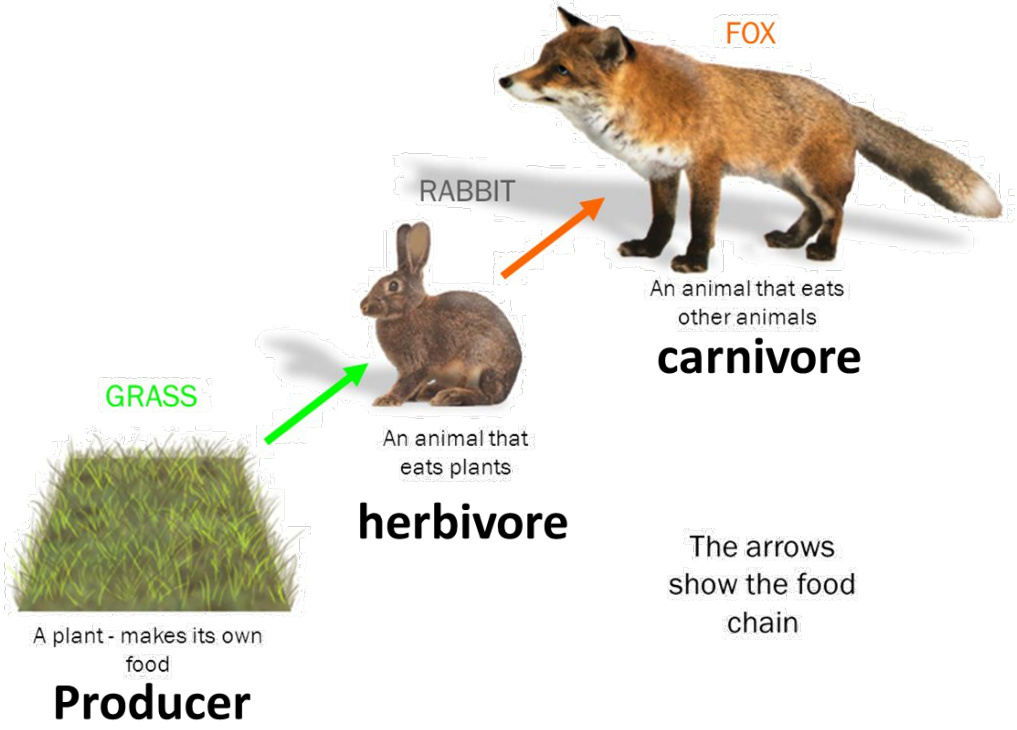
Producers	Consumers	Decomposers
Plants that make food from carbon dioxide, light and water	Herbivores that eat plants and carnivores that eat other animals	Fungi and bacteria that break down the bodies of dead plants and animals

Herbivores	Omnivores	Carnivores
Herbivores are animals that eat plants only. (plant eaters) In a food web they are directly above the producers	Omnivores eat both plants and other consumers. They obtain their food from more than one source.	Carnivores eat only other consumers (meat eaters). This also includes birds that eat only insects.

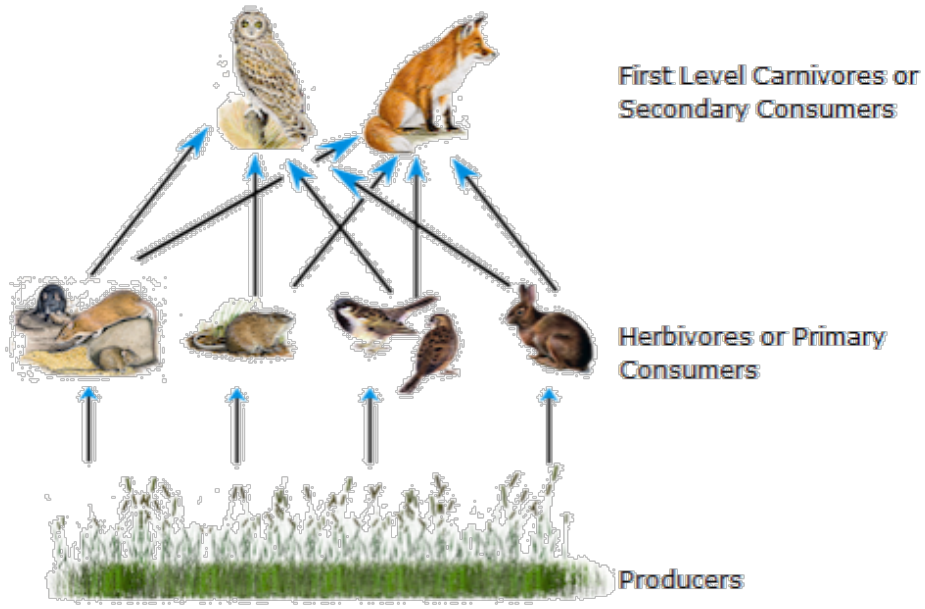


The role of producers in food chains.

A food chain is a series of organisms through which energy flows; first link is always a producer, such as a plant. The producer stores energy from the Sun through the process of photosynthesis. Each organism above the producer eats the one below it in the chain. Energy flows in one direction only.



Food Webs



In an ecosystem, there are many different food chains and many of these are cross-linked to form a food web. Ultimately, all plants and animals in an ecosystem are part of this complex food web.

If one species in the food web changes in numbers, it will affect all other species in the food web. For example, if all the rabbits were removed the predators would need to start eating more of the birds, mice and rats. The grass that the rabbits ate would increase and feed more of the other herbivores.

Energy enters an ecosystem in sunlight, which is transferred to energy in plants by photosynthesis and that this energy is then passed along food chains.

Trophic levels are the feeding positions in a food chain such as primary producers, herbivore, primary carnivore, etc. Green plants and phytoplankton form the first trophic level, the **producers.** Herbivores form the second trophic level, while carnivores form the third and even the fourth trophic levels, all called the **consumers**. An **apex predator** sits at the top of the food web

Energy is passed from one trophic level to another starting from the producers. **Food webs** and **food chains** are used to show which species of organism is at each level and how energy moves between them.

1. Ecological systems are organised according to what is included. Label the diagram below with the correct terms.

community	*individual*	*biosphere*	*ecosystem*	*population*

2. Complete the following statements

active	*niche*	*adaptations*	*habitat*	*feeding role*

The _____ of a species describes how members "make a living" in the environment in which they are found. Describing the niche of a species would include:

- ❑ The _____, which means where the species lives, feeds and reproduces.
- ❑ When the organism is _____ (day or night)
- ❑ The _____ that the species has in the community. (producer, consumer or decomposer)
- ❑ The _____the organism has to best survive.

3. Use the following terms to complete the mind map of Ecology

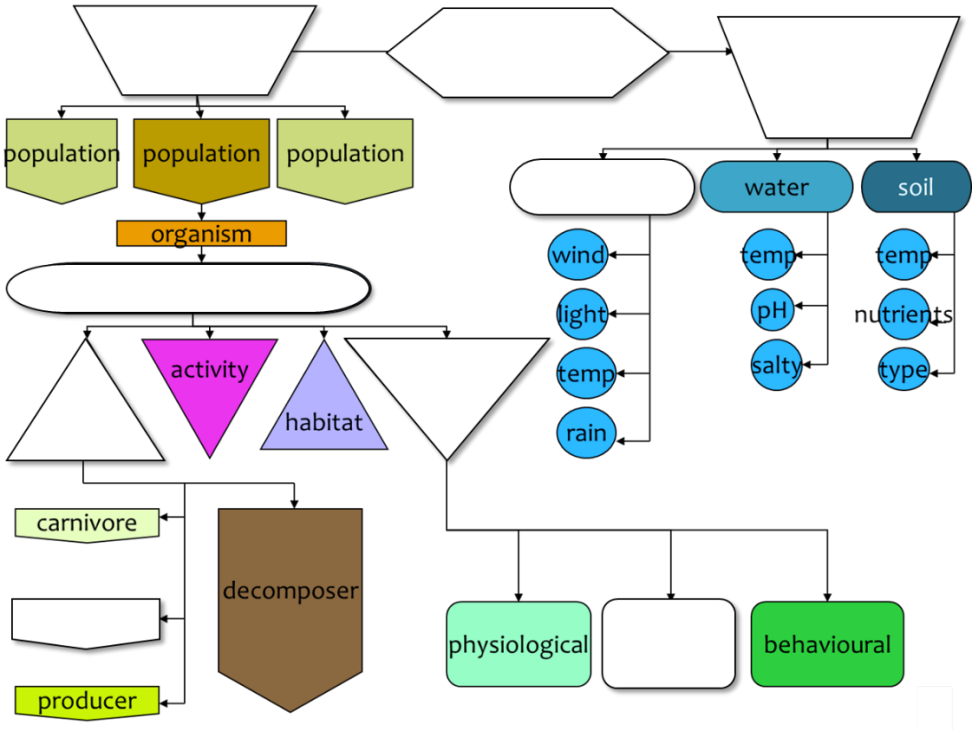
feeding role *atmosphere*

niche *community*

adaptations *habitat*

herbivore *ecosystem*

physical environment

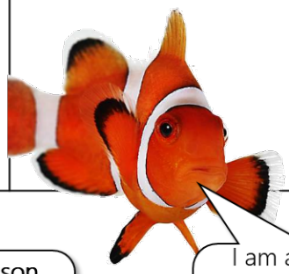


4. Use the information given below to identify ONE adaptation for each animal, and link to survival.

Type of adaptation	Structural	Physiological	Behavioural
Feature observed from animal			
How might this adaptation help the organism survive?			

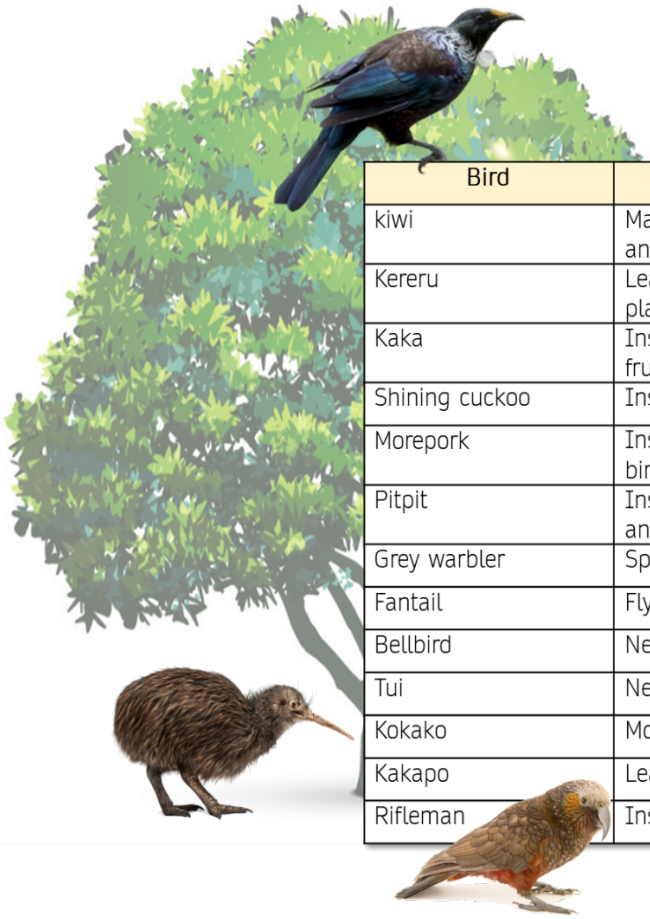
I am a **takahe**. I can be found in areas that have tussock grass – I eat the soft base of the leaves

I am a **poison arrow frog**. I have brightly coloured skin



I am a **clown fish** – you will find me amongst sea anemones around reefs

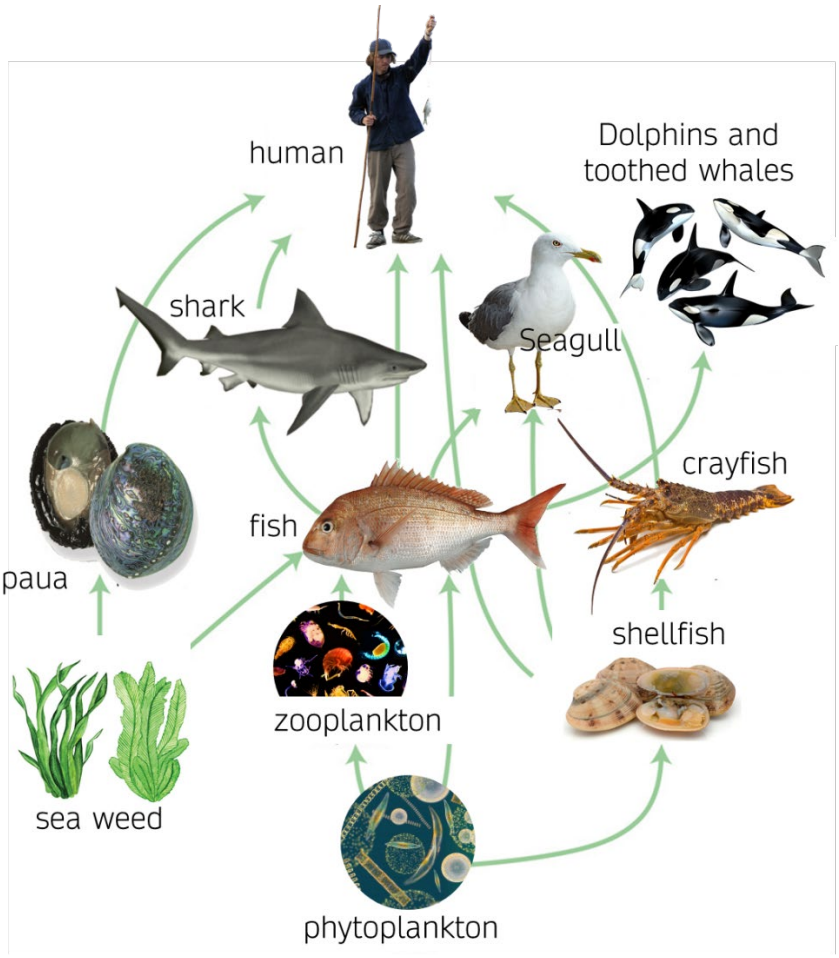
5. Identify the following New Zealand birds as either carnivore, herbivore or omnivore.



carnivore, herbivore or omnivore?

Bird	Food	Classification
kiwi	Mainly invertebrates and some seeds and fruit	
Kereru	Leaves, fruit and flowers of many plants	
Kaka	Insects and larvae, and seeds and juicy fruit	
Shining cuckoo	Insects and their larvae	
Morepork	Insects plus spiders, lizards, small birds, mice and rats	
Pitpit	Insects and larvae plus snails, worms and seeds	
Grey warbler	Spiders, beetles and caterpillars	
Fantail	Flying insects	
Bellbird	Nectar, soft berries, insects and spiders	
Tui	Nectar, fruit and insects	
Kokako	Mostly Leaves and fruit	
Kakapo	Leaves, roots, flowers and fruit	
Rifleman	Insects and spiders	

6. Use information from the food web below to answer the following questions



a. Give examples, from the food web, of organisms for each of the following feeding groups

Producers
Herbivores
Omnivores
Carnivores

b. Write an example of **food chain** that can be found within the food web above.

Producer	Primary consumer	Secondary consumer	Tertiary consumer	Apex predator
	→	→	→	→

c. Describe TWO consequences that might be seen in this food web if overfishing by humans decreased the quantity of the fish population by over half and explain why they would occur.

Consequence	Reason for this consequence