Web of Life

Summary
Students research organisms living in NZ forests and learn how they interact with one another.

Learning Objectives
Students will be able to:
- Explain 5 ways organisms interact with one another.
- Explain the possible consequences of removal or addition of an organism from the environment.

Curriculum Connections
Science, Living World, Levels 3-6 (details below)

Vocabulary/concepts
commensalism, competition, cultivation, ecology, herbivore, herbivory, husbandry, mutualism, parasite, parasitism, pollination, predation, predator, symbiosis

Time
Introduction: 15-30 minutes
Research time: several hours, or could be done as homework
Reflection: 30-45 minutes

Materials
- 1 copy of Forest Organisms sheet
- 11 copies of Web of Life Worksheet (both sides)
- library and internet resources
- whiteboard or large piece of butcher paper

Background information

Organisms interact with one another in a variety of ways. Interactions can be positive or negative (or have no effect) . When exotic organisms are introduced to an ecosystem, they join the “web” of interactions, sometimes with negative consequences for native organisms.

Activity

Use think, pair, share to brainstorm a list of ways in which living things interact with one another. You might give the example of grasshoppers and grass—the grasshopper eats grass. The grasshopper is a “herbivore”, and the act of eating plants (the interaction) is called “herbivory”. Encourage students to think of other ways in which living things interact. Remind them not to forget people, as we are also living things interacting with other living things.

Some interactions to discuss include:
- Predation
- Herbivory
- Pollination
- Cultivation (particularly of crops by humans)
- Husbandry (particularly of animals by humans)
- Habitat modification (e.g. fungi rot trees, creating holes that birds nest in)
- Competition
- Symbiosis
- Mutualism
- Commensalism
- Parasitism

Explain to the students that the study of all these complex interactions is called *ecology*, and understanding ecology is essential for understanding how changes in an ecosystem will affect the living things in it.

Explain to the students that they are going to be researching the ecology of some organisms that live in New Zealand forests. Their job is to find out how those organisms interact with other living things in the forest.

Divide the class into 11 groups of 2 or 3 students each. Copy and cut apart the Forest Organism cards. Put these in a hat and have each group of students chose one. This is the organism they will study. Groups search internet and library resources to find out how their organism interacts with other organisms (particularly the ones other groups are studying). As they find information, they record it on the Web of Life worksheet according to the worksheet directions.

Create a large version of the circle of forest organisms on a whiteboard or large piece of butcher paper. When students have completed their research, ask each group to transfer the information from their worksheet to the board. Do not write details of the interactions on the board (there won't be room for it all); just draw the lines and indicate positive and negative interactions.

Discuss as a class the interactions and implications of what they've learnt. You might use the following sequence of questions to elicit discussion.

1. When we draw all these interactions, what does it look like?
2. Is this everything that's going on in the forest? Note that this is an extremely simplified example—there are thousands of organisms involved in this web of life, each one of which interacts with the others.
3. Are all the interactions among organisms positive?
4. Some of the organisms in our forests are exotic organisms (mark them). How do their interactions affect the other organisms in the forest?
5. What would happen if we removed one organism from the forest? How would it affect the others? (Trace the interactions around the web, and consider whether the organism's removal would have positive or negative effects on other living things) What if we removed one of the exotic organisms?
6. None of you had humans as your study organism, but humans play important roles in New Zealand forests. Can you think of some additional ways that humans affect the forest? (things like pollution, forestry, weed control, pest control) Note that humans can have positive or negative effects on the native forest organisms, and by understanding forest ecology, we can choose our actions carefully so as to not damage the forest.
7. What are some things we could do that would have positive effects on our native forest organisms?

Assessment/Extensions

1. Have students write a story about a fictional New Zealand forest. In the story, they should describe some of the relationships among organisms

in the forest, a change that happens within the forest community (a new plant is introduced, or a disease kills off one type of organism, etc.), and what happens to the relationships among organisms as a result of the change.

2. Ask students to create a “Save our Forests” poster. The poster should explain one thing people can do to help New Zealand forests, and explain why this action will help.

3. Play the following “web of life” game. Ask each student to choose an organism in the New Zealand forest and write it on a sticker (encourage variety—plants, animals, fungi, etc.), then stick the stickers on their shirts. Gather students in a circle. Hold a ball of string in your hand and explain that you are going to toss the ball from person to person. When a person receives the ball, they say one way their organism interacts with one of the other organisms around the circle, then passes the ball to the person with the other organism. When passing the ball, each student should hold onto the string, so that the ball unravels as it goes, creating a web between students. Once every student has had the ball of string, you can all admire the complex web you’ve created. You can also tug gently on the start of the string. As each student feels a tug, he or she should tug on the next person’s end of the string. In this way you can demonstrate how something that affects one organism in the forest ends up affecting every organism in the forest in some way, because they are all interconnected.

Curriculum Connections

Science--Living World

Levels 3 & 4
- Ecology: Explain how living things are suited to their particular habitat and how they respond to environmental changes, both natural and human-induced.

Level 5
- Ecology: Investigate the interdependence of living things (including humans) in an ecosystem.

Level 6
- Ecology: Investigate the impact of natural events and human actions on a New Zealand ecosystem.

Vocabulary/concepts

Commensalism – a symbiosis in which one organism benefits and the other is not affected.

Competition –fighting for the same resources (e.g.: water, light, nutrients, etc.)

Cultivation – the practice of breeding and growing plants

Ecology – the study of the interactions among living things

Herbivore – an animal that eats plants

Herbivory – the interaction of an animal eating a plant

Husbandry – the practice of breeding and raising animals

Mutualism – a symbiosis in which both organisms involved benefit from the interaction

Parasite – an organism that lives on (or inside) another organism (a host) and gets food or other benefits from the host. The host is harmed in the interaction, but often not killed.

Parasitism – a symbiosis in which an organism lives on (or inside) another organism (the host), getting food or other benefits from the host. The host is harmed in the interaction, but often not killed.

Pollination – when pollen from a flower's anthers is carried to (usually) another flower's stigma so the ovules can be fertilised to produce seeds. Some plants rely on animals to carry their pollen from flower to flower; others rely on the wind to carry pollen.

Predation – an interaction in which one animal eats another animal

Predator – an animal that eats other animals

Symbiosis - an interaction in which two different organisms live together.

Forest Organisms

Copy and cut out. Groups of students choose an organism to study by randomly drawing one out of a hat.

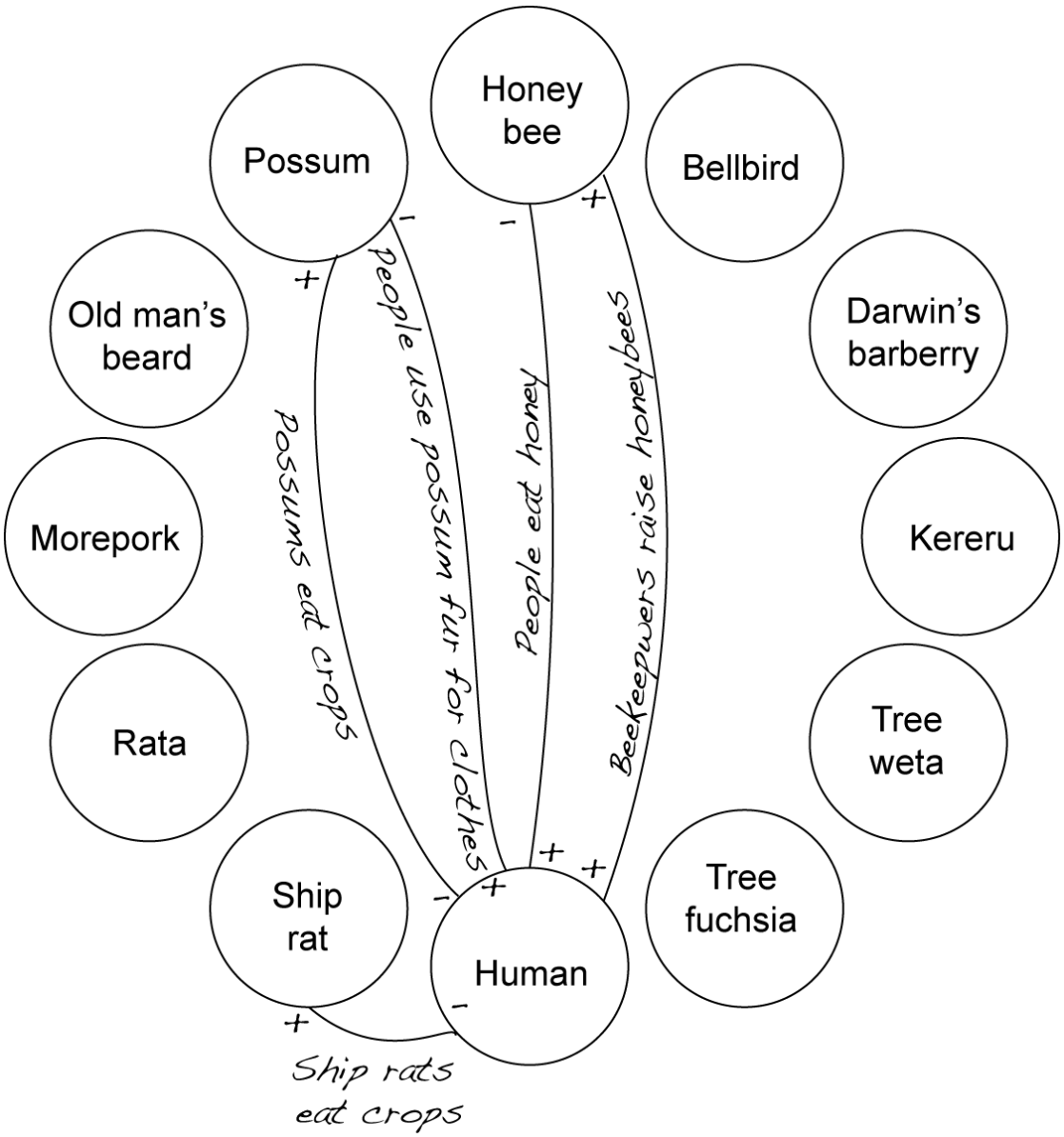
Ship rat (*Rattus rattus*)	Rata (*Metrosideros robusta* and *Metrosideros umbellata*)	Morepork (*Ninox novaeseelandiae*)
Tree fuchsia/kotukutuku (*Fuchsia excorticata*)	Tree weta (*Hemideina spp.*)	Kereru/wood pigeon *(Hemiphaga novaeseelandiae)*
Wilding pine (*Pinus radiata* and *Pinus contorta*)	Bellbird/korimako (*Anthornis melanura*)	Honey bee (*Apis mellifera*)
Possum (*Trichosurus vulpecula*)	Old man's beard (*Clematis vitalba*)	

Web of Life Worksheet

How do these organisms interact?

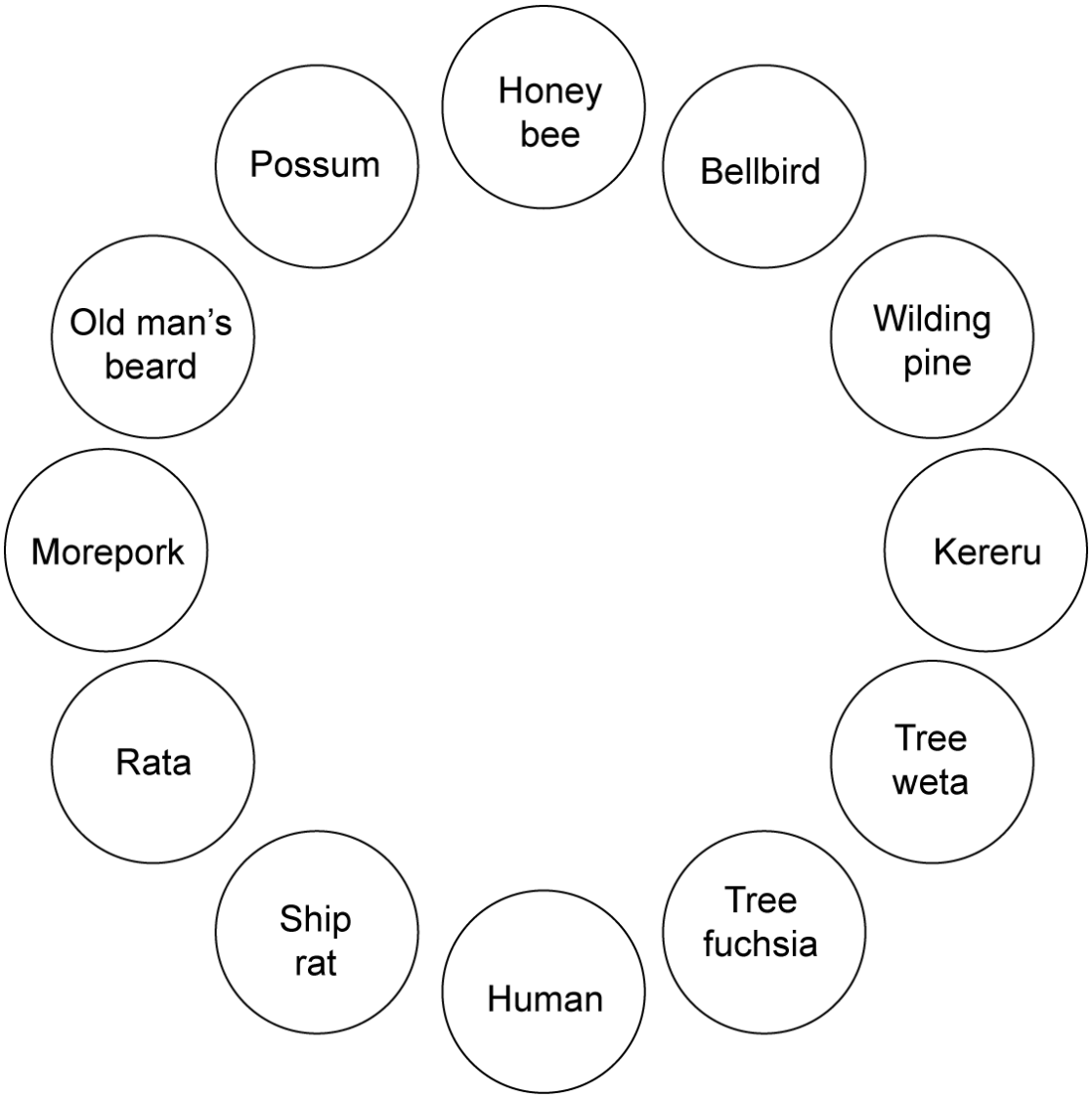
Choose one of these organisms to research. As you learn about your organism's *ecology*, draw lines between it and other organisms it interacts with in some way. Describe the interaction along the line you draw. Label the ends of each line with a "+" for interactions that are beneficial to the organism, a "-" for interactions that are harmful to the organism, or "0" for interactions that don't really affect the organism.

The example below shows you how.



Turn to the back for a blank circle of organisms to write on.

Our organism is: _____



Other interactions we learnt about: