

Feeding Relationships

This educational resource can be used with Queensland Museum Loans kits such as: *What's on the Menu*; *Sun, Sand, Salt and Survival*; *Wetlands*; and *Woodlands to Sea*.

This worksheet supports the Years 5, 7 and 9 Biological Sciences strand of the Australian Science Curriculum.

Australian Science Curriculum

Year 5

Adaptations

Living things have structural features and adaptations that help them to survive in their environment.

Students should be able to

- describe and list adaptations of living things suited for the Australian environment by relating form and function
- explore general adaptations for particular environments
- explain how particular adaptations help survival such as nocturnal behaviour, silver coloured leaves of dune plants and so on
- compare types of adaptations such as behavioural and structural

Year 7

Interactions between organisms

Interactions between organisms can be described in terms of food chains and food webs: human activity can affect these interactions.

Students should be able to

- use food chains to show feeding relationships in a habitat.
- construct and interpret food webs to show relationships between organisms in an environment
- classify organisms of an environment according to their position in a food chain

Year 9

Ecosystems

Ecosystems consist of communities of interdependent organisms and abiotic components of the environment; energy flows and matter cycles through these systems.

Students should be able to

- explore interactions between organisms such as predator-prey, parasite-host, competition, pollination and disease
- consider how energy flows into and out of an ecosystems via the pathways of food webs, and how matter must be replaced to maintain the sustainability of the system

Background information needed for students:

- Definitions and examples of structural, behavioural and functional adaptations
- Procedures for constructing a food chain and food web (Note: The arrows indicate the direction of energy flow and go from prey to predator.)
- Definitions and examples of producers, first-order (or primary) consumers, second-order (or secondary) consumers i.e. different trophic levels; predator-prey relationships; parasite-host relationships; competition
- Solar energy (the sun) is the energy source for food webs

Feeding Relationships

Aim: To investigate the structural features of living things and the adaptations that help them to survive in their environment.

Activities:

1. **Examine** some of the specimens from either the *What's On the Menu; Sun, Sand, Salt and Survival, Wetlands; or Woodlands to Sea* kits. These specimens could include some of the following:

Coastal Banksia; Plant lice; Forest Red Gum; Black Wattle; Sandpaper Fig; Native Ginger; Termite; Hedge Grasshopper; Razor Grinder Cicada; Double-headed Hawk Moth; Titan Stick Insect; Lace Monitor; Easter Brown Snake; Tawny Frogmouth; Rainbow Lorikeet; Laughing Kookaburra; Squirrel Glider; Common Koel; Pacific Baza.

2. **List** the **features** discussed on the back of their information cards in the table below.
3. **Explain** how these features are **adaptations** to the environment in which they live.

Summarise your results in the following table.

Name of Specimen	Feature	Adaptation to the Environment

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Name of Specimen	Feature	Adaptation to the Environment

4. Now discuss your findings with the class. Classify each adaptation as structural, behavioural or functional.

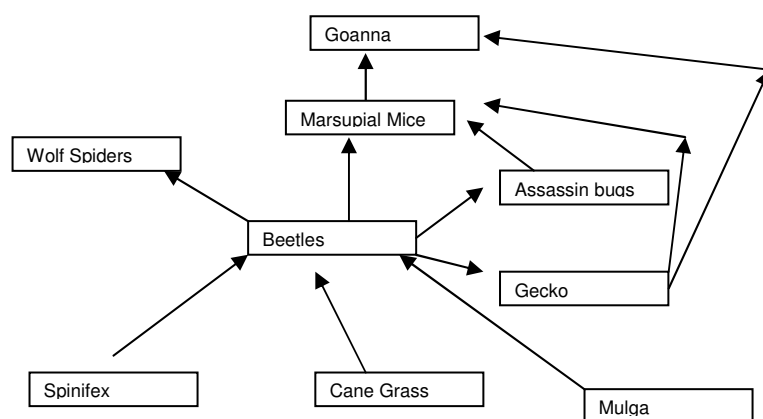
Feeding Relationships

Aim: To construct and interpret food webs to show relationships between organisms in an environment and to classify organisms of an environment according to their position in a food chain.

Activities:

1. In groups, examine each of the specimens from either the *What's On the Menu; Sun, Sand, Salt and Survival; Wetlands; or Woodlands to Sea* kits.
2. Read over the information on the back of the specimen cards. Use this information to construct a food web of this habitat. (The information on the back of the cards for the *What's on the Menu* kit appears below.) Hint: Start with all the producers (plants) at the bottom of a large, blank A3 page. Add the organisms that feed on these plants above this layer and work your way up the page.

An example of a food web is shown below:



Name of specimen	What do I eat?	What eats me?
Jumping plant lice (or psyllids)	Sap from leaves especially eucalypts like the Forest Red Gum	Lerps are the protective covers made by nymphs of jumping plant lice or psyllids. Sweet 'manna' shells made by these insects are popular food for birds, small mammals, and other insects
Coastal Banksia	Nothing – these are producers and make their own food using the sun's energy and nutrient ions from the soil.	Lorikeets, honeyeaters, possums and gliders, bees and other insects eat abundant nectar
Titan Stick Insect	Leaves of many types of shrubs and trees	- Birds, especially the Pacific Baza; - small mammals; - ants and other insects prey on eggs and small nymphs
Laughing Kookaburra	They beat small animals against a tree branch to kill them, including birds, mammals, lizards, frogs, snakes & insects	- Pythons; - Lace Monitor; - birds of prey
Forest Red Gum	Nothing – these are producers and make their own food using the sun's energy and nutrient ions from the soil.	- Koalas and caterpillars eat leaves; - scale insects, lerps and cicadas suck sap; - lorikeets, honeyeaters, possums and gliders, bees, wasps and butterflies eat nectar and pollen



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Name of specimen	What do I eat?	What eats me?
Termite	dead trees as wells as buried timber	- Echidnas; - blind snakes; - ants and other predatory insects
Lace Monitor	- dead animals (carrion); - small lizards, birds and mammals; - eggs and chicks from birds' nests; - turtle eggs	- this top predator has few enemies; - young and eggs are eaten by birds, snakes and other lizards
Squirrel Glider	- beetles, caterpillars and other insects; - occasionally eggs, nestling birds, and other small animals; - when insect numbers are low, wattle sap, eucalypt pollen, nectar and sap are obtained by making cuts in the bark	- Lace monitor, pythons; - eagles, hawks and owls
Black Wattle	nothing – these are producers and make their own food using the sun's energy and nutrient ions from the soil.	- caterpillars, beetle larvae, and wallabies eat leaves; - cicadas and scale insects suck sap; - rosellas and cockatoos eat seeds
Hedge Grasshopper	leaves, mostly on broad-leafed shrubs and palms	- birds; - lizards; - bandicoots and small mammals
Eastern Brown Snake	- mostly mammals; - also reptiles, particularly when young; - prey captured by a combination of venom and constriction	- this top predator has few enemies; - young eaten by Lace Monitor, birds of prey and larger snakes
Common Koel	- fruit; - insects	- birds of prey; - Lace Monitor and pythons take eggs and young
Sandpaper fig	nothing – these are producers and make their own food using the sun's energy and nutrient ions from the soil.	- caterpillars, especially fig beetle larvae, eat leaves; - humans, many species of birds, possums, flying foxes (bats) eat fruit; - considered to be an important food for the critically-endangered Coxen's Fig Parrot
Razor Grinder Cicada	- nymphs use their piercing mouthparts to suck sap from eucalyptus roots; - adults suck sap from trees - when cicadas are in large numbers, fine 'cicada rain' falls	- bandicoots dig up nymphs; - birds, bats, gliders, spiders, lizards eat adults; - Cicada-killer Wasps use cicadas to feed their larvae which then parasitise the cicada



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Name of specimen	What do I eat?	What eats me?
Tawny Frogmouth	<ul style="list-style-type: none"> - insects, lizards and other small animals; - they can fly fast over short distances to catch prey from the ground and tree branches 	<ul style="list-style-type: none"> - larger birds of prey; - pythons
Pacific Baza	<ul style="list-style-type: none"> - animals that live in the foliage of trees – stick insects, lizards and tree frogs; skims edge of foliage or sits in trees to scan for prey; - deliberately crashes into foliage with wings and tail spread to flush out slow-moving insects 	<ul style="list-style-type: none"> - larger hawks; - pythons
Native Ginger	<p>nothing – these are producers and make their own food using the sun’s energy and nutrient ions from the soil.</p>	<ul style="list-style-type: none"> - grasshoppers, caterpillars, and wallabies eat leaves; - birds eat fruit; - Aboriginal people ate the fruit and shoot tips; the leaves were used under meat cooked in earth ovens
Double-headed Hawk Moth	<ul style="list-style-type: none"> - caterpillars feed on leaves of Banksia, Macadamia, Silky Oak and related plants; - moths feed on nectar 	<ul style="list-style-type: none"> - these large caterpillars and moths are a popular food for Tawny Frogmouths and other birds; - small mammals
Rainbow Lorikeet	<ul style="list-style-type: none"> - mainly nectar from flowering trees; - some seeds 	<ul style="list-style-type: none"> - birds of prey, especially Peregrine Falcons

3. Examine the food web you have made. Make a list of the producers, first-order consumers, second-order-consumers and so on. Some organisms may be in more than one trophic level (category).
4. What are the top predators in this food web?
5. Consider what would happen to this food web if the vegetation was cleared and all the producers disappeared.
6. What would be the effects if all the top predators were removed from this ecosystem?



Feeding Relationships

Aim: To explore interactions between organisms such as predator-prey, parasites, competitors, and pollinators; to consider how energy flows into and out of an ecosystem via the pathways of food webs; and how matter must be replaced to maintain the sustainability of the system.

Activities:

Read the instructions on pages 4 – 6 of this worksheet and complete the food web. Answer the following questions.

1. Examine the food chains within the food web. List at least five that could be classified as a **predator-prey** relationship. Write the predator first, followed by the prey.
2. List two **parasite-host** relationships. (e.g. Ticks, mites and lice are examples of ecto-parasites.)
3. A **competitor** is defined as an organism that requires the same resources as another. Organisms can compete for food, shelter, mates or space. Examine the food web. List some competitors and state what they are competing for.
4. Read the descriptions of the feeding relationships again from pages 4-6. Which organisms could bring about pollination of a particular plant species while they are feeding on that plant? List the **pollinator** and the plant species it is pollinating.
5. At the base of each of the food chains in the food web, there is a producer. **From where does a producer get its energy supply?** What would happen if this supply was no longer available?
6. When animals and plants die, they are broken down by micro-organisms and their nutrients are recycled back into the soil, to be used later by plants. In this way **matter cycles within ecosystems**. This helps to maintain the sustainability of natural ecosystems.

In large agricultural ecosystems, crops and herds of cattle and sheep are taken away to markets so there is a **loss of matter from the food web** of that area. Crops and livestock are under constant attack from pests, parasites, and threats from drought and flood. Farmers have solved some of these problems by applying pesticides and fertilisers. However, these have created other problems.

Investigate the following terms and their associated **consequences**:

- (a) Biological magnification
 - (b) Eutrophication
 - (c) Monocultures
 - (d) Rising water tables
7. Investigate some other ways of replacing matter within ecosystems and some **sustainable farming** practices that reduce the reliance on pesticides and fertilisers.