

# Grassland Food Webs: Teacher Notes



Alan Henderson ©

## Activity 1

Food chains & trophic levels in a grassland ecosystem

## Objectives

After completing this activity students will be able to:

- Create a food web and identify producers, consumers, herbivores and carnivores.
- Assign organisms to trophic levels and investigate how organisms depend on their environment.

## Target audience

Year 6

## Duration

Two 50-minute sessions

## Materials

- Whiteboard and whiteboard markers
- Sixteen food chain role play cards, printed and laminated with a hole in the top middle, with a piece of string attached (to form a necklace)
- Printed copy of the food web role play answers
- Ball of string
- Class set of computers with BWVP Grassland Food Webs learning object
- Student workbook
- Pencil

## Activity

All living things require energy for survival including growth, reproduction and repair. Some organisms produce their own food while others need to consume other organisms to obtain nutrients and energy. The interaction between organisms and the flow of nutrients and energy through ecosystems will be explored in this activity.

## Introduction

Begin this lesson by engaging students in a brainstorming session about grassland food chains. Students should list the animals and plants that live in grasslands. Discuss how plants create energy and introduce the term photosynthesis. Discuss the diets of grassland animals and introduce the terms habitat, herbivore, carnivore, omnivore and predator. Record student responses on the board and consider these prompts to keep the discussion lively (answers have been provided).

### **What is a habitat?**

A habitat is the place where an animal or plant makes its home.

### **What plants and animals live in grasslands habitats?**

Students may talk about tussock grasses, wildflowers, shrubs, trees, birds of prey, insects, wallabies,

kangaroos, lizards, etc.

### How do plants and animals make food?

Plants make food using a process called photosynthesis. Photosynthesis uses the sun, carbon dioxide from the air and water containing dissolved materials from the soil to make energy. Animals rely on plants or other animals for their food.

### What is a herbivore?

A herbivore is an animal that only eats plants, such as leaves, grass, berries, bark, etc., e.g. a cicada.

### What is a carnivore?

A carnivore is an animal that only eats other animals e.g. an Eastern Brown Snake.

### What is an omnivore?

An omnivore is an animal that eats plants and animals e.g. a Southern Brown Bandicoot.

### What is a predator?

A predator is an animal that hunts for food e.g. a Brown Falcon.

### What is a food chain?

A food chain shows a simple pathway of the flow of nutrients in an ecosystem. It is called a chain because each living organism provides a link in the chain and each organism depends on the organisms linked to it.

## Food chains and food webs

Students will explore food chains and food webs in grasslands. Write the following food chain on the board.

Tussock Grass → Cricket → Lizard → Wedge-tailed Eagle

Ask students if they can explain the relationships between the organisms. If students need assistance, explain that each food chain is a possible pathway that energy and nutrients can follow through the ecosystem e.g. Tussock Grass produces its own food from sunlight. The Tussock Grass is eaten by the Cricket, the Cricket is eaten by the Lizard, and the Lizard is eaten by the Wedge-tailed Eagle. When the Wedge-tailed Eagle dies, bacteria breaks down its body, returning it to the soil where it provides nutrients for plants like the Tussock Grass. Of course, many different animals eat Tussock Grass, and Crickets can

eat other grasses and plants. Lizards and Wedge-tailed Eagles can eat many different types of animals too. Each of these living things can be a part of a multitude of food chains. All of the interconnected and overlapping food chains in an ecosystem make up a food web. Ask students to complete questions 1-5 in their workbook.

## Trophic levels

Next introduce students to trophic levels. Organisms in food chains are grouped into categories called trophic levels. These levels are divided into producers (first trophic level) and consumers (second, third and fourth trophic levels). There are different types of consumers. There are herbivores (primary consumers) that eat the plants or carnivores (secondary and tertiary consumers) that eat the herbivores. The consumers that are able to eat both plants and animals are known as omnivores (secondary or tertiary consumers) while the animals that only eat dead organisms are called scavengers. Bacteria and fungi that return nutrients to the soil when they decompose dead animals and plants are called decomposers. The interaction between producers and primary and secondary and possibly tertiary consumers keeps an ecosystem healthy.

Draw the following pyramid on the board and discuss trophic levels. Refer to the food chain example already discussed. Pose the following questions to the students.

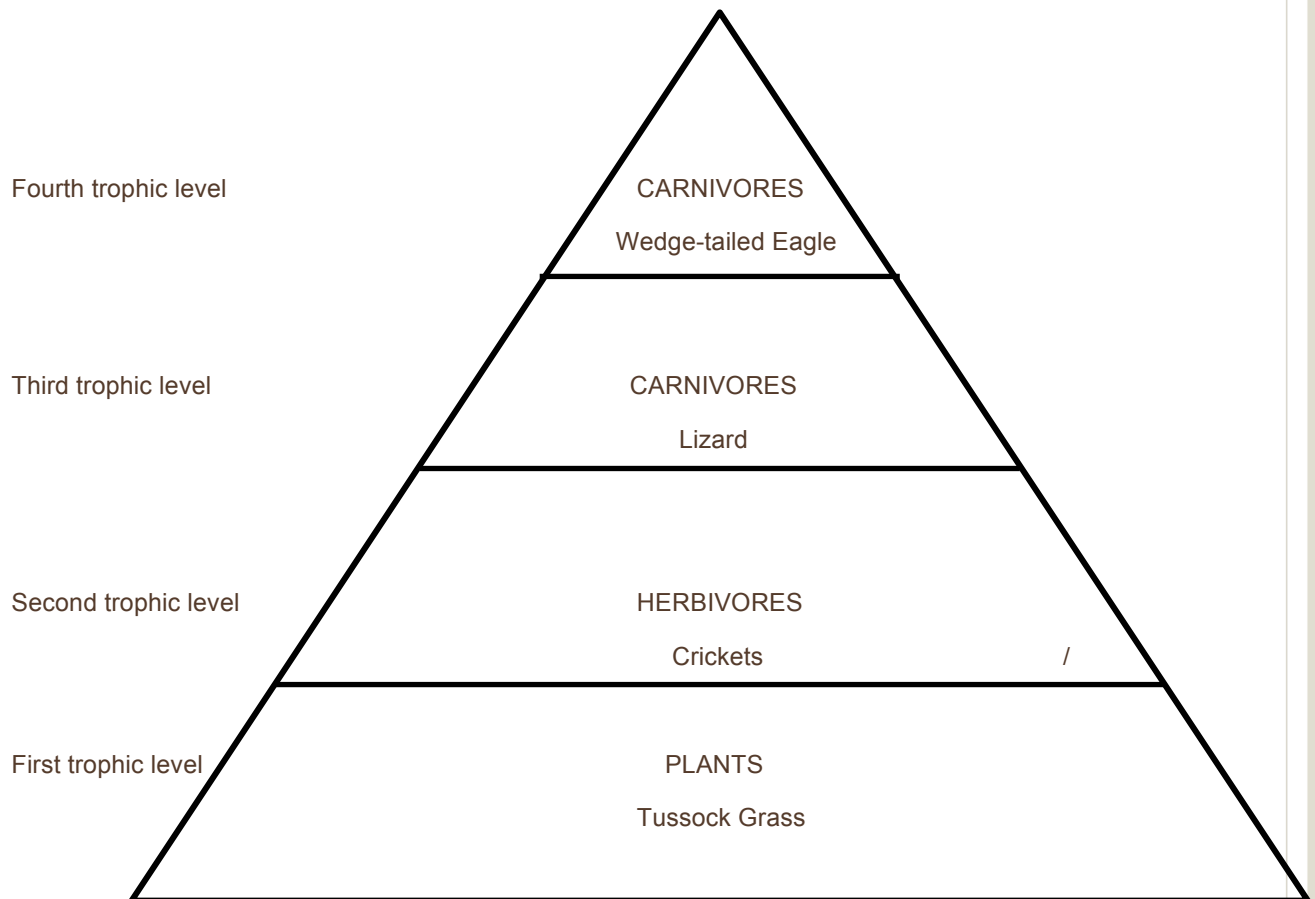
**What are producers? Where do they get their energy from?**

Producers are plants, algae, phytoplankton and some types of bacteria. Producers are also known as autotrophs. They make their own food through a process called photosynthesis. This process uses sunlight, carbon dioxide and water to create energy.

**Consumers are divided into herbivores, carnivores and omnivores. Where do consumers get their energy from?**

Consumers get their energy by consuming other plants and animals.

Below is a trophic pyramid. This shows the feeding position an organism occupies in a food chain.



**Which organisms occupy the first trophic level?**

Plants (producers) always occupy the first trophic level. These are also known as primary producers.

**Which organisms occupy the second trophic level?**

The second trophic level eats the producers. This means the animals are herbivores. These are also known as primary consumers.

**Which organisms occupy the third trophic level?**

The third trophic level eats the primary consumers. This means the animals are carnivores. These are also known as secondary consumers.

### Which organisms occupy the fourth trophic level?

The fourth trophic level eats the secondary consumers. These animals are carnivores. These are also known as tertiary consumers.

### What are top predators?

Top predators are also known as apex predators. These animals are found at the top of their food chain and have virtually no predators.

There is another group of organisms called scavengers. Explain to students that a scavenger is an organism that mostly consumes decaying matter also known as carrion. Discuss the role of scavengers by posing the following questions.

### Is a scavenger a carnivore or herbivore?

Carnivore

### How do carnivores and scavengers differ?

Carnivores hunt and kill their prey, while scavengers usually consume animals that have either died of natural causes or have been killed by another carnivore or by other means e.g. vehicles.

### Which trophic level do scavengers occupy?

Scavengers are carnivores that occupy the third or fourth trophic level.

### What are some examples of scavengers?

Some birds are scavengers which will only eat the bodies of dead animals (carrion). Raptors are carnivorous, but some also eat carrion. Some mammals also scavenge.

### How important are scavengers in an ecosystem?

Scavengers are very important as they keep an ecosystem free of carrion. They break down this organic material and recycle it into the ecosystem as nutrients.

## Biomass

Explain to students the reason why the trophic pyramid is a pyramid; it represents the number of organisms in the ecosystem. To teach this concept simply, ask students if they would expect more Crickets or Wedge-tailed Eagles in the grassland ecosystem. Crickets is the correct answer. Then ask if you would expect more grasses than the crickets. Yes, there will be more grasses. Therefore, this pyramid represents the numbers of organisms. Ask students to complete questions 6-11.



## Food web role play

Students will further develop their understanding of these concepts by undertaking the following group exercise on food chains and food webs. You will need the 16 organism cards and a ball of string. The idea of this exercise is for students to visualise who eats who in the grassland and to understand how animals are linked in a food web. First, hand out all the cards, one per person (there may not be enough cards for all students however those that missed out can assist with the links). Choose a plant, and ask the student to read out what eats it. Those students with these cards stand next to the plant and then ask a student (without an organism card) to link the organisms with the string. Ensure the links are going in the correct direction. Continue until all the cards are used. Make sure you link them to one another to create a food web. The food web answers have been provided in the Teacher Resource section.

Discuss the results of the food web as a class. Ask students to identify the following in the food web:

- Producers
- Consumers
- Herbivores
- Carnivores
- Top predators
- First trophic level, second trophic level, third trophic level and fourth trophic level.

## Food webs unbalanced

Each organism interacts with others in a food web and if one organism is removed, all the other organisms are affected and the food web becomes unbalanced. Use the following example to explore the effects on an ecosystem. Explain that an insecticide has been sprayed on the grassland and the cicadas have died. Ask the cicada to sit down. Explain to students that to show the impact this has on the grassland, could all the students who are directly linked to the cicada also sit down. Ask all of those students who are directly linked to also sit down and so on. Ask students who are left? Producers and a couple of insects should remain. Ask students how the death of the cicadas has affected the grassland? Also ask what would happen to the producers and the other insects? Conclude this discussion by explaining that life in any ecosystem is in a delicate balance and that changing one organism in a food chain can alter that balance. Ensure students understand that all plants and animals are linked and depend on each other and their environment.

## BWVP Grassland Food Webs Learning Object

Students can now put their knowledge to the test by completing the Very Easy Food Chain and Easy Food Web online activities. It is recommended students at Level 6 complete the Very Easy Food Chain first then complete the Easy, (no Feral Cat) Food Web, then the Easy, (Feral Cat) Food Web. When finished ask students to draw their food chain and food webs in their workbook and complete questions 12-16. Students may wish to complete the Medium Food Webs as an extension activity.

### Introduced species

Finally, students will explore the impact of introduced species. Explain that the introduction of an introduced species will cause a food web to become unbalanced. Discuss the effects of a Feral Cat in the food web. Consider the following questions to keep the discussion lively.

#### **What is an introduced species?**

An introduced species is a species that does not naturally occur in an area. They are also known as exotic or non-native.

#### **Can you identify any introduced species?**

Here is a list of some introduced species: European Rabbit, Red Fox, Cane Toad, Feral Cat, Brumby, Feral Pig and Black Rat.

#### **What is the impact of an introduced species in a grassland ecosystem?**

Introduced species impact on native species by:

- Competing for food and shelter,
- Predation,
- Destroying habitat,
- Spreading diseases.

#### **How does the introduction of an introduced species affect the balance in a food web?**

The introduction of an introduced species affects the balance of the food web as animals without natural predators can now be affected by predation.

#### **Why is the Feral Cat a threat to native animals?**

Feral Cats compete for food and shelter; they prey on native animals and spread diseases and parasites.



### **Do domestic cats pose a threat to native animals in an urban environment? How?**

Yes. Shelter requirements are usually met for domestic cats so this is usually not a problem, however these animals will compete for food, prey on native animals and spread diseases and parasites.

### **If you are a cat owner, what can you do to reduce the impact on native animals?**

Cat owners should make sure that their cat is locked up at night to reduce predation; ensure that their cat wears a bell on the collar to make native animals aware when they're close by, and provide ample food and shelter to reduce the need for them to find these in the urban environment.

Students will use the BWVP Flora and Fauna Field Guide to research the impact of introduced species on an ecosystem. Ask students to complete questions 17-21.

## Conclusion

Conclude the session by engaging students in a brainstorming session about the activities. Here are some examples of discussion points to keep the discussion lively.

Can you give me an example of a producer?

How does a producer gain energy?

Can you give me an example of a consumer?

How does a consumer gain energy?

What does a herbivore eat?

What does a carnivore eat?

What does an omnivore eat?

Describe a top predator.

Describe a scavenger.

Give an example of a food chain?

What is a food web?

What organism always occupies the first trophic level?

How can a food web become unbalanced?

Students will complete the conclusion questions in their workbook.

## Food chains and food webs in the grassland ecosystem

### 1. What is a food chain?

A food chain shows who eats who.

### 2. Are plants always at the base of a food chain?

Yes plants are always at the base of a food chain.

### 3. How do plants gain their energy?

Plants make their own food by a process called photosynthesis. For this to occur, plants need water from the soil, carbon dioxide from the air and sunlight.

### 4. How do animals gain their energy?

Animals gain their energy by consuming other organisms.

### 5. What is a food web?

A food web consists of many food chains linked together.

## Scavengers

A food web consists of producers, herbivores, carnivores and omnivores, however there is another group called scavengers. Scavengers consume decaying matter also known as carrion.

### 6. Is a scavenger a carnivore or herbivore?

Scavengers are carnivores.

### 7. How is the diet of carnivores and scavengers different?

Carnivores hunt and kill live prey while scavengers usually consume animals that have either died of natural causes, or have been killed by another carnivore or by other means e.g. vehicles.

### 8. Which animals are scavengers?

The following animals are scavengers; foxes and some raptors including the Wedge-tailed Eagle.

Open the BWVP Flora and Fauna Field Guide. Look up the Group – Raptors.

9. Click on each of the birds and explore their diets. One of these birds is a carnivore and scavenger. Which one?

Wedge-tailed Eagle

10. What is the diet of this bird?

Carnivore – rabbits, hares, lizards, mammals and other birds

Scavenger – carrion and road-kill

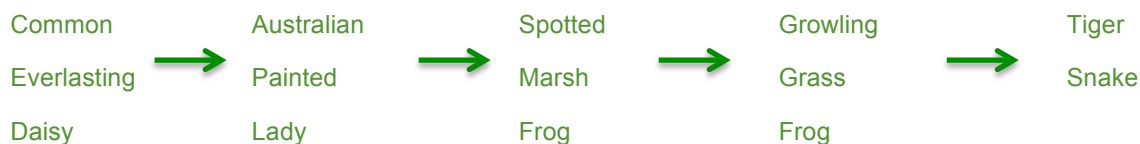
11. What trophic level would the bird occupy?

The Wedge-tailed Eagle would occupy the top of the food chain, in the highest trophic level.

## BWVP Grassland Food Webs Learning Object

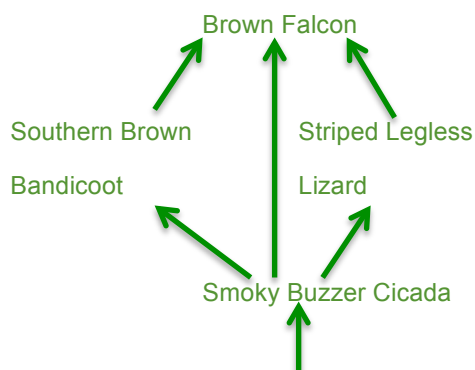
Complete the Very Easy Food Chain and Easy Food Webs using the BWVP Grassland Food Webs learning object.

12. Draw the food chain in the space below.

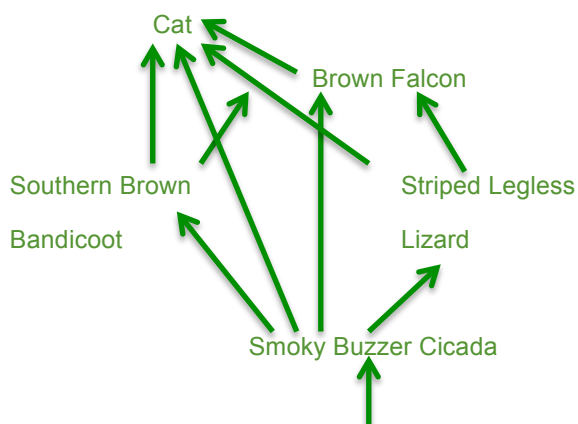


13. Write down your food webs in the space provided below.

Food web – no Feral Cat



Food web – with Feral Cat



Kangaroo Grass

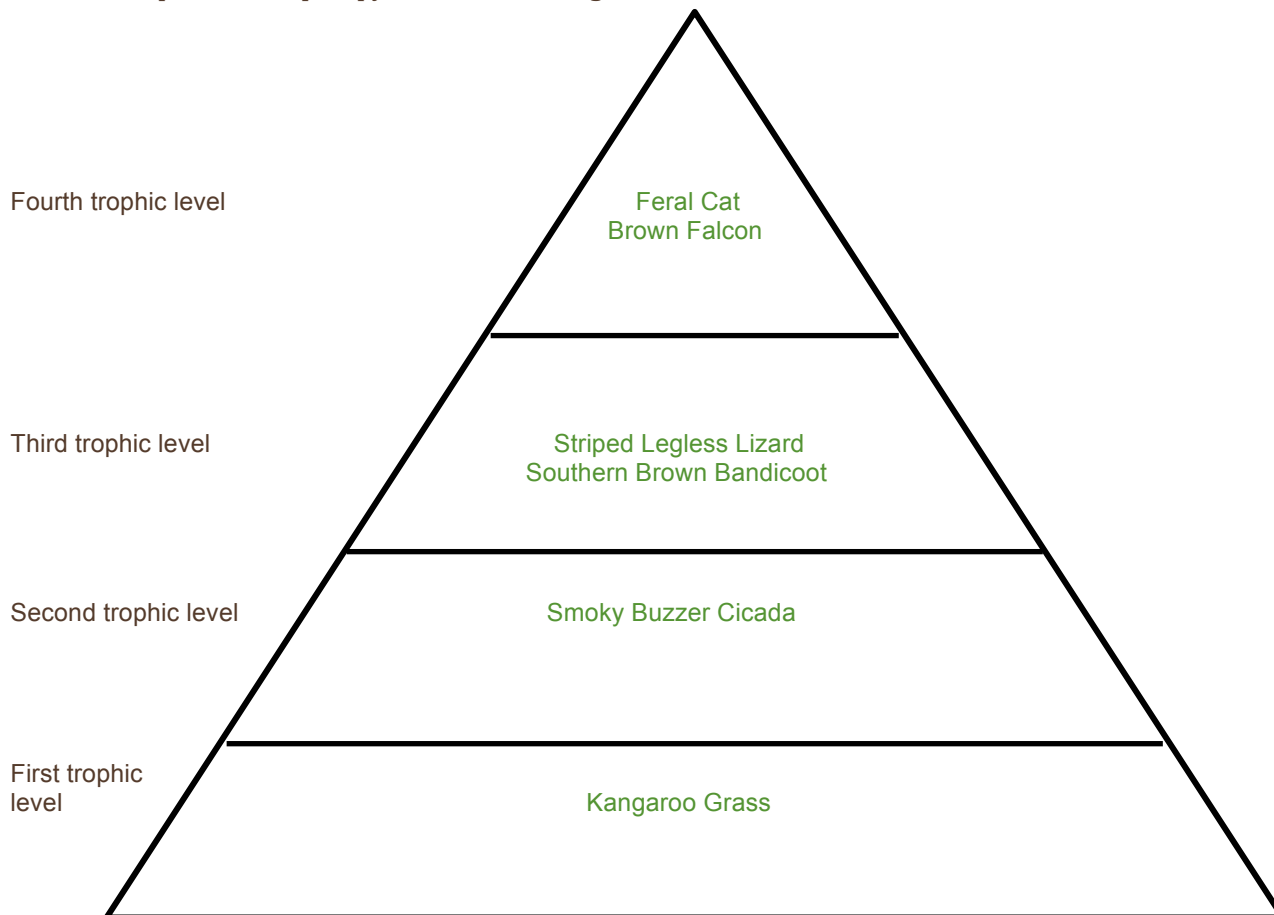
Kangaroo Grass

14. Complete the following table. Tick whether the organism is a producer or consumer, herbivore or carnivore.

Organism	Producer	Consumer	Herbivore	Carnivore
Common Everlasting Daisy	✓			
Australian Painted Lady		✓	✓	
Spotted Marsh Frog		✓		✓
Growling Grass Frog		✓		✓
Tiger Snake		✓		✓

## Energy flow through trophic levels

15. Complete the trophic pyramid with the organisms used in the food web.



**16. Which organism is greatest in abundance?**

The producer, which is the Kangaroo Grass has the greatest abundance.

## Introduced species

Explore the impact of introduced species on ecosystems. Open the BWVP Flora and Fauna Field Guide and look up Animal > Mammal > Placental.

**17. There are several introduced placental animals. List these.**

Black Rat, European Rabbit, European Hare, Feral Cat, House Mouse, Red Fox

**18. How do these animals pose threats to native plants and animals?**

These animals prey on native animals, compete for food, resources and habitat and spread diseases.

**19. Look up the Feral Cat. What is the diet of the Feral Cat?**

Feral Cats eat small mammals, up to the size of a Brushtail Possum, and catch birds, reptiles, amphibians, fish and insects.

**20. When are cats active?**

Cats spend most of the day sheltering and are nocturnal (active at night).

**21. Refer to your food webs. What is the impact of the Feral Cat on this ecosystem?**

The Feral Cat will cause a reduction in the number of Brown Falcons, Southern Brown Bandicoots, Striped Legless Lizards and Smoky Buzzer Cicadas.

## Conclusion

**22. Observe the following food chain.**

Eucalypt Tree → Gumleaf Grasshopper → Tiger Snake → Brown Falcon

**23. What would happen if the Brown Falcon became extinct?**

If the Brown Falcon becomes extinct, this will unbalance the ecosystem. No animals would prey on the Tiger Snake, which would cause the numbers of the snake to increase.

**24. What would happen if all of the grasshoppers were removed from the grassland?**

If all the grasshoppers were removed from the grassland, this would unbalance the ecosystem. There could be reduced food for the snake or the falcon, which could cause their numbers to reduce. The eucalypts would not have as many animals feeding on them.

**25. In a trophic pyramid, what organisms are always on the bottom?**

Plants are always at the base of the trophic pyramid.

**26. How important are scavengers in an ecosystem?**

Scavengers are very important as they keep an ecosystem free of carrion. They break down this organic material and recycle it into the ecosystem as nutrients.

**27. Are domestic cats a threat in an urban ecosystem?**

Yes. All cats are a threat to native wildlife.

**28. If you are a cat owner, what can you do to protect native animals?**

You could keep your cats inside at night and put a bell on the cat's collar to reduce predation on native animals.