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Sustain the chain • Lesson 1 • Our local environment

**Lesson 1**

**Launch**

**Year 4**

**Lesson 1**

**Launch**

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# Lesson overview

Students explore the roles and interactions of consumers, producers and decomposers within a habitat by identifying how scientific knowledge can be used to support the development of the local environment.

## Key learning goals

Students will:

* demonstrate curiosity about the local environment.
* identify some of the living things that can be found in the local environment.
* describe the importance of the local environment to people, plants and animals.

Students will represent their understanding as they:

* draw labelled diagrams of a plant, animal and non-living thing.
* participate in and contribute to discussions, sharing information, experiences and opinions.

## Assessment advice

In the launch phase, assessment is diagnostic

Take note of:

* Are students using all their senses in the environment?
* Do students see the differences in plants?
  + Different shaped leaves
  + How the leaves are arranged on their stems (opposite each other or alternating)
* Do students consider fungi/mushrooms plants?
  + They are not.
* Do students recognise insects as animals?
  + They are.
* Do students recognise themselves as an animal?
* Are students associating human emotions to plants and animals?
* What vocabulary are they using?

## List of materials

**Whole class**

* Class science journal (digital or hard-copy)
* Material to create a word wall
* Materials to create a TWLH chart
* Low Tech option: iPad or digital camera to record observations

**Each student**

* Individual science journal (digital or hard-copy)
* Pencils

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| **Lesson Routine** | **Estimated time** | **Task type** |
| Experience and empathise | 10 minutes | Whole class |
| Elicit | 25 minutes | Whole class, Individual |
| Anchor | 15 minutes | Whole class |
| Elicit | 15 minutes | Whole class |
| Connect | 15 minutes | Whole class, Individual |

# Launch

## Experience and empathise • Keeping it local

As part of your [preparation for this sequence](/teaching-sequences/year-4/sustain-chain), you should have selected one of the following contexts:

* Local bushland or parkland: planting or writing a [field guide](https://naturalhistory.si.edu/education/teaching-resources/life-science/field-book-activity-making-and-recording-observations) for future students or locals
* School vegetable garden: deciding what to plant this season and encouraging pollinators
* School garden: identifying how to encourage diversity of local birds and insects
* School compost bin development

In relation to your chosen context, **discuss:**

* the reason for needing students' help with the context.
* what is already in the local environment.
* what else students might expect to find in the environment.

**Potential discussion prompts**

* *Can anyone suggest some of the things we might observe in our location?*
* *What do we mean when we say we are ‘observing’ something?* 
  + Using all of our main senses; eyes, ears, nose, skin–not taste today.
* *What types of animals might we see, smell, hear or feel?* 
  + Birds, insects, mammals, spiders, snails or slugs etc.
* *What types of plants might we see, smell or feel?* 
  + Will we be able to hear plants?
* *Will we see, feel or smell some non-living things?* 
  + Can you hear non-living things?
* *What else will we see, hear, smell or feel?*
* *How else might we know animals have been there?* 
  + Scats, nests, burrows, webs, tracks.

## Elicit • Noticing our environment

Explain that students will write ‘field notes’ in their science journals during their first observational walk of their context area.

**Discuss:**

* the purpose of a science journal.
  + To record what we see, hear, feel and think so that we can look at it later to help us with our claims, evidence and planning.
* what field notes could be written in a science journal.
  + Dates, times of observations including descriptions, labelled drawings, measurements, tables and graphs.
* how they can make observations.
  + What they see, hear, smell and feel.
  + LOW TECH: Students may use an iPad or digital camera to record observations.

Students divide a page of their science journal into four sections: observations, plant, animal, and non-living thing. They record today's date.

Discuss the difference between a ‘non-living thing’ (i.e. rock) and a once-living thing (i.e. a fallen leaf).

Start the observational walk, stopping periodically to sit, close eyes and listen. Support students to make observations by asking questions that focus on the relevant senses.

**Potential discussion prompts**

* *When you look closely, what can you see?*
  + Compare plants to highlight features such as:
    - leaf size and shape
    - whether leaves are opposite each other on branches, or alternating
    - if leaves are fanned out at the end of the branch
* *What can you hear?*
  + Leaves rustling in the wind/crunching underfoot, animals including insects and birds, running water, traffic, people etc.
* *What can you smell?*
  + Wet soil, plants, animals, people, traffic, machinery.
* *What do the things around you feel like?*
  + Responses to this will be determined by location and season.

**Optional:** Discuss why we're not using the sense of taste in our observations, and why it is important not to taste items as part of an observation unless given express permission by a responsible adult.

Students write their observations in the observations section of the divided page in their science journal, and draws draw three objects in the other sections: one plant, one animal, one non-living thing.

You might complete this outside, take photographs, or take specimens into the classroom to complete the task.

Encourage students to label as many parts of their diagrams as they can.

A close up of a fern

Description automatically generated

These leaves are opposite each other on the stem. Each frond is made up of many smaller thin leaves.

A close-up of a plant

Description automatically generated

These leaves are fanned out at the end of the stem to maximise the light. Each leaf is curled away from the stem.

A green leaf on a grey surface

Description automatically generated

Each leaf stem is alternating on different sides of the branch.

Display students’ images and undertake a gallery walk. Students give feedback on others' work, using sticky notes or similar, noting positive aspects of each drawing, or asking questions to provoke improvements. For example:

* *You've drawn the jagged edges of the leaf really well.*
* *You've spotted (this detail) that I missed.*
* *Did you notice if the leaves were opposite each other on the branch?*

You may need to model this for students, or think about structures that might support them, if they are not accustomed to giving this style of feedback.

## Achor • What can’t we see?

Discuss aspects about the plants, animals, or non-living things that were likely missed in students' observations and drawings because they can't be observed in either such a short time frame or by the naked eye.

**Potential discussion prompts**

* *Do you think there are animals living in (walk location) that we did not see?*
* *What kinds of animals?*
* *Why did we not see them?*
* *Do you think some of them would be really small? Too small to see?*
* *What happens to the leaves after they've been sitting on the ground for a long time? Do they stay the same or do they change?*
* *How do they change?*
* *What about an apple core, or a banana skin? What might happen if they were left on the ground?*
* *What do you think is making that happen?*
* *How might the plants we saw have started growing there in the first place?*
* *What does a plant grow from?*
* *How do seeds end up in the ground?*
* *How do you think everything is connected in (walk location)?*

Accept the responses that students give here, and use them to guide your planning and questioning in subsequent lessons. If students do not, for example, acknowledge seed dispersal caused by wind or animals, do not offer that as an idea at this stage.

Explain that over the course of this sequence, we are going to attempt to answer these questions, and more, through a series of investigations and observations.

## Elicit • What do we think we know?

Begin a class [TWLH chart](/pedagogical-tools/learning-through-inquiry-tools/using-twlh-chart) by recording students’ thoughts about what is important in an environment in the ‘What we think we know’ column.

Students ask any questions they have, especially after the observation walk. Record them in the ‘What we WANT to know’ column of the TWLH chart.

## Connect • Connecting to community

Discuss:

* the importance of everything in the environment.
* how Aboriginal and Torres Strait Islander Peoples see themselves as being part of or belonging to the environment, rather than being in control of the environment.

Ask students to describe their favourite outdoor environment.

Potential discussion prompts

* *Why is (location) your favourite place?*
* *How often do you visit there?*
* *How often are you outside in a natural environment/space, like a park, bushland, a river, the ocean etc.?*
* *How does being in a natural environment make you feel?*
* *What living and non-living things are in your favourite environment?*

#### Reflect on the lesson

You might:

* revisit your selected context for this teaching sequence. Discuss why this context is important to the school or local community.
* identify any questions that arise as a result of this context and add them to the TWHL chart.
* **discuss:**
  + *What do/will the plants need to eat?*
  + *What will the animals need to eat?*
  + *What will eat the plants or animals?*
  + *Where do the ‘once-living’ plants/animals go?*

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**Year 4**

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Sustain the chain • Lesson 2 • Follow the chain

**Lesson 2**

**inquire**

# Lesson overview

Students explore and identify the key features of an organism’s habitat. They use a labelled diagram of a plant or animal to describe how it is interdependent on other living organisms.

## Key learning goals

Students will:

* demonstrate curiosity about living things in the environment.
* identify some of the key features of a living thing’s habitat.
* describe the importance of the local environment to people, plants and animals.

Students will represent their understanding as they:

* use a labelled diagram of a plant or animal and describe its habitat.
* describe the interdependence between two living things.
* participate in and contribute to discussions, sharing information, experiences and opinions.

## Assessment advice

In this lesson, assessment is formative.

Feedback might focus on:

* Has the amount of detail in students’ diagrams improved?
* Are students identifying plants as shelter and protection (and not just a food source)?
* Are students starting to describe the relationships between living things?
* Are students starting to describe the interdependence between living things (similar food sources, needing shelter, one organism being food for another)?
* Are students providing reasoning and justification based on evidence they have collected?

## List of materials

**Whole class**

* Class science journal (digital or hard-copy)
* Materials to create a word wall
* Optional: Demonstration copy of **Observing living things Resource sheet**
* Demonstration copy of **Scientific field notes Resource sheet**
* Demonstration copy of **Code for caring and hygiene Resource sheet**
* Low tech option: digital camera

### Animal ethics note

This sequence describes investigations of animals. Each Australian state and territory has animal ethics requirements for school investigations involving vertebrate animals (those with a backbone such as birds or guinea pigs). You would need to comply with any requirements of the relevant Animal Welfare Act if you chose to investigate vertebrate animals. Each school might also have policies in place addressing animal welfare in classroom settings.  
Insects and crustaceans are invertebrate animals and are not covered by the Animal Welfare Act but still require care and consideration.

### Safety note

A variety of snails, slugs and planarians are suitable intermediate hosts of the rat lungworm, Angiostrongylus cantonensis. Human infection occurs following ingestion of raw snails, slugs or planarians, something young toddlers particularly are prone to do. Another possible source of human infection is through ingestion of improperly washed vegetables such as lettuce.  
It is recommended that the following safety procedures be followed during this sequence:

* Wear gloves when handling any biological material.
* Always wash hands with soap and water after handling any biological material (particularly snails, slugs or their slime, and any vegetation such as vegetables or leaf litter), even after wearing gloves.
* When handling snails or slugs, keep hands away from the mouth, and clarify with students that they should never encourage, or dare anyone to eat raw snails or slugs.

**Each student**

* Individual science journal (digital or hard-copy)
* **Observing living things Resource sheet**
* **Scientific field notes Resource sheet**
* **Code for caring and hygiene Resource sheet**

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| **Lesson Routine** | **Estimated time** | **Task type** |
| Reorient | 5 minutes | Whole class |
| Question | 10 minutes | Whole class |
| Investigate | 40 minutes | Whole class, Collaborative teams |
| Integrate | 10 minutes | Whole class |

# Inquire

## Re-orient

Remind students of the context that is being used for this teaching sequence and why their help is needed:

* Local bushland or parkland: planting or writing a field guide identifying some of the animals in this area.
* School vegetable garden: deciding what to plant this season and if other animals will be affected by changing the garden.
* School garden: identifying the local native animals/insects/plants and how they can be encouraged, and how introduced species could be discouraged.
* School compost bin development: identifying if there are any local plants that might use the compost, or animals/insects that be attracted, or affected by other animals that might be attracted to it.

## Question • Relative importance

Recall the pictures of plants and animals that were drawn the previous lesson.

Discuss the features of the environment where the observation walk was undertaken. During the discussion begin, or add to, the class [*word wall*](/pedagogical-tools/learning-through-inquiry-tools/using-word-wall) by noting specific vocabulary offered by the students.

**Potential discussion prompts**

* *Were there a variety of plants and animals in (walk location)?*
* *Do you think having a variety of plants and animals would be important? Why?*
* *If you were planting or adding to a garden/natural space, what could you do to encourage variety?*
* *Do plants always grow well in any location, or at any time of the year?*
* *Why do you think that?*
* *Do we see animals in the environment at all times of the day, or at all times during the year?*
* *Are there some animals that are only around at specific times?*
* *What are they doing when we can't see them?*
  + Hibernating, breeding, sleeping, attending to their young.
* *Is it important to not disturb them? How can we do that?*
* *How do animals depend on the plants in their environment?*
  + Food, shelter.
* *How do animals depend on other animals?*
  + Some animals will be consumed by other animals for food.

**Pose the question:** *What plant or animal is most important in our bush/school/garden?*

If students haven’t asked this question themselves, add it to the list of class questions and discuss that answering this question will be the centre of today’s investigation.

Discuss how we could find out the answer to this question.

## Investigation • Identifying the links

Discuss the importance of observing plants and animals closely to learn about them.

**Potential discussion prompts**

* What can we learn by observing living things closely?
  + Their behaviour, diet, preferred habitats, reproduction cycles etc.
* Why is it important to know these things?
* How can we make observations?
  + Refer back to the focus on senses for making observations, discussed in Lesson 1.

Using the **Observing living things Resource sheet**, in collaborative teams students compare the pictures of different plants and animals, identifying:

* the features they have in common.
  + Insects: ant, beetle and black bottlefly all have three body parts (head, thorax and abdomen), 6 legs attached to thorax, mouth parts, and eyes
  + Plants: green leaves, stems
  + Birds: feathers, beaks, 2 wings, 2 legs, eyes
* the features that are different.
  + Colours, sizes

If required, model an example using the demonstration copy of the **Observing living things Resource sheet.**

Discuss what we can and cannot tell by looking at pictures.

**Potential discussion prompts**

* *Can we tell what things eat, or what eats them, from the pictures?*
* *Can we tell if they might provide shelter?*
* *Can we tell what kind of shelter they need?*
* *Do you know what they eat? If they eat other animals?*
* *What might happen to a plant if too many leaves were eaten?*
* *What might happen to a bird if there were no insects?*
* *Does the picture tell you these things, or are you connecting your prior knowledge here?*
* *If we do something to one plant or animal, can it affect others unintentionally?* 
  + For example, sometimes snail bait (poison for snails) can also poison other animals—like the birds who eat the poisoned snails, or family pets who also eat the bait.

Read through the demonstration copy of **Scientific field notes Resource sheet**, clarifying any unknown vocabulary with students, and establish that students in collaborative teams will:

* quietly observe and record an animal that they see in their chosen area.
* record details about the animal on the resource sheet, including what they eat and who they hide from.
* record any other observations of living things feeding and what they eat.
* HIGH TECH: Students can take photos of the animal that they find. Discuss with students to include an object of known size, such as a coin or ruler, to show scale.

Explain that students will also draw a labelled diagram as part of their notes. **Discuss:**

* what features/feedback they remember from the diagrams they viewed during the previous gallery walk.
* the purpose and features of a labelled diagram.
  + To show the shape, size and features of an object. It might include a title, an accurate drawing, a scale to show the object’s size and labels showing the main features. A line or arrow connects the label to the feature.

Model how to complete the resource sheet.

**Discuss:**

* the different places in the school grounds where they might observe animals. Define the boundaries of where students may and may not go.
* how it is better to find an area where there are healthy plants, leaf litter, branches and logs on the ground; however, even an asphalt area will have some animals living on or around it, such as ants, snails, and birds.
* the guidelines that students need to follow when out in the field.

Before going outside, discuss the importance of taking environmental and health considerations into account when observing plants and animals, particularly if students are moving things around during their search. Establish a code for caring and hygiene that students agree to abide by over the course of the sequence. You might like to use the **Code for caring and hygiene Resource sheet** as a starting point or create your own with students. Display the code somewhere prominent so that students can see it.

Allow teams time to complete their observations. If students do not observe their animal eating or hiding, allow time for research on return to the classroom.

**Optional:** Also allow time for background research, using a collection of books, access to the internet and other resources.

## Integrate • Relying on each other

List the plants and animals students have found in the class science journal.

Invite teams to present their findings to the class.

**Potential discussion prompts**

* *Where were all the living things found? Were the habitats similar?*
* *Did any of the living things observed by the different groups meet each other? Did they have the same habitat?*
* *Which animals ate similar things?*
* *What might happen if the food of one animal disappeared? How would they be affected?*
* *What might happen if all the plants disappeared? Who would go hungry?*
* *Why do animals eat other living things?*
  + Animals eat other living things for energy.

## Reflect on the lesson

You might:

* re-examine the intended learning goals for the lesson in the classroom context and consider how they were achieved.
  + Local bushland or parkland: planting or writing a field guide identifying some of the animals in this area.
  + School vegetable garden: deciding what to plant this season and if other animals will be affected by changing the garden.
  + School garden: identifying what are the local native animals/insects/plants and how they can be encouraged.
  + School compost bin development: identifying if there are any local plants that might use the compost, or animals/insects that be attracted, or affected by other animals that might be attracted to it.
* update the TWLH chart by inviting students to add what they have learned (L) and the evidence/observations that show how (H) they now know that.
* update the class word wall with relevant words and images.

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**Year 4**

**Lesson 3**

**inquire**

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Sustain the chain • Lesson 3 • Ant picnic

**Lesson 3**

**inquire**

# Lesson overview

Students use the scientific process to identify the preferred food of ants. They discuss the mutually beneficial relationship between plants and ants.

## Key learning goals

Students will:

* investigate food preferences of ants.
* use scaffolding to plan and conduct an investigation into the food preferences of ants.
* observe the behaviour of ants and discuss how this behaviour is linked to seed dispersal.

Students will represent their understanding as they:

* construct and use representations of ant behaviour.
* use discussions to compare their findings with those of others.
* use discussion to clarify ideas, make predictions and explain observations.

## Assessment advice

In this lesson, assessment is formative.

Feedback might focus on:

* descriptions of how ants are connected to other living things in the habitat.
* planning of investigations using scaffolds.
* construction of representations to organise data and identify relationships.
* comparisons of findings to assess the fairness of investigations and conclusions.
* communication of ideas and findings using scientific words where appropriate.

## List of materials

**Whole class**

* Class science journal (digital or hard-copy)
* Materials to create a word wall
* Demonstration copy of **Ant dispersal investigation planner Resource sheet**
* Note: You may wish to identify likely locations of ants in your school grounds so that you can point students towards them during the Ant dispersal investigation.
* Low tech option: digital camera
* ABC video [Meet the germinator: Meat ant](https://www.abc.net.au/education/nature-of-australia-ants-and-the-ecosystem/13909784) (2:40 min)

**Each group**

* A variety of cut fruits

**Each student**

* Individual science journal (digital or hard-copy)
* **Ant dispersal investigation planner Resource sheet**

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| **Lesson Routine** | **Estimated time** | **Task type** |
| Reorient | 5 minutes | Whole class |
| Question | 5 minutes | Whole class |
| Investigate | 20 minutes | Whole class, Collaborative teams |
| Integrate | 15 minutes | Whole class |

# Inquire

## Re-orient

Discuss the relevant context for this teaching sequence, focusing on:

* the organisms observed.
* diversity and variety in the organisms observed.
* how the organisms acted on one another.
* whether the organisms should be encouraged in the area, and how they could be.

**Potential discussion prompts**

* *Were all the animals observed the previous lesson similar sizes or shapes?*
* *How did the animals affect the plants?*
  + Did they just eat the plants?
  + What else did they do?
* *Did anyone observe an insect?*
* *How many different types of insects were there?*
* *Do we need to encourage insects like ants? Why?*
  + How could we encourage more insects to live in our habitat?

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## Question • Small but mighty

**Pose the question:** *Do ants help or hurt plants?*

Refer to a student question (if one has been asked) as a jumping off point for the following investigation about the complexity of relationships between plants and animals.

**Potential discussion prompts**

* *What do ants eat?*
* *Are all ants the same? Do they come in different sizes/colours?*
* *Do all ants eat the same thing?*

If students haven’t asked any questions that challenge the assumption that plants are only food for animals, add one to the list of class questions and discuss how answering this question will be the centre of today’s investigation.

## Investigate • Follow the trail

Watch, then discuss, the video [Meet the germinator: Meat ant](https://www.abc.net.au/education/nature-of-australia-ants-and-the-ecosystem/13909784) (2:40 min).

**Potential discussion prompts**

* *Did the ants eat the seed? What did they eat off the seed?* 
  + No, they ate the white ‘eliasome’ attached to the seed.
* *What did the ants do to the seeds when they had eaten the eliasome?* 
  + They threw the seeds in the underground rubbish heap.
* *Why was the meat ant called an accidental gardener?* 
  + They carry seeds underground just like a gardener plant seeds.
* *How did the ant pick up friends from foes?* 
  + Antenna pick up pheromones that are released by other ants.
* *How would this help ants find food?*
* *Do you think both the ants and the plants helped each other? What evidence do you have for this claim?*

**Pose the question:** *Do all ants prefer the same food?*

**Discuss:**

* the types of food that ants might like.
* how students could test which foods ants prefer/like most.

Referring to the demonstration copy of the **Ant dispersal investigation planner Resource sheet**, explain the investigation:

* Students will choose types of foods that ants might like.
* They will place a small amount of each type of food on a piece of card a small distance from an ant nest or trail, and measure the number of ants on the card every minute for fifteen minutes.
* They will create a storyboard of the investigation.
  + A storyboard is used to show the important steps of a process in the order that they happen.
  + A storyboard includes a title and a series of drawings. Each step in the storyboard is numbered and includes a caption describing the step.

Model how to complete the planning section of the investigation planner as they complete their individual investigation planners.

* Change: type of food.
* Measure/Observe: the number of ants and the dispersal of food.
* Keep the same: the distance of the food from the nest or trail, the mass of food, the type of card, the size of the card.

Allow time for teams to complete their investigations.

A diagram of a dog biscuits

Description automatically generated with medium confidence

Work sample of storyboard of ant investigation

## Integrate • Ant farmer

Teams share their findings with the class.

Model and support students to ask questions of other teams using the [science questions starters](/pedagogical-tools/learning-through-inquiry-tools/facilitating-evidence-based-discussions), as appropriate.

**Potential discussion prompts**

* *What food type did your ants prefer? How do you know that?*
* *What did you notice about the way the ants shifted the food?*
* *Were the different food types shifted in different ways? Why do you think that happened?*
* *What was similar about all the teams’ results? What was different?*
* *Different species of ants prefer different types of food. For example, some prefer seeds, some like sweet food, others prefer protein such as meat.*
* *Do you think that our school grounds might have more than one species? Why do you think that?*
* *How could we find out more information about the species of ants in our school grounds?*
* *Scientists think that ants are the most efficient insect dispersers of seed. What thoughts do you have after completing your investigation?*

**Optional:** Make observations of the food cards over the course of a day.

### Reflect on the lesson

You might:

* update the TWLH chart by inviting students to add what they have learned (L) and the evidence/observations that show how (H) they now know that.
* update the class word wall with relevant words and images.

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**Year 4**

Sustain the chain • Lesson 4 • Producers and consumers

**Lesson 1**

**Lesson 4**

**inquire**

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# Lesson overview

Students identify the key features of producers and consumers and use arrows to describe the movement of energy along a food chain.

## Key learning goals

Students will:

* identify organisms as producers or consumers.
* describe the transfer of energy along a food chain.

Students will represent their understanding as they:

* create a food chain from a selection of plants and animals.
* use arrows to identify the transfer of energy along a food chain.
* describe a food chain in the local environment.

## Assessment advice

In this lesson, assessment is formative.

Feedback might focus on:

* Are students using the terms producer and consumer appropriately?
* Are students able to describe a food chain in terms of producer and consumer?
* Are students using food chains to describe energy transfer?
* Do all food chains start with a producer?
* Are students identifying links between different food chains?
* Do students identify all organisms in the food chain as important?
* Do students identify consumers as being reliant on producers?

## List of materials

**Whole class**

* Class science journal (digital or hard-copy)
* Materials to create a word wall
* Demonstration copy of **What eats what? Resource sheet**

**Each student**

* Individual science journal (digital or hard-copy)
* **What eats what? Resource sheet** (or create their own)

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| **Lesson Routine** | **Estimated time** | **Task type** |
| Reorient | 5 minutes | Whole class |
| Question | 5 minutes | Whole class |
| Investigate | 30 minutes | Whole class, Collaborative teams |
| Integrate | 15 minutes | Whole class |

# Inquire

## Re-orient

Discuss the classroom context for this teaching sequence. Outline what students have learned so far and how this affects their thinking about the activity they will complete in the Act phase.

Discuss the variety of plants and animals that need to be considered in this context.

## Question • Diversity is important

**Pose the question**: *How do plants and animals affect each other?*

Refer to a student question (if one has been asked) as a jumping off point for the following investigation, relating it to the context being used in this teaching sequence.

## Investigate • Who is hungry?

Referring to the demonstration copy of the **What eats what? Resource sheet**, identify the animals and plants shown.

Ask students if they think there are other living things besides plants and animals, and if they can name any.

Students arrange the images of plants and animals into groups/categories. They can make different types of groups, or sub groups.

Share and discuss the categories students found.

**Potential discussion prompts**

* *What groups did you make? What did you call those groups?*
* *What do the members of each group have in common?*
* *What other groupings can we make?*
* *Why do you think scientists group organisms?*
* *What connections did you make about what eats what?*

A group of animals and insects

Description automatically generated

Sample categories

Discuss food in relation to how it provides energy to animals.

**Potential discussion prompts**

* *What's the purpose of eating food?*
  + Students might discuss the enjoyment they get from eating food, or that it keeps us healthy and gives our body nutrients. These are all acceptable responses. However, try to guide the conversation towards the specific point that food gives animals energy.
* *Where do we get our energy from?*
  + The food we eat.
* *Why do we need energy?*
  + To grow, move, stay alive.
* *What might happen if you missed lunch? How would you feel? Why do you think this happens?*
* *Of the plants and animals we've been looking at, which ones don't ‘eat’ anything else?*
  + The plants: grass, trees and leaves.

**Pose the question:** *Where do plants get their energy?*

At this stage it is not necessary for students to understand the process of photosynthesis, however, students might have some understanding that plants get their energy from the sun, or that, at the very least, they need the sun to grow and survive.

If students are unable to articulate this, present the following claims and ask them if they think each is true or not true, and why:

* *Plants use the energy from the sun to grow and produce leaves.*
* *Plants also use water and minerals from the soil to stay healthy (but it is not eating as they do not receive energy from it).*

Remind students of learning about heat in Year 3, specifically:

* how heat energy was transferred from one object to another.
* how this was shown with arrows showing the direction of heat energy moves.

Discuss how their learning about heat energy connects to this lesson.

**Potential discussion prompts**

* *When we draw a representation of the transfer of heat energy, what conventions do we use?*
  + Arrows can show where the energy is coming from and where it is going to.
* *How might you show the transfer of heat energy from the sun to a plant?*
* *How might you show the plant using the energy it gets from the sun to grow new leaves etc.?*

Introduce the term ‘producers’ and 'consumers' in the context of the environment. Add these words to the word wall.

In collaborative teams, using the images from the **What eats what? Resource sheet**, students arrange a series of images in order to show what eats what, and how energy is transferred from one plant/animal to the next. They will:

* identify something that is a producer (does not ‘eat’ anything), and use it to start their chain.
* select an image of an animal that eats this producer (a consumer).
* select an image of an animal that eats this animal.
* and so on, until they believe there is no 'greater' animal.

You might like to model an example to the class if appropriate.

Share and discuss teams’ series of images.

Discuss the movement of energy from one thing to another, identifying that as each animal eats the one before it, it is gaining energy to enable it to move and grow.

Introduce the phrase ‘food chain’ in the context of following the movement of energy through an environment, and add it to the word wall. Discuss.

Potential discussion prompts

* *What do all of the food chains start with?* 
  + They all start with a producer.
* *How many organisms/consumers are there in your food chain?*
* *How many consumers could you have in the longest food chain from these organisms?*

Students revise their earlier attempts at creating a food chain and add it to their science journals.

A group of animals with arrows

Description automatically generated

Sample food chains

## Integrate • Local food chains

Review the **Scientific field notes** from Lesson 2 and:

* identify the plant/animal that was observed in the selected context.
* identify organisms that might become before and after it in a food chain, thus creating a food chain relevant to the selected context.
* identify and label the producer and consumer in this 'local' food chain.

Discuss how this food chain might be interrupted.

**Potential discussion prompts**

* *What would happen if one of the producers were removed from this chain?*
* *If we change something/build something new in (selected context location) how might we disturb the habitats of the plants and already living there*?
* *What can we do to make sure we conserve or replace the producers/homes/shelters if we disturb them?*

### Reflect on the lesson

You might:

* review the new words learned during this lesson: producer, consumer, food chain.
* update the TWLH chart by inviting students to add what they have learned (L) and the evidence/observations that show how (H) they now know that.

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**Year 4**

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| To read the most recent version of this task, download associated resources, and view embedded professional learning including classroom videos and work samples, visit: [https://primaryconnections.org.au/teaching-sequences/year-4/sustain-the-chain/lesson-5-food-chains](https://primaryconnections.org.au/teaching-sequences/year-4/sustain-the-chain/lesson-5-food-chains?utm_source=docx&utm_medium=lesson_5&utm_campaign=STC) |

Sustain the chain • Lesson 5 • Food chains

**Lesson 1**

**Lesson 1**

**Lesson 5**

**inquire**

# Lesson overview

Students explore a model of a food chain. They gather data that outline how food, shelter, predators and water affect the survival of a kangaroo population and use a graph to explain their observations.

## Key learning goals

Students will:

* explore a model of a food chain.
* play several rounds of the game of **Roo survival**.
* discuss ideas about what the game represents.
* graph and interpret the data from the game of **Roo survival**.

Students will represent their understanding as they:

* describe how a change in the availability of resources in an ecosystem has an effect on an animal population.
* identify interactions between organisms within an ecosystem.
* construct a graph using the data from the game.
* interpret the patterns of the graph to describe the impact of different factors on Roo survival.
* discuss their observations and ideas on food chains, and the impact of human activity with the class.

## Assessment advice

In this lesson, assessment is summative.

Students working at the achievement standard (science inquiry) should have:

* posed questions to explore patterns and relationships based on observations.
* constructed representations to organise data and information and identify patterns and relationships.

They might also:

* explain the role of data in science inquiry.
* describe how human activity can affect the interactions between other organisms.

Refer to the Australian Curriculum content links on the [Our design decisions](https://primaryconnections.org.au/teaching-sequences/year-4/sustain-the-chain/lesson-5-food-chains?utm_source=docx&utm_medium=lesson_5&utm_campaign=STC) tab for further information.

## List of materials

**Whole class**

* Class science journal (digital or hard-copy)
* Materials to create a word wall

**Each student**

* Individual science journal (digital or hard-copy)
* **Graphing 'Roo survival' Resource sheet**

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| **Lesson Routine** | **Estimated time** | **Task type** |
| Reorient | 5 minutes | Whole class |
| Question | 10 minutes | Whole class |
| Investigate | 30 minutes | Whole class |
| Integrate | 30 minutes | Whole class, Individual |

# Inquire

## Re-orient

Review the previous lesson using the class science journal, word wall and glossary. Discuss food chains, what makes a food chain and how the energy that flows in a food chain is represented by arrows.

## Question • Not just food

**Pose the question:** *What do consumers (like kangaroos) need to survive?*

Refer to a student question (if one has been asked) as a jumping off point for the following investigation about the resources needed by consumers.

**Potential discussion prompts**

* *What do consumers need to survive?*
  + Food for energy (kangaroos eat plants such as grass), water, shelter for protection from weather and enemies, space to move around.
* *Why do they need space to move around? Could they survive without it?* 
  + Students may think that space is not essential for survival, but having sufficient area within which to locate food is very important for animals. You might point out how animal populations decline when their habitat is lost, as more animals are competing for food in a smaller area. Use a local example if possible.
* *What do we call animals that hunt their animals for their food?*
  + Predators.
* *What do we call the animals they hunt?*
  + Prey.

Add ‘predator’ and ‘prey’ to the word wall.

**Pose the question:** *How do these resources (food, water, shelter, space) make it easier for kangaroos to survive?*

If students haven’t asked this question themselves, add it to the list of class questions and discuss how answering this question will be the centre of today’s investigation.

## Investigate • Roo survival model

With your class, play a game called ‘Roo survival’ to create a model of how the number of kangaroos changes each year, based on the availability of resources and the presence of threats.

|  |  |  |  |
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| **Setting up** | |  | | --- | | 1. Approximately 30% of students will pretend to be kangaroos. They form a line on one side of the play area. |  1. Approximately 65% of students will pretend to be the 'needs/resources' (food, water, shelter or space) that the kangaroos need for survival. They form a line on the other side of the play area. They make the following signs to indicate the 'need/resource' they are:      |  | | --- | | 1. Approximately 5% of students will pretend to be a ‘roo hunter’ (a disease or a predator), that can kill kangaroos. They spread out between the two lines. |  1. Two students are given the job of ‘animal biologist’, counting and recording the numbers of kangaroos each round or ‘year’. |
| **Playing the game** | |  | | --- | | 1. On the teacher's signal ‘kangaroos’ will attempt to retrieve one of their ‘needs/resources’ from the other side of the play area and return it to their original side. 2. If they are caught by a ‘roo hunter’ they are ‘killed’. (They then become one of the ‘needs/resources’ in the next round.) 3. If they make it back successfully they have met their needs for survival that year, were able to reproduce, and their ‘need/resource’ then becomes a kangaroo, or joey. 4. ‘Needs’ that were not collected remain ‘needs’ for the following rounds. They may change the sign they make if they wish. 5. Continue the game for at least 10 rounds. |  1. Each round of the game represents one year. |

After each round, or at appropriate points during the game, stop to note how the kangaroo population has changed year by year, as the amount of available food, water, shelter or space has changed.

After the game, discuss this further with students.

**Potential discussion prompts**

* *During the game, what happened to the number of kangaroos when there was plenty of food, water, shelter and space?*
  + There were more kangaroos when there were sufficient resources.
* *What happened to the number of kangaroos when there was a shortage of food, water, shelter and space?*
  + There were less kangaroos when there were not enough resources.
* *In the bush, what would kangaroos use for food, water and shelter?* 
  + Kangaroos eat grasses; they drink fresh water from lakes, streams and rivers; they use trees, tall grasses and rocks for shelter and camouflage.
* *What might cause the availability of food, water and shelter to change from year to year?*
  + Droughts, floods, fires, competition with other animals, severe winters and human activity all affect the amount of resources available.
* *Which kangaroos would be the most likely to be killed by diseases or predators?* 
  + The very young, very old, ill or malnourished kangaroos.

## Integrate • Representing and sense making

Display the data showing the kangaroo numbers recorded after each round of ‘Roo survival’. Discuss the data in relation to different 'years' of the game.

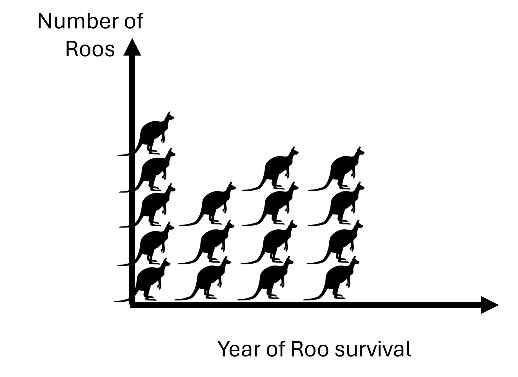
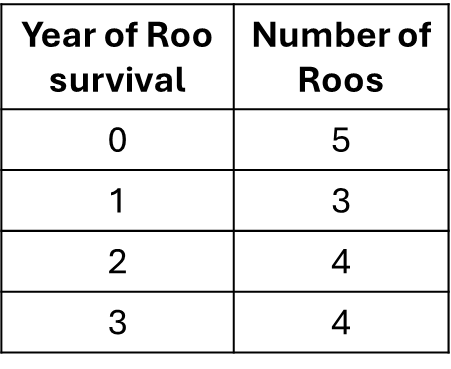
Students transfer the data into their own table, then use that data to create a column or picture graph to represent how the kangaroo population changed over time.

Discuss the purpose and features of a graph.

Potential discussion prompts

* *Why do we use a graph?*
  + We use a graph to organise information so we can look for patterns. We use different types of graphs, such as picture, column or line graphs, for different purposes.
* *What does a graph include?* 
  + A graph includes a title, axes with labels on them and the units of measurement.
* What kind of graph have you created, and why did you choose that style of graph?

Allow students time to complete their graphs.



Samples data table and picture graph

**Optional:** Undertake a gallery walk to share students' graphs with the class.

Discuss with students the patterns and relationships shown by their graph.

**Potential discussion prompts**

* *What is the story of your graph?*
* *What was the highest number of kangaroos that survived a round in the game?*
* *What happened to the number of kangaroos the year after the mob was at its largest?*
* *What was the lowest number of kangaroos that survived a round in the game?*
* *What happened to the number of kangaroos the year after the mob was at its smallest?*
* *What pattern does the graph make and what do you think caused that?*

Discuss the purpose of playing the game ‘Roo survival’.

**Potential discussion prompts**

* *What were the main ideas that you learned from playing ‘Roo survival’?*
* *What do you now know about the importance of all parts of the habitat?*
* *What do you think scientists mean when they talk about ‘upsetting the balance of the habitat’?*
* *Why do you think scientists use models like ‘Roo survival’ to help them understand a habitat?*

Record students’ responses in the class science journal.

**Reflect on the lesson**

You might:

* update the word wall with relevant words and images.
* update the TWLH chart by inviting students to add what they have learned (L) and the evidence/observations that show how (H) they now know that.

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**Year 4**

Sustain the chain • Lesson 6 • Decomposers and detritivores

**Lesson 1**

**Lesson 1**

**Lesson 1**

**Lesson 6**

**inquire**

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# Lesson overview

Students explore and identify the effects of a decomposer on fruit. They identify the sequence of events that occur during decay and test for the presence of decomposers in their local environment.

## Key learning goals

Students will:

* identify evidence of a decomposer on fruit.
* explain the role of a decomposer in a habitat.

Students will represent their understanding as they:

* identify the sequence of decomposing fruit.
* describe the effects of a decomposer.

## Assessment advice

In this lesson, assessment is formative.

Feedback might focus on:

* Can students identify the sequence of decomposition?
* Have students identified signs of a decomposer being present?
* Can they separate a claim from the evidence?

## List of materials

**Whole class**

* Class science journal (digital or hard-copy)
* Materials to create a word wall
* The video [Fruit and vegetable decomposition, Time-lapse](https://www.youtube.com/watch?v=c0En-_BVbGc) (1:36 min)
* Low tech option: digital camera
* High tech option: time lapse camera (for example, a GoPro)

**Each group**

* Small trowel or shovel
* Gardening gloves
* Small clear plastic container with a sealable lid (once this is used, it should not be opened again)
* Magnifying glass
* A cut up piece of fruit (apple, berries, orange)

**Each student**

* Individual science journal (digital or hard-copy)
* **Decaying fruit Resource sheet**

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| **Lesson Routine** | **Estimated time** | **Task type** |
| Reorient | 5 minutes | Whole class |
| Question | 10 minutes | Whole class |
| Investigate | 15 minutes | Collaborative teams |
| Integrate | 10 minutes | Whole class |
| Question | 5 minutes | Whole class |
| Investigate | 10 minutes | Whole class |
| Integrate | 10 minutes | Whole class |

# Inquire

## Re-orient

Remind students of the ‘Roo survival’ game from the previous lesson.

**Discuss:**

* *What did the kangaroos need to survive?*
* *What happened to the number of kangaroos when there was not enough food?*
* *What type of food do kangaroos eat to get energy?* 
  + Grass, trees, producers.
* *Where do producers get their energy?* 
  + Light/heat from the sun.
* *How will this affect the local bushland/school vegetable garden/compost bin we are creatin*g?

## Question • Introducing decomposing

**Pose the questions:**

* *What happens to a piece of fruit if you don't eat it? Does it stay 'good' forever?*
* *What happens to the flowers and leaves when they fall off the plants?*

Refer to a student question (if one has been asked) as a jumping off point for the following investigation about decomposers or what happens to the leaves that fall to the ground.

If students haven’t asked this question themselves, add it to the list of class questions and discuss that answering this question will be the centre of today’s investigation.

## Investigate • Decomposing fruit

Show the video [Fruit and vegetable decomposition, Time-lapse](https://www.youtube.com/watch?v=c0En-_BVbGc) (1:36 min).

After playing the video once, assign collaborative teams a specific fruit or vegetable from the bowl to observe. Discuss with students what they will look for as they make their observations, and how they might record them.

Play the video at least once more. You may wish to watch the video multiple times to support students observations.

Discuss what happens to things as they rot, calling on teams to share what they observed about specific fruits or vegetables as the need arises.

**Potential discussion prompts**

* *What happened to the fruits and vegetables over time?*
  + They got smaller, shrink, rotted away.
* *What made the fruit and vegetables ‘shrink’ (or other term offered by students)?*
* *Did they actually shrink?*
* *Does it change colour? What colour will it change to?*
* *Did anything 'grow' over some of the fruit?*
  + Show the video again to examine the peach decomposing (black fungi 0:13-0:17) and apples decomposing (brown fungi 0:27-1:36 minutes).
* *Were there any insects hanging around the fruit in the video?*
  + Fruit flies were seen.
* *What might attract the flies to the fruit?*
  + The smell and chance to eat some of the decaying fruit.
* *How long does it take for the fruit or vegetable to become unrecognisable?*
* *Does your fruit or vegetable have a thick or thin skin?*
* *Does that make a difference to how long it took to start being affected?* 
  + Thicker, multi layered outer surfaces are usually more protected from external fungi or bacteria.

Introduce the term decomposer: a living thing/consumer that gains its energy from dead or decaying things. Add it to the word wall.

Students cut out the pictures on **Decaying fruit Resource sheet** and, in consultation with their collaborative teams, place them in the correct order of healthy to decomposed. They add the ordered images to their science journals.

## Integrate • Gallery walk

Conduct a gallery walk to compare the similarities and differences between each decomposing fruit.

**Potential discussion prompts**

* *How did you know which version of the fruit was most decomposed?*
* *On which fruit could you see the decomposer?*
* *What evidence do you have that the decomposer was present?*
* *What effect did it have on the fruit?*

Students describe the effect the decomposers had on the fruit under the images in their science journal.

Discuss with students what living things leave behind, and what happens to those 'waste products'.

**Potential discussion prompts**

* *What do plants and animals leave behind them as 'waste products'?*
  + Plants drop leaves and animals release poo/faeces.
* *How many leaves do you think fall to the ground from some trees?*
* *Have you ever seen possums in the trees?*
* *Where do you think their poo goes?*
* *What do you think happens to all the leaves and poo on the ground?*
  + It eventually rots and returns to the soil.
* *What helps to make this happen?*
  + Mould grows on it and rots it. Students might also offer the idea that small animals feed on the leaves and droppings. This will be explored further in subsequent lesson steps.

## Question • Introducing detritivores

**Pose the question:** Do you think there are decomposers in our bushland/garden/park/compost bin? All environments will contain detritivores of some description.

Introduce the term detritivore: larger animals such as worms, dung beetles, slaters and slugs that do a similar job as decomposers. Detritivores eat the decaying leaves, animals and poo to take the chemical energy stored in them.

Add ‘detritivore’ to the word wall.

## Investigate • Keeping it local

Discuss how students could test if there were decomposers or detritivores in their local environment.

**Potential discussion prompts**

* *Will we be able to see the decomposer?*
  + We may see fungi, or it may be too small to see.
* *Will we be able to see the detritivore?* 
  + Probably, if we're careful and quiet.
* *What evidence could we use to see if it is present?*
* *How could we test if a decomposer is there?*

Students consider which of the below tests would be most appropriate for their environment.

**On location (*In situ)***

If the habitat is controlled, students may choose to place the piece of cut fruit on the ground and place the clear plastic container over the top. They could take pictures of how it changes or write descriptions over time.

**In classroom (*Ex situ*)**

If there is a chance the location could be disturbed, use gloves and the trowel to collect a small amount of soil and humus (the dark organic material including leaves and bark) and place in the sealable container. This should also include decomposers. Add the cut fruit on top and seal the container tightly.

Store the container in a warm place in the classroom. Take pictures of how it changes or write descriptions over time. Do not reopen the jar as fungi can produce spores that can affect those with compromised immune systems.

Set up the experiment in the decided location. Encourage students to identify any detritivores that may be in the habitat.

**Potential discussion prompts**

* *Where are these animals located? Are they close to the top or deeper down?*
* *How many different types of detritivores can you find?*
* *Should we touch these animals? Why not?*
  + No. They are important to the environment, and we need them to do their job.
* *How are these animals different to decomposers?* 
  + They are animals that can be seen. They need to eat the dead thing to get their energy.
* *How are they the same as decomposers?*
  + The are usually too small to be seen. Both are consumers that get their energy by breaking down the chemicals in dead things.

## Integrate • Decomposers in the food chain

Revisit the local environment food chain from Lesson 5. Discuss where decomposers fit into a food chain.

**Potential discussion prompts**

* *Are decomposers producers or consumers?* 
  + Consumers.
* *What do decomposers eat?* 
  + Everything in the food chain.
* *Where do they get their energy from?* 
  + The chemical energy stored in the body of other organisms.
* *How could we show this movement of energy in a food chain?*
* *How could we use what we know in the local bushland/school garden/compost bin?*

### Reflect on the lesson

You might:

* update the word wall with relevant words and images.
* update the TWLH chart by inviting students to add what they have learned (L) and the evidence/observations that show how (H) they now know that.

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**Year 4**

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Sustain the chain • Lesson 7 • Changing habitats

**Lesson 1**

**Lesson 1**

**Lesson 1**

**Lesson 7**

**inquire**

# Lesson overview

Students investigate the impact of introduced organisms in a food chain through modelling. They examine how science knowledge can be used to solve a problem of an introduced plant in the Northern Territory.

## Key learning goals

Students will:

* observe and discuss a video on invasive species.
* model the effect of an introduced or invasive species on the environment.
* model the effect of removing a food source from within a habitat.

Students will represent their understanding as they:

* represent their ideas on interactions between organisms.
* discuss how introduced animals can affect the survival of other organisms.

## Assessment advice

In this lesson, assessment is formative.

Feedback might focus on:

* Have students identified the links or feeding relationships in the different food chains?
* Are they able to describe the impact of introduced plants and animals in a habitat?
* Are students reasoning and justification based on evidence they have collected?

## List of materials

**Whole class**

* Class science journal (digital or hard-copy)
* Materials to create a word wall
* Sticky notes
* Cards and spinner prepared from the **Changing habitats Resource sheet.** Laminating the cards prior to use means they can be reused. Alternative pictures or food chains appropriate to your local environment can be used.
* The video [Crazy Yellow Ants](https://www.abc.net.au/btn/classroom/yellow-crazy-ants/103147458) (3:47 min)
* Optional: the video [Calligrapha Beetle Business](https://www.abc.net.au/btn/classroom/calligrapha-beetle-business/13350950) (2:34 min)

**Each student**

* Individual science journal (digital or hard-copy)

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| **Lesson Routine** | **Estimated time** | **Task type** |
| Reorient | 5 minutes | Whole class |
| Question | 15 minutes | Whole class |
| Investigate | 40 minutes | Whole class, Individual |
| Integrate | 10 minutes | Whole class |

# Inquire

## Re-orient

Discuss the context that is being used for this teaching sequence, from the point of view of how the students will be changing the habitat of the bushland/school garden.

## Question • Human impact

**Pose the question:** *How do we affect a habitat?*

Refer to a student question (if one has been asked) as a jumping off point for the following investigation about habitats. If students haven’t asked this question themselves, add it to the list of class questions and discuss that answering this question will be the centre of today’s investigation.

Brainstorm things that happen that affect the plants and animals in a food chain. Write each idea on a sticky note.

Discuss the difference between natural events (bushfires, floods) and human impacts (extending farmlands, clearing land for housing and roads, spraying crops, farming animals as food).

Organise the ideas on the sticky-notes into these categories

**Pose the question:** *Does spraying/killing insects that eat a human-food crop just affect the targeted insects, or are other things affected too?*

## Investigate • Habitat pyramid

Using the cards from the **Changing habitats Resource sheet**, provide:

* approximately 60% of students with a grass card.
* approximately 25% of students with an insect (cicada) card.
* approximately 10% of students with a rosella card.
* approximately 5% of students with a falcon card.

In a class of 30, this would be approximately 18 grass cards, 8 insect cards, 3 rosella cards and 1 falcon card.

1. Arrange the students in a habitat pyramid.
2. Students holding grass cards should sit in a row on the floor.
3. Students holding cicada cards should kneel in a row behind the grass holders. They put their hands on the shoulders of two ‘grasses’.
4. Students holding a rosella card should sit on chairs in a row behind the cicada holders. They put their hands on the shoulders of two ‘cicadas’.
5. The students holding a falcon card should stand behind the rosella holders. They put their hands on the shoulders of two ‘rosellas’.

Discuss how students are representing the flow of energy in a food chain.

**Potential discussion prompts**

* *What does each consumer need access to?*
  + A food source. Cicadas need grass. Rosellas need cicadas. Falcons need rosellas.
* *If there is not enough food for the consumer, what might happen to it?*
  + It might need to leave the area for another one, it might not be healthy enough to reproduce, or it might die.
* Explain that we've created a model of a closed system. A closed system is contained and no other plants or animals can come into the area. *Is this what would happen in real-life usually?*
  + No. Many animal environments interact with each other, and other living things come in and out of it.
* *Where might we see a closed system in real-life?*
  + Islands, because land and living things are surrounded by the ocean—although birds can still fly between islands and animals can travel on refuse rafts. Fish tanks, ant farms or terrariums are closed systems, as they are contained in one space, and often sealed so other things can't enter.

**Optional:** Discuss when and why scientists use models, their benefits and their limitations. See the **Scientific models** professional learning embedded in this step for more details.

Using the spinner from **Changing habitats Resource sheet,** spin to determine the change in the habitat.

Model the impact of the change in the number of organisms in the habitat pyramid, based on where the spinner lands.

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| **Grasses** | |  | | --- | | A bushfire (a natural event) has destroyed some grass. A student holding a grass card is removed from the habitat pyramid.  As a consequence, the cicada that needs that grass is also removed. |   This may affect the students holding rosella and falcon cards. |
| **Cicadas** | |  | | --- | | Insect repellent is sprayed on a cicada. Remove a student holding a cicada card.  As a consequence, the rosella that needs that cicada is also out. This may then affect falcon cards. |   This also means that less grass is eaten. Provide a new grass card to a student and add them to the habitat pyramid. |
| **Eastern Rosellas** | |  | | --- | | A rosella eats a snail that has been poisoned by snail bait, and dies from secondary poisoning.  Remove a student holding a rosella card, and a falcon card holder if affected. |   This means that fewer cicadas are eaten. Provide a new cicada card to the habitat pyramid. |
| **Falcons** | Someone decides to practice their hunting skills on larger birds. Remove a student holding a falcon card. This means that less rosellas are eaten. Provide a new rosella card to the habitat pyramid. |

Repeat this process up to 5 times. During the Question routine at the beginning of the lesson, students identified possible natural events and human impacts on food chains. Use these suggestions to model the impact on the grass-cicada-eastern rosella-falcon food chain.

After giving students time to discuss with a partner, ask them to make a claim about the changes that happen in ecosystems. Encourage them to use evidence from the model they've just experienced and reasoning to support the claims they make. The QCER approach can support this.

Some examples might include:

* If there are not enough grasses and plants to eat, then insects will die, and when the insects die, the things that eat them die too. We saw this in the Changing habitats model, when things in the pyramid started to die as the grasses started to die.
* When there are no predators in the habitat, the smaller animals don't have anything to eat them, and they reproduce a lot, and need more food. We saw this in the Changing habitats model, when the falcon was removed, and more rosellas came and ate all the cicadas.

**Pose the question:** *What would happen if another animal, such as a fox, was introduced to the habitat pyramid?*

Suggest that the fox is a better hunter than the other animals so they can ‘steal’ the food from other animals. Model this in the habitat pyramid for five spinner rounds, with the fox selecting one Eastern Rosella and one Cicada each round.

Reset the habitat pyramid and introduce a rabbit that needs to eat two lots of grass each round (removing them from the game). Model the impact in the habitat pyramid for 5-10 rounds of the spinner.

**Potential discussion prompts**

* *What happened when the fox/rabbit was introduced?*
* *Which organisms were directly affected by the fox/rabbit?*
* *Which organisms were affected indirectly (not eaten by them, but affected anyway)?*
* *Why were these organisms affected?*
* *How are each of the organisms in the food chain important to the other organisms?*

Students draw the food chain in the habitat pyramid in their science journal and describe the impact of introducing rabbits into the habitat pyramid including the impact on each of the grass, cicadas, rosellas and falcon.

## Integrate • Crazy yellow ants

Watch and discuss the video [Crazy Yellow Ants](https://www.abc.net.au/btn/classroom/yellow-crazy-ants/103147458) (3:47 min).

**Potential discussion prompts**

* *Crazy Yellow Ants and Red Fire Ants were called invasive. What does this mean?*
* *Do you think ants are an important part of our food chain? Why?*
* *What impact do you think 'introduced' ants would have on our native ants?*
* *Crazy Yellow Ants spray acid on other insects and small birds. Red Fire ants kill by many stings. How would this affect our habitat pyramid?* 
  + Direct affect: kill Cicada and maybe Eastern Rosella. Indirect affect: kill all animals further up the food chain.
* *How did scientists use a computer game to model how the native ants could stop the invasive ants?*
* *How is our habitat pyramid like the computer model?*
  + Both showed how the number of organisms decreased when there was a fight over food. Both were a closed system – with no other invaders or humans coming in.
* *How is it different?* 
  + Habitat pyramid did not have moving organisms and did not show other factors like shelter and water.
* *How are humans trying to help the habitat?*
  + Using biosecurity to stop invasive animals coming in, reporting suspicious ants when you find them.

**Optional:** Watch and discuss the video [Calligrapha Beetle Business](https://www.abc.net.au/btn/classroom/calligrapha-beetle-business/13350950) (2:34 min).

**Potential discussion prompts**

* *Does the sida weed come from Australia?*
* *Does this mean it is like the Crazy Yellow Ants, an invasive organism? What does this mean?* 
  + Invasive is another word for introduced.
* *Why is an invasive plant like sida weed a problem for farmers?* 
  + It stops other plants from growing and cows can’t eat it.
* *Is sida weed a producer or consumer? What evidence do you have to support your claim?*
  + Producer: it does not eat other organisms and is green so it uses light energy from the sun.
* *Is the beetle a produce or consumer? What evidence do you have to support your claim?* 
  + Consumer: it eats the sida weed.
* *If the beetles were not used, farmers would have to use weed killing chemicals to spray the weeds. Why are the beetles better than the weed killing chemicals?* 
  + Chemicals may kill other insects. This affects other organisms in the food chain.
* *Why is the Calligrapha Beetle good for the habitat?* 
  + It does not eat anything else and therefore does not affect other producers or food chains.
* *How does Jack and Kelly help control the invasive sida weeds?*

### Reflect on the lesson

You might:

* re-examine the intended learning goals for the lesson and consider how they were achieved.
* update the word wall with the terms ‘introduced’ and ‘invasive’.
* update the TWLH chart by inviting students to add what they have learned (L) and the evidence/observations that show how (H) they now know that.
* discuss any questions that have not been answered by this teaching sequence.

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**Year 4**

Sustain the chain • Lesson 8 • Habitat stewards

**Lesson 1**

**Lesson 1**

**Lesson 1**

**Lesson 8**

**act**

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| To read the most recent version of this task, download associated resources, and view embedded professional learning including classroom videos and work samples, visit: [https://primaryconnections.org.au/teaching-sequences/year-4/sustain-the-chain/lesson-8-habitat-stewards](https://primaryconnections.org.au/teaching-sequences/year-4/sustain-the-chain/lesson-8-habitat-stewards?utm_source=docx&utm_medium=lesson_8&utm_campaign=STC) |

# Lesson overview

Students use their knowledge of the local habitat to design a product for the classroom context, and communicate it to an audience.

## Key learning goals

Students will:

* use a design thinking process to plan and produce a field guide/vegetable garden/increased diversity in school garden/compost bin.

Students will represent their understanding as they:

* identify appropriate criteria that can be used to evaluate the effectiveness of a design.
* draw a labelled diagram of their classroom context.
* participate in and contribute to discussions, sharing information, experiences and opinions.

## Assessment advice

In the Act phase, assessment is summative.

Students working at the achievement standard should have:

* identified the roles of different organisms in their local habitat.
* constructed a food chain.
* communicated their ideas and findings for an identified audience and purpose.
* used scientific vocabulary when appropriate.

Refer to the Australian Curriculum content links on the [Our design decisions tab](/teaching-sequences/year-4/sustain-chain) for further information.

## List of materials

**Whole class**

* Class science journal (digital or hard-copy)
* Other materials as appropriate for the context you have selected for the sequence

**Each student**

* Individual science journal (digital or hard-copy)

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| **Lesson Routine** | **Estimated time** | **Task type** |
| Anchor | 10 minutes | Whole class |
| Connect | 10 minutes | Collaborative teams, Whole class |
| Design | Variable | Collaborative teams, Whole class |
| Communicate | Variable | Collaborative teams, Whole class |

# Act

## Anchor • Local food chains

Using the class science journal, refer back to all the different food chains that students have identified over the course of the teaching sequence. These may include:

* the food chain linked to their local context, begun in Lesson 2’s Field notes activity and expanded on in Lesson 4.
* the interaction between ants and seeds, in Lesson 3.
* produce and consumer food chains (producer-kangaroo-dingo; producer-ant-lizard-magpie; producer-grasshopper-snake-kookaburra), in Lesson 4.
* ‘Roo survival’ (grass-kangaroo-predator), in Lesson 4.
* Decomposers linking to all food chains, in Lesson 6.
* the ‘Habitat pyramid’ (grass-cicada-rosella-falcon), in Lesson 7.

Discuss the common features in all food chains.

**Potential discussion prompts**

* *What do all food chain have in them?*
  + Producers and consumers, decomposers, detritivores, predators and prey,
* *We've looked at very simple chains, but do animals usually eat only one kind of animal, or do they eat more than one thing?*
  + Lizards eat ants and cicadas; dingoes eat birds like kookaburras, rosellas and falcons as well as kangaroos.
* *If we drew a big picture if all the animals and plants that feed off each other, would it look like a chain, or more like a web?*
* *Scientists call these complicated models food webs, why do you think they do this?*
* *What do all living things need to survive?*
  + Food, water, shelter and space to survive.

## Connect • Planning for change

Discuss/remind students why the selected context is important to the school or local community.

**Potential discussion prompts**

* *What have we learned about the habitat?*
* *What producers do we have, or will we need?*
* *What food chains did we discover?*
* *How is the habitat impacted by people and pets?*
* *Are there any introduced organisms?*
* *How can we help the habitat?*
* *What is needed in the habitat?*
* *How can we do this?*

## Design • Designing our world

Discuss what students will be designing for the selected context:

* Local bushland or parkland: planting or writing a field guidefor future students or locals.
* School vegetable garden: deciding what to plant this season and encouraging pollinators.
* School garden: identifying how to encourage diversity of local birds and insects.
* School compost bin development.

Discuss how the class will decide that it is a good field guide/vegetable garden/diverse school garden/compost.

Identify and describe the key criteria that will guide their design.

Students research or investigate to find out about different versions of a field guide/vegetable garden/diverse school garden/compost. Alternatively, provide a range of sample pictures for students to examine. Identify the 'good designs', or design elements that match their key criteria devised by students. If identifying plants to add to a garden, encourage students to consider the shelter and water requirements of the different plants. Encourage student to provide evidence to support the claims or choices that they make.

Students represent their ideal design in a labelled diagram.

Undertake a gallery walk to view students’ designs, identifying the advantages in each. Encourage students to use question prompts when discussing each other’s work. This can be done by students providing two stars (positive comments about what they like) and one wish (for something new to be added or changed). [Download AITSL's guide for more on peer feedback](https://www.aitsl.edu.au/docs/default-source/feedback/aitsl-peer-feedback-stratedy.pdf).

Select the best features of the students’ designs to develop a single class design that will be created.

Allow time for the build of the design.

## Communicate • Sharing our learning

Students could share their designs with their peers, other students, the principal, a gardener/ranger, or parents and carers.

They might share:

* their science journals.
* the labelled diagram of their design.
* the design that was constructed.
* their part of the field guide that was created.

Discuss if any further information will need to be included in their descriptions (written or verbal) such as:

* a description of one food chain in the habitat.
* identifying the producers, consumers and decomposers in the habitat.
* identifying how we/humans are part of the habitat.
* the patterns and relationships that they saw in the habitat.
* the data that they collected as evidence.