



The Crown Estate Sustainability Initiative

Food webs lesson

Teacher guide

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OVERVIEW

Thank you for downloading these resources to use with your students. By equipping your students with the knowledge and skills to understand biodiversity, nature recovery, and sustainability, you are empowering them with the tools to take positive action in their own communities, now and in their futures.

This lesson links to the Aquatic Adventure assignment in the Conservation Quest at Windsor Great Park.

Pupils will:

- Recall their understanding of food chains.
- Build a food web model based on the pond in the world.
- Consider the value of a pond and how human activity can affect the balance of food webs.

Throughout the lesson, you will find background information on each topic. **There is also a glossary of key terms at the end.**

To find out more about how to use these resources, watch our teacher video on the website.



OUTCOMES

Students will be able to build a model food web and consider how humans can affect the natural balance of ecosystems



SKILLS

Teamwork, problem solving, analysis



VOCATIONS

Ecologist, conservationist, outdoor education officer



RESOURCES

- Presentation slides
- Food web cards (one set per team)
- Starter worksheet
- Large A3 sheet of paper (1 per team)
- SWOT worksheet (optional extension task)



TIMINGS

We have included activities for your class that develop themes from the Minecraft worlds. They are sequenced to build on each other, but we encourage you to pick and choose the ones that will work best for your class and the time available. We have included approximate timings as a guide, but you may wish to spend longer on certain sections.

CONTENTS	TIME	PAGE
Introduction and gameplay	25 minutes	2
Starter activity - Identifying roles in the food chain	10 minutes	3
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Stats quoted in these lesson packs refer to the UK.




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Introduction

 (2 minutes)

- Introduce students to the Conservation Quest at Windsor Great Park that they are about to explore. Explain that this world will highlight biodiversity, sustainability and ecology and how our decisions can impact this in the long term.
- In the Aquatic Adventure, they learn about the water cycle first hand as they evaporate and precipitate, before dining under the pond to learn about aquatic producers, consumers and predators.


Minecraft gameplay

 (<20 minutes)

- When they launch the world, students will enter the lobby and meet Dotty the Dragonfly, their helpful guide. To take part in each challenge, students can visit the Windsor School from the estate office. In the school, there are four classrooms - and from each one, students can teleport instantly to a different challenge.
- For the purpose of this lesson, you may wish to direct students to teleport directly to The Aquatic Adventure assignment but they can come back and explore the world in their own time too.
- Consider sharing the reflection questions below with your students before they explore the world, so that they can keep them in mind throughout and ahead of class discussion.



Reflecting on gameplay (Slide 2)

 (5 minutes)

- Facilitate a class discussion about the activity, encouraging pupils to reflect on new knowledge gained and anything they found challenging/easy/interesting.
- To steer discussion, you could ask them:
 - What can you remember about producers, prey, and predators?
 - What organisms did you meet? Which ones had you heard of before?
 - Do you remember the job of the toad you met?
 - What do you think an ecologist does?





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Starter activity – Identifying roles in the food chain (Slide 3-6)



(10 minutes)

This starter activity will encourage students to think of other examples of predators, prey and producers; primary consumer and secondary consumers; and herbivores and carnivores to ensure they understand their meanings. They will have met the organisms in a pond ecosystem during gameplay, including algae, perch and grass snakes.

- Explain that it isn't just ponds that have food webs – every environment and ecosystem has food webs, and although they have different organisms they fulfil the same roles.
- Show **slide 3** and ask students to identify the correct picture (wood mouse, fox, grass) for each of the terms: predator, prey, producer; herbivore, carnivore; primary consumer and secondary consumer.
- Show them the correct answers (**slide 4**).
- Show **slide 5**. Give all the students the **starter worksheet** and ask them to match as many of the pictures to categories that apply to them (predator, prey, producers; consumers, herbivore; carnivore, omnivore).
- Give them a few minutes to reflect, then ask them to check their answers in pairs.
- Reveal the correct answers (**slide 6**). Confirm they understand the different roles in an ecosystem, and that a food chain can be created from the living organisms in an ecosystem.

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Identify the correct picture for each of these roles

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Predator
Prey
Producer
Primary consumer
Secondary consumer
Herbivore
Carnivore
Omnivore

A. Woodmouse
B. Fox
C. Grass

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Can you pick the right roles for these examples?

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Predator
Prey
Producer
Primary consumer
Secondary consumer
Herbivore
Carnivore
Omnivore

A. Woodmouse
B. Fox
C. Grass
D. Oak Tree
E. Blackberry
F. Caterpillar
G. Owl
H. Woodpecker
I. Hedgehog
J. Vole
K. Squirrel
L. Grasshopper

BACKGROUND INFORMATION

Food webs

A food web is a visual representation of the feeding relationships and energy flow among different species in an ecosystem.

It shows how various organisms are interconnected by their feeding relationships, and how energy and nutrients are transferred from one organism to another.

In a food web, producers, such as plants and algae, are at the bottom of the chain using energy from the sun, and are eaten by primary consumers, such as herbivorous animals. The primary consumers are in turn eaten by secondary consumers, such as carnivorous animals, which may then be eaten by tertiary consumers, and so on. Decomposers, such as fungi and bacteria, break down dead organic matter and recycle nutrients back into the ecosystem.

Changes in one part of the food web can have cascading effects on other parts of the ecosystem, making them a useful tool for understanding and predicting the effects of human activities, climate change, and other environmental factors on ecosystems.



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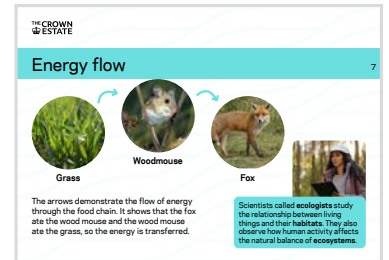
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Activity - Building the food web (slides 7-10)

(10 minutes)

In this activity, students will create a food web for the pond ecosystem they have explored in gameplay. They will learn more about the organisms within a pond ecosystem, and think about how they interrelate.

- Recap the information on food webs, and how many food chains form complex food webs (**slide 7**). Use the example trophic levels to highlight how many food chains form a web, often with multiple links between different producers and consumers (**slide 8**). Encourage students to share their ideas about the examples on the slide.
- Ask students to recall the characters they met in the pond in the Minecraft gameplay. Tell students they are going to create their own food webs featuring those organisms (**slide 9**).
- Split the class into their teams of four, and hand each team a set of food web cards (based on the organisms in the pond from the world).
- Tell students to organise the cards into a food web on a large sheet of paper, drawing arrows between different cards.
 - You can circulate the room and ensure teams are making progress.
 - If they get stuck, remind them to think about the different roles – producer, prey, predator, primary consumer, secondary consumer...
- After 5 minutes, display the correct food web (**slide 10**). Tell students that even a pond is a complex ecosystem where all the living organisms live in balance and are interdependent on each other.



Activity - Understanding the human influence (slides 11-16)

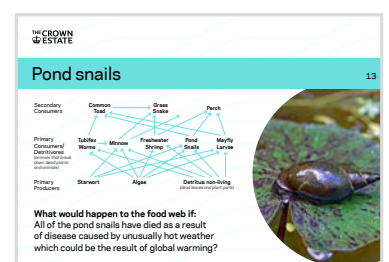
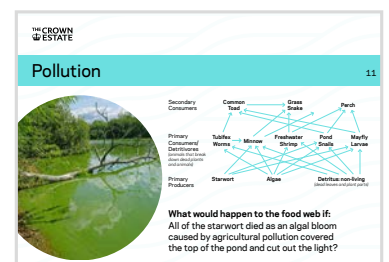
(15 minutes)

In this activity, students will reflect on different scenarios that will alter the balance in the food web and consider the implications to the result of the species:

- Students will work in the same teams as the previous activity.
- Explain that in this task they will be thinking in the same way as people doing real jobs – including the Conservation Manager and Ecologist they have already met.

Scenario thinking:

- Work through the example scenarios and answers on slides **11-16**:
- After introducing each scenario, encourage teams to discuss the implications for the food web at their table. Prompt discussion with questions like:
 - What is the role of the missing organism in this ecosystem?
 - What does this organism eat? What is it eaten by?
 - What would happen if those organisms are not doing so?
- For each scenario, after teams have had a few minutes to discuss, ask a different member of each team to feedback to the class.
- Provide any missing ideas with the answer slides.





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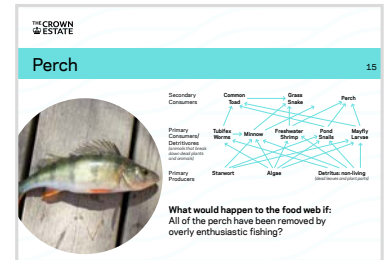
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Activity - Understanding the human influence (slides 11-17) Cont'd (15 minutes)

Reflecting on skills:

- You can also prompt them to think about what skills they are using - if you have time, at the end of each scenario ask:
 - What skills are you using to think about this?
 - What skills helped you the most to come up with your answer?
 - What skills would it be most important for an ecologist or conservation manager to have to protect ecosystems?



Reflection (Slide 18)

 (5 minutes)

Before finishing the lesson, encourage your students to reflect on their learning. In particular, we want them to reflect on the skills involved in protecting delicate ecosystems, as well as some of the careers that might be involved

Use **Slide 18** as a prompt. Ask students to reflect using questions below - you may wish to do this one by one or invite volunteers to take turns.

- What was the most interesting thing you learned today?
- Did anything you learned surprise you?
- What jobs do you think have the biggest impact on ecosystems and the organisms in them?
 - Prompt them with the scenarios from previous activity - e.g. agricultural/farming/gardening, fishing and food production, anything that contributes to global warming or pollution.
 - You can also ask them to think about the jobs they met in the Minecraft world - Asella the Hydrologist and Buffy the Ecologist.
- Do you think the skills you talked about in the previous activity could help people doing those jobs to protect nature? How could they do things differently to protect ecosystems?

- What was the most interesting thing you learned today?
- Did anything you learned surprise you?
- What jobs do you think have the biggest impact on ecosystems and the organisms in them?
- How could people doing these jobs protect ecosystems?



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Optional extension activity (SWOT) (Slide 19)



(10 minutes)

There is so much more of the world to explore so if you have some more time, we'd encourage you to let the students engage in some free play in the world.

If you would like to extend the learning from this lesson a bit further you can try the following activity, which works well to prepare students for the **real world action** section.

- Explain to students that they will be creating a SWOT (Strength Weakness Opportunities Threats) analysis for a pond.
- Use **slide 19** to explain they need to think about wildlife ponds, based on everything they have learned today. Ask them to reflect on each of the questions on the slide.
- Give one worksheet to each team of 4 students.
- Give teams 3 minutes to make notes, with one student writing independently in each section.
- Tell teams to discuss their ideas, adding to their sections as necessary, so they are prepared to feedback to the class.
- Pick one student from each team to feedback on the strengths, weaknesses, opportunities and threats of having a pond.
- Thank them for their contributions. Explain ponds need to be looked after as they can host a huge amount of biodiversity but are sensitive to disruption.

Conduct a SWOT analysis on a pond			
Complete the worksheet.			
1. Strengths Hint: What are the positive aspects of the wildlife pond? Think about humans and other living organisms e.g. high biodiversity (lots of different plants and animals).	2. Weaknesses Hint: What are the disadvantages of the wildlife pond? Think about safety and water pollution.		
3. Opportunities Hint: How could you add features or areas for people and the environment? Could conservation bring benefits? e.g. well-being.	4. Threats Hint: What dangers could come to the wildlife in the pond? Think about how humans can disrupt the balance e.g. farming, fishing and climate change.		

BACKGROUND INFORMATION

SWOT Analysis for a wildlife pond in the UK

Strengths: UK wildlife ponds provide vital habitat for a range of native species. They can help to improve water quality by filtering out pollutants and providing a home for beneficial bacteria. They can also act as a valuable store of water in case of drought. Wildlife ponds can act as a refuge for wildlife where natural habitats have been lost. They are relatively easy to construct and can be adapted to suit a range of different environments.

Weaknesses: Without proper management, wildlife ponds can become overgrown and stagnant, which can lead to the growth of invasive species and the decline of biodiversity and may require maintenance. As they are open water, they can also provide a hazard for young children. In urban areas, they can be vulnerable to pollution from run-off and chemicals which can damage the ecosystem.

Opportunities: There is a growing interest in wildlife conservation and sustainable living, which could lead to increased support for the creation and maintenance of wildlife ponds. Wildlife ponds can be used as part of larger conservation efforts, such as creating green corridors and connecting fragmented habitats. They can provide educational opportunities for local communities and schools, helping to raise awareness about the importance of biodiversity. Wildlife ponds can be integrated into garden designs and landscaping, providing a unique and attractive feature for homeowners.

Threats: Climate change and extreme weather events, such as droughts and floods, can impact the survival of wildlife species in UK wildlife ponds. Overfishing and pollution can also harm wildlife ponds. Development and urbanisation can lead to the destruction of natural habitats and the loss of suitable sites for ponds. The introduction of non-native species, can negatively impact the biodiversity of wildlife ponds. Lack of funding hinders efforts to create wildlife ponds.



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Real world action

Building student agency with real world action

By taking part in this lesson, students have developed their:

- knowledge of a key sustainability topic
- understanding of why it is important
- practical toolkit, and articulation, of their own green skills

These are the ingredients that enhance students' agency and power to take real world action that builds biodiversity and supports nature recovery.

There are a number of ways you can support them to take their learning forward and continue this process beyond the classroom. We have a few starter ideas for you below:

- Some schools may have their own wildlife pond. A great project could be for students to consider how biodiverse their pond is by conducting a survey to find ways to improve it.
- Invite a representative from the local River Trust or Wildlife Trust to run a workshop for the children. Useful resources can be found on their websites.
- Challenge students to run an assembly to raise awareness about water issues in their area and how we can help each other use water more sustainably.
- Support students in organising a fundraising activity to help local wildlife, e.g. funding for more birdboxes, bug hotels, spring bulb planting.



Lesson 5 in this series - Taking action toolkit

For more ideas on safe and manageable ways to harness the enthusiasm your students may have for this or other biodiversity topics, we have created a **Taking Action Toolkit**.

It features accessible principles to empower students to identify key issues that they care about, affecting their school/local community, and begin creating meaningful solutions for nature recovery with their peers.





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Glossary

- **Algae:** A diverse group of photosynthetic organisms that can be found in a variety of aquatic environments, ranging from freshwater to marine habitats. They are important producers of oxygen and form the base of many aquatic food webs.
- **Biodiversity:** The variety of life in a particular ecosystem or on the planet as a whole. It encompasses the range of species, genetic diversity, and ecosystems that make up the natural world.
- **Carnivore:** An animal that primarily eats meat or other animal tissue. Examples include fox, hedgehog, and buzzard.
- **Ecologist:** A scientist who studies the relationships between living organisms and their environment, including how they interact with each other and their physical surroundings.
- **Ecosystem:** A community of living organisms and the physical environment in which they exist, interacting with each other and with their surroundings.
- **Herbivore:** An animal that primarily eats plants. Examples include deer, caterpillars, and rabbits.
- **Photosynthesis:** The process by which green plants and some other organisms convert light energy into chemical energy, using carbon dioxide and water to produce glucose and oxygen.
- **Producer:** An organism that makes its own food through photosynthesis or chemosynthesis, forming the basis of the food chain. Examples include algae, plants, and some bacteria.
- **Primary consumer:** An organism that feeds on producers, such as herbivores that eat plants. Examples include caterpillars, rabbits, and cows.
- **Predator:** An animal that hunts and kills other animals for food. Examples include badgers and foxes.
- **Prey:** An animal that is hunted and eaten by another animal. Examples include rabbits, deer, and fish.
- **Secondary consumer:** An organism that feeds on primary consumers, such as carnivores that eat herbivores. Examples include snakes, foxes, and hawks.

