

Water... WOW!

STAGE 3 EDUCATION

Module 7: Aquatic Food Webs & Life Cycles

To live and grow, all life on Earth needs energy and nutrients, this is why plants and animals have adapted to capture those resources.

There are many food chains in watery environments or ecosystems, and together these create complex food webs.

In this module, students will:

- compare the life cycles of aquatic animals
- create a food web to show how environments and living things are interdependent



Module 7: Aquatic Food Webs & Life Cycles



Teacher Background

Food Webs in Watery Environments (ST3-4LW-S: Examines how the environment affects the growth, survival and adaptation of living things)

In *Module 6: Living Things in Water*, students learned about how some plants and animals are adapted to living in water. To live and grow, all life on Earth needs energy and nutrients, so plants and animals must be adapted to capture those resources. Plants are called producers because they can create their own energy if they have access to sunlight, nutrients and water. Conversely, consumers cannot create their own energy, they get energy by eating other life forms. Consumers can be herbivores that eat plants, carnivores that eat animals, omnivores that eat both plants and animals (e.g. people are omnivores) or detritivores that eat dead plants or animals. The pathway of energy and nutrients flowing from producers to herbivores to carnivores through to top predators is called a food chain. There are many food chains within each aquatic ecosystem and together these create complex food webs. All the plants and animals living in an aquatic ecosystem are interconnected and dependent upon each other through the food web.

Aquatic Life Cycles (ST3-4LW-S: Examines how the environment affects the growth, survival and adaptation of living things)

In some cases, there are extreme changes in the traits of animals as they pass through different life stages. Students probably know about the life cycle of frogs → eggs → tadpoles → frogs. They may not know that there are many insects that lay their eggs in water, live in water as juveniles and then emerge from water as flying adults. These include mosquitoes, stoneflies, mayflies, caddisflies and dragonflies.

Sequence for Module 7: Aquatic Food Webs & Life Cycles

Syllabus Outcomes	ST3-4LW-S Examines how the environment affects the growth, survival and adaptation of living things.
Learning Intentions	For students to: <ul style="list-style-type: none"> ◆ revise that living things have life cycles ◆ compare the life cycles of two aquatic animals ◆ investigate the lifecycle of an aquatic macroinvertebrate, such as a dragonfly ◆ create a food web to show how environments and living things are interdependent
Teaching & Learning Activities	<p><u>Inquiry Question</u>: <i>What are the similarities and differences between the life cycles of aquatic living things?</i></p> <ul style="list-style-type: none"> ◆ Students to investigate life cycles of aquatic animals, including insects that lays its eggs in water such as mosquitoes and dragonflies. Have students search for information about life cycles of different aquatic animals (e.g. frogs, dragonflies, mayflies, eels, corals), draw and label the stages of the life cycle. How does the life cycle differ between different aquatic animals? ST3-4LW-S ◆ Use the 'Playground fact' to reinforce that some animals that live in water during essential developmental stages can metamorphose and dramatically change their body shape and lifestyle. Dragonfly emergence is another example of a transition from the aquatic to terrestrial stage of the life cycle involving metamorphosis. ◆ Discuss the essential resources animals need for survival (food, water, shelter). Brainstorm what food certain animals eat. Using string and the animal cards from the previous module, create a food web for understanding the interconnectedness of all living things. There are many different types of ecosystem and food webs, such as this stream food web. ◆ What is an ecosystem? Why are ecosystems important? Review 7 minute video from Module 6 explaining survival and adaptation of mangroves. List the animals dependent on the mangrove wetland for survival. Use the activities in this link to consider what it means to be a healthy ecosystem? ST3-4LW-S ◆ Compare the way that different aquatic animals capture food: dragonfly stalking, humpback whale using bubble nets and porcelain crab filter feeding.
Resources	<ul style="list-style-type: none"> > Dragonfly emergence https://www.youtube.com/watch?v=CylF7eX6qmo > String food web exercise https://scientistinresidence.ca/pdf/life-

	<p>science/Aquatic%20Ecosystems/SRP_Aquatic%20Ecosystems_Lesson%205%20WF.pdf</p> <ul style="list-style-type: none"> > Stream food web https://www.researchgate.net/figure/A-generalised-diagram-showing-reciprocal-flows-of-invertebrate-prey-and-inputs-of-plant_fig1_227642618 > How do mangrove trees live in mud and sea water? http://education.abc.net.au/home#!/media/85976/how-do-mangrove-trees-survive- > What it means to be a healthy ecosystem https://stemlyndalesc.weebly.com/what-does-it-mean-to-be-a-healthy-ecosystem.html > Dragonfly hunting https://www.youtube.com/watch?v=W557aSVdW_g > Humpback whale bubble net https://www.youtube.com/watch?v=Q8iDclTD9wQ > Porcelain crab feeding https://www.youtube.com/watch?v=-4atlpzhzJM
Feedback	<p>Your feedback is important to us. Please complete this quick online survey: http://bit.ly/ModulesFeedback</p>

Playground fact:

Mayflies live most of their lives in water, where they walk or swim, only having the capacity to fly as short-lived adults. Some species have immature stages that grow in unpolluted streams for up to several years. They climb out of the water and transform into adults only to reproduce. Adults do not feed and the digestive system is filled with air, so their energy stocks only allow a short burst of activity. The shortest lifespan of any adult mayfly species is only five minutes!



Biographies of authors

Dr David Reid

David is a scientist who studies waterways for his work at Georges Riverkeeper in southern Sydney. He grew up near Lake Macquarie and the beaches south of Newcastle, where he spent much time swimming, surfing, exploring the life in water and generally enjoying being close to water. After finishing school, he went to university and his studies eventually led to completion of a PhD on waterbugs and food webs in farmland streams. Gaining those qualifications has allowed him to do research and monitoring work in waterways around the world, including those in New South Wales, Victoria, South Australia, New Zealand and New York City (see https://www.researchgate.net/profile/David_Reid15). He still enjoys having fun in water too!

Antonina Fieni

Antonina loves rivers. She is often seen paddling up rivers and creeks looking for Eastern water dragons or sacred kingfishers. When not paddling, Antonina is teaching environmental science and geography at the Georges River Environmental Education Centre and at the Field Study Centre at Sydney Olympic Park. Her qualifications include a Bachelor of Education and a Graduate Diploma in Environment.

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PO Box 205

Hurstville BC NSW 1481

Australia

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with collective responsibility for the Georges
River and its catchment.

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