



Dive 6: Lesson Plan - Fabulous Food Chains

Module Summary

This module is an immersive scientific dive where students can observe numerous cascading food chains and food webs. Students will be given an in-class activity to assist with the learning and understanding of these marine food chains, food webs, and the energy transfer that goes on between them. The CCMI team will deploy a Baited Remote Underwater Video Survey (BRUVS) permitted by the Cayman Islands Department of Environment (DoE), which is used to estimate the shark and ray population. Students will discover the role of apex predators at the top of food chains, the impact of removing a keystone species, and how feeding fish can alter their natural behaviour thus having a negative impact on fish fitness and their surrounding environment.

Year 6

Learning Objectives

- Describe the differences between a food chain and a food web
- Define what it means to be an apex predator
- Explain what happens when you remove an apex predator or a keystone species from a food chain
- Discuss energy transfer along a food chain or a food web
- Report on why feeding fish is illegal (except in permitted Animal Interaction Zones) and how it affects fish fitness and behaviour overall

Science National Curriculum Alignment

- Order living things in a simple food chain and understand the dependency of one on the other (Year 6).

Description of the live dive

The dive will take place in front of a pristine coral reef rich with marine life. The underwater educator will communicate with the live lesson host on the boat and with the engaged remote class. The educator will take the students through a series of fun facts and learning objectives regarding food chains, keystone species, and apex predators, all in alignment with the Science National Curriculum of the Cayman Islands. Students will have an in-class activity to complete during the live lesson, which they are welcome to ask questions about to our underwater educator at any time during the duration of the broadcast. Pre-recorded footage and images will be used to show the differences between food chains and possible results of setting a BRUVS, should hopeful results not occur naturally during the broadcast. Students will observe a deployed BRUV in front of a coral reef to see what apex predators are attracted during the broadcast. The dive will conclude with students thinking about why it is illegal to kill sharks and feed fish in the Cayman Islands and many other places around the world.



Live broadcast outline (45 mins)

00:00 - 03:00	CCMI host welcomes students and outlines the lesson
03:00 - 05:00	CCMI host introduces the educator and the in-class activity
05:00 - 10:00	Educator sets and defines a BRUVS
10:00 - 15:00	Educator describes a typical marine food chain
15:00 - 20:00	Educator explains apex predators and keystone species and their importance to marine food chains
20:00 - 25:00	Questions
25:00 - 30:00	Educator informs students of positive ways to make an impact on apex predators and keystone species
30:00 - 35:00	Educator discusses the negative impacts of fish feeding
35:00 - 40:00	Questions
40:00 - 45:00	CCMI host on the boat recaps the live dive and concludes

Materials

Internet connection, laptop, projector, speakers, paper, pencils/pens, CCMI activity sheet, and CCMI fun fact sheet.

Useful resources

- www.reefresearch.org/reefs-go-live
- www.projectaware.org
- www.doe.ky
- www.education.gov.ky/education/curriculum
- www.oceanservice.noaa.gov/kids/



Fun Fact Sheet - Fabulous Food Chains

1. A food chain is a way to describe how each living thing gets its food or energy and how that energy is passed from one living thing to the next up the food chain as they are consumed. Most food chains begin with plants and ends with large predatory animals (Adam et al. 2011).
2. Food chains start with primary producers. On the reef, the most common producer is phytoplankton, a marine organism that produces its own food through photosynthesis (Miller et al. 1996).
3. Primary producers on the reef also include, algae, seagrasses, and coral (specifically the zooxanthellae within the coral polyps) (Miller et al. 1996).
4. Every other living thing in the food chain which does not make its own food is a consumer; consumers can be herbivores, carnivores, or omnivores (Miller et al. 1996).
5. The feeding relationships in an ecosystem consist of many food chains, which are all interconnected into a larger network called a food web (Encyclopaedia Britannica 2017).
6. On average, only 10% of the energy from an organism is transferred to its consumer. This means that a top predator (also known as an apex predator) is supported by millions of primary producers from the base of the food web (University of Waikato 2007).
7. A “keystone species” is a species that has a greater impact on a food web than you would expect in relation to their abundance. In the Atlantic Ocean and Caribbean Sea, the long-spine sea urchin (an herbivorous consumer) is considered a keystone species (Adam et al. 2011).
8. Apex predators (top carnivores) such as sharks, stingrays, and groupers are very important in keeping the ocean’s fish populations in balance (WildAid 2005).
9. Apex predators hunt efficiently by feeding upon the older, sick, or slower fishes in a population, thus preventing the spread of disease and lowering the reproduction rates of less healthy and genetically unbeneficial fishes (WildAid 2005).
10. Feeding fishes from any level of the food web is unnatural and can cause a learned behaviour in the fish called conditioning. Conditioning can cause those fish being hand-fed to be more vulnerable to predators and will keep fish from feeding on their natural food source. Feeding by humans may cause a feeding frenzy in a small area that could lead to injury. (REEF 2010)
11. In the Cayman Islands, feeding fish is illegal according to the Cayman Islands National Conservation Law. More information can be found here:
website: www.doe.ky
phone: 1-345-949-8469
email: DOE@gov.ky

In Class Activity Sheet - Fabulous Food Chains

Today, you're the scientist! Help our CCMI scientist to identify food chains on the coral reef. Draw or label plants or animals you see with our CCMI scientist during the dive, creating a food chain on each of the food pyramids below. Don't forget to start with primary producers and end with apex predators. If you are lacking apex predators, what is taking its place?

