



Dive 3: Lesson Plan - Diving off the Wall

Module Summary

This module is an immersive dive on a pristine coral reef, featuring the famous “wall” of the Cayman Trench in the Cayman Islands which goes from 20 m to 2000 m. The CCMI team will guide students through an interactive geologic and oceanographic history lesson of how Little Cayman reefs came to be what they are today. Students will be able to participate in a live lesson by engaging with an underwater educator as they tour the reefs of Little Cayman in search of fossils, differing geologic structures on the reef, and of course changes in the coral reef ecosystem as we travel down the wall.

Year 6

Learning Objectives

- Define plate tectonics and the Mid-Ocean Ridge
- Describe the change in life and underwater communities along the Cayman Trench at various depths
- Explain why an animal may live on the wall instead of in a shallow reef
- Analyse the changes in the wall throughout the dive: number of sponges, density of algae, colour of the corals, size of the fish, etc.
- Discuss how the famous walls of the Cayman Islands were formed

Science National Curriculum Alignment

- Learn about the structure of the earth (Year 6).
- Learn about fossils and how they are formed (Year 6).

Description of the live dive

This live broadcast will be along the edge of the vertical wall which goes from 6.1 m to 610 m. 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 the geologic and oceanographic history of the “wall” and Little Cayman, 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. The dive will observe changes in ecosystems at various depths including: small niches, large expanses of vertical wall, and blue water communities along the wall. Pre-recorded footage and images will be used to show changes in geology and oceanography over time, as we are only able to show a snapshot of what reefs look like today during the live broadcast.



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 introduces the Cayman Trench and the “wall”
10:00 - 15:00	Educator guides students on a tour of the wall at various depths
15:00 - 20:00	Questions
20:00 - 25:00	Educator explains change in the ocean’s benthic habitat based upon basic geologic and oceanographic theory
25:00 - 35:00	Educator engages students to report their observations from the different environments along the wall
35:00 - 40:00	Questions
40:00 - 45:00	CCMI host on the boat recaps the live dive and concludes the lesson

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.doe.ky
- www.education.gov.ky/education/curriculum
- www.oceanservice.noaa.gov/kids/
- www.reefresilience.org/coral-reefs
- www.projectaware.org



Fun Fact Sheet - Diving off the Wall

1. Approximately 75% of the earth's surface is covered by oceans, accounting for 97% of the water on earth. Less than 1% of the Earth's water is freshwater (Laymon 2003).
2. Ninety-five per cent of the oceans are still unexplored, mostly the deep ocean. Scientists currently know more about the surface of the moon and Mars than they do about our oceans (Copley et al. 2008).
3. Ninety per cent of the world's volcanic activity occurs underwater in the oceans (NOAA 2006).
4. The Mid-Ocean Ridge is the longest mountain range in the world at more than 72,000 km long, and it is located underwater (NOAA 2006).
5. The world's deepest place is the Mariana Trench at 11,034 m deep in the western region of the Pacific Ocean (NOAA 2006).
6. The Cayman Trench, also known as Bartlett Deep, Bartlett Trench, Bartlett Trough or the Cayman Trough, was first explored for research in 2008 by Dr. Jon Copley, who wanted to identify hydrothermal vents located within the trench using 'whale-friendly' sonar (Copley et al. 2008).
7. The Cayman Islands are outcrops of a submarine mountain range, which leads to large underwater vertical relief (Unruh 2008).
8. The Cayman Trough, greater than 5000 m deep, is formed by the plate boundary of the Caribbean plate (south) and the North American plate (north) (Dillon et al. 1993).
9. These plates are slipping past each other at a rate of 19 mm per year (DeMets et al. 2007).
10. The Cayman Trough is home to some of the deepest and hottest hydrothermal vents in the world, some up to 450°C - hot enough to melt lead (McGrath 2012).
11. The Cayman Trough began forming in the Eocene epoch, between 56 to 33.9 million years ago (Brunt et al. 1994).
12. Wall diving is a unique experience where divers can find the smaller reef dwelling organisms and the larger pelagic (aka oceanic) species in the same location (Laymon 2003).
13. Unlike many other underwater trenches, the Cayman Trough is likely a result of tectonic plate tension, rather than mantle circulation (Bowen 1968).
14. The Cayman Trough could hold many answers to global deep-sea life, as it lays where an Atlantic and Pacific deep-sea connection used to be before North and South America joined, three million years ago (National Oceanography Centre 2008).

In Class Activity Sheet - Diving off the Wall

You're the scientist! Help our CCMI scientist to identify the changing organisms as he/she moves from the top of the "wall" down the wall to a deeper depth. Using the outline of the wall below, label or draw these organisms according to where you spot them during our dive. Are they on top of the wall? Are they at 10 m, 15 m, or 20 m? If you see an organism that you don't know, be sure to ask our CCMI scientist so that you can include it in your wall! We've given you some examples to help you get started...

