



Dive 1: Lesson Plan – Welcome Back to Reefs Go Live: Quiet Oceans

Module Summary

Welcome back to Reefs Go Live! We are starting the 2021 RGL Season with a very special broadcast. Not only will students be re-introduced to the coral reef ecosystem but the CCMI research team will take the students through their latest research project “Quiet Oceans”.

Students will be taken on an underwater exploration in Grand Cayman, at a dive site that has been barely used over the last year, since the Covid-19 pandemic forced the closure of the international borders in the Cayman Islands. Students will learn about why fish populations are so important to the coral reef ecosystem, why human impact is an important factor for marine conservation, as well as being introduced to key principles, such as biodiversity, density and biomass.

Suitable for years: 4, 5 & 6

Learning Objectives

- List some of the fish that make up the coral reef ecosystem in the Cayman Islands
- Learn what an ecosystem is and how different organisms play various parts
- Explain what a herbivorous fish is and why are they important
- Summarize why fish populations are important to coral reefs and to humans
- Think about and plan an activity to help coral reefs in the future

Science National Curriculum Alignment

- Observe similarities and differences among animals and among plants (Year 4).
- Find out about other animals, including how they grow, feed, move, use their senses (Year 4).
- Investigate a local habitat, including the relationship between the animals and plants found there, and develop skills in classifying animals and plants by observing external features (Year 4).
- Investigate the conditions necessary for the growth of familiar plants including light, heat and water. For example, place plants in different environments, varying the light, water, and temperature and observe the results (Year 5).
- Order living things in a simple food chain and understand the dependency on one another (Year 6).



Description of the live dive

The dive will take place on a dive site that is very popular for tourists but has been 'Quiet' for a year, giving the coral reef ecosystem an unusual opportunity to exist with limited human activity. This coral reef is rich with marine life. The underwater educator will communicate with the live lesson host (who will be on the boat) and with the engaged remote class. The educator will take the students through an understanding of how fish abundance and biodiversity have been impacted by reduced human activity as a result of Covid-19, 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 diversity and complexity of the coral reef, should these processes not be discovered naturally during the broadcast. The dive will include a visual demonstration of conducting a reef survey as a way of understanding the health of our coral reef ecosystem.

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 research project 'Quiet Oceans'
- 05:00 –10:00 Educator describes biodiversity, density and biomass and why this is important to fish populations
- 10:00 – 15:00 Educator explores the local fish populations and answers questions
- 15:00 – 20:00 Educator summarizes why managing the coral reef ecosystem is so crucial to planetary health
- 20:00 –45:00 Educator and host answer questions live from the audience

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
- <https://reefguide.org/>
- www.oceanservice.noaa.gov/kids/



Teacher Resources: Quiet Oceans Definitions List

Our CCMI educator and host will refer to a number of key terms which will be defined throughout the broadcast. We have also provided a definitions activity for students to complete while viewing the episode. The relevant terms are defined below.

BIODIVERSITY- the variety of life in a particular area/ecosystem, in this case referring to different species

BIOMASS- the total mass of organisms in a given area

DENSITY-(in ecology) the number of individuals of a given species that occurs within a sample unit or study area

TROPHIC GUILD- a group of species with similar diets

ANTHROPOGENIC- human impacts on the environment, ecosystems, biodiversity, and natural resources, caused directly or indirectly

ECOSYSTEM- a community of living organisms in conjunction with the nonliving components of their environment, interacting as a system



Fun Fact Sheet – Welcome Back to Reefs Go Live: A Review of Coral Reefs

1. Coral reefs are important because they protect our coastlines from storm damage, provide habitat for many commercially important fishes, and are estimated to generate \$375 billion USD in economic and environmental services worldwide annually (Costanza et al. 1997).
2. The average depth below the water's surface in the Caribbean Sea is about 2,200 m (Spaulding et al. 2001).
3. Coral reefs only make up less than 1% of the ocean floor, but they are home to 25% of all marine species (Worm et al. 2006).
4. Today's coral reefs are between 5,000 and 10,000 years old, but ancestors of these reefs formed almost 250 million years ago (Knowlton and Jackson 2008).
5. Coral reefs are the largest living organism in the world. The largest reef system is the Great Barrier Reef in Australia, which is just over 4,000 km long and can be seen from outer space (Belfield 2002).
6. Corals are an animal, a plant, and a rock all in one (Nothdurft 2009).
7. Coral reefs act as the world's carbonic sink, trapping carbon. Excessive carbon dioxide (CO₂) is being emitted into our atmosphere, and as the atmosphere becomes supersaturated, excess carbon is forced into our oceans resulting in ocean acidification. However, coral reefs are taking up this excess carbon in their nutrient cycle and helping to clean our oceans (Anthony et al. 2011).
8. It is estimated that over one billion people world-wide rely on coral reefs for food, income, and eco-tourism opportunities (WWF 2017).
9. Ninety-five per cent of nutrients that corals need to survive is obtained from the zooxanthellae living inside the coral polyps, undergoing photosynthesis. The other 5% comes from the coral polyps using their tentacles to reach out and grab food that floats by in the water column (Cheal et al. 2010).
10. Coral reefs are important to the development of new medicines linked to the treatment of cancer, Alzheimer's, bacterial infections, and other diseases (Reaka-Kudla 1997).
11. It is estimated that we have lost approximately half of the world's coral reefs over the last 30 years, and we could potentially lose more than 90% by the year 2050 if we don't take drastic measures (Gates 2016).
12. Coral reefs are the connecting ecosystem between nursery grounds (such as seagrass beds or mangrove forests) and the open sea. This is where most developing fishes spend a portion/majority of their lives reaching sexual maturity before some apex predators move to open ocean (NOAA 2015).



In-Class Activity Sheet – Welcome Back to Reefs Go Live:

Quiet Oceans Key Words

In today's Reefs Go live you are going to learn some important words. Can you help the CCMI research team by writing down what the words mean? This will help you communicate them to your teacher, parents and friends, to help explain why fish populations are so important for coral reef health. Imagine you are going to be a journalist and you are going to write up an important news article on what you learned today, these key words will help you.

1
BIODIVERSITY

3
BIOMASS

5
TROPIC GUILD

1. _____

2. _____

3. _____

4. _____

5. _____

6. _____

2
DENSITY

4
ECOSYSTEM

6
ANTHROPOGENIC

Quiet Oceans In-Class Activity Sheet: Surveying the Ecosystem

Our CCMI scientist needs your help! If you see one of the below creatures during the dive, or if you can research and identify them, make sure you label what you see next to it. If you see something during our dive that our underwater educator doesn't see, please let us know what you see in the YouTube chat box! Can you identify what it is? Describe or draw it in one of the empty boxes below. If you cannot identify it, describe it to your teacher, who will share with the CCMI scientist to help you identify it!



1. _____

2. _____

3. _____

4. _____

5. _____

6. _____

7. _____

8. _____

Bonus (draw your own)

Bonus (draw your own)

