



Dive 4: Lesson Plan - How do Scientists Grow Coral?

Module Summary

This module is an opportunity for students to dive into the world of growing corals and CCMI's coral nursery. Students will be given an in-class activity to assist with the understanding of the importance of corals, coral reefs, and coral nurseries. Methods such as cleaning corals, outplanting corals, and monitoring corals will be demonstrated live by an underwater educator. Students will be able to participate in a live lesson by interacting with the underwater educator while performing nursery methods such as: cleaning corals, preparing corals for outplanting, and outplanting a living coral onto the reef.

Year 4, 5

Learning Objectives

- Define the importance of coral nurseries
- Explain why fragmenting corals is only okay in a nursery setting
- Summarize the scientific method scientists use to grow coral
- Report on the difficulties and challenges scientists face with coral nursery work
- Organize a volunteer effort to assist with a local coral nursery

Science National Curriculum Alignment

- Find out about other animals, including how they grow, feed, move, and use their senses (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).

Description of the live dive

The dive takes place in front of CCMI's coral nursery in the sand between two fingers of pristine coral reef that is rich with marine life. The underwater educator communicates with the lesson host on the boat and with the engaged remote classes that were live at the time. The educator takes the students through a series of fun facts and learning objectives regarding corals and coral nurseries, in alignment with the Science National Curriculum of the Cayman Islands. Students will have an in-class activity to complete during the lesson. Pre-recorded footage and images are used to show examples of outplant site success stories where the diversity of corals and fishes is high due to methods of coral farming, as these sites are too far to reach during the live broadcast. The dive includes a visual demonstration on nursery methods such as cleaning corals in the nursery, removing corals to prepare for outplanting, and physically outplanting a live coral onto the reef.



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 describes history of coral nurseries
- 10:00 - 15:00 Educator explores the CCMI coral nursery
- 15:00 - 20:00 Questions
- 20:00 - 25:00 Educator explains the importance of coral nurseries
- 25:00 - 35:00 Educator demonstrates some nursery methods; cleaning, fragmenting, and outplanting
- 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.

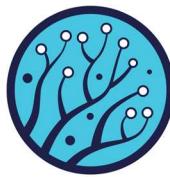
Useful resources

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



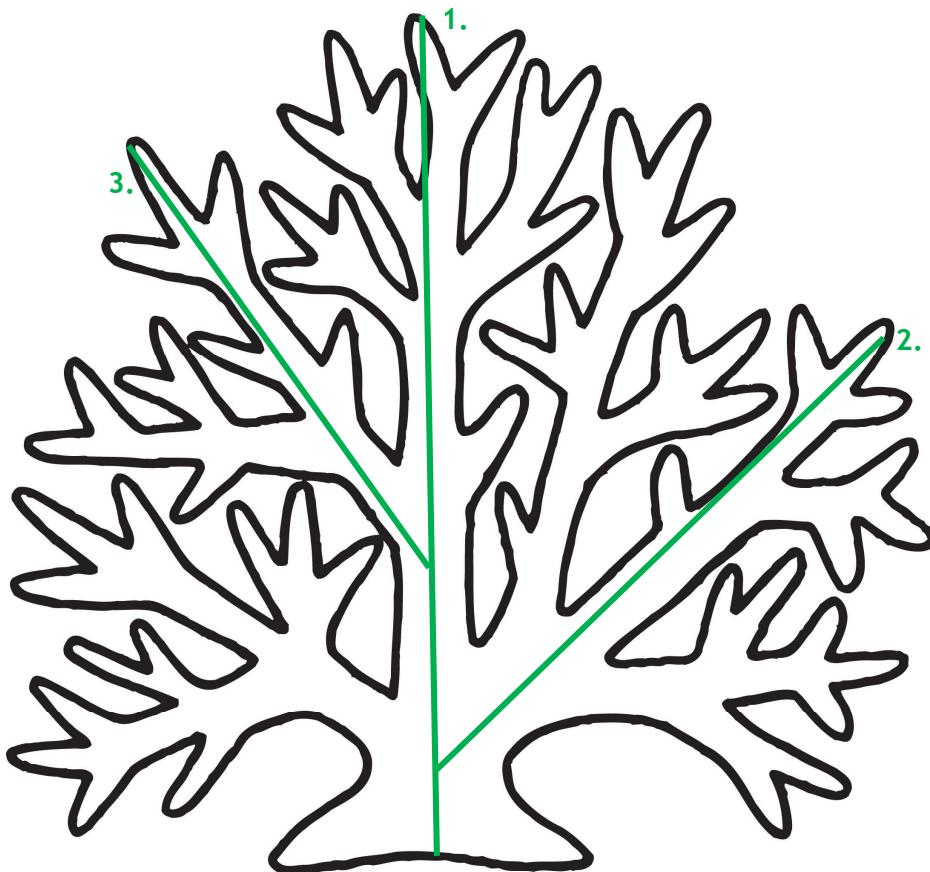
Fun Fact Sheet - How do Scientists Grow Coral?

1. Corals are animals living in a symbiotic relationship with microscopic algae called zooxanthellae that live within the coral's polyps. Corals also build their own exoskeleton out of calcium carbonate, similar to our own human skeleton. This makes them an animal, a plant, AND a rock (Jackson 1997).
2. Growing corals underwater is very similar to growing plants on land. Corals are reared in an ideal habitat area called a coral nursery. Coral nursery methods such as the ones used at the CCMI nursery are based on terrestrial nursery practices (Lirman et al. 2012).
3. Nursery methods for growing corals are taken from the fact that corals are able to reproduce in two ways, both asexually (through fragmentation, which scientists use in coral nurseries) and sexually (through annual massive spawning events) (Schopmeyer et al. 2013).
4. Coral fragmentation occurs when a small piece of coral breaks off of the larger coral colony (called the parent colony). Scientists mimic this natural process by cutting small fragments and re-attaching them to a structure. Coral fragments then grow into larger, healthy, adult colonies of coral (Young et al. 2012).
5. Once corals grown in an underwater nursery setting are large enough (between the size of a melon and a basketball for staghorn corals), they can be carefully removed from the nursery and outplanted onto the reef (CCMI 2016).
6. Coral outplanting can be a very complicated process and requires a lot of preparation. First scientists must grow the coral, then select corals to outplant and pick an appropriate outplant site. Corals must be safely transferred to the new outplant site and then physically outplanted onto the reef. Once outplanted corals must be monitored to determine how well outplants survive at the new site.
7. CCMI has two underwater offshore coral nurseries currently growing two species of critically endangered coral, *Acropora cervicornis* (staghorn coral) and *Acropora palmata* (elkhorn coral) (CCMI 2017).
8. Staghorn coral grows an average of 8-10 cm per year in the wild; however, CCMI scientists have shown that in a nursery setting it can grow an average of 50-70 cm per year (CCMI 2017).
9. The Cayman Islands have some of the deepest and healthiest staghorn coral colonies ever recorded, being found as deep as 26 m (CCMI 2016).
10. Nursery grown outplanted colonies of coral have proven to increase habitat for commercially important fish species, provide millions of dollars a year in eco-tourism, offer multiple opportunities for outreach education, and provide a new research platform for scientists (Johnson et al. 2011).
11. CCMI's first coral nursery was constructed in 2012, and it was the pilot nursery for all of the Cayman Islands. Now there are 12 Cayman Islands DoE permits for coral nurseries throughout the country, and six nurseries are currently growing corals (DoE 2017).



In Class Activity Sheet – How do Scientists Grow Coral?

You're the scientist! Help our CCMI scientist to analyse and measure this coral. Cut out the ruler at the bottom of the page to measure the maximum height, maximum width, and total linear extension (TLE) of the coral outline below, just like the CCMI scientists do in our coral nursery! To calculate TLE, add up the total length of ALL of the branches, using the green "help lines" below. The ruler below is marked in centimetres (cm).



How many branches are there? _____

What is this coral's TLE in cm? _____

What is the max width of this coral? _____

What is the max height of this coral? _____

Cut here -----

