



a nonprofit membership organization dedicated to improving and protecting our coral reef ecosystem
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Virtual Marine Science Classroom

Unit 1: Marine Ecosystems

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Course Description: This unit was designed to supplement existing science coursework. Students will learn about various biomes around the planet. They will then learn about specific ecosystems that can be found in or near marine areas as well as the various roles organisms experience.

Course Objective:

1. Students will be able to recognize different ecosystems and their purpose.
2. Students will be able to understand and explain various roles of an ecosystem.
3. Students will gain a better understanding of the natural world.

Attendance:

Students are able to complete this at their own pace. There are no deadlines for materials, and it is up to the student and parent/teacher to keep said student on their desired pace.

Internet Etiquette:

Reef Relief staff has enabled commenting on the materials. The comment sections shall be used to ask legitimate questions or voice formatting/technological issues. Should there be any concern about this please contact us.

Materials:

All course materials and worksheets are provided in an online PDF format. If your student does not have access to a printer, feel free to write down your answers on a separate piece of paper.

Technical Difficulties:

Please contact us via email or phone to let us know about any technical difficulties, we will be more than happy to assist!

Course Work:

Reef Relief has provided many different videos and activities for the students. Students are not required to complete all of the materials in this unit, it is ultimately up to the student, parent or teacher.

Skill Level:

Many activities are labeled Beginner, Medium, or Advanced and it is up to the adult to decide what they would like their student to complete. We recommend the following to evaluate:

- Beginner: Someone new to marine science or is between the ages of 5-8.
- Medium: Someone who has received a moderate amount of science education or between

the ages of 9-11.

- Advanced: Someone who is comfortable with more in depth science topics or between the ages of 12-17.

Grading:

Reef Relief will not be implementing any grading. Parents and teachers may make the personal decision to grade their student's work. There will be a section labeled answer keys that can be used to check your student's work.

Sharing of Material:

Please do not share classroom materials with others. This includes but is not limited to the class password, the class link, worksheets, video, etc.

Office Hours:

Reef Relief is open Monday- Friday from 10:00 AM until 4:00PM EST. Outside events may change these hours however we will do our best to respond as promptly as possible.

Feedback:

We appreciate your feedback! Please let us know if you have any questions, comments, or concerns by emailing us or posting in the classroom. There is also a survey within the unit you may submit your feedback in.

Unit 1 Syllabus

Pre-Quiz: We encourage every student to take the pre-quiz at the beginning of the course to evaluate their basic knowledge. The information compiled from this quiz will be used for Reef Relief's general knowledge and grant purposes.

Biomes:

- Lesson 1: Biomes and Ecosystems
 - Learn about biomes, ecosystems, and symbiotic relationships.
- Lesson Notes: Biomes
 - Follow along worksheet you may complete during or after the lesson for review and retention.
- Worksheet: Biotic/Abiotic Matching (Beginner)
 - Color and cut the items, then group them into abiotic and biotic sets.
- Worksheet: Biome Activity (Medium)
 - Select a biome that you would like to learn more about and fill in the blank spaces.
- Activity: Symbiotic Matching (Medium to Advanced)
 - Cut out the cards and pair them by their symbiotic relationships. Determine if the relationship is mutualism, commensalism, or parasitism.
- Presenter Notes: Biomes
 - A copy of the PowerPoint slides to assist with activities.

Food Webs:

- Lesson 2: Food Webs
 - Learn about the different roles of an ecosystem, and practice reading food chains and food webs.
- Lesson Notes: Food Webs
 - Follow along worksheet you may complete during or after the lesson for review and retention.
- Worksheet: Kingdoms of Life (Medium)

- Review the kingdoms of life
- Worksheet: Photosynthesis and Cellular Respiration (Advanced)
- Worksheet: Create Your Own Food Web (All)
 - Choose your favorite ecosystem and design a realistic food web.
- Presenter Notes: Food Web
 - A copy of the PowerPoint slides to assist with activities.

Coral Reefs:

- Lesson 3: Coral Reefs
 - Learn about coral, what it is, what it does, and why it is so important.
- Lesson Notes: Coral Reefs
 - Follow along worksheet you may complete during or after the lesson for review and retention.
- Lesson 3.5: Beginner Level Coral Reef Lesson
 - Learn about coral, what it is, what it does, and why it is so important.
- Lesson Notes: Beginner Coral Reefs
 - Follow along worksheet you may complete during or after the lesson for review and retention.
- Activity: Create Your Own Coral Polyp Craft (Beginner to Medium)
 - Create your own coral polyp craft out of a toilet paper roll.
- Worksheet: Color the Coral (Beginner)
 - Give the coral its zooxanthellae by coloring in the different species.
- Worksheet: Identify the Coral (Medium)
 - An expansion from the previous worksheet, students will not only color the coral but must label the species properly.
- Video Activity: Coral Reproduction (Advanced)
 - Coral Reproduction Video and Activity Directions
 - Watch this video first to be introduced to the different ways corals can reproduce, and for instructions on the coinciding activity.
 - Presenter Notes: Coral Reproduction
 - A copy of the PowerPoint slides to assist with the activity.
 - Activity: Coral Spawning
 - Print the worksheet and conduct this activity to see why corals reproduce using mass broadcast spawning.
- Interview With a Scientist: Michelle Dobler (Advanced)
 - Learn all about coral reproduction with research scientist, Michelle Dobler from NOVA Southeastern University. Michelle is a field researcher in the Florida Keys Barrier Reef Tract.
- Additional Resource: Coral City Camera
 - Watch the live stream video for a chance to see real-time reef activity.
- Additional Resource: Coral Life Cycle Video
 - Watch this video to learn about the coral life cycle.
- Movie: Coral Hybrids
 - Watch this episode of Changing Seas to learn about a specific hybrid species of coral on the rise.
- Movie: Corals of the Deep
 - Watch this episode of Changing Seas to gain a better understanding of ancient deep-sea corals.
- Presenter Notes: Coral Reefs
 - A copy of the PowerPoint slides to assist with activities.
- Presenter Notes: Beginner Coral Reefs
 - A copy of the PowerPoint slides to assist with activities.

Mangroves:

- Lesson 4: Mangroves

- Lesson Notes: Mangroves
 - Follow along worksheet you may complete during or after the lesson for review and retention.
- Worksheet: Mangrove Cut and Paste (Beginner)
 - Cut the organisms out from page two and place on page one. Students should make sure to put the organisms in the correct location.
- Worksheet: Mangrove Cut and Paste (Medium)
 - Cut out the organisms on page two and properly place them on page one. The goal of this assignment is to recognize where you will find the different species in regard to land and water.
- Worksheet: Mangrove Identification (Medium to Advanced)
 - Organize the traits in the word box to the type of mangrove they belong to, and draw the three types of mangroves.
- Interview with a Scientist: Michael Timm, MPS graduate from the University of Miami.
 - Listen to Michael answer some of our most common questions about Mangrove ecosystems.
 - Additional Resource: Michael Timm Research Publication titled "Comparisons of south Florida's seawall and natural mangrove stands reveal similar structural attributes".
- Presenter Notes: Mangroves
 - A copy of the PowerPoint slides to assist with activities.

Seagrass:

- Lesson 5: Seagrass
 - Learn about the evolution of seagrass, why it's important, and the largest issues facing seagrass today.
- Lesson Notes: Seagrass
 - Follow along worksheet you may complete during or after the lesson for review and retention.
- Activity: Seagrass Coloring (Beginner)
 - Enjoy coloring this seagrass ecosystem coloring page.
- Worksheet: Seagrass Species (Beginner to Medium)
 - Draw the type of seagrass as it is described.
- Worksheet: Seagrass Word Search (Medium)
 - Complete this word search with seagrass vocabulary.
- Worksheet: Seagrass Word Search (Advanced)
 - Complete this word search with seagrass vocabulary.
- Activity: Seagrass Experiment (All Ages)
 - Conduct this experiment to observe why seagrass is such an effective habitat for small prey. Video and paper instructions provided.
- Bonus Material: Seagrass Reproduction Overview (Advanced)
 - Do you know how seagrass reproduces? Review these notes on a deeper dive into reproduction methods of seagrass.
- Interview with a Scientist: Carter Henne
 - A discussion with a managing biologist and seagrass expert from Sea and Shoreline LLC.
- Additional Resource: Global Seagrass Observing Network
 - A great place to learn more about seagrass habitat monitoring and restoration projects.
- Movie: Seagrasses & Mangroves
 - Watch this episode of Changing Seas to learn about "prairies of the sea."
- Presenter Notes: Seagrass
 - A copy of the PowerPoint slides to assist with activities.

Algae:

- Lesson 6: Algae
 - Learn about how algae is classified, the importance of algae, and the different kinds of algae.

- Lesson Notes: Algae
 - Follow along worksheet you may complete during or after the lesson for review and retention.
- Worksheet: Micro v Macro Algae Coloring (Beginner)
 - Circle and color which type of algae indicated in the question.
- Worksheet: Algae Word Search (Beginner)
 - Find the words provided that describe algae.
- Worksheet: Algae Mix and Match (Medium)
 - Draw a line from the algae families and pigments that matches the picture.
- Worksheet: Algae Crossword (Advanced)
 - Fill out the algae words based on the clues provided.
- Interview with a Scientist: Dr. Brian Lapointe
 - Dr. Brian Lapointe provides a more in-depth discussion on sargassum.
 - Additional Resource: Dr. Brian Lapointe Research journal article on sargassum.
- Movie: Toxic Algae
 - Watch this episode of Changing Seas to learn about toxic algae blooms in south Florida.
- Presenter Notes: Algae
 - A copy of the PowerPoint slides to assist with activities.

Kelp:

- Lesson 7: Kelp
 - Learn about kelp structure, the importance of kelp, and the importance of keystone species.
- Lesson Notes: Kelp
 - Follow along worksheet you may complete during or after the lesson for review and retention.
- Additional Resource: Dive in a Kelp Forest
 - Experience a virtual dive in a kelp forest with California Academy of Sciences.
- Worksheet: Identify Animals Coloring (Beginner)
 - Color the 5 animals that you can find in the kelp forest.
- Worksheet: Kelp Structure (Medium)
 - A review of the structure and function of kelp.
- Worksheet: Trophic Cascade (Advanced)
 - Fill out the worksheet with the information you learned in the lesson.
- Presenter Notes: Kelp
 - A copy of the PowerPoint slides to assist with activities.

Deep Sea:

- Lesson 8: Deep Ocean
 - Learn about the different deep ocean environments, how the lack of light has forced organisms to adapt, learn about a few awesome deep ocean creatures, and learn about the deepest ocean point.
- Lesson Notes: Deep Sea
 - Follow along worksheet you may complete during or after the lesson for review and retention.
- Activity: Paper Plate Anglerfish Craft (Beginner to Medium)
 - Follow the instructions to create your own paper plate anglerfish.
- Worksheet: Deep Sea Creature Feature (Medium)
 - Creature feature worksheet: after watching the deep ocean lesson video, review the organisms you learned about.
- Worksheet: Create Your Own Deep Sea Creature (Advanced)
 - Create your own new deep sea creature that doesn't exist. Answer the questions to help you form it, then draw it.
- Activity: Deep Sea Colors Video Activity (All levels)
 - Watch this video to learn more about colors in the deep sea. For beginner level simply

watch and follow along. For Medium and Advanced, print and complete the follow along worksheets.

- Additional Resource: Scroll to the Bottom of the Deep Sea
 - Check out this website to see how deep the ocean really goes and what creatures you can find at different depths.
- Movie: Creatures of the Deep
 - Watch this episode of Changing Seas to learn how oil spills in the Gulf of Mexico affect deep-sea creatures.
- Presenter Notes: Deep Ocean
 - A copy of the PowerPoint slides to assist with activities.

Polar:

- Lesson 9: Polar
 - Lets learn about the North and South Poles, the importance of ice and the different organisms that thrive in the icy cold.
- Lesson Notes: Polar
 - Follow along worksheet you may complete during or after the lesson for review and retention.
- Worksheet: South and North Pole Comparison (Beginner to Medium)
 - Print out the 3 sheets. Color, cut, and paste the animals onto the proper ecosystem of where they are from (Antarctic or Arctic).
- Worksheet: Polar Question Sheet (Advanced)
 - Test your polar knowledge with this polar question sheet.
- Activity: Blubber Experiment (All Ages)
 - Make your own “blubber” glove and discover how animals stay warm at the poles.
- Interview with a Scientist: Dr. Henry Huntington
 - Dr. Henry Huntington provides an in-depth interview about the Arctic, research, the biological importance of the Arctic, and the importance of sea ice to different Arctic animals.
- Presenter Notes: Polar
 - A copy of the PowerPoint slides to assist with activities.

Bonus Material:

- iSpy: Florida Keys Ecosystems
 - Apply what you learned during this unit to identify various organisms in the ecosystems.
- Worksheet: Ecosystems Compare (Medium to Advanced)
 - Compare what you learned about each organism in the unit!

Post Quiz: We encourage every student to take the post-quiz at the beginning of the course to evaluate their basic knowledge. The information compiled from this quiz will be used for Reef Relief’s general knowledge and grant purposes.

Answer Keys: We have provided answers to most worksheet activities and combined them into this folder for parents and teachers to check their student’s work.