# Coral Reef Bleachwatch Program

**Grade Level:** High School or above

**Timing:** Class is one hour and field trip is 3 hours (field trip can be shortened)

**Summary**: The coral reef ecology program is a part of MarineLab's core curriculum. MarineLab's coral reef Bleachwatch program was created for more advanced students and for groups interested in service learning/citizen science opportunities. Students will learn about the importance of this diverse habitat, snorkel multiple reefs, and collect coral bleaching data. Coral bleaching is a common disturbance to coral reefs and a local organization, Mote Marine Lab, has created a program for snorkelers to survey the corals while snorkeling. MarineLab staff will be in the water and on the boat to lifeguard, point out marine life, and discuss observations. Students will discuss data once on the boat and data will be entered into an online database used by scientists at Mote Marine Lab.

**Program Objectives:**
After completion, students will be able to…

- Differentiate between coral bleaching and disease
- Participate in a coral bleaching study in the FL Keys
- Have an appreciation for the delicate coral reef habitat and understand the reasoning for proper snorkeling etiquette
- List three reasons coral reefs are an important habitat within the FL Keys marine ecosystem and three threats to the habitat
- List three types of corals and give examples of species

**Concepts Covered:**
- Types of corals and coral reproduction
- Ecological and economical importance of coral reefs in the Florida Keys
- Relationship with coral and zooxanthellae
- Abiotic conditions necessary for healthy coral reefs
- Disturbances to corals in the Florida Keys and coral reef protection efforts in the Florida Keys
- Fragility of the coral colony and proper coral reef snorkeling etiquette
- Mote's Bleachwatch protocols
- Differences between coral bleaching, paling, coral disease and coral predation

**Vocabulary:** ecology, hexacoral, gorgonian, octocoral, spur and groove bank reef, patch reef, mutualistic symbiosis, zooxanthellae, coral bleaching, salinity, diversity, polyp, nocturnal, oligotrophic, mooring buoy

**Procedures:** The program begins with a classroom discussion covering the concepts and vocabulary listed above. The students are then taken snorkeling, usually at two sites, to view the coral reef habitat with a MarineLab staff biologist guide. Students will discuss observations once on boat and record data.

**Extensions:** Ask staff about our efforts in collaboration with the Coral Restoration Foundation (http://www.coralrestoration.org/) and Mote Marine Lab (https://mote.org/research/program/coral-reef-science-monitoring/bleachwatch)

**Resources:** http://floridakeys.noaa.gov/corals/welcome.html


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## Standards:

***Next Generation Sunshine State Standards***

SC.5.L.17.1: Compare and contrast adaptations displayed by animals and plants that enable them to survive in different environments such as life cycles variations, animal behaviors and physical characteristics.

SC.7.L.17.2: Compare and contrast the relationships among organisms such as mutualism, predation, parasitism, competition, and commensalism.

SC.7.L.17.3: Describe and investigate various limiting factors in the local ecosystem and their impact on native populations, including food, shelter, water, space, disease, parasitism, predation, and nesting sites.

SC.912.L.17.2: Explain the general distribution of life in aquatic systems as a function of chemistry, geography, light, depth, salinity, and temperature.

SC.912.L.17.4: Describe changes in ecosystems resulting from seasonal variations, climate change and succession.

SC.912.L.17.6: Compare and contrast the relationships among organisms, including predation, parasitism, competition, commensalism, and mutualism.

SC.912.L.17.8: Recognize the consequences of the losses of biodiversity due to catastrophic events, climate changes, human activity, and the introduction of invasive, non-native species.

***Ocean Literacy Principles:***

**Principle 3.** The ocean is a major influence on weather and climate.

f. The ocean has had, and will continue to have, a significant influence on climate change by absorbing, storing, and moving heat, carbon and water. Changes in the ocean's circulation have produced large, abrupt changes in climate during the last 50,000 years.

g. Changes in the ocean-atmosphere system can result in changes to the climate that in turn, cause further changes to the ocean and atmosphere. These interactions have dramatic physical, chemical, biological, economic, and social consequences.

**Principle 5.** The ocean supports a great diversity of life and ecosystems.

c. Most of the major groups that exist on Earth are found exclusively in the ocean and the diversity of major groups of organisms is much greater in the ocean than on land.

d. Ocean biology provides many unique examples of life cycles, adaptations and important relationships among organisms (symbiosis, predator-prey dynamics, and energy transfer) that do not occur on land.

**Principle 6**. The ocean and humans are inextricably interconnected.

d. Humans affect the ocean in a variety of ways. Laws, regulations and resource management affect what is taken out and put into the ocean. Human development and activity leads to pollution (point source, non-point source, and noise pollution), changes to ocean chemistry (ocean acidification) and physical modifications (changes to beaches, shores and rivers). In addition, humans have removed most of the large vertebrates from the ocean.


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e. Changes in ocean temperature and pH due to human activities can affect the survival of some organisms and impact biological diversity (coral bleaching due to increased temperature and inhibition of shell formation due to ocean acidification).


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