

Phytoplankton Monitoring Lab (HAB Lab)

Grade Level: High School and Above

Timing: 2 hours

Summary: Phytoplankton play a vital role in the marine ecosystem; changes in diversity and abundance can affect the entire food chain, including humans. Students will observe and analyze phytoplankton in water samples collected off of Key Largo. Students will work in groups to identify phytoplankton species, determine if toxic and participate in NOAA's Phytoplankton Monitoring Network.

Program Objectives:

After completion, students will be able to...

- Define plankton and explain the difference between phyto- and zooplankton
- Understand the basics of phytoplankton, why we study phytoplankton and the impacts HABs can have
- Differentiate between the two main groups of phytoplankton: dinoflagellates and diatoms
- Identify five different species of phytoplankton and five species of zooplankton
- Participate in data collection for the Phytoplankton Monitoring Network

Concepts Covered:

- Zooplankton versus phytoplankton
- Benefits of healthy phytoplankton communities
- Sources and impacts of harmful algal blooms
- Dinoflagellates and diatoms and the identifying characteristics of each group
- Phytoplankton species identification
- Importance of monitoring phytoplankton

Vocabulary: plankton, zooplankton, phytoplankton, dinoflagellate, diatom, harmful algal bloom, biomagnification, toxin, red tide, monitoring

Procedure: The hands on portion of the lab will be preceded by a powerpoint presentation where students will learn about plankton, the importance of phytoplankton in the marine ecosystem, sources and impacts of HABs and how to identify phytoplankton. Students will then participate in data collection for NOAA's Phytoplankton Monitoring Network by filtering and analyzing water samples collected from water adjacent to Key Largo. Each group of students will have a compound microscopes with screens to utilize for analysis.

Extensions: All data will be entered into NOAA's program database as well as the MarineLab database. All data is accessible to be used in home classroom.

Resources: <https://products.coastalscience.noaa.gov/pmn/>



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Standards Addressed:

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.912.L.14.4: Compare and contrast structure and function of various types of microscopes.

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

SC.912.L.17.18: Describe how human population size and resource use relate to environmental quality.

Ocean Literacy Principles

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

e. The ocean dominates the Earth's carbon cycle. Half the primary productivity on Earth takes place in the sunlit layers of the ocean and the ocean absorbs roughly half of all carbon dioxide added to the atmosphere.

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.

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

a. Ocean life ranges in size from the smallest living things, microbes, to the largest animal that has lived on Earth, blue whales.

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.

h. Tides, waves, predation, substrate, and/or other factors cause vertical zonation patterns along the coast: density, pressure, and light levels cause vertical zonation patterns in the open ocean. Zonation patterns influence organisms' distribution and diversity.

Principle 6. The ocean and humans are inextricably interconnected.

a. The ocean affects every human life. It supplies freshwater (most rain comes from the ocean) and nearly all Earth's oxygen. The ocean moderates the Earth's climate, influences our weather, and affects human health.

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.

Principle 7. The ocean is largely unexplored.

b. Understanding the ocean is more than a matter of curiosity. Exploration, experimentation, and discovery are required to better understand ocean systems and processes.



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