

# Advanced Water Quality Lab

**Grade Level:** High School and Above (**APES**)

**\*\* Service learning/citizen science is always integrated into the water quality lab \*\***

**Timing:** 1 hour

**Summary:** Abiotic water parameters determine the health and the community of any water system. Water quality parameters will be discussed as well as tools and methods to measure each parameter. Students will have hands on opportunity to use all of the tools in preparation for water quality field collection and analysis.

## Program Objectives:

After completion, students will be able to:

- List five water quality parameters and a tool that can be used to measure each parameter
- Participate in a worldwide citizen science program and collect data for a south Florida university
- Interpret the water quality data collected

## Concepts Covered:

- Environmental conditions determine the geographical distribution of all organisms
- Relevant water quality parameters and the common tools used to measure each parameters
- Water quality parameters can vary significantly from the Bay to the Ocean, inshore to offshore.
- Causes/effects of fluctuations of each parameter, including ocean acidification and increased salinity
- Healthy levels for all water quality parameters
- Units of measurement for all water quality parameters
- Importance of long term monitoring
- Precision versus accuracy
- Importance of replicate measurements

**Vocabulary:** abiotic/biotic, refractive index, salinity, specific gravity, hypoxia/anoxia, Refraction, refractometer, hydrometer, turbidity, Secchi disk, YSI sonde, acidity/alkalinity, hypersaline, hyposaline, pH, ammonia, precision, accuracy, turbidimeter, conductivity, colorimeter, eury/steno haline/thermal, eutropic, oligotrophic

**Procedure:** Students discuss water quality, common parameters and tools used to measure each parameter. Students will measure sample waters to gain experience in water quality data collection and analysis before collecting data in the field. Students will collect water quality data during scheduled snorkel trips.

**Extensions:** It is recommended to include the “summary” program into your schedule if your group is participating in this lab. During the summary, all water quality data will be discussed and entered into the GLOBE database. Additionally, all water quality data collected by MarineLab staff and/or students is available for analysis before or after your MarineLab program.

**Resources:** [www.globe.gov](http://www.globe.gov)



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# Standards:

## *Next Generation Sunshine State Standards*

**SC.5.N.1.3:** Recognize and explain the need for repeated experimental trials.

**SC.6.N.1.2:** Explain why scientific investigations should be replicable.

**SC.7.N.1.2:** Differentiate replication (by others) from repetition (multiple trials).

**SC.8.N.1.2:** Design and conduct a study using repeated trials and replication.

**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.17.18:** Describe how human population size and resource use relate to environmental quality.

## *Ocean Literacy Principles*

**Principle 1.** The Earth has one big ocean with many features.

e. Most of Earth's water (97%) is in the ocean. Seawater has unique properties: it is saline, its freezing point is slightly lower than fresh water, its density is slightly higher, its electrical conductivity is much higher, and it is slightly basic. The salt in seawater comes from eroding land, volcanic emissions, reactions at the seafloor, and atmospheric deposition.

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

f. Ocean ecosystems are defined by environmental factors and the community of organisms living there. Ocean life is not evenly distributed through time or space due to differences in abiotic factors such as oxygen, salinity, temperature, pH, light, nutrients, pressure, substrate and circulation. A few regions of the ocean support the most abundant life on Earth, while most of the ocean does not support much life.

**Principle 7.** The ocean is largely unexplored.

d. New technologies, sensors and tools are expanding our ability to explore the ocean system. Scientists are relying more and more on satellites, drifters, buoys, subsea observatories and unmanned submersibles.

