

Is It Healthy, or in Trouble? *Teacher's Guide*

GRADE LEVEL: 6th – 8th

SUBJECT AREA/COURSE: Earth Science, Life Science, Chemistry, Environmental Science

SUNSHINE STATE STANDARDS:

- The student uses the scientific processes and habits of mind to solve problems. (SC.H.1.4)
- The student understands most natural events occur in comprehensible consistent patterns. (SC.H.2.4)
- The student understands that humans are part of an ecosystem and their activities may deliberately or inadvertently alter the equilibrium in ecosystems. (SCG.2.3.4)
- The student knows that scientific knowledge is subject to modification as new information challenges prevailing theories and as new theory leads to looking at old observations in a new way. (SC.H. 1.3.1)
- The student knows that a change in one or more variables may alter the outcome of an investigation. (SC.H.1.3.5)

ACADEMIC OUTCOMES/LESSON OBJECTIVES: Students will learn about water quality through:

- Sharing prior knowledge
- Making observations
- Reading graphs
- Making predictions based on observations
- Testing predictions with LaMotte water chemistry kit.
- Draw conclusions based on evidence gathered

BACKGROUND INFORMATION: A lake's overall health, or Trophic State, depends on many factors (variables). One factor is the nutrient chemistry. The basic nutrient chemistry is based on total nitrogen, total phosphorous, and chlorophyll. These nutrients can be tested using different test kits. If your lake has a LAKEWATCH Volunteer, ask the volunteer to test for chlorophyll with your class.

Another factor is water clarity. Water clarity can be tested using a secchi disc or a turbidity test.

A third factor is dissolved oxygen. This conventional pollution is usually measured by the amount of dissolved oxygen and fecal coliform. These can also be tested. In general, lakes are categorized in four trophic states based on their nutrient levels. Oligotrophic is a fairly low nutrient lake, mesotrophic is a lake carrying a medium nutrient load, eutrophic is a lake with fairly high nutrient levels, and hypereutrophic is a lake with very high nutrient levels. Florida lakes naturally vary in their trophic states. An increase in an overall trophic level might indicate nutrient pollution from outside sources, such as agriculture or urbanization.

MATERIALS NEEDED:

- Lake access
- Internet access with www.hillsborough.wateratlas.org bookmarked.
- Test kits for nitrogen and phosphorus, distilled water, milk jugs for chemical waste. (There are no school-age tests for chlorophyll. You may want to test for other-than-nutrient factors, such as dissolved oxygen, pH, temperature, and water clarity.)
- Rubber gloves
- Safety glasses

Name:

Date:

Is It Healthy, or in Trouble? *Teacher's Guide*

SAFETY:

- Go over basic lab safety
- Go over proper outdoor behavior
- Go over how to properly perform the selected tests

VOCABULARY: Trophic states, variables, nutrients, limiting nutrients, nitrogen, phosphorous, chlorophyll, pollution, dissolved oxygen, fecal coliform, agriculture, urbanization, limnology

KEY: Answers will vary.

TEACHER PROCEDURES:

1. Have test kits ready for students to use.
2. Introduce the topic of Limnology.
3. Ask students why it is important to study freshwater ecosystems
4. Ask students how scientists can know if a lake is healthy or not. This is where the teacher would introduce the topic of Trophic States and cover vocabulary.
5. Talk about natural patterns and cycles of lakes.
6. Select a lake to which students have access.
7. Pass out lab papers to students and go over procedures with them.
8. Guide students through internet exercise.
9. When finished gathering the data on the Watershed Atlas be ready to take the students outside.
10. Put the students into lab groups. If you have enough test kits, more than one group can test each parameter.
11. Bring students back into the classroom to finish their conclusion.
12. Compile class data. As data is shared, check to be sure data reported is logical.

AUTHOR: Lindsey Spalding – Modified from the original lesson plans created for the Seminole County Watershed Atlas.

Name:

Date: