

Activities Include:

- Part 1: Explore Your Watershed
- Part 2: Explore a River and Two Lakes
- Part 3: Explore Dissolved Oxygen
- Part 4: Explore Website and Research

Grade Level: 6th – 12th

Performance Objectives:

References are to the Next Generation Sunshine State Standards.

Science

- SC.6.E.7.2 Investigate and apply how the cycling of water between the atmosphere and hydrosphere has an effect on weather patterns and climate.
- SC.6.N.2.3 Recognize that scientists who make contributions to scientific knowledge come from all kinds of backgrounds and possess varied talents, interests, and goals.
- SC.7.L.17.1 Explain and illustrate the roles of and relationships among producers, consumers, and decomposers in the process of energy transfer in a food web.
- 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.8.L.18 Living organisms acquire the energy they need for life processes through various metabolic pathways (photosynthesis and cellular respiration).
- SC.912.L.17.4 Describe changes in ecosystems resulting from seasonal variations, climate change and succession.

Math

- MA.6.A.3.6 Construct and analyze tables, graphs and equations to describe linear functions and other simple relations using both common language and algebraic notation.

Language Arts

- LA.6.6.2.2 Collect, evaluate and summarize information using a variety of techniques from multiple sources (e.g., encyclopedias, websites, experts) that includes paraphrasing to convey ideas and details from the source, main idea(s) and relevant details.

Academic Outcomes/Lesson Objectives:

- Students will be able to search a document and determine relevant information.
- Students will read a graph and show relationships between variables.
- Students will be able to report data in the form of a data table.
- Students will be able to download data and make a graph using the data.
- Students will be able to use a search engine to find information.

Background Information:

The Seminole Water Atlas is a repository of scientific data and documents about the surface water and groundwater in Seminole County, Florida. This set of four student sheets guides both teachers and students into familiarity with this rich website.

Students may work at their own pace, or in pairs. The teacher may plan one Student Sheet per class period. Data is continually updated, so the information will change from year-to-year.

The teacher can gain a working knowledge of how to use the Seminole WaterAtlas website as well as a site-specific answer key by working through the activities in preparation for class. Students will use Excel or another spreadsheet program to set up a data table and will search the web for information.

Duration: Four class periods

Materials Needed: Computers connected to the Internet (Internet Explorer, Netscape, Safari, etc.) with www.Seminole.WaterAtlas.org bookmarked, access to a printer, paper, student handouts, and highlighters.

Safety: N/A

Vocabulary:

Watershed

A watershed is an area of land that collects, stores and transports all forms of precipitation (rainfall and snow melt).

Dissolved oxygen (DO)

The oxygen freely available in water that is vital to the existence of fish and other aquatic life.

Exotic plant

A species of plant that has been introduced to an area outside its native range, either deliberately or accidentally. In Florida, any plant known to have existed in the state prior to the arrival of the Spanish in the 16th century is generally considered to be native.

Trophic State Index (TSI)

A classification system designed to “rate” individual lakes, ponds and reservoirs based on the amount of biological productivity occurring in the water.

Nutrient chemistry

The type and concentration of naturally-occurring ions present (dissolved) in water including nitrogen, chlorophyll, and phosphorous, in all their forms.

Macroinvertebrate

Aquatic invertebrate animals large enough to be seen with the naked eye, consisting mainly of insects and their larvae, shrimp, crayfish, clams, snails, and worms. The analysis of the quantity, diversity, and types of macroinvertebrate species is used as an indicator of water quality.

Evaluation:

- The student will complete the student handouts.
- The student will complete a data table with the information on Water Quality.
- The student will define the vocabulary words and use each correctly in a paragraph written about the activity.

Student Handout Answer Key:

Many topics will be site-specific or subject to change over time, so can't be answered in a key.

Overview

Part One: Explore Your Watershed

A watershed (also called a drainage basin) is an area on the land surface from which water flows or has the potential to flow into a stream, lake, estuary or ocean. Watersheds are naturally separated from adjacent basins by topographic divides.

Part Two: Explore a River and Two Lakes

An exotic plant is one that is not native to Florida. People brought it here. Because it does not have the same “enemies” as it had in its home country, such as diseases and things that eat it, the exotic can out-compete native plants and change the habitat. Animals in the area can't find food and die or move away. Aquatic exotic plants can clog the waterways so boats and even fish can't get through. Floating exotic plants can shade the plants living on the lake or river bottom that are homes and food to aquatic animals.

Digital photos can be submitted by clicking on “Submit a Photo” under the Photo tab and following directions.

Part Three: Explore Dissolved Oxygen

Both aquatic animals and aquatic plants depend on dissolved oxygen in the water. They can't use the oxygen in the H₂O molecules, but there are other atoms and molecules (such as oxygen) tucked in among the water molecules. Animals need to be able to take in oxygen and get rid of carbon dioxide during respiration, when they use their food for energy. Plants in the water put oxygen into the water during photosynthesis, but they use up oxygen during respiration.

Decomposing organic matter uses up oxygen in the water. If the level is too low there may be a fish kill. Macroinvertebrates (invertebrates one can see with the eye) have different tolerances for available oxygen.

Cold liquids including water can hold more gas such as oxygen than can warm water. When a cold soda gets warmer, the gas (carbon dioxide) bubbles out of the liquid.

Fish that live in warm water generally require dissolved oxygen concentrations of at least 5 parts per million also expressed as 5 milligrams per liter or 5 mg/L. Just like humans, fish can endure brief periods of reduced oxygen. However, if DO levels drop below 2 mg/L, they aren't always able to recover. When concentrations fall below 1 mg/L fish begin to die. Dissolved oxygen values vary naturally throughout the day directly related to photosynthetic activity.

Daily fluctuations of oxygen levels are related to photosynthesis of aquatic plants. They give off oxygen during the daylight hours. Plants use oxygen for respiration and give off carbon dioxide, just like animals do. Respiration is occurring all the time, but at night the oxygen isn't replaced by photosynthesis so the level of dissolved oxygen drops.

Part Four: Explore Website and Internet Search

The Trophic State level was 5.4 (good) in 1977.

Aquatic macroinvertebrates are creatures that fish and birds feed on. Some species are indicative of poor water quality, and others indicate good or excellent water quality. Other species in Florida are threatened or endangered. Some species such as mussels and crayfish are fairly reliable indicators of habitat quality. Macro means you can see it with your naked eye.

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