

## Exploring the Watershed Atlas *Teacher's Guide*

*Students learn how to use the Watershed Atlas through a four-part series of activities.*

### ACTIVITIES INCLUDED:

- 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 – 12<sup>th</sup>

**SUBJECT AREA/COURSE:** Science

### SUNSHINE STATE STANDARDS:

#### GRADES 6-8:

- 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.17.1)

#### GRADES 9-12:

- Standard #17: Interdependence (SC.912.17)
  - A. The distribution and abundance of organisms is determined by the interactions between organisms, and between organisms and the non-living environment.
  - B. Energy and nutrients move within and between biotic and abiotic components of ecosystems via physical, chemical and biological processes.
  - C. Human activities and natural events can have profound effects on populations, biodiversity and ecosystem processes.
- Identify sources of information and assess their reliability according to the strict standards of scientific investigation. (SC.912.N.1.4)
- Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger, leading to its durability. (SC.912.N.2.4)

### 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 Pinellas Watershed Atlas is a depository of scientific data and documents on the surface waters of Pinellas 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 Pinellas Watershed Atlas 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.

Name:

Date:

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**MATERIALS NEEDED:** Computers connected to the Internet (Internet Explorer, Netscape, Safari, etc.) with [www.pinellas.wateratlas.org](http://www.pinellas.wateratlas.org) bookmarked, access to a printer, paper, student handouts, and highlighters.

**SAFETY:** N/A

**DURATION:** Four class periods

**VOCABULARY:** Watershed, dissolved oxygen (DO), exotic plants, trophic state index, nutrient chemistry, macroinvertebrate

**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 questions will be site-specific or subject to change over time, so they can't be answered in the following key.

***Part One: Explore Your Watershed***

4. 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 or lake. Watersheds are naturally separated from adjacent basins by topographic divides.

5. d. 2-Year Rainfall Trend shows the amount of rainfall is changing over time. Typically Summer and Fall are wet seasons with higher rainfall amounts and Winter and Spring are drier seasons with lower rainfall amounts. The 2-year Rainfall Trend graph is like a snapshot of rainfall amounts at a given time.

***Part Two: Explore a River and Two Lakes***

12. 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.

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

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### **Part Three: Explore Dissolved Oxygen**

9. Both aquatic animals and aquatic plants depend on dissolved oxygen in the water. They can't use the oxygen in the H<sub>2</sub>O 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.

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

11. Summer

12. 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**

6. Aquatic macroinvertebrates are critters 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 eye.

**AUTHORS:** Polly Wilson and Pat Burkett – Modified from the original lesson plans created for the Seminole County Watershed Atlas.

Name:

Date: