WaterWeb

current water info for schools

A publication of the Southwest Florida Water Management District

Groundwater Teacher's Guide

Welcome to the groundwater issue of WaterWeb*! As part of the Splash! Water Resources Education program, the Southwest Florida Water Management District (SWFWMD) offers the* WaterWeb *water resources newsletter for middle and high school students. The newsletter is correlated to grades 6–8 and 9–12 of the Sunshine State Standards and provides an interesting way for students to increase their awareness and respect for Florida's precious water resources.*

This issue of WaterWeb *focuses on groundwater. It includes nonfiction articles, an aquifer overview, information about water under the surface, a career focus, a classroom activity, a crossword puzzle and word scramble, and a web site to explore. All the information and activities are designed to teach students about groundwater. In addition, we have included* WaterWeb *Challenge, which contains items similar to those students could expect to find on the Florida Comprehensive Assessment Test. Let* WaterWeb *make a splash in your classroom today!*

Many other free materials are available from the SWFWMD and can be ordered online at WaterMatters.org/publications/. *We also offer water resources workshops for teachers. Please contact us if you have any questions or suggestions about our water resources education programs.*

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Groundwater — Page 1

Groundwater can be found beneath the surface almost everywhere on earth. Within the United States, approximately half of the population depends on groundwater on a daily basis. In our region, approximately 80 percent of our water supply comes from the aquifer. Before reading the introductory article on groundwater, review the concepts associated with the water cycle. Key terms include solar energy, precipitation, evaporation, percolation, condensation and transpiration. After reading the article, ask students why they think groundwater is important and why they should learn more about it. During the discussion, emphasize the responsibility citizens have in protecting water resources.

Sunshine State Standards *Science (6–8):* Processes that Shape the Earth, SC.D.1.3. *Social Studies (6–8)*: People, Places and Environments, SS.B.2.3. *Science (9–12)*: Processes that Shape the Earth, SC.D.1.4. *Social Studies (9–12)*: People, Places and Environments, SS.B.2.4.

WaterWeb Query — Page 1

Ask two students to read the parts of Question and Answer. Then ask students if they can identify any wells near their homes.

Sunshine State Standards *Science (6–8):* Processes that Shape the Earth, SC.D.2.3. *Social Studies (6–8):* People, Places and Environments, SS.B.2.3. *Science (9–12):* Processes that Shape the Earth, SC.D.2.4. *Social Studies (9–12):* People, Places and Environments, SS.B.2.4.

Overview & The Floridan Aquifer System — Pages 2 & 3

As a class, read the article and facts about aquifers. Try a few of the extended activities with your students.

Sunshine State Standards *Science (6–8):* Processes that Shape the Earth, SC.D.1.3, SC.D.2.3; The Nature of Science, SC.H.2.3. *Social Studies (6–8):* People, Places and Environments, SS.B.1.3, SS.B.2.3. *Science (9–12):* Processes that Shape the Earth, SC.D.1.4, SC.D.2.4; The Nature of Science, SC.H.2.4. *Social Studies (9–12):* People, Places and Environments, SS.B.1.4, SS.B.2.4.

Water Under the Surface — Page 4

Prior to reading the article, ask students if they have heard of the term "karst." Read descriptions together about Florida's terrain and its prevalence of sinkholes and springs.

Sunshine State Standards *Science (6–8):* The Nature of Matter, SC.A.1.3; Processes that Shape the Earth, SC.D.1.3; The Nature of Science, SC.H.2.3. *Science (9–12):* The Nature of Matter, SC.A.1.4; Processes that Shape the Earth, SC.D.1.4; The Nature of Science, SC.H.2.4.

It's Your Turn — Page 4

Don't Be a Groundwater Polluter!

Ask students to list several types of pollution that affect surface water bodies. Then read the article together. Discuss the difference between the effects of pollution on groundwater and surface water. For an extended activity, have students write about lessons they have learned over time for reducing pollution in our water resources.

Sunshine State Standards *Science (6–8):* Processes that Shape the Earth, SC.D.2.3; How Living Things Interact with Their Environment, SC.G.2.3. *Social Studies (6–8):* People, Places and Environments, SS.B.2.3; Government and the Citizen, SS.C.2.3. *Science (9–12):* Processes that Shape the Earth, SC.D.2.4; How Living Things Interact with Their Environment, SC.G.2.4. *Social Studies (9–12):* People, Places and Environments, SS.B.2.4; Government and the Citizen, SS.C.2.4.

Career Focus

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Emphasize to students that there are many career opportunities for those who choose to work in the environment. For additional information, use the web sites listed at the end of the article.
Sunshine State Standards *Language Arts (6–8):* Reading, LA.A.2.3. *Language Arts (9–12):* Reading, LA.A.2.4.

Classroom Activity

Page 6

Create Your Own Sinkhole

Before beginning this activity, make sure your students understand the concept of a sinkhole. For additional background, guide students through a review of other sections of the newsletter. Proceed with the activity and use the discussion questions to enhance their understanding of groundwater.
Sunshine State Standards *Science (6–8)*: Processes that Shape the Earth, SC.D.1.3, SC.D.2.3; The Nature of Science, SC.H.1.3, SC.H.2.3. *Social Studies (6–8)*: People, Places and Environments, SS.B.1.3, SS.B.2.3. *Science (9–12)*: Processes that Shape the Earth, SC.D.1.4, SC.D.2.4; The Nature of Science, SC.H.1.4, SC.H.2.4. *Social Studies (9–12)*: People, Places and Environments, SS.B.1.4, SS.B.2.4.

Activities

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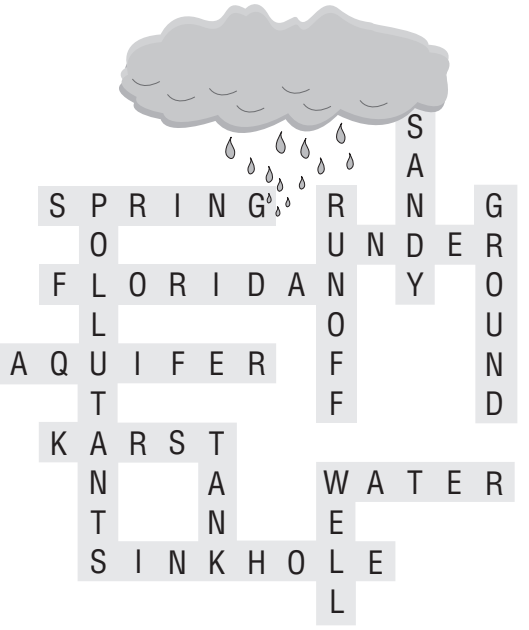

Crossword Puzzle

Although these activities are meant to be fun, they are designed to reinforce important vocabulary and concepts associated with understanding groundwater.

Activities

Page 7

WaterWeb Scramble

Words: ground, polluters, water, Floridan

Paragraph:

It's up to us to protect the groundwater in the Floridan aquifer system. Tell people you know about how important groundwater is to our well-being. Encourage them not to be groundwater polluters.
Sunshine State Standards *Language Arts (6–8):* Reading, LA.A.1.3, LA.A.2.3. *Language Arts (9–12):* Reading, LA.A.1.4, LA.A.2.4.

WaterWeb

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There is a variety of information available on groundwater at the following web site: **www.groundwater.org.**

Be sure to try a few of the other sites that are linked to it. As an extended activity, ask students to prepare research questions about groundwater and search for answers on the Internet.
Sunshine State Standards *Science (6–8):* Processes that Shape the Earth, SC.D.1.3, SC.D.2.3; The Nature of Science, SC.H.2.3. *Language Arts (6–8):* Reading, LA.A.2.3. *Science (9–12):* Processes that Shape the Earth, SC.D.1.4, SC.D.2.4; The Nature of Science, SC.H.2.4. *Language Arts (9–12):* Reading, LA.A.2.4.

WaterWeb Challenge

WaterWeb Challenge

Items included in the Challenge are similar to those presented on the Florida Comprehensive Assessment Test (FCAT). Make copies of the Challenge (on following pages) and explain to students that this provides good practice for preparing for the FCAT. Students should be allowed to use the *WaterWeb* issue as they complete the Challenge.

Answers to multiple-choice items:
1-d, 2-c, 3-a, 4-b, 5-d, 6-c, 7-c, 8-b, 9-d, 10-a

Answers to extended-response items:

Question 1.
Responses will vary. Student should be able to accurately explain where groundwater may be found and the role it plays in the water cycle.

Score 2 points if . . . The response indicates the student has a basic understanding of groundwater and the role it plays in the water cycle. The student has provided a response that is accurate and complete.

Score 1 point if . . . The response indicates the student has a partial understanding of groundwater and the role it plays in the water cycle. The student has provided a response that includes information that is essentially correct, but the information is too general or too simplistic.

Score 0 points if . . . The response is inaccurate, confused, or irrelevant.

Question 2.
Responses will vary. Student should be able to describe how a sinkhole is formed and list several ways it affects the surrounding area.

Score 2 points if . . . The response indicates the student has an understanding of how a sinkhole is formed and how it can affect the surrounding area. The student has provided a response that is accurate and complete.

Score 1 point if . . . The response indicates the student has partial understanding of how a sinkhole is formed and how it can affect the surrounding area. The student has provided a response that includes information that is essentially correct, but the information is too general or too simplistic.

Score 0 points if . . . The response is inaccurate, confused, or irrelevant.

Sunshine State Standards *Science (6–8):* Processes that Shape the Earth, SC.D.1.3, SC.D.2.3; *Social Studies (6–8):* People, Places and Environments, SS.B.2.3; Economics, SS.D.1.3. *Language Arts (6–8):* Reading, LA.A.2.3; Writing, LA.B.2.3. *Science (9–12):* Processes that Shape the Earth, SC.D.1.4, SC.D.2.4. *Social Studies (9–12):* People, Places and Environments, SS.B.2.4; Economics, SS.D.1.4. *Language Arts (9–12):* Reading, LA.A.2.4; Writing, LA.B.2.4.

WaterWeb Challenge

Directions: *This is your opportunity to demonstrate what you have learned about groundwater. It is also an opportunity for you to practice test items similar to the FCAT. Do your best and meet the challenge!*

For each multiple-choice item, select the best answer.

1. In this issue of *WaterWeb*, you have learned about the importance of groundwater. What is groundwater?
   a. water in lakes, ponds and rivers
   b. water under the earth's surface
   c. water stored in an aquifer
   d. both b and c

2. Which one below does NOT belong in a list of facts about the Floridan aquifer system?
   a. It consists primarily of limestone rock.
   b. It is replenished through a natural process called recharge.
   c. It was created within the last decade due to the effects of sinkholes and springs.
   d. It is the largest and deepest aquifer system in Florida.

3. What can be generalized about groundwater pollution?
   a. It is easy for a variety of pollutants to soak into the groundwater supply.
   b. Florida's sandy soils keep pollutants from soaking into the water table.
   c. Stormwater runoff helps filter out other pollutants from groundwater.
   d. Groundwater rarely becomes polluted due to the actions of people.

4. How is groundwater drawn from the aquifer for use in our cities, homes and farms?
   a. Sinkholes are created and pumps are used to move the water to surface water towers.
   b. Wells are drilled into the aquifer, with pipes and pumps used to bring the water to the surface.
   c. Computers are programmed to locate and collect surface water.
   d. Computer technology is used to create springs and draw water from them.

5. Much of Florida is made up of karst terrain. Which of the following characteristics could be used to describe karst terrain?
   a. land surface produced by water dissolving the underlying bedrock
   b. sinkholes
   c. springs
   d. a, b and c

6. In the Career Focus section, *WaterWeb* interviewed an environmental scientist who is involved in a water quality monitoring program. What is the primary goal of the program?
   a. to educate the public about water quality issues
   b. to write reports about the effects of pollutants on surface water bodies
   c. to examine the water quality of the major aquifers and surface water bodies in the area
   d. to examine the water quality of the drinking water in the area

7. A spring is a natural place where groundwater under pressure discharges through an opening in the earth's surface. Which of the following statements is TRUE?
   a. There are fewer than 10 springs in Florida.
   b. A spring is another name for a sinkhole.
   c. Springs provide areas for recreational activities such as water-skiing, fishing and swimming.
   d. Springs rarely exist in a landscape that has a karst terrain.

8. What can cause a sinkhole to occur in the landscape?
   a. the development of several new springs
   b. a situation in which acidic water erodes and dissolves underground limestone
   c. an increase in the number of pollutants in the groundwater
   d. a decrease in the volume of stormwater runoff soaking into the aquifer

9. Which one below is NOT an example of a groundwater pollutant?
   a. pesticides
   b. herbicides
   c. motor oil
   d. drinking water

10. What is an important message for readers after completing this *WaterWeb* issue?
    a. Use your knowledge about groundwater to encourage others not to be groundwater polluters.
    b. Realize that groundwater is not an important part of the water cycle.
    c. Teach others that most of Florida's drinking water comes from rivers, lakes and ponds.
    d. Avoid visiting natural tourist attractions such as springs.

READ
THINK
EXPLAIN

1. Groundwater is an important part of the water cycle. Explain where groundwater may be found and the role it plays in the never-ending water cycle.

READ
THINK
EXPLAIN

2. Sinkholes exist in many parts of Florida. Describe how a sinkhole is formed and list several ways it affects the surrounding area.