

Teacher's Guide

Springs Coast Watershed Excursion

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT

High School

View excursions at: WaterMatters.org/Watersheds

Lesson Time: One block or class period (approximately 50 minutes)

Grades: 9–12

Objective: Using context clues and relevant facts in the excursion, students will build an understanding of what a watershed is, the characteristics of local watersheds and how human actions affect the health of a watershed.

Next Generation Sunshine State Standards:

- SC.912.L.17.1:** Discuss the characteristics of populations, such as number of individuals, age structure, density, and pattern of distribution.
- SC.912.L.17.7:** Characterize the biotic and abiotic components that define freshwater systems, marine systems and terrestrial systems.
- SC.912.L.17.8:** Recognize the consequences of the losses of biodiversity due to catastrophic events, climate changes, human activity, and the introduction of invasive, nonnative species.
- SC.912.L.17.10:** Diagram and explain the biogeochemical cycles of an ecosystem, including water, carbon, and nitrogen cycle.
- SC.912.L.17.12:** Discuss the political, social, and environmental consequences of sustainable use of land.
- SC.912.L.17.16:** Discuss the large-scale environmental impacts resulting from human activity, including waste spills, oil spills, runoff, greenhouse gases, ozone depletion, and surface and groundwater pollution.
- SC.912.L.17.18:** Describe how human population size and resource use relate to environmental quality.
- SC.912.L.17.20:** Predict the impact of individuals on environmental systems and examine how human lifestyles affect sustainability.

Common Core State Standards:

- LACC.1112.WHST.1** Text Types and Purposes
- LACC.910.WHST.1** Text Types and Purposes
- LACC.1112.RI.1** Key Ideas and Details
- LACC.910.RI.1** Key Ideas and Details
- LACC.1112.RI.3** Integration of Knowledge and Ideas
- LACC.910.RI.3** Integration of Knowledge and Ideas

Lesson Plan and Activities

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Vocabulary:	watershed:	an area of land that water flows across as it moves toward a common body of water, such as a stream, river, lake or coast; also known as a drainage basin
	aquifer:	a spongelike layer of underground rock that can hold and release water
	wetland:	land that is wet all, or part, of the year and supports plants adapted to wet soil and water level changes
	point source:	contamination that can be traced to a single point or location
	nonpoint source:	pollution that does not come from a single point or location
	sediments:	the rock or soil that comes from erosion and carries pollutants through water
	erosion:	erosion happens when water and wind eat away at rock or soil
	nitrates:	a form of nitrogen found in inorganic fertilizers that in excess amounts can cause significant water quality problems and algae blooms
	phosphates:	a nutrient that becomes a pollutant in excess amounts and can make water uninhabitable for many aquatic species
	pH:	a measure of the amount of hydrogen ions (H ⁺) and hydroxide (OH ⁻) in a solution
	runoff:	rainfall that is not absorbed by the soil but flows to a larger body of water

Engage: (15 minutes) Students will take the pretest included before beginning this lesson. Review the vocabulary terms and ask aloud the following questions to activate prior knowledge:

- Where does our drinking water come from?
- How does drinking water get to your home?
- What types of pollution affect a water body and how does the pollution get to the water body?

Explore/Explain: (20–25 minutes) Pass out the student worksheet and ask students to go to WaterMatters.org/Watersheds, scroll to the bottom of the webpage and click on the Springs Coast Watershed Excursion. Instruct students to read the welcome page and follow the links numbered 1–7 at the top of the Excursion’s welcome page while completing the worksheet.

Lesson Plan and Activities *continued from page 2*

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Extend: (10 minutes) Bring the class together after 20–25 minutes to discuss the “Reflecting” questions on the student worksheet. If time allows, consider using “Think-Pair-Share” and pair students with one another to share their answers. Then ask each pair to share one of their answers with the class.

Evaluate: (5 minutes) [Students will take] a posttest (same as pretest) after viewing the excursion and completing the worksheet.

- Additional links:**
- Visit WaterMatters.org/education/resources to view all six virtual watershed excursions and the coordinating teacher’s guides. At this site, you can also view the Florida Watersheds video (11 minutes) and download the coordinating middle or high school teacher’s guides.
 - Take the Watershed Pledge with your class at WaterMatters.org/education/.

Teacher Answer Key

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Pre-/posttest Answer Key

1. c.
2. c.
3. a.
4. b.
5. a.

Student Worksheet Answer Key

- (1) second largest springs
- (2) limestone aquifer
- (3) algae
- (4) education and increased awareness, use fertilizers correctly, use less fertilizer or have switched to organic fertilizers that do not contain nitrates.
- (5) Freshwater and Saltwater
- (6) threatened
- (7) Department of Environmental Protection
- (8) leaky septic tanks and excessive fertilizing
- (9) umbrella species
- (10) destruction and development of bear habitats
- (11) Southwest Florida Water Management District
- (12) west
- (13) brackish
- (14) nurseries
- (15) salt water
- (16) habitats
- (17) osprey
- (18) four (plus)
- (19) III
- (20) Spring Hill appears to have more houses and a higher population than Brooksville. Brooksville has more natural areas than Spring Hill.
- (21) aquifer recharge
- (22) too much fertilizer placed on yards is the likely cause of increased nitrates. The increase in population also increased the number of yards and fertilizer being applied for the past 10 plus years.
- (23) organic acids
- (24) stormwater discharge
- (25) increased development increases the amount of stormwater runoff because water can't absorb into the ground as easily.

Pre- and Posttest

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1. What is the cause of elevated nitrates in a watershed?
 - a. Leaking septic tanks
 - b. Excessive fertilizer
 - c. Both a. and b. are correct

2. What type of water is found in an estuary?
 - a. Fresh water
 - b. Salt water
 - c. Fresh and salt water

3. Which of the following statements about the Florida sandhill cranes is true?
 - a. They are a threatened species.
 - b. They are an endangered species.
 - c. Sandhill cranes are a well-established species in Florida.

4. What causes some streams and rivers to be dark in color?
 - a. Not enough sunlight
 - b. Organic acids in the water
 - c. An increased fish population

5. What is the main problem facing the Springs Coast Watershed?
 - a. Increased levels of nitrogen in the water
 - b. Increased levels of bacteria in the water
 - c. Increased population causes excessive pollution

Student Worksheet

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Go to the Springs Coast Watershed Excursion at: WaterMatters.org/Watersheds

Directions: Read the excursion’s welcome webpage and follow the tabs numbered 1–7 at the top of the webpage. Fill in the blanks on this worksheet as you complete the tour.

Tab 1: Crystal River

Crystal River Springs group is the (1) _____ springs group in Florida.

- * Launch the Kings Bay salt marsh panorama by clicking the link. After seeing what Crystal River looks like, return to the text by clicking “Back to Crystal River.”

Coming from deep within the (2) _____, the spring water is 72 degrees year-round and a safe haven for manatees in the winter.

Nitrate is a form of nitrogen found in inorganic fertilizer. Excess nitrates wash into water bodies or seep into the aquifer, which can make aquatic vegetation and water plants, such as (3) _____, grow out of control.

Question to reflect

(4) After reading about the effects of nitrogen in the water and its threat to water quality, aquatic plants and fish, what can you do to prevent the high levels of nitrates in the water?

Tab 2: Homosassa River

The springs of the Homosassa River are home to both (5) _____ and _____ fish.

Click on the picture of the Florida sandhill cranes. Florida’s sandhill cranes are a (6) _____ species that are found in inland shallow freshwater marshes, prairies, pastures and farmlands. To return, click “Back: Homosassa River.”

Today, Homosassa Springs State Wildlife Park is owned by the state and managed by the (7) _____. Finish reading the section and then click the next stop.

Student Worksheet

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Tab 3: Chassahowitzka River

To see what the Chassahowitzka River looks like, launch the Chassahowitzka River panorama by clicking the link. Click “Back to Chassahowitzka River” to return.

Nitrate levels have increased and levels of bacteria are elevated in the canal system above the river’s headwaters. (8) _____ and _____ are two ways nitrates can get into the groundwater supply and eventually appear in spring discharge.

Click the “Florida black bear” link. The Florida black bear is considered a(an) (9) _____ because by protecting its broad ecological requirements, a variety of other protected, threatened and endangered species habitats are protected.

Biologists believe the decline in Florida’s black bear population is due to the (10) _____ combined with historic hunting pressure. Finish reading the section and click “Back: Chassahowitzka River.”

The (11) _____ buys lands like the Chassahowitzka Riverine Swamp Sanctuary that are important to the protection of Florida’s water resources.

Tab 4: Coastal Estuarine Habitats

Most of the springs and rivers in the watershed flow (12) _____ into the Gulf of Mexico.

Tidal influence creates (13) _____ water in estuaries. Estuaries are protected shallow areas that serve as (14) _____ for fish, shellfish and other animals.

Salt marshes are drained of water when the tide goes out and then flooded with (15) _____ when the tide comes back in. This flushing action brings in nutrients, making salt marshes some of the richest and most productive (16) _____ on Earth.

Student Worksheet

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Tab 5: Weeki Wachee River

First click on the picture of the bird on the top right of the page. The (17) _____ is a large bird of prey that has large talons to dive for fish up to (18) _____ pounds . Click “Back: Weeki Wachee River.”

(19) _____ million gallons of water flow from this first-magnitude spring per day.

Tab 6: Brooksville and Spring Hill

First click on the picture of Spring Hill to change to the photo of Brooksville. What difference do you notice between the two communities? (20) _____

Both Brooksville and Spring Hill are located in an area of moderate to high (21) _____ because the sandy soils allow water from rainfall to percolate easily down into the aquifer. It also means that pollutants such as oil, fertilizer and pesticides can easily percolate down into the aquifer.

What is the likely cause for increased nitrate levels in the area’s springs and why?

(22) _____

Tab 7: Pithlachascotee River

Click on the “blackwater stream” hyperlink. What causes the water of the Pithlachascotee River to be dark in color? (23) _____. Close the window.

Development along the banks of the river has led to decreases in natural character and vegetation and increases in (24) _____ and nitrate levels in the river.

Critical thinking

(25) What does the amount of runoff from stormwater have to do with the level of residential and commercial development along the banks of a river? _____
