

Teacher's Guide

Hillsborough River Watershed Virtual Excursion

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT

Lesson Time: One block or class period (approximately 55 minutes)

Subject/Grade Level: Environmental Science and Biology, Grades 9–12

Objective: Using context clues and relevant facts in the virtual excursion, students will describe the ecology and geology of the Hillsborough River Watershed. Using real-world applications and an interactive tour of the watershed, students will learn about the importance of preserving natural environments.

Materials Needed: Internet, computer access, copies of worksheet and quiz

Next Generation Sunshine State Standards:

- 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.17.12:** 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.17.17:** Assess the effectiveness of innovative methods of protecting the environment.
- 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.
- SC.912.N.1.1:** Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science
- LA.910.1.6.1:** Students will use new vocabulary presented to them directly.
- LA.910.5.2.1-2:** Students will use appropriate listening strategies and oral communication for active class discussions.

Common Core Curriculum Standards:

Grades 9–10

- LACC.910.WHST.1.1e** Text Types and Purposes
- LACC.910.RST.1.1** Key Ideas and Details
- LACC.910.RST.1.2** Key Ideas and Details
- LACC.910.RST.2.4** Craft and Structure

Grades 11–12

- LACC.1112.WHST.1.1e** Text Types and Purposes
- LACC.1112.RST.1.2** Key Ideas and Details
- LACC.1112.RST.2.4** Craft and Structure
- LACC.1112.RST.2.6** Craft and Structure

Additional links: Visit WaterMatters.org/Education/Resources to view all seven virtual watershed excursions and the coordinating teacher's guides. At this site, you can also view the Florida Watershed's video (11 minutes) and teacher's guide among other resources.

Teacher's Guide

Lesson Plan and Activities

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT

Vocabulary:	Watershed:	an area of land that water flows across as it moves toward a common body of water, such as a stream, river, or coast
	Spring:	places where groundwater flows out of a natural opening in the earth's surface
	Aquifer:	a sponge-like layer of underground rock that can hold and release water
	Tributary:	a small stream or river that flows into a larger one
	Ecosystem:	a biological community of interacting organisms and their physical environment
	Estuary:	a partially enclosed body of water where fresh water from rivers and streams flows into the ocean, mixing with the salty seawater; has the most productive ecosystem on earth
	Paleo-Indians:	earliest humans in the Hillsborough River area who lived about 8,000–12,000 years ago
	Conservation Lands:	publicly-owned land purchased for preservation; sometimes purchased by the District to protect watersheds and serve as buffers that filter out polluted runoff before entering a body of water

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

- Describe the environment of a typical river in Florida. What type of animals will you find?
- Where do you think our drinking water comes from?
- How do you think human activities on land can affect the water around it?
- What are some recreational activities that you and your family do along a river or at a spring?

Explore/Explain: (20 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 Hillsborough River Watershed Excursion. Instruct the students to click on the links to move through the virtual tour while completing the worksheet.

Extend: (5 Minutes) 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: (10 minutes) Students will take the posttest (same as pretest) after reviewing the excursion and completing the worksheet to measure student learning gains.

Extensions: Take the Watershed Pledge with your class at WaterMatters.org/Conservation/Pledge.

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Pre-and Post-Assessment

Hillsborough River Watershed Virtual Excursion

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT

Lesson Time: 10 minutes

True or False

- ___ 1) The Hillsborough River has one main tributary that causes more flooding in the area.
- ___ 2) An estuary is a coastal region that mixes salt and fresh water.
- ___ 3) Shallow estuaries act as nurseries to animals because they are not too salty or polluted.
- ___ 4) Blackwater is when the land gets polluted and the runoff goes into the water.
- ___ 5) It is much more affordable to conserve and protect our water than to treat it later on.
- ___ 6) Some events from the Civil War and the Seminole Indian War happened around the Hillsborough River.
- ___ 7) The Hillsborough River provides a source of drinking water for the Tampa Bay area.
- ___ 8) Tampa Bay is the largest open-water estuary in Florida.
- ___ 9) The Wood Stork is an endangered species in the Hillsborough River Watershed.
- ___ 10) The Hillsborough River is mostly spring water.

Student Worksheet

Hillsborough River Watershed Virtual Excursion

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT

Directions: Read the excursion’s Introduction webpage and follow the tabs labeled at the top of the webpage. Fill in the blanks on this worksheet as you complete the tour.

Tab 1: Home-Welcome

The Hillsborough River is the primary source of (1) _____ for the City of Tampa.

(2) _____ is the largest open-water estuary in Florida.

Tab 2: Watershed

A watershed is an area of land that water flows across as it moves toward (3) _____.

When rainwater drains to the lowest point in a watershed, it carries (4) _____ with it.

Look at the map. What city is on the eastern border of the watershed? (5) _____.

Tab 3: River Begins

Four rivers emerge from the Green Swamp between (6) _____. This area has the ability to

store (7) _____ and slow floodwaters. The Hillsborough River receives water from

(8) _____.

Tab 4: Springs

A spring is a natural opening where water flows directly from the (9) _____. **Click on**

Crystal Springs. Crystal Springs is a source of (10) _____ gallons of fresh water per DAY.

Click on Sulfur Springs. In the urbanized area of Tampa, Sulfur Spring has been closed since the 1980s because of

(11) _____. **Click on Ulele Springs.** The area around this spring was

industrialized and a pipe was installed that altered the natural flow to the river. In 2014, the pipe was removed. Describe

the benefits to removing the pipe. (12) _____.

Tab 5: Tributaries

A tributary is a small (13) _____ that flows into a larger one. The Hillsborough River

has several tributaries. The Tampa Bypass Canal is one of them and was built to provide (14) _____

protection for the surrounding cities. The Lower Hillsborough Wilderness Preserve stores floodwaters and is important

for the conservation of (15) _____.

Student Worksheet

Hillsborough River Watershed Virtual Excursion

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT

Tab 6: Reservoir

Click on the virtual tour link at the bottom. Click pause as more time is needed to answer questions.

In the History section: In 1924 they built a water treatment plant in Tampa near the Hillsborough River. Today the plant is named the (16)_____.

In the Treatment Process: Click through the steps 1-7 to answer questions. The 80 million gallons of water demanded per day is treated and then stored in tanks called (17)_____. After flocculation the water flows into (18)_____.

In the Water Quality section: Which agency receives monthly reviews to make sure the Tampa Water Department follows all state and federal parameters? (19)_____.

Tab 7: Human History

The earliest humans present around the Hillsborough River 12,000 to 8,000 years ago were the (20)_____. There were plenty of fish and shellfish to support humans. What two wars happened around this river? (21) _____ and the _____.

Tab 8: Ecology

The Hillsborough River is spring fed, but it is mostly a blackwater river. These types of rivers originate in (22)_____ where organic acids stain the water a dark brown. The habitat used to be home to ancient cypress trees that were removed by the (23)_____. The wood stork is one of hundreds of animal species in the watershed. They are considered a (24)_____ by the U.S. Fish and Wildlife Service.

Tab 9: Restoration

What did the Reed Property Shoreline Restoration Project do? (25) _____

Tab 10: Tampa Bay

Estuaries are an essential habitat as they are home to all kinds of animals. The Hillsborough River empties into Tampa Bay, which is the largest open-water estuary in Florida. Estuaries act as a (26)_____ because many young animals can't live in water that is too salty or polluted. Seagrasses are sensitive to changes in water (27)_____.

Tab 11: Recreation

The District and other government agencies purchase (28) _____, which may serve as buffers that filter out polluted runoff before entering a body of water.

Teacher Answer Key

Hillsborough River Watershed Virtual Excursion

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT

Pre-/post Assessment Answer Key

- | | |
|-----------|---|
| 1) False | F |
| 2) True | T |
| 3) True | T |
| 4) False | F |
| 5) True | T |
| 6) True | T |
| 7) True | T |
| 8) True | T |
| 9) False | F |
| 10) False | F |

Teacher Answer Key

Student Worksheet Answer Key

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT

- (1) Drinking water**
- (2) Tampa Bay**
- (3) A common body of water**
- (4) Pollutants and contaminates**
- (5) Lakeland**
- (6) Tampa and Orlando**
- (7) Surface water**
- (8) Springs and tributaries**
- (9) Aquifer to the earth's surface**
- (10) 36 million gallons**
- (11) High bacteria counts**
- (12) A stream and wetland was created allowing fish, manatees, and other wildlife access to the springs providing water quality benefits.**
- (13) Stream or river**
- (14) Flood**
- (15) Natural Resources**
- (16) Water treatment process**
- (17) Clearwells**
- (18) Settling basins**
- (19) The Florida Department of Environmental Protection**
- (20) Paleo-Indians**
- (21) Seminole Indian and the Civil Wars**
- (22) Swampy areas**
- (23) Logging industry**
- (24) Threatened species**
- (25) Combined habitat restoration with stormwater treatment to improve water quality.**
- (26) Nursery**
- (27) Clarity and quality**
- (28) Conservation lands**