



# Crystal Springs Live!



# SPRING VACATION

## Purpose:

Florida's springs are a vital and undervalued resource. Through this lesson, students will learn about several different aspects of springs. They will research the benefits humans get from springs, why springs are important to the animals that live there, and what is being done to protect the water.

## Objective:

Students will research a Florida Spring.  
Students will create a travel brochure with facts about the spring they researched.  
Students will present their spring brochure to the class.

## Background:

Many people visit Florida for our beaches or our many theme parks. Only those people "in the know" come to Florida for our other natural gems, our windows to the aquifer. Florida is estimated to have over 700 springs and yet most people never see any while they are visiting our state. On one hand this is a good thing, the less people that visit springs, the less impact we have on this natural resource. On the other hand, the more people who enjoy our springs, the more people who will be willing to protect and conserve them for future generations.

## Procedure:

1. Write the word spring on the board. Ask students "What do you know about this?" Answers should range from seasons of the year, to Slinkies. If students don't bring up springs as a water source, steer them in that direction through open-ended questions.
2. Ask students to come up with a definition of what a freshwater spring is. The definition from US Geological Survey is  
"A spring is a water resource formed when the side of a hill, a valley bottom or other excavation intersects a flowing body of ground water at or below the local water table, below which the subsurface material is saturated with water. A spring is the result of an aquifer being filled to the point that the water overflows onto the land surface."  
<http://ga.water.usgs.gov/edu/watercyclesprings.html>
3. Your class definition should be simpler, but should focus on where spring water comes from.

## Vocabulary

Karst	Limestone
Erosion	Recreation
Resource	Spring
Aquifer	Spring vent

## Grade Level

4th -7th grade

## NGSSS

SC.4.P.10.4 SC.4.P.8.2  
SC.5.P.8.2 SC.7.E.6.6

## Length

1-2 hours

## Materials

Computer access for student groups  
Word processing program for students to design brochures  
Printer

4. Once you have a definition ask students if they have ever been to a spring or seen one. If anyone has, ask them what they remember, if no one has, have a picture of website available (see resources) for them to see and discuss.
5. Tell students they will be doing a research project on one of Florida's many freshwater springs. Then, after their research they will create a travel brochure to inform people about the spring and encourage conservation of the spring. As a class, create a list of topics that their research must cover. These topics may include but not limited to:
  - How the spring was named?
  - How the springs were formed?
  - What is the magnitude of the spring and what does it mean?
  - Is it public or privately owned?
  - What animals live in the spring?
  - How deep is the spring?
  - Has the springs been changed from its natural state?
  - Is there any interesting history of the spring?
  - How do humans use the spring today?
  - If the spring is associated with a river or lake?
  - Where is it located in Florida?
6. Once students are situated into groups at computers, lead them to <http://www.dep.state.fl.us/geology/geologictopics/springs/bulletin66.htm> or another website that lists several Florida Springs. This map from the DEP's Springs Task Force Report may also be helpful <http://www.dep.state.fl.us/springs/reports/files/SpringsTaskForceReport.pdf> p 14
7. Once they have gathered some research, direct students to the program you would like them to use to create their brochure. Common programs would be Microsoft Publisher, or Microsoft word. If printing is not an option, students can create their brochures without a computer on construction paper.
8. When brochures are complete, allow students to present their spring to the class, as if they were selling a vacation to the spring. What about the spring makes it worth visiting?

### **Assessment:**

Evaluate student brochures. Did they include all the information you asked them to? Did they present their spring well? Was their information accurate?

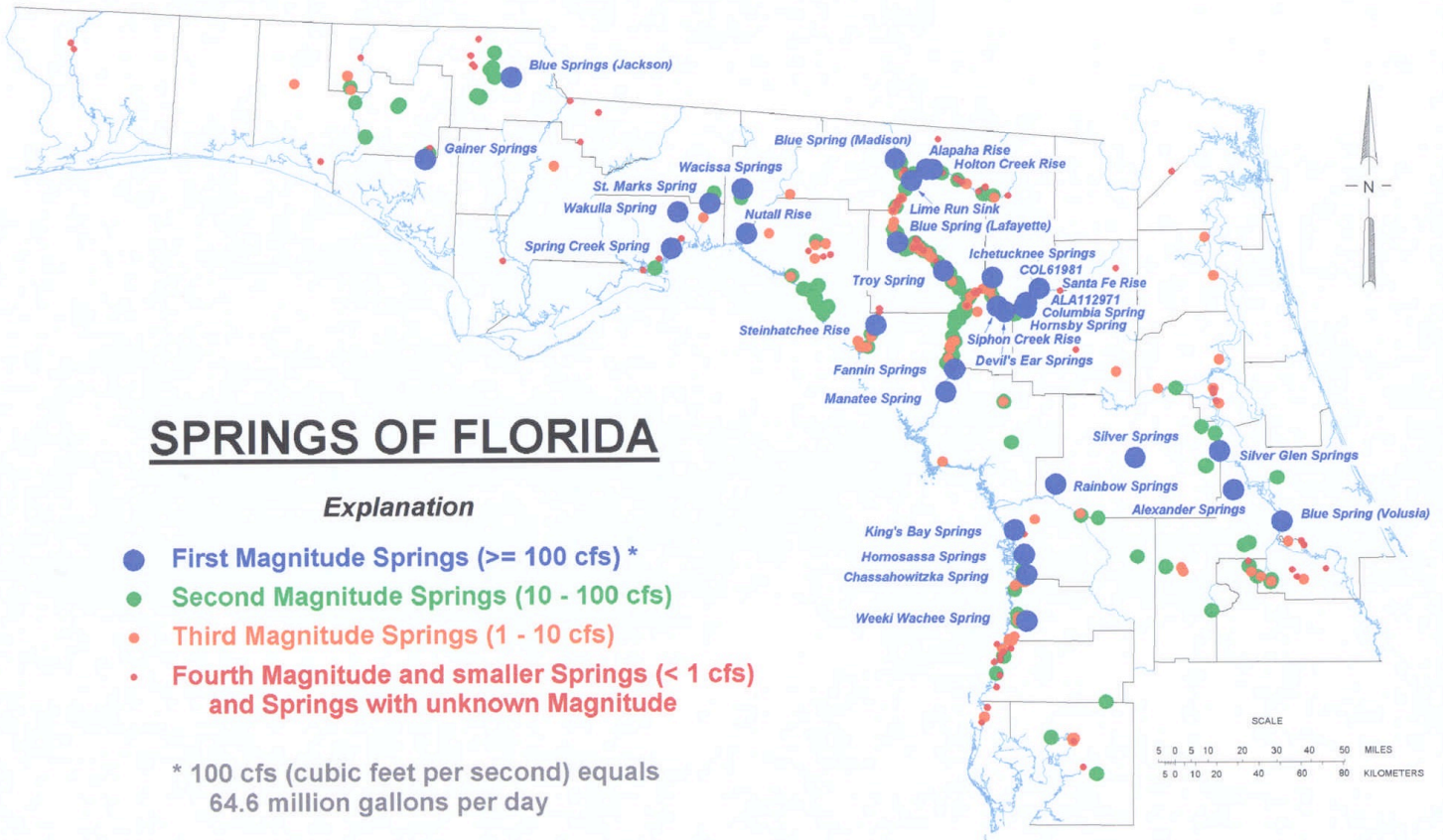
### **Resources:**

Department of Environmental Protection

<http://www.dep.state.fl.us>

US Geological Survey

[www.usgs.gov/](http://www.usgs.gov/)



# SPRINGS OF FLORIDA

## *Explanation*

- **First Magnitude Springs ( $\geq 100$  cfs) \***
- **Second Magnitude Springs (10 - 100 cfs)**
- **Third Magnitude Springs (1 - 10 cfs)**
- **Fourth Magnitude and smaller Springs (< 1 cfs) and Springs with unknown Magnitude**

\* 100 cfs (cubic feet per second) equals 64.6 million gallons per day

<http://www.dep.state.fl.us/springs/reports/files/SpringsTaskForceReport.pdf> p 14

# WATER'S JOURNEY

## Purpose:

When you turn the faucet on, water comes out, but where does that water come from? Most students don't think about that. Living in Florida, we are dependent on groundwater for 90% of the water we use. In this lesson, students will define an aquifer; learn how it works, and what it does for our water

## Objective:

Students will describe and draw a representation of the Floridan Aquifer.

Students will understand the importance of the Floridan Aquifer.

## Background:

Aquifers are found under every continent and in places where humans can dig wells and are a huge source of drinking water.

Because we cannot see aquifers, they are often taken for granted. In Florida, 90% of our potable water comes from the Floridan Aquifer system. This system starts in southern South Carolina, extends west into Mississippi and south under all of Florida, and most of it is easily accessible by drilling. It has only been in the last decade that people have started to study aquifers more closely. Scientists are now studying the impact that human activity is having on these delicate systems.

The best way to appreciate aquifers and their unique form and function is to dive right in! The film *Water's Journey: The Hidden Rivers of Florida* takes viewers on a journey with a pair of cave divers as they swim through underground passages that may have never been filmed or seen prior to this video.

## Procedure:

1. As a class come up with a definition for the word aquifer. Ask students to think about the root *aqui-* and what that might refer to. Tell students that aquifers exist underground and there are very few places that an aquifer comes to the surface.
2. Ask students what kind of rock they think might make up the Florida Aquifer that is underneath all of Florida? Limestone rock is the main rock that makes up the Floridan Aquifer. Clay, dolomite, and other minerals are also present.
3. Once students understand that the aquifer is an underground holding tank where water collects after percolating through the ground and rock, have each student draw what they think the aquifer looks like underground.

## Vocabulary

Aquifer	Hydrologic cycle
Karst topography	Sand
Limestone rock	Infiltration
Clay	Pollution
Filtration	Percolation

## Grade Level

4th -7th grade

## NGSSS

SC.3.L.15.1, SC.5.E.7.2, SC.4.N.1.1,  
SC.5.N.1.1, SC.6.N.1.1, SC.6.N.1.4,  
SC.7.N.1.1 LA.3-5.1.6.1

## Length

1 hour

## Materials

A copy of *Water's Journey - The Hidden Rivers of Florida*, this should be available through your school library or your local public library  
Paper  
Pencil  
Crayons, markers, and/or colored pencils

4. Have students share their drawing and their rational for why they chose to draw the aquifer the way they did.
5. Show students a cross section graphic of the Floridan Aquifer provided at the bottom of the lesson (from the cave in the exhibit). Have student find similarities between the real image and the one they drew. Allow students time to add features to their drawing that were previously unknown to them.
6. Tell students they are going to be watching a documentary film called *Water's Journey: The Hidden Rivers of Florida*. Ask students what they think the film will be about from the title. Tell students while they are watching the film to write down 3 facts that they did not know and 3 things they did know that the video reinforced.
7. After the film, ask students if the class definition of an aquifer needs to be revised. If so, how? Have student share some of the facts they wrote down while watching the film.
8. Allow students to change their drawings of the aquifer now that they have seen the video.

### **Discussion:**

How has the student's view of where their water comes from changed from before the video to after? What impact do students have on the aquifer in their everyday lives? What can they do to protect the aquifer?

### **Assessment:**

Replay the section of the film where the divers are under the golf course and homes nearby, but place the video on mute. Have students write the narration that would accompany this section of the film.

### **Resources:**

Environmental Protection Agency

[www.epa.gov](http://www.epa.gov)

United States Geological Survey

[www.water.usgs.gov](http://www.water.usgs.gov)

Department of Environmental Protection

[www.dep.state.fl.us](http://www.dep.state.fl.us)

# AROUND THE WORLD AGAIN, AND AGAIN, AND AGAIN

## Purpose:

The water cycle is one of the most important cycles on Earth. It is responsible for our weather, and the cleaning of every drop of water on the Earth. Students need to understand the water cycle in order to understand how it moves through the habitats in Florida and around the world.

## Objective:

Students will be able to name the phase changes water goes through in the water cycle.

Students will create a picture of the water cycle in their schoolyard or home.

## Background:

The water cycle is the process in which the Earth cleans and recycles all the water on the planet. This process uses solar energy to change the state of water from solid to liquid to gas. These state changes and the interaction with plants, rocks, soil, and animals, combine to make the entire water cycle process. This process controls and drives the weather and recirculates all the water on the planet. This important process is subtle and often overlooked in the grand scheme of things. But it is arguably the most important process on the planet.

## Procedure:

1. Ask students “Where do you see or use water in your everyday life?” Make a list of their responses. Continue the discussion with “Where else in the world is there water?” Add these places to the list.
2. Pick a place on the list and ask “So, where did the water in the pond behind school come from?” Lead students to answer all the places that may contribute to that water body. If it is a pond on your school property it may receive water from rain, runoff from fields, runoff from parking lots, runoff from roads, or neighborhood storm drains. If it is a river the water may come from runoff, rain, springs, small creeks, lakes, or industrial waste. Some research or a map will help you find water sources
3. Continue this discussion by asking questions about the places the water came from before the place you are taking about. For example, if you were discussing the pond behind your school, the next question may be “Ok, so some of the water in the pond comes from rain. Where did the rain come from? Clouds, ok, how did the rain get in the clouds?” Keep questioning your students until they get stumped.
4. Write ‘Water Cycle’ on the board. Ask students what a cycle is and then explain that the water cycle is how water moves from one place to another and from one state of matter into another.

## Vocabulary

Evaporation	Condensation
Precipitation	Transportation
Percolation	Respiration
Absorption	Consumption
Water cycle	Run off

## Length

1-2 hours

## Materials

Construction paper  
Markers/paint/colored pencils  
Computer access (optional)

Ask students what the 3 states of matter are (solid, liquid, gas) and what we call water when it is in those states (ice, liquid water, steam or vapor). Write all those words on the board.

5. Have students draw a map of their neighborhood or school yard and label all the water on the drawing. After a few minutes, ask if they remembered clouds or rain? Ask if they remembered water fountains, pools, wells, or city water treatment plants if there is one near your town. What about water in plants and animals?
6. Next, have your students label the water on their drawing as solid, liquid, or gas.
7. On the board list the major phase changes in the water cycle, you can list as many as you have time to cover in class. There is evaporation, condensation, precipitation, transportation, percolation, respiration, absorption, and consumption. Ask the students if they recognize any of the words or any part of them. Have the students come up with definitions of the words you have listed. Write those definitions on the board or on chart paper so you can display them in the room after the lesson. From the definitions, ask students to draw arrows on their pictures and label them with these terms. (Optional: let students research these words on the internet and then come up with their own definitions.)
8. Display the drawings around the room.

**Assessment:**

Make a drawing of the water cycle that includes your entire county, country, state, or world.

**Resources:**

Environmental Protection Agency

[www.epa.gov](http://www.epa.gov)

United States Geological Survey

[www.water.usgs.gov](http://www.water.usgs.gov)

Department of Environmental Protection

[www.dep.state.fl.us](http://www.dep.state.fl.us)



# CLASSROOM WATER USE

## Purpose:

Understanding where water comes from and how to protect it in natural settings is extremely important. It may be argued that knowing how much water you personally use every day is the best place to start when thinking about conservation.

## Objective:

Students will be able to identify where and when water is used in daily life.

Students will be able to find ways to reduce their water consumption.

Students will be able to calculate the average amount of water used by their class per day.

## Background:

Less than 1% of the world's fresh water (~0.003% of all water on earth) is accessible for direct human uses. This is the water found in lakes, rivers, reservoirs and those underground sources that are shallow enough to be tapped at an affordable cost. Only this amount is regularly renewed by rain and snowfall and is therefore available on a sustainable basis. The amount of water used in the home is a relatively small amount when compared to agriculture and other industries, but it is where the individual can have the biggest impact. Even small changes at home can lead to big changes in the world.

## Procedure:

1. Ask students why water is important. There is no new water. All the water on Earth is the same water that has always been here. The Earth recycles it and it is our job to help keep the water clean and to conserve as much as possible.
2. Brainstorm as a class all the places water is used while at school. List these places on the board. Of those places listed, ask students which places would be easiest to collect data. For example, counting the number of toilet flushes is easy; the water used to wash lunchroom dishes is a significant use of water but would be very hard to calculate.
3. Once narrowed down to 5 or 6 water use sites at school, create a water use chart. There is an example at the bottom of the lesson.
4. As a class come up with ways to calculate data for the different water use sites you will be using. For example, if you are going to gather data about how much water is used when washing hands, start counting when the water is turned on (1-1,000, 2-1,000, 3-1,000, etc.) until it is turned off and record.

## Vocabulary

Conservation  
Low Flow Fixtures  
Consumption  
Reclaimed water  
Salinity  
Recharge  
Sustainable

## Grade Level

4th -7th grade

## NGSSS

SC.3.L.15.1, SC.5.E.7.2, SC.4.N.1.1,  
SC.5.N.1.1, SC.6.N.1.1, SC.6.N.1.4,  
SC.7.N.1.1  
LA.3-5.1.6.1

## Length

1 hour

## Materials

Water use chart

5. Tell students they will each be charting their water use for 1 full school day. They should record on their water use chart as much data as they can.
6. Begin using the chart at the very beginning of a school day or from the end of class one day until the same class period the next day.
7. The following day, use these general amounts to figure out the averages:
  - a. Average Toilet Flush (non conserving fixture) = 5 gallons
  - b. Average kitchen faucet (non conserving fixture) = 4 gallons a minute
  - c. Average yard watering (non conserving fixture) = 9 gallons per minute
8. Total all the seconds the students washed, convert to minutes and multiply by 4.
9. Total the toilets flushes and multiply by 5.
10. Discuss and share results. As a class, brainstorm ways to use less water. Repeat the process using some of their ideas and see if it makes a difference.

### **Discussion:**

Did any of the changes you made or suggested making, make a difference? Why or why not? Find out if your school uses low flow toilets or water faucets. If they don't, how much difference would it make as far as conservation is concerned, to install them? Is the amount of water used by each student each day a significant amount or in the grand scheme of things is it so small it doesn't matter? Why is it important to make little changes, even if the gallons per day savings are not great?

### **Assessment:**

Have students create a data sheet to measure water usage at their house. Record water usage for one week. A water use chart can be found on the SWFWMD website at [http://www.swfwmd.state.fl.us/publications/files/daily\\_water\\_use.pdf](http://www.swfwmd.state.fl.us/publications/files/daily_water_use.pdf). Discuss ways of conserving water with family members.

### **Resources:**

Environmental Protection Agency

[www.epa.gov](http://www.epa.gov)

United States Geological Survey

[www.water.usgs.gov](http://www.water.usgs.gov)

Southwest Florida Water Management District

[www.swfwmd.state.fl.us](http://www.swfwmd.state.fl.us)

University of Florida – IFAS Extension

[www.ifas.ufl.edu](http://www.ifas.ufl.edu)

