

Water Quality & Algae

Teacher's Guide

Subject: Integrated Science (Life; Earth-Space; Physical)

Topic: River Flow, Source Water, Water Quality

Summary: Students will use various types of water monitoring equipment to explore selected parameters of water quality and quantity to gain a better understanding of the dynamics of water flowing in the Ichetucknee River. Special emphasis will be given to changes in dissolved oxygen.

After completing the field lab, students will be able to:

Objective(s):

1. Explain how source water affects water quality parameters
2. Use various water quality test equipment
3. Explain why dissolved oxygen changes from the spring vent as it flows downstream

Ecosystem(s): Rivers/Springs

Equipment:

- Flow Meter (current)
- GPS Receiver
- YSI 85 Meter
- pH meter with probe
- Dip net
- Water test kits (N3, pH, hardness)
- Dissolved Oxygen meter
- Park radios
- Gloves & Safety Glasses
- Manual flow (oranges, measuring tape, stopwatch)
- Calculators
- Microscope w/ USB camera (in class)

Background:

- **Reference Material:** Project WET *Back to the Future* (pg. 293); Current speed/velocity and Discharge (volume); *Water's Journey* video and curriculum; USGS How Stream flow is Measured (part 1 & 2) ([link](#))
- **Vocabulary:** velocity, discharge, concentration, ppm, parameter, pH, dissolved oxygen, nitrate, hardness, limestone, stream flow, volume, CFS (cubic feet per second), MGD (million gallons per day)
- **Equipment Training:** In-school, pre-trip equipment demonstrations, how to read a GPS for new teachers

Procedure (Engage; Explore; Explain):

1. Hook: Somebody is polluting the river. We know the headspring is closest to Lake City. Our role is to find out what type of pollution it is and where it is entering the river.
2. Ask students to imagine what happens when the flow from a single spring joins the flow of a larger stream that is fed by many other springs. Make sure they describe what happens to the speed of the water as well as the quality.
3. Students will be divided into 3 groups. Each group will rotate through data-recording stations either on the bank at Dampiers Landing or at the Tube take-out location. These stations will include pH and nitrate testing, DO, temperature, hardness, flow, and a manual water flow test.
4. At each location, the instructors will briefly demonstrate the use of each piece of equipment.
5. At Dampier's Landing, students will use the flow meter from the dock and test for nitrates. Along the bank, students with waders will conduct the manual flow test as a comparison to the flow meter results. The third group, some with waders, will test for temperature, pH and DO near the bank and a safe distance in the river. The students at Dampiers Landing should be told that the river at that location has water flowing mostly from the Head Spring.
6. At the Tube Take Out area, the students will perform the same tests as at Dampier's, but will not get in the river. Inform students that river flow at this point probably has water contributed by sources (springs, streams) from the Suwannee River as well as from the Ichetucknee Head Spring.
7. Discuss the results with special emphasis on the differences in the velocity of water, the dissolved oxygen content, and the nitrate levels. How might these influence the other parameters?
8. Back at school, the Dampiers Landing and Tube Take Out groups should exchange information and compare data in order to answer the Assessment Questions. Also, have students estimate algae count through microscopes.

Sunshine State Standards:

Science: SC.D.2.3.2; SC.G.1.3.4; SC.G.2.3.2, 3, 4; SC.H.1.3.2, 4, 6, 7; SC.H.2.3.1; SC.H.2.3.7; **Language Arts:** LA.A.1.3.3; LA.B.2.3.1; LA.C.1.3.1; **Mathematics:** MA.B.4.3.2; MA.D.1.3.2; MA.3.3.2; **Social Studies:** SS.B.2.3.6.9

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Assessment

1. At which location was the dissolved oxygen lowest? Highest? Why?

2. At which station was the nitrate level highest? Why?

3. Where did the water flow the fastest, at the bank or near the center? Why?

4. Most of the water at Dampier’s Landing comes from Lake City and traveling through underground conduits. At the South Takeout there are different sources contributing to the flow. How could the parameters you measured change and why?

5. How can people reduce the amount of pollution from common land-uses such as agriculture, commercial, and residential areas?

6. If your results were to show pollution entering the river at Headsprings, would you expect to see the same pollution measurement further downstream? Why or Why not?

Lab Performance	EXCELLENT	GOOD	FAIR	POOR
Follows lab procedures carefully and fully.	10 - 9	8 - 7 - 6	5 - 4 - 3	2 - 1 - 0
Uses laboratory time productively and stays on task.	10 - 9	8 - 7 - 6	5 - 4 - 3	2 - 1 - 0
Works well with partners.	10 - 9	8 - 7 - 6	5 - 4 - 3	2 - 1 - 0
Facilitator Signature:				

