

## Water Quality & River Flow

## Teacher's Guide

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

**Topic:** River System, Velocity, Water Quality, Nitrates

**Summary:** From the ISSP pontoon boat, students will use various types of water monitoring equipment to explore selected parameters of water quality (dissolved oxygen, temperature, conductivity, pH, and nitrate levels) and quantity (primarily velocity) to gain a better understanding of the dynamics of water flowing in the Ichetucknee River. Special emphasis will be paid to changes in dissolved oxygen.

**Objective(s):** After completing the field lab, students will be able to:

1. Operate selected water quality field equipment
2. Collect and interpret water quality data

**Ecosystem(s):** Springs, Rivers

### Equipment

- Water test kit (Nitrate)
- Pontoon boat, “canoemaran” and paddles
- Secchi Disc
- Flow Meter (current)
- GPS
- Data sheet & clipboard
- PFD’s for each student
- Anchor lines and attachments

### Background:

- Vocabulary: Current speed/velocity and Discharge (volume)
- Reference Material: Dissolved Oxygen Meter Background (Pre-field Classroom Activity), Project WET *Back to the Future* (pg. 293), USGS How Streamflow is Measured (part 1 & 2): <http://ga.water.usgs.gov/edu/measureflow.html>
- Equipment Training: Water Test Kit, Flow Meter, GPS

### Field Lab Procedure

1. Students assemble at the ISSP North Entrance, Head Spring parking lot, and transport to the Canoe/ Tube Launch.
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 of the water.
3. Students will be divided into 3 groups. Each small group will rotate through data-recording stations either on the bank or on a vessel anchored by a rope stretched overhead across the spring run/ river. These stations will include pH and nitrate-testing (bank) and DO, temperature, conductivity, and water flow (boat).
4. At the Canoe/ Tube Launch the instructor will demonstrate the use of each piece of equipment while the students record the readings on their data sheets. The instructor will explain that this location receives flow only from the Ichetucknee Head Spring.

5. At the Canoe/ Tube Launch, two groups will take readings from the boat at two sampling points moving across the spring run/ river, each taking turns on the anchored vessel. The third group will take pH readings from the bank and begin testing for the nitrate level. After the first group switches places with the second group on the boat, the first group will join the bank group to finalize the nitrate reading.
6. Students will then transport to the second location at Trestle Point. This site receives combined flow from the Ichetucknee Head Spring, Cedar Head Spring, and Blue Hole Spring. Students will repeat the exercise at Trestle Point, recording their readings on the data sheets and rotating through each of the equipment stations.
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?

### **Sunshine State Standards**

**Science:** SC.A.1.3.1, 3; SC.C.1.3.1; SC.D.1.3.1,3,5; 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.A.4.3.1; MA.B.2.3.1; MA.B.4.3.1; MA.E.2.3.1

**Social Studies:** SS.A.6.3.2; SS.B.2.3.9

## Water Quality & River Flow

## Data Sheet

### General Information

Full Name:		Date:	
School (teacher):		Time:	<i>Enter in tables below</i>
Latitude:	<i>Enter in tables below</i>	Longitude:	<i>Enter in tables below</i>

### Student Hypothesis and Rational

I hypothesize that the velocity (flow meter count) will be (choose one: higher/lower) at the spring vent compared with downstream because...  
 \_\_\_\_\_  
 \_\_\_\_\_.

### Field Observations/Measurements

#### Location #1: Spring Vent

Time: \_\_\_\_\_ Lat: \_\_\_\_\_ Long: \_\_\_\_\_

Site	pH	Temp. (C)	Dissolved O <sub>2</sub>	Conductivity	Flow (count)	Nitrate Nitrogen	Other
Near Bank							
Near Center							

#### Location #2: Downstream

Time: \_\_\_\_\_ Lat: \_\_\_\_\_ Long: \_\_\_\_\_

Site	pH	Temp. (C)	Dissolved O <sub>2</sub>	Conductivity	Flow (count)	Nitrate Nitrogen	Other
Near Bank							
Near Center							

## **Water Quality & River Flow**

## **Assessment**

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

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2. At which station was the nitrate level highest? Why? How do you think the flow from a single spring or the flow from many springs influence the nitrate level?

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3. At which location was velocity (current) highest (that is, which location had the highest flow meter count)? Why?

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4. If the source of the water flowing from the Ichetucknee Head Spring is from a different location within the Ichetucknee Basin than the waters from Blue Hole (for example, a source other than Lake City), how would the parameters you measured change? Why?

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5. What do you think would happen if the water stopped flowing? What would happen to organisms that are adapted to the parameters you observed today?

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