



## **McKinney Falls Macroinvertebrate Test**

### **Concept**

Aquatic Macroinvertebrates (organisms that live in water and do not have a backbone) can indicate water quality.

### **Objective - Students will:**

- 1) collect water bugs using appropriate collection procedures;
- 2) identify bugs collected;
- 3) use the given mathematical formula to assess water quality and;
- 4) understand diversity and food web interactions.

### **Time**

1 and 1/2 hours

### **Materials in Earth Camp Field Trip Kit**

For instruction:

- Laminated poster, "Is the Creek Clean or Polluted?"
- Dry erase marker

Group Materials:

- 1 bin for collecting bugs
- "Is the Creek Clean or Polluted?" bug identification sheet
- Wax pencil

Materials for Student Pairs:

- Magnifying viewer
- Forceps

### **Materials in this Book (for reference only)**

"Is the Creek Clean or Polluted?" bug identification sheet  
Smith Rock Shelter Trail Guide

### **Preparation**

1. Organize materials to bring on the field trip.
2. Prepare to lead the macroinvertebrate lesson.

## INTRODUCTION: McKinney Falls Macroinvertebrate Test

### 1. Explain Important Safety Rules:

- Discuss avoidance of **snake habitat** (plants and brush) and **snakes**. Move backward slowly away from the snake if one is near. Do not yell, run, or wave arms. When a safe distance from the snake (5 to 6 feet), sit quietly and watch the snake. If a snake is spotted in the water, stay out OR get out of the water.
- Be aware of **poison ivy**.
- **DO NOT THROW ROCKS**. You might hurt someone or something in the water.

### 2. Watershed Information (*Before walking to Falls*)

- Review the definition of a **watershed**. (area of land that drains to a creek) Identify the watershed you are in. (Onion Creek watershed)
- Explain to students:  
**Onion Creek** begins north of Dripping Springs and flows into the Colorado River south of Austin. There are 12 major tributaries to Onion Creek, so when it rains, Onion Creek can flood severely.
- Tell students to observe signs of flooding, volcanic ash (remains of Pilot Knob volcano off hwy 183), and fossils while walking down to the creek.

### 3. Geology (*Walk to the area just above the Falls and stop*)

- Ask students to identify the type of this rock they are standing on? (**Limestone**; students think it's volcanic rock)
- Discuss examples of **erosion** and **deposition**.
- Walk down to the waterfall area and look for fossils and volcanic rock (dark grey and crumbly)

### 4. Identifying Macroinvertebrate Habitat (*At the waterfall*)

- Ask students why **oxygen** is important in the creek. (organisms breath it) Where does the oxygen they breath come from? (plants, algae, bubbles) Point out the bubbles that oxygenate the water at the waterfall and downstream at the **riffle** where the water is flowing over the rocks.
- Ask students why the bugs are important to the creek (they are food for fish) So without oxygen and bugs, what would happen to the creek? ( the **food web** would break down)  
Tell students we will look for bugs at the shallow, bubbly, rocky area (riffle) because it is a good habitat for the bugs, provides protection from predators, and is full of oxygen (bubbles).

### 5. Purpose of the Macroinvertebrate Test (*Walk down to riffle area, the shallow, rocky area downstream of lower McKinney Falls. Students should **SIT DOWN.***)

- One way to check the health of a creek is to identify and count the variety of tiny water bugs. Pollutants in the water can kill the sensitive water bugs. A chemical test will not identify pollution in the water after it has washed downstream, but the water bug community will change because the pollution would cause sensitive water bugs to die. If sensitive water bugs are not living in an area where they should be, then it is a sign something in the environment is not healthy. You will be collecting and identifying water bugs to determine the health of the creek.

## **PROCEDURE**

### **1. Teach Bug Count (Use the large bug poster)**

- Tell students to look at the bugs in the top blue section of the poster. These are sensitive bugs because they can only live in a healthy creek. They are worth 3 points. The bugs in the middle green box can tolerate a little bit of pollution without dying, but are still sensitive because they cannot live in heavy pollution. They are worth 2 points. The bugs in the bottom brown box can tolerate pollution but they are also found in a healthy creek. They are worth 1 point.
- Finding all categories of bugs is best because it shows a diversity of organisms. If there are no bugs found from the excellent or good category, then the creek is considered unhealthy. When there is not a good diversity of bugs in the water, it affects the food web of the creek. Animals that depend on the bugs in the water for food could lose their food supply. People also depend on the aquatic food web because we eat fish.
- Explain that if they find a bug in the poor water quality group it does not necessarily mean the creek is polluted; however if they were the only bugs they found, then the creek would be considered polluted.
- Demonstrate how to check off the type of bug found on the worksheet. Emphasize the importance of correct bug identification. Discuss how to tell them apart by looking at their structures (i.e. count number of tails, does it have legs?)

### **2. Demonstrate How to Collect the Bugs**

- Go to a spot near the creek for demonstration.
- Show the students how to fill the bin with 1-2 inches of clear water for holding the bugs after they've been collected.
- Tell the students they will work with a partner in their group. Demonstrate by picking a partner and having them hold a magnifier with creek water. Bring a pair of forceps, and wade into the water with your partner. Explain to students the procedure as you bend down to pick up a rock sitting on the bottom of the creek (not buried), in a shallow area with running water (to bring oxygen). Lift the rock out of the water and inspect the bottom for movement or shapes. When a bug is spotted, use the forceps to carefully remove the bug and place it in your partner's magnifier. Walk slowly and carefully to a spot where you think bugs are living.

## **IMPORTANT RULES:**

DO NOT PLAY OR SWIM IN THE WATER.

DO NOT DROP ROCKS OR SPLASH ROCKS IN THE WATER.

DO NOT GET IN WATER DEEPER THAN YOUR KNEES (bugs don't like the deeper water)

DO NOT HARM THE BUGS.

Note: If someone is too scared to go in the water or does not have water shoes, bugs can be found under rocks in the water near the edge of the creek.

### **3. Demonstrate How To Identify and Document the Bugs**

- Use the Bug ID sheet to identify the bug.
- Check off the bug found on the worksheet.
- Reward students for identifying a bug correctly (this will help them stay focused on identification)
- Put the bug in the collection bin. Look for more bugs in the water.

### **4. Activity**

- Divide class into **three groups** each with an adult leader. Give each group materials. Assign one group an upstream site, one group a midstream site, and one group a downstream site so everyone is not crowded and collecting in the same area.
- Allow time for everyone to collect, identify, and document (**20 minutes**). Adult leaders should actively keep students on task. **NO SWIMMING!!**

***NOTE:** When the majority of students start to play, usually enough time has passed for their interest in the activity. If one or two students are disrupting the activity, ask them to sit out until the rest of the group is done.*

### **5. Final Calculation of Water Quality Rating**

- Gather the class together (**SIT DOWN**). Use the poster to check off all the bugs found by every group. Ask students to check off on their worksheet any additional bugs found by the class that might not have been found by their group. If there is an especially interesting bug, send the viewer around for everyone to observe. Add up score and rate the creek (note: only calculate 1 of each bug).

***NOTE:** Bugs we don't often find include stonefly nymphs, beetle larva, leeches. If a student says he/she found one of these, check it.*

- Remind students that this activity can be done at their own creek to test water quality.
- Carefully dump bugs back in creek.