Backyard STEM

Creek Critters: Home in the River

Investigating Habitats in Streams

Project Area:
Environmental Science

Skill Level: Intermediate—Advanced

Learner Outcomes:

⇒ Be able to explain how to collect a samle of benthic macroinvertebrates from a stream.

⇒ Be able to use an identification guide to identify common benthic macroinvertebrates.

⇒ Be able to describe the difference between pollutant tolerant and sensitive species and use a water quality index.

Tennessee Science Curriculum Standards:

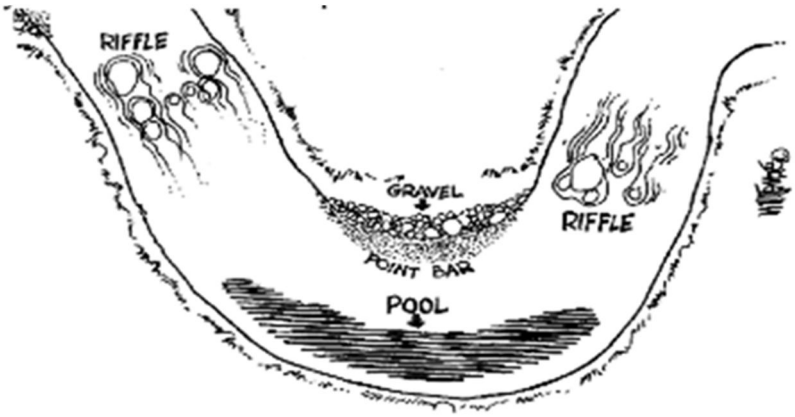
Science Skills:
Evaluate, observe

Life Skills: Observing, Reasoning

⇒ Did you know that there are over 60,000 miles of streams and rivers in Tennessee? That's a lot of habitat for benthic macroinvertebrates!

Vocabulary Word	Definition
Benthic Macroin-vertebrate	Organisms that do not have a backbone and are visible to the naked eye and live in the benthos environment; benthos is the bottom of a stream channel. [abbreviated BMI]
Riffle	Stream habitat with shallow, fast-moving water and large substrates.
Pool	Stream habitat with deep, slow-moving water and small substrates.
Substrate	Eroded soil that is a pollutant in large quantities.
Watershed	The land area that drains to a common point.

The river is home to many different types of organisms, who live in stream substrates, which are the rock, soil and sediment that lie in the bottom of streams and rivers. It provides habitat for aquatic life, such as fish, crustaceans, and insect larvae. Two types of habitats in rivers are *riffles* and *pools*. **Riffles** are relatively short and shallow with fast moving water (or high velocity) and larger substrates (like gravel, cobbles, and boulders). Insect larvae generally live in riffles in between rocks, along stream banks, and in natural debris like leaf packs and wood. **Pools** are relatively long and deep with slow moving water (or low velocity) and smaller substrates (like sand and muck). Pools provide fish and other larger aquatic organisms shelter. In healthy streams and rivers, you will find many inhabitants in pools and rivers.



courtesy *Streamkeeper's Field Guide*

Credits: Andrea Ludwig and Jennifer DeBruyn

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Helpful links:

Tennessee Department of Environment and Conservation Watersheds Program: http://www.tennessee.gov/environment/water/watersheds/index.shtml

US Geologic Survey (USGS) real-time stream flow stations in Tennessee: http://waterdata.usgs.gov/tn/nwis/rt

A river is formed by many small creeks and streams, which are fed from runoff and groundwater, flowing together. The land area that drains to a river is called a *watershed*. A river's watershed gets larger as you move downstream, and in turn, a greater amount of water flows in the river. The shape of a river changes over time as water flow weathers and forms the channel. A river channel has dimensions, just like a shoebox or pipe, with a width from bank to bank and an average depth of water. The speed at which the water flows is known as *velocity*. River dimensions and velocity can be easily measured, and then the river *flow rate* can be calculated from these measurements by finding the product of the dimensions and the velocity.

GO OUTSIDE!

Go find the nearest creek and check out the sub-strates! Are they rocky? Sandy? Can you see the bottom? Lift up a rock and see what you find!

ACTIVITY: Stream Habitats!

Collect measurements from your stream in a riffle and pool.. Then calculate the flow rate using this equation:

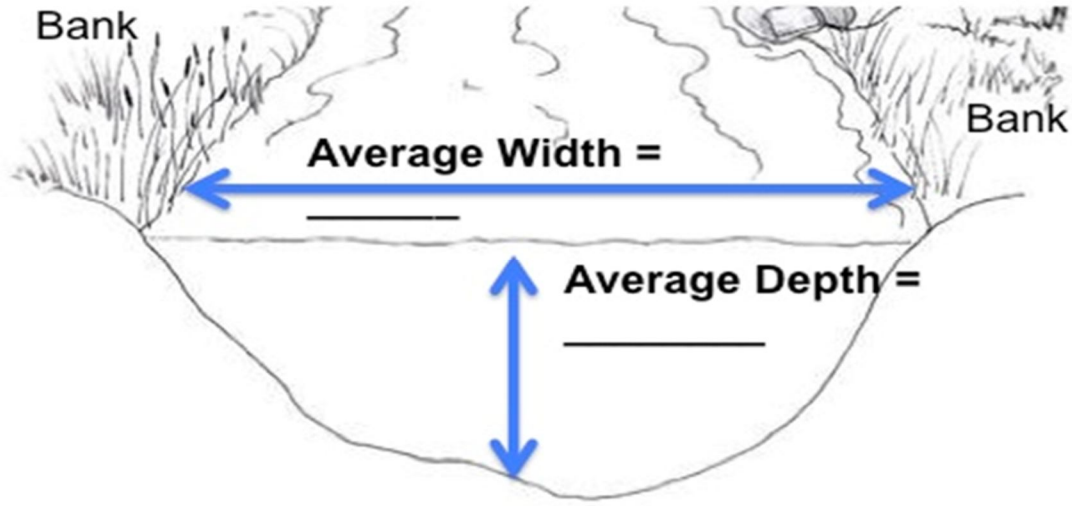
Flow Rate (cubic ft per second or ft^3/s) = Width (ft) x (Depth (ft) x Velocity (ft/s)

Riffle Measurements:

Velocity = _____ ft/s

Flow Rate = [Width] x [Depth] x [Velocity] = _____ ft^3/s

Pool Measurements:



Velocity = _____ ft/s

Flow Rate = [Width] x [Depth] x [Velocity] = _____ ft^3/s

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Complete the questions below about the stream flow data you just collected.

1. How did the riffle flow rate and the pool flow rate compare?
2. Take the flow rate you measured; this is the volume of water that passes by that location every second of the day. If you were to sit at the stream riffle for an entire day, a large amount of water would pass by you. How much water would pass by? (Hint there are 84,600 seconds in a day)
3. What would happen to the stream if it were raining? Would the flow rate go up or down? What would happen to the depth and width?
4. The Little River coming out of the Great Smoky Mountains usually flows around 200 ft^3/s. If an Olympic sized swimming pool holds 88,000 ft^3 of water, how long would it take to fill if the Little River was flowing straight into it?
5. Large rivers are fed by small creeks and streams called tributaries. If the stream you measured during the activity were a tributary to the Little River (flowing at 200 ft3/s), then what proportion of the Little River was made up by the measured stream? (Hint: the measured stream is a fraction of the total Little River)

Go Further!

Visit the US Geologic Survey website for real-time stream flow stations in Tennessee (http://waterdata.usgs.gov/tn/nwis/rt). Choose a station dot and explore the flow rates currently measured at the station. How does this compare with the flow rate you measured? Look at the flow rate history at the station for the past 14 days. What was the highest recorded flow rate? And the lowest?