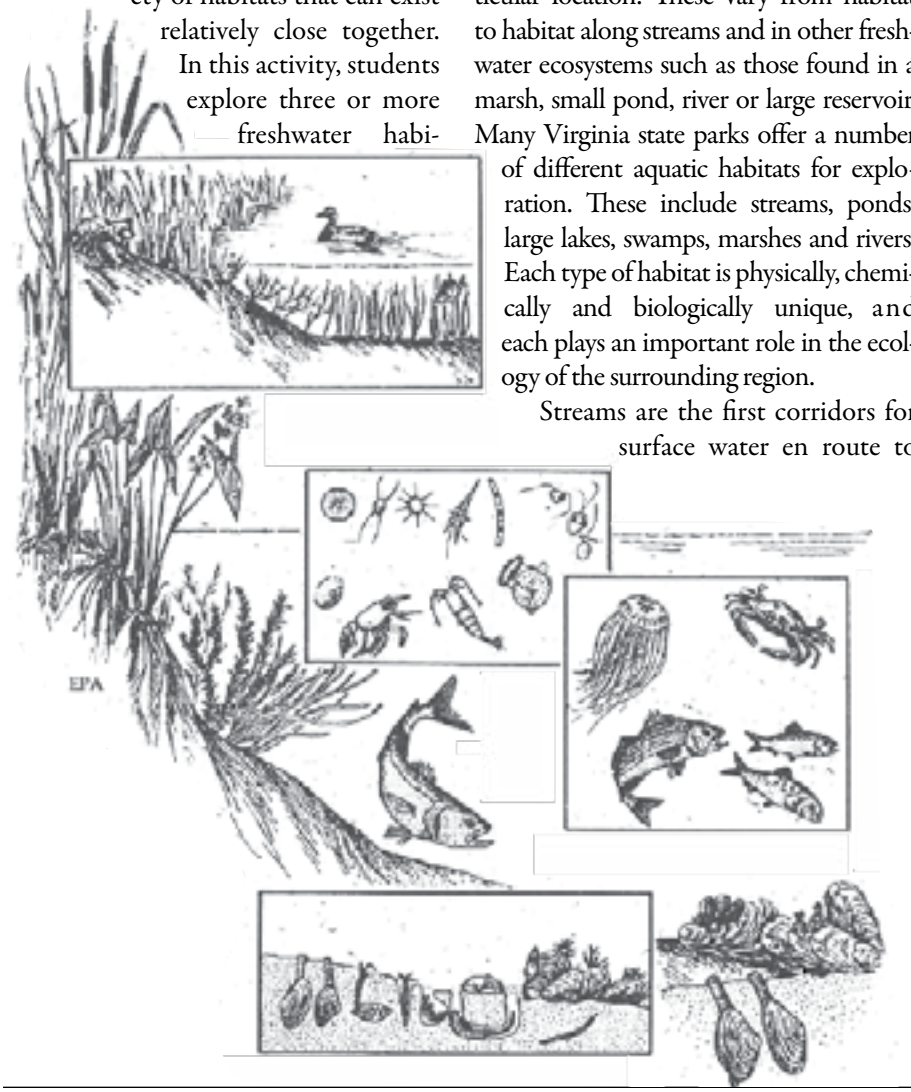
Habitat Hunt

Freshwater habitats are familiar to all of us, yet they are formed by only a tiny fraction of the water available on our planet. They are vulnerable to natural and human disturbances, yet our lives often depend on the quality of the water we take from them.

Extreme environmental changes such as periodic flooding and temperature fluctuation make demands on freshwater organisms, which require some unique and highly specialized adaptations to survive. One of the fascinating things about aquatic environments is the variety of habitats that can exist relatively close together. In this activity, students explore three or more freshwater habitats that exist near one another in a Virginia state park.



Note that this activity can serve as a companion to "Little Limnologists" another Backyard Classroom lesson plan.

Background

The study of freshwater ecosystems is known as limnology. To understand freshwater habitats, we must study abiotic (nonliving) aspects of the environment, such as pH, temperature and oxygen availability, and biotic components—the plants, animals and other organisms found in a particular location. These vary from habitat to habitat along streams and in other freshwater ecosystems such as those found in a marsh, small pond, river or large reservoir. Many Virginia state parks offer a number of different aquatic habitats for exploration. These include streams, ponds, large lakes, swamps, marshes and rivers. Each type of habitat is physically, chemically and biologically unique, and each plays an important role in the ecology of the surrounding region.

Streams are the first corridors for surface water en route to

Grade Levels: 6-12

Objectives

Students will investigate variation among aquatic habitats by:

- *predicting* patterns in relationships.
- *planning* an investigation.
- *observing* biotic and abiotic factors.
- *measuring* environmental parameters.
- *collecting* data.
- *drawing* conclusions.
- *communicating* results.

Materials

Students will make their own lists but the following could be used:

- salinity test kit, hydrometer or salinometer
- pH paper
- LaMotte or HACH Company test kits (dissolved oxygen, pH, salinity)
- non-glass thermometers
- clear plastic bottles or jars
- safety goggles
- buckets
- watch with second hand
- Secchi disk or white meter stick
- assorted sieves
- "floatables" and measuring tape for velocity observation
- dip net
- enamel pan
- notebook, pencils
- cameras
- soap and water (for washing after using chemicals)
- assorted field guides

To Wear

- boots or old sneakers

When

Any time of year, but observations will vary with the seasons.

Time Required

2 to 4 hours

the oceans. Virginia's mountain streams usually begin on the sides of ridges and drop quickly into a valley. They are usually rocky, cool, clear and well-oxygenated at higher elevations but flow more slowly and become less rocky in valleys. Eventually, Virginia's mountain streams join larger rivers in the Piedmont and flow to the Atlantic Coastal Plains. These larger rivers often have more cloudy water, less oxygen and warmer temperatures than do the small streams.

Lake Drummond in the Great Dismal Swamp and Mountain Lake in Giles County are the only natural lakes in Virginia. Natural ponds are very rare, except those created by beavers, but many streams flow into manmade ponds or lakes. In ponds, the water takes on new characteristics, and new habitats that vary with the water's depth can be found. Oxygen levels and water clarity are often low in ponds. Temperatures typically rise in the summer and drop in the winter, and the pH may be altered by the pond's biological activity. Larger lakes are different because of their greater depth. Less light reaches the deepest areas, and some cooler water is usually available all year to fish and other organisms that can swim down to where it is found.

Procedure

Before the Trip:

1. Become familiar with the site to be visited. Identify several aquatic habitats that can be investigated during a field trip there.
2. Communicate with park staff and visit the site in advance. At some sites, the various habitats are far apart and require transportation between locations so careful planning and timing are essential.
3. Review the activity procedure with the class. Describe to the students the basic types of aquatic habitats that will be visited (such as stream, pond and cattail marsh) and orient them to the basic site features using maps, a topographic map of the site and other visuals if available. (See parks section for USGS topographic map numbers.)
4. Lead the class in a brainstorming session to make a list of basic aquatic habitat characteristics that can be measured or observed in the field, such as water flow rates, available light, substrate, turbidity, biota and pH.
5. Divide the class into teams of about four students each. Charge each team with collecting data on one aquatic habitat characteristic. If the list is small or the class is large, more than one team can collect information on the same characteristic. Each team makes predictions about what they think their data will show.
6. Help each team devise a plan for collecting data. Include:
   - a data collection method
   - a data entry chart (include date and time of measurements)
   - an equipment list
   - questions to answer after visiting all locations

   a. An especially important question is: *What are the similarities and differences in the observations between the locations and what appear to be the underlying causes?* Be sure that teams can carry out their plans within the time allotted for the field trip.

   b. Before departing for the site, teams should practice their data collection techniques such as measuring dissolved oxygen, pH and turbidity with water samples prepared at school or collected from nearby bodies of water.

At the Site:

1. Have each team carry out its data collection plans designed above. Assist them when necessary.
2. After all the locations have been visited but before leaving the site, ask each team to present its observations to the whole class, explaining how close observations were to the predictions and describing the differences and similarities in observations between the locations. Speculate about what factors, manmade and natural, influence the observed characteristics and how.

Follow-up:

1. Have teams organize their data with graphs, bar charts and tables, and then formally present their findings to the rest of the class. They should suggest reasons for the differences and similarities between the aquatic habitats and suggest how these ideas might be tested.
2. Lead the class in a discussion to synthesize the team observations into generalized profiles for each habitat and to find apparent correlations in their data.

Resources

Caduto, Michael J. 1990. *Pond and Brook: A Guide to Nature in Freshwater Environments.* University Press of New England (reprint edition).

Cole, Gerald A. 1994. *Textbook of Limnology*, fourth edition. Waveland Press.

Fox, B. 1992. *Aquatic Animal Adaptations*. Virginia Cooperative Extension Service, 4-H. Box 9081. Virginia State University. Petersburg, VA 23806. 804-524-5848.

Giller, Paul S., and Bjorn Malmqvist. 1999. *The Biology of Streams and Rivers.* Oxford Unviersity Press.

Reid, George K., with H.S. Zim, editor. 1990. *Pond Life.* Golden Books.

Reid, George K., with H.S. Zim, editor. 2001. *Pond Life.* St. Martin's Press. New edition of the above classic handbook.

Voshell, J. Reese, Jr. (2002) *A Guide to Common Freshwater Invertebrates of North America.* Blacksburg, VA: The McDonald & Woodward Publishing Company.

Wetzel, Robert G. 2001. *Limnology: Lake and River Ecosystems*, third edition. Academic Press.

3. Using the data, examine the list of apparent correlations. Develop these into hypotheses and experimentally test them.

In addition to the characteristics found with testing the physical characteristics of the water, remember to include observations on:

Vegetation – Note the presence, abundance and variety of plants growing in the water. What are their shapes and textures? Which parts are above or below water? What is the water depth where they are growing? Are the plants herbaceous, trees or shrubs? Make sketches.

Animals – A dip net and bucket may be useful. Note all forms of animal life seen in or on the water such as wading birds, insects and fish. Note signs of aquatic and amphibious animals such as tracks, scat, eggs and fish breaking the surface of the water. (Care should be taken to avoid hurting or being hurt by any animals caught, and all must be released where they were caught.) Do the animals' features and habits reflect anything about the habitat in which they are found?

Freshwater Habitat Hunt

Sample Data Sheet

Team Name: _____

Date: _____ Location: _____

Brief description of aquatic areas: _____

_____

_____

Habitat				
Air temperature				
Water temperature				
Turbidity				
Current speed				
Waves				
Soil type				
Vegetation in aquatic habitate (sketch)				
Animals/insects in or near aquatic habitat				
pH				
Salinity				
Dissolved oxygen				
Other observations				

SOLS: 5.6, 6.5, 6.7, 6.9, LS.1, LS.4, LS.5, LS.6, LS.9, LS.10, LS.11, LS.12, BIO.1, BIO.2, BIO.8