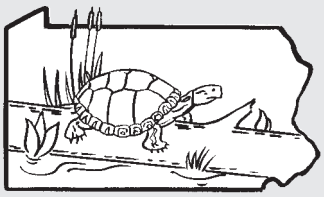
"Herp" Sweet Home

Adapted from "Water, Water Everywhere," in *Living in Water*, Edition 1 (Baltimore, Md.: National Aquarium, 1987).



- **GRADE LEVELS:** 6 – 12
- **SUBJECT AREAS:** Environmental Studies, Science
- **DURATION:** 2 sessions
- **SETTING:** Classroom
- **SKILLS:** Classifying, comparing, concluding, describing, developing vocabulary, following directions, interpreting, reading, reasoning
- **VOCABULARY:** Biome, bog, deciduous forest, dichotomous key, habitat, marsh, swamp, vernal pool, wetland, wet meadow
- **CHARTING THE COURSE:** Class Field Guide; Herpetology Field Trip; "Herp" Habitat Haggle; Park It Here!; Before the Well Runs Dry; Carry On!; What Every "Herp" Needs; Froggy Swamp; What Do You Know About "Herps?"; Oh "Herps!"; Isn't That Special?
- **"HERP" HAPPENINGS:** A Tiny Turtle in Danger of Disappearing; Leave No Stone Unturned; Sandstone and Salamanders; Swamp Rattlers

Summary

Students use a dichotomous key and a flow chart to classify common Pennsylvania habitats. Each of these habitats is a potential home to many species of amphibians and reptiles.

Objectives

Students in grades 6 through 8 will
- define habitat.
- use a flow chart and a dichotomous key.
- name and describe three different Pennsylvania habitats.

Students in grades 9 through 12 will
- analyze the usefulness of dichotomous keys to scientific investigation.
- describe several habitats, listing the typical vegetation and other defining properties.
- given a habitat type, name two amphibians or reptiles that live in that habitat.

Materials

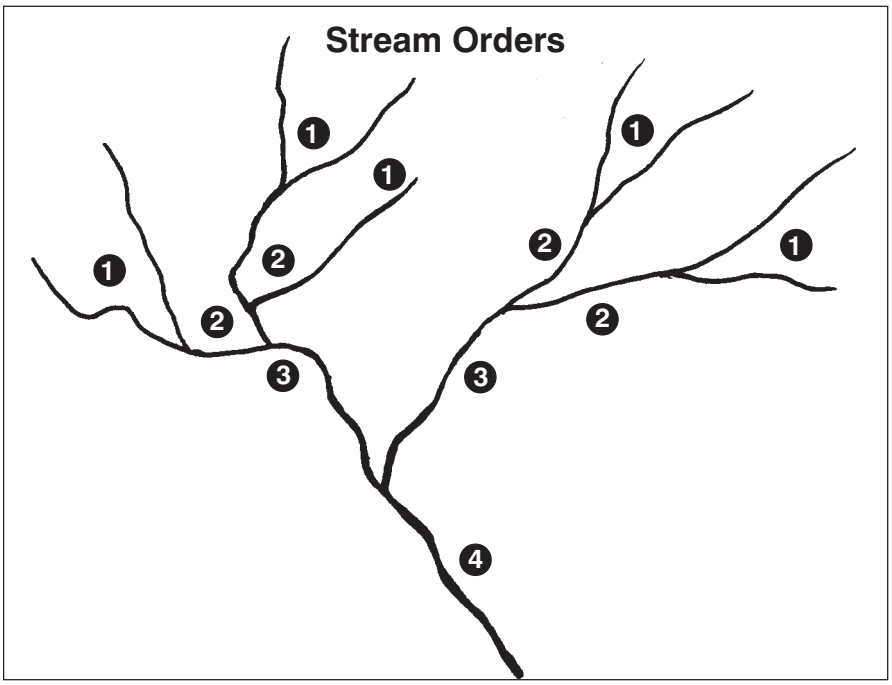
Copies of Key to Pennsylvania Habitats (page 147); copies of Pennsylvania Habitat Flow Charts (pages 149–151); copies of habitat cards (pages 153–167), one per student.

Background

Dichotomous keys are used in science to classify many types of things, usually living organisms. The user is offered two choices at each step, and by choosing between the two the user is led to an answer or to another choice. These keys can seem daunting at first due to their minute detail. Introducing students to a simple key allows them to become accustomed to the concept without being overwhelmed. A flow chart offering two choices at each step is essentially the same as a key, but the layout of the flow chart can help children visualize how a dichotomous key works.

The entire state of Pennsylvania is part of a temperate **deciduous forest biome**, a biome characterized by mid-range temperatures and high levels of precipitation. The final stage of *ecological succession* in Pennsylvania is a deciduous forest dominated by large hardwood trees such as oak, maple, and beech. Before the European settlement of this state, about 98 percent of it was covered by forest. Today, only small, inaccessible patches of old growth forest remain, notably in Cook Forest State Park, Susquehannock State Forest, and Bald Eagle State Forest. Second and third growth forests now cover approximately 60 percent of the state. A major part of Pennsylvania has been cleared for agriculture, the number one industry in the Commonwealth. As the population grows, more and more land is becoming residential, and wildlife and humans must share backyard **habitats**. In rural areas, and even in some suburbs, small stands of second growth trees dot the landscape. These woodlots are home to many species, including several amphibians and reptiles.

The forest was not the only habitat found in Pennsylvania before colonial times. There were naturally occurring meadows or prairies (the result of pond or lake succession), and the mountainous regions of the state contained rocky outcrops that still exist today. Aquatic habitats abounded, including over 50,000 miles of flowing water. (In fact, Alaska is the only place in the United States that has more miles of rivers and streams than Pennsylvania.) Unfortunately, some of this flowing water has been degraded by human activities like farming, industry, and mining. Abandoned mine drainage is the primary pollutant, impacting more than 3,000 miles of Pennsylvania streams. It may come as a surprise that there were far fewer lakes and ponds in Pennsylvania prior to the



immigration of Europeans, but most of the lakes and ponds we have today are artificial. Of course, Lake Erie existed, holding a wealth of species before an influx of sewage and agricultural fertilizer led to it being declared biologically dead in the 1960s. (Today, Lake Erie is recovering and is once again home to many species, although some, such as the blue pike, are now extinct.) Excluding Lake Erie, Pennsylvania's two largest lakes — Raystown Lake and Lake Wallenpaupack — are both artificially created. In addition, Pennsylvania once had an abundance of **wetlands**, including **swamps**, **bogs**, **marshes**, **wet meadows**, and **vernal pools**. Today, 56 percent of those wetlands have been eradicated by human activities like filling and flooding, and we are still losing wetlands each year.

The dichotomous key and flow chart used in this activity distinguish between different habitats by using distinctive characteristics like the amount of water or the type of vegetation. Also, since some habitats are created by human activity, human impact and the proximity of homes and other buildings are also considered.

Terrestrial habitats are those which are not covered with water for a significant amount of time, although they may be covered with water immediately after a rainfall or when snow melts. These include forests, both old growth and second growth; woodlots, which are small wooded areas surrounded by other, usually human habitats; rocky outcrops that have occurred naturally in mountainous areas or have been exposed by human activities; meadows, or open areas of land that have been cleared of trees by fire or other natural occurrences; farmland that may be cultivated for crops or cleared for pasture; and backyards, those areas immediately surrounding residences.

Pennsylvania has a diversity of aquatic habitats that are covered by water for all or part of the year. This water can be flowing, as in a river or stream. Rivers and streams are formed by the runoff of precipitation or by water coming up from underground. When groundwater reaches the surface, it forms a spring. Streams and rivers are classified by order. A first-order stream has no tributaries; it is formed directly from runoff or a spring at its headwaters. When two first-order streams join, they form a second-order stream. It remains a second-order stream, even when other first-order streams converge with it. However, when it meets with another second-order stream, it becomes a third-order stream. The designation "river" is somewhat arbitrary and is based primarily on the size of the body of water. However, most flowing bodies of water with an order of five or above are considered rivers. It is very rare for a river to reach the tenth order, but the Mississippi River is twelfth order. (See diagram.)

Size is the only real difference between lakes and ponds, and these two habitats share many characteristics. They have open water and are not dominated by emergent vegetation, although plants may grow around the periphery. Algae, duckweed, and lilies may, however, appear throughout a lake or pond. Lakes and ponds in temperate climates will also have a temperature gradient. In general, the surface water will be coldest in winter and in fact may be frozen, while the water at the bottom will be 4° Celsius. (Water is densest at 4° Celsius, and therefore this heavier water will sink to the bottom.) In warm months, the top layer will be warmest due to the sun, the bottom layer will be coldest, and the area in

the middle will have a *thermocline* or marked decrease in temperature from top to bottom. At some point in both spring and autumn, all the water in the lake or pond reaches the same temperature and, therefore, the same density. At this point, the water mixes freely.

There are five habitat types in Pennsylvania that are described as wetlands. A wetland is an area that is underwater for at least part of the year and contains *hydric soils* (soils that are saturated with water and show signs of anaerobic conditions) and *hydrophytic* plants (plants that grow in water). The type of vegetation is important to distinguishing among different wetland habitats. The predominant vegetation in a bog is moss; bogs tend to have low (acidic) pH and are usually found at high elevations. Swamps are characterized by trees that grow in standing water; species found in Pennsylvania swamps include willows, red maples, and sycamores. A marsh has grasses and shrubs growing in it. A wet meadow resembles a marsh, but this wetland looks like a meadow or pasture. Upon close inspection, it becomes obvious that the ground is very wet, at times with a few inches of water on the surface, and the soil is saturated. Another wetland type found in Pennsylvania is a vernal pool. These tiny pools, often found in forests and woodlots, are formed in winter or spring. In most years, the water evaporates or is absorbed into the soil by late summer.

For a list of Pennsylvania amphibians and reptiles and the habitats in which they live, see Appendix I.

Preparation

Copy the Key to Pennsylvania Habitats and the Pennsylvania Habitat Flow Chart. (You can copy one per student or allow two or three students to share.) Copy and cut out the Habitat Cards. You can glue these to poster board or index cards and laminate them for future use. Gather pictures, drawings, or photographs of the habitats used in this activity. These can be glued to the back of the appropriate habitat card. Good sources include nature magazines and posters. The following habitats are included in this activity: forest; vernal pool; marsh; woodlot; pond; wet meadow; rocky outcrop; lake; bog; meadow; brook; swamp; farmland; spring; stream; backyard; river.

Procedure

1. Lead a class discussion. Have students define "habitat." Ask them to name some habitats. What are some major differences in the habitats they have named?

2. Pass out one Habitat Card to each student. (You may wish to have younger students color the cards first so they are more familiar with the habitat.) Distribute the Pennsylvania Habitat Flow Chart and the Key to Pennsylvania Habitats. Explain to students how to use a dichotomous key.

3. Have each student use the flow chart to name the habitat on his or her assigned Habitat Card. Once they have done this, they can use the dichotomous key to name the same habitat.

4. Have students trade cards, then have them try using the key to name their new habitats. If they have trouble using the key, they can return to the flow chart to find the answer.

Conclusions

A dichotomous key works in the same manner as a flow chart, using a series of choices to arrive at a final category. These tools can be used to classify a variety of things, including habitats. Even a small state like Pennsylvania has a diversity of habitats.

Assessments

1. Have students define "habitat," then ask them to name some of the categories of habitats found in Pennsylvania (aquatic, terrestrial, flowing water, standing water, wetlands).

2. Have each student list three Pennsylvania habitats and describe each one. Have them name one or two amphibians or reptiles that live in each habitat. For older students, have them describe the habitat in detail, including the vegetation found there.

3. Watch a nature video and have students identify the habitats they see.

4. For older students, discuss the use of dichotomous keys. For what other categories might dichotomous keys be useful? (They are frequently used for identifying plant and animal species.) Why would a key be more accurate than a field guide? Are there any drawbacks to using dichotomous keys?

Extensions

1. Take students outside and have them name the habitats in the area around the school, or have them make a list of all the habitats they see on their way to school.

2. Have students search for newspaper articles about Pennsylvania habitats being degraded or saved.

How might human activities affect "herp" species in these areas?

3. Have students (alone or in groups) create their own dichotomous key for any category they choose.

Tadpole Option

Give each student a habitat card to color. Have them draw in the "herps" mentioned in the description. You may want to enlarge the cards for this activity.

Resources

"Acid Mine Drainage/Abandoned Mine Land Fact Sheet." Pottsville, Pa: Eastern Pennsylvania Coalition for Abandoned Mine Reclamation, 1997.

Bier, Charles. "Patterns of Biogeography in Watersheds." *Allegheny Watershed Network Notes*. November 1997.

Cole, Gerald A. *Textbook of Limnology.* Prospect Heights, Ill.: Waveland Press, 1983.

Endangered and Threatened Species of Pennsylvania. Harrisburg, Pa.: Wild Resource Conservation Fund, 1995.

Facts about Wetlands 5. Washington, D.C.: U. S. Environmental Protection Agency, February 1995.

Miller, G. Tyler. *Living in the Environment.* Belmont, Calif.: Wadsworth Publishing, 1994.

Shaffer, Larry L. *Pennsylvania Amphibians and Reptiles.* Harrisburg, Pa.: Pennsylvania Fish Commission, 1991.

"Water, Water, Everywhere." In *Living in Water,* Edition 1. Baltimore, Md.: National Aquarium, 1987.

The Wonders of Wetlands. Bozeman, Mont.: The Watercourse, 1995.

HERP JOKE

How many spotted salamanders does it take to screw in a light bulb?

None. They're nocturnal.

Key to Pennsylvania Habitats

1. a. Terrestrial habitat.....2
   b. Aquatic habitat.....7

2. a. Covered densely with trees.....3
   b. Open land (trees sparse or absent).....4

3. a. Large tract of land with few or no buildings present.....Forest
   b. Small area surrounded by developed or agricultural land.....Woodlot

4. a. Rocky, with little or no vegetation, usually in a mountainous region.....Rocky Outcrop
   b. Covered with vegetation.....5

5. a. Human impact minimal.....Meadow
   b. Area impacted by humans.....6

6. a. Cultivated land or pasture.....Farmland
   b. Part of a residential area.....Backyard

7. a. Standing water.....8
   b. Flowing water.....14

8. a. Open water.....9
   b. Water with emergent vegetation.....11

9. a. Very large body of standing water.....Lake
   b. Smaller body of standing water.....10

10. a. Temporary, arising in late winter or spring.....Vernal Pool
    b. Permanent, not seasonal.....Pond

11. a. With trees.....Swamp
    b. Without trees.....12

12. a. With mosses and bushes.....Bog
    b. With grasses and shrubs.....13

13. a. Open water more prominent than grasses.....Marsh
    b. Grasses more prominent than open water.....Wet Meadow

14. a. Small body of flowing water, low order.....15
    b. Large body of flowing water, high order.....River

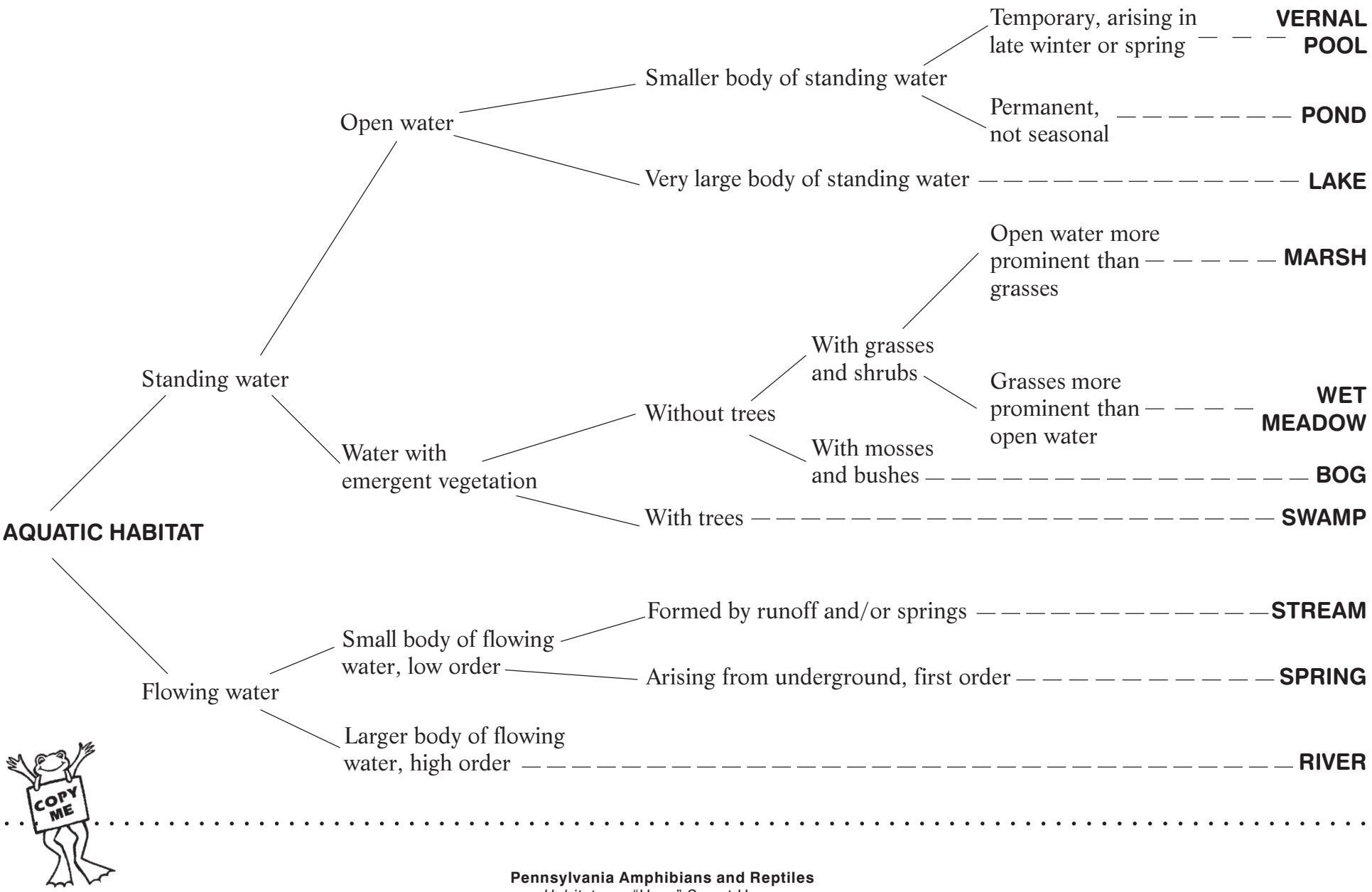
15. a. Arising from underground.....Spring
    b. Formed by springs or runoff.....Stream

Pennsylvania Habitat Flow Chart

TERRESTRIAL HABITAT

- Covered densely with trees
  - Large tract of land with few or no buildings present — **FOREST**
  - Small area surrounded by developed or agricultural land — **WOODLOT**
- Open land (trees sparse or absent)
  - Rocky, little vegetation, in mountainous region — **ROCKY OUTCROP**
  - Covered with vegetation
    - Human impact minimal — **MEADOW**
    - Area impacted by humans
      - Cultivated land or pasture — **FARMLAND**
      - Part of a residential area — **BACKYARD**

Pennsylvania Habitat Flow Chart



"Herp" Sweet Home Habitat Clue Cards

A Jefferson salamander spends most of its time deep in the soil, while a wood turtle walks along the leaf-covered surface. Small mammals hide among the many trees, often falling prey to copperheads and milk snakes.

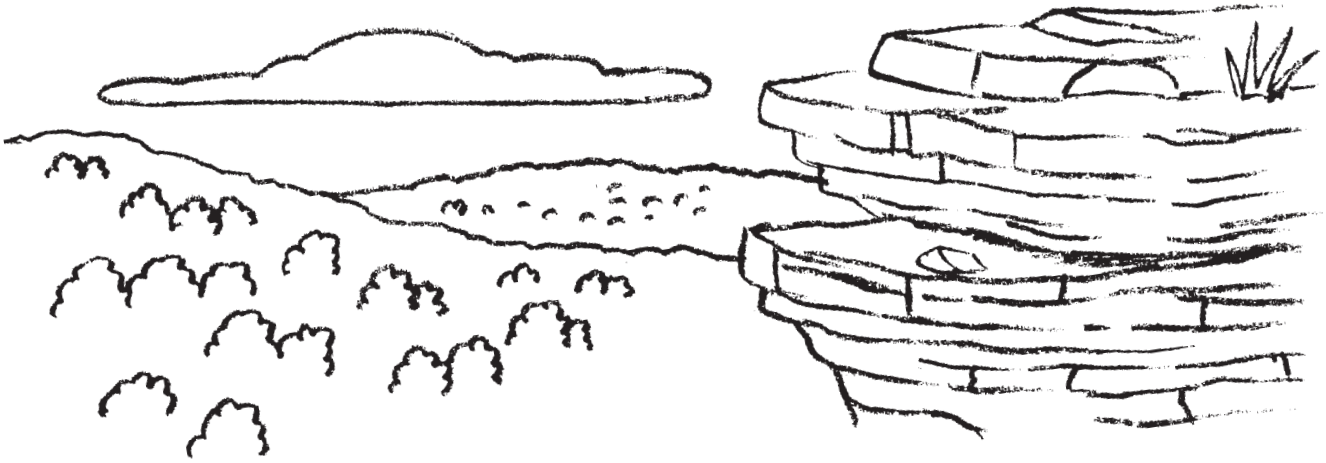
Pennsylvania Amphibians and Reptiles
"HERP" SWEET HOME HABITAT CLUE CARDS

Under small rocks and damp leaf litter, slimy and redback salamanders abound. A tiny smooth earth snake competes with them for earthworms, oblivious to the nearby cars and homes.

Pennsylvania Amphibians and Reptiles
"HERP" SWEET HOME HABITAT CLUE CARDS

"Herp" Sweet Home Habitat Clue Cards

High on an Appalachian ridge, a timber rattlesnake rests on the protruding rocks. The bluish tail of a young coal skink is barely visible between two stones.



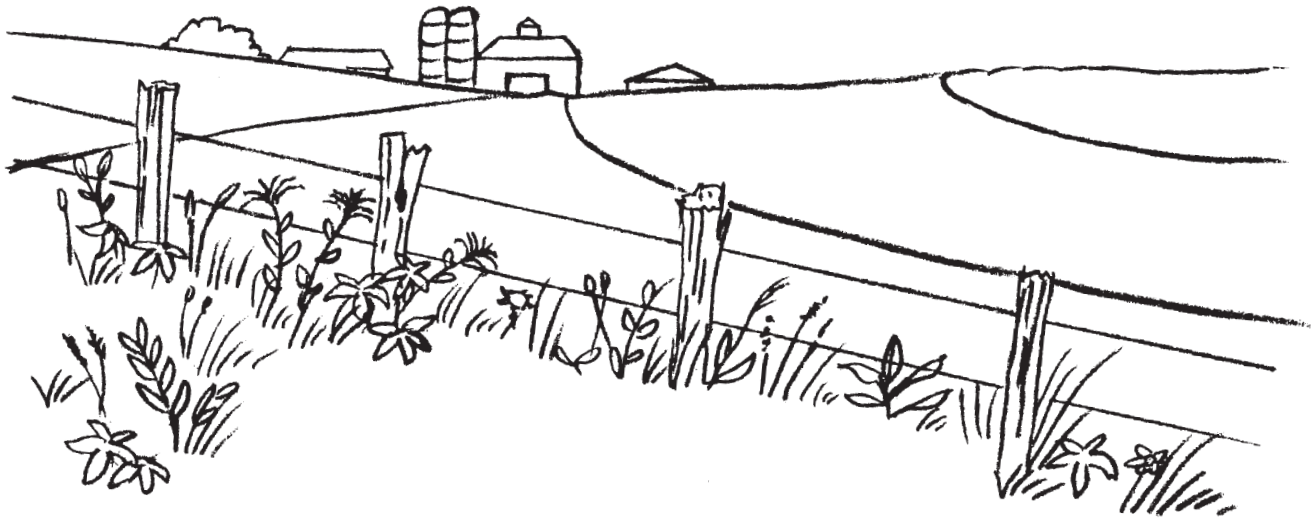
Pennsylvania Amphibians and Reptiles
"HERP" SWEET HOME HABITAT CLUE CARDS

As the sun begins to climb over the horizon, tall grasses and wildflowers hide a black rat snake as it swallows a mouse. A Fowler's toad, after a long night of foraging, buries itself in the dirt.

Pennsylvania Amphibians and Reptiles
"HERP" SWEET HOME HABITAT CLUE CARDS

"Herp" Sweet Home Habitat Clue Cards

Basking in the sun, a northern fence lizard rests on an old fencepost. Weeds grow thick along the field's edge, where a rough green snake hunts for grasshoppers.



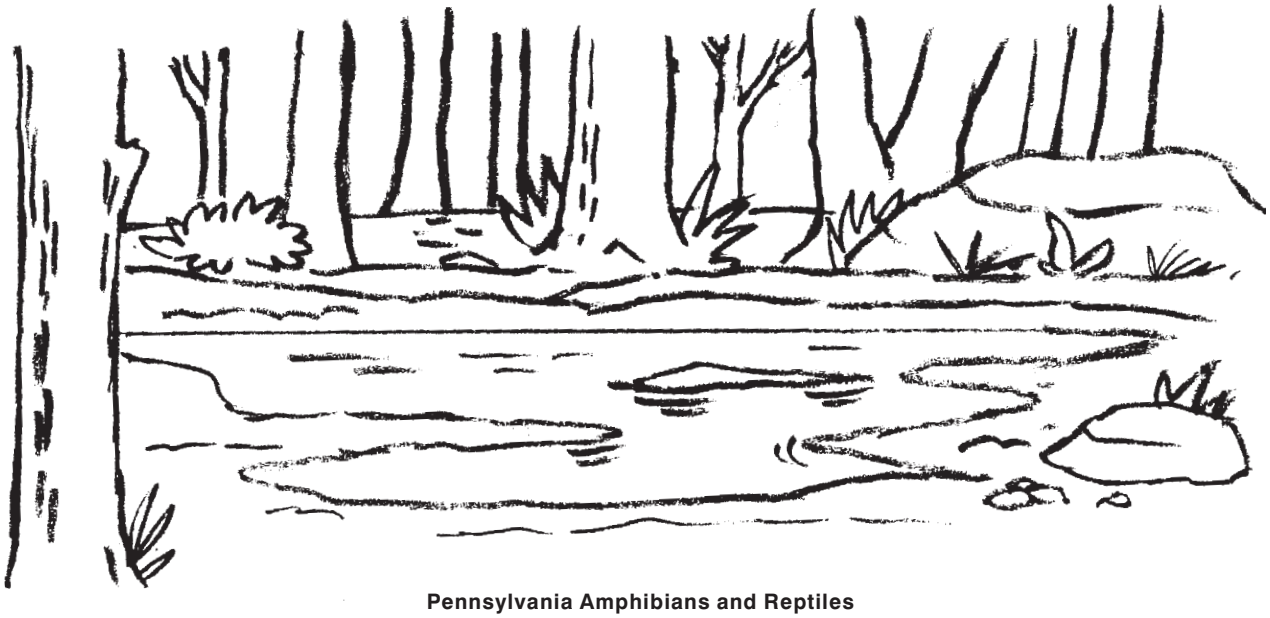
Pennsylvania Amphibians and Reptiles
"HERP" SWEET HOME HABITAT CLUE CARDS

A ringneck snake hides in the compost pile. Under the woodpile, a box turtle escapes the afternoon heat.

Pennsylvania Amphibians and Reptiles
"HERP" SWEET HOME HABITAT CLUE CARDS

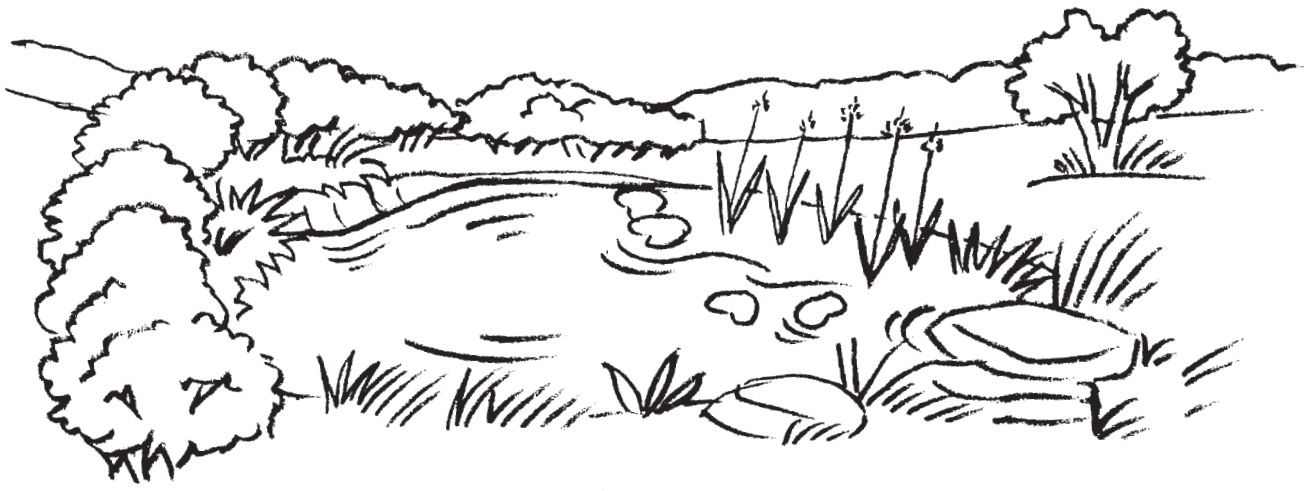
"Herp" Sweet Home Habitat Clue Cards

The spring sun warms the water left behind from melting snow. Wood frog tadpoles fill the water. Soon they will be gone, becoming adults before the water disappears.



Pennsylvania Amphibians and Reptiles
"HERP" SWEET HOME HABITAT CLUE CARDS

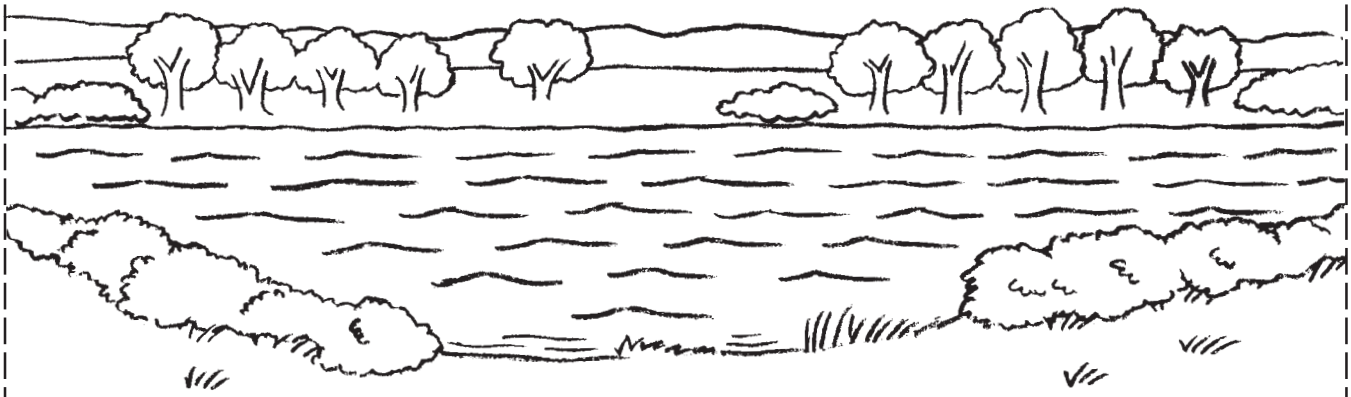
An adult red-spotted newt has returned to the water to breed. A common snapping turtle moves through the open water, feeding its voracious appetite on a variety of tadpoles and fish.



Pennsylvania Amphibians and Reptiles
"HERP" SWEET HOME HABITAT CLUE CARDS

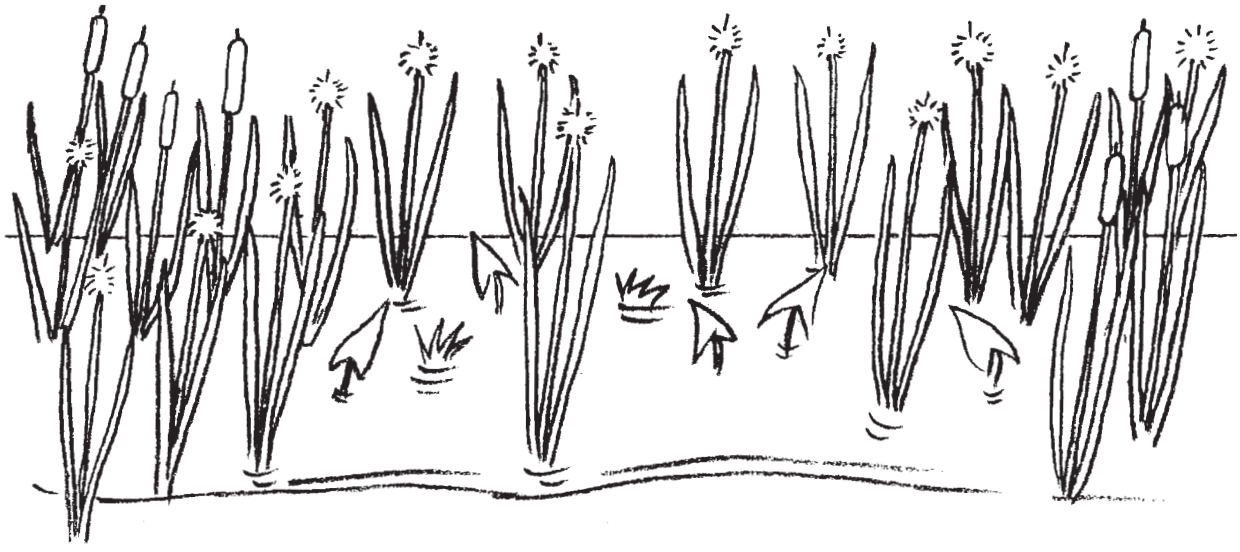
"Herp" Sweet Home Habitat Clue Cards

Below the deep, open water, a mudpuppy blends in with the muddy bottom. Not even its blood-red gills are evident. Closer to shore, a spiny softshell turtle has buried itself in a sandbar.



Pennsylvania Amphibians and Reptiles
"HERP" SWEET HOME HABITAT CLUE CARDS

The croak of a pickerel frog can be heard coming from somewhere among the cattails and bulrushes. A brightly colored ribbon snake suns itself along the water's edge.



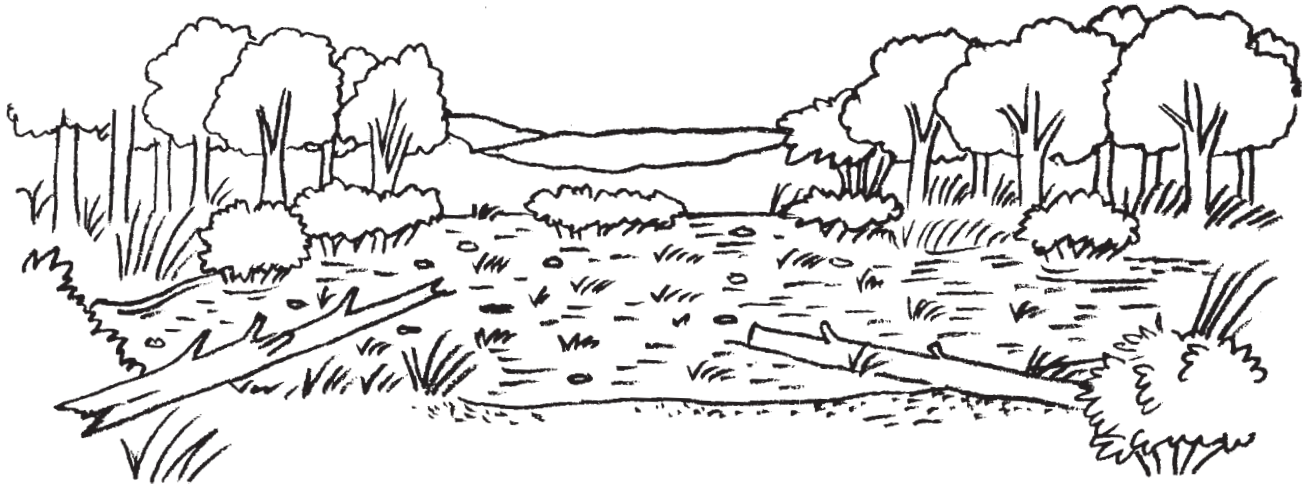
Pennsylvania Amphibians and Reptiles
"HERP" SWEET HOME HABITAT CLUE CARDS

"Herp" Sweet Home Habitat Clue Cards

A northern leopard frog hops through the grass, its belly wet from the water that seeps up every time it lands. It is unaware of the eastern massasauga that lurks in a clump of grass, waiting for a meal.

Pennsylvania Amphibians and Reptiles
"HERP" SWEET HOME HABITAT CLUE CARDS

A spongy mat of sphagnum hides young four-toed salamanders, but if you look closely you may see their gilled heads peeking out from under the moss. The acidic water does not seem to bother the spotted turtle who seeks refuge here.



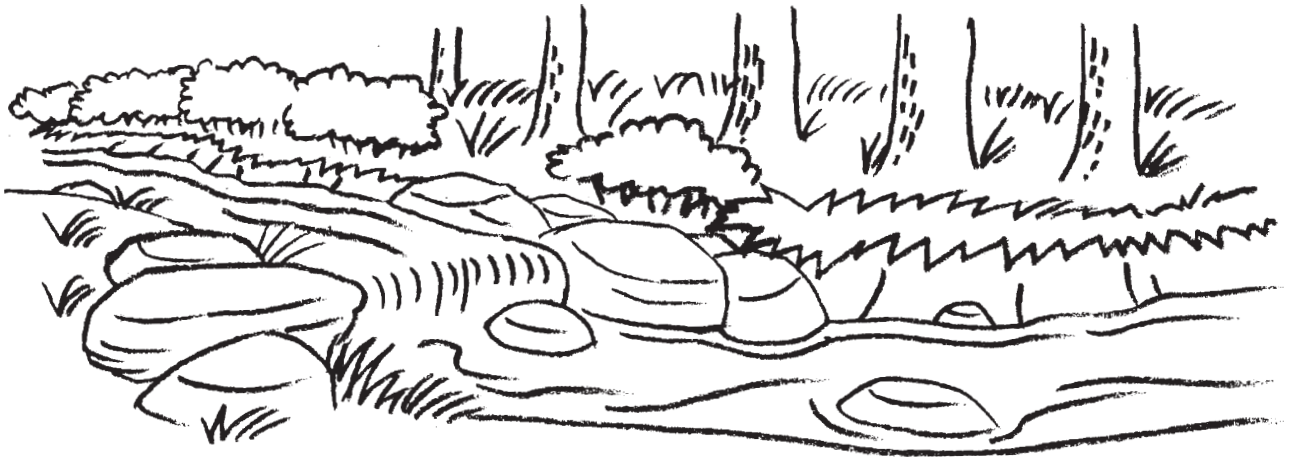
Pennsylvania Amphibians and Reptiles
"HERP" SWEET HOME HABITAT CLUE CARDS

"Herp" Sweet Home Habitat Clue Cards

The trees rise right out of the water. One has fallen, and on this rotting log a wood turtle is warmed by the sun's rays. A green frog swims near the water's edge, searching for aquatic insects to eat.

Pennsylvania Amphibians and Reptiles
"HERP" SWEET HOME HABITAT CLUE CARDS

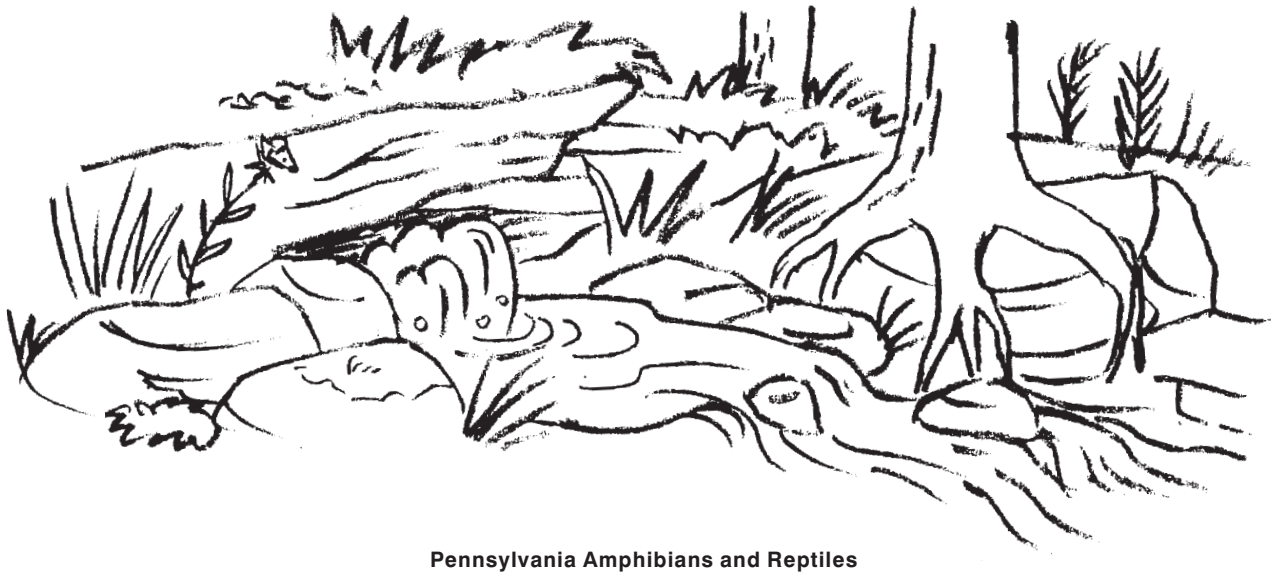
The water gurgles as it sweeps over rocks, rocks that hide many northern dusky salamanders. The crayfish also hide under these rocks, trying to escape the queen snake who searches for a crustacean meal.



Pennsylvania Amphibians and Reptiles
"HERP" SWEET HOME HABITAT CLUE CARDS

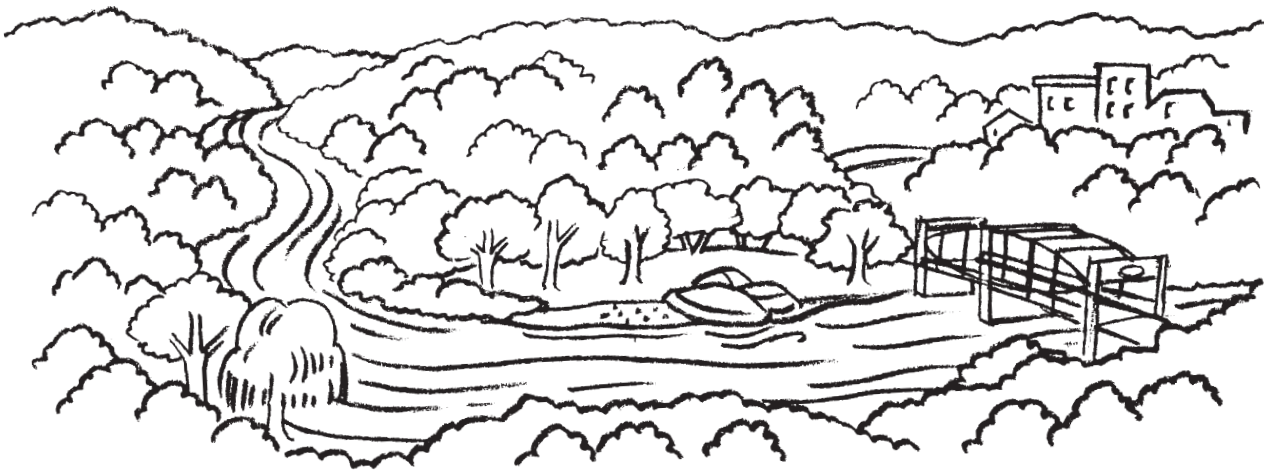
"Herp" Sweet Home Habitat Clue Cards

The water is cold as it bubbles from the earth. Laden with dissolved limestone, it tumbles over newly hatched northern spring salamanders as it makes its way downhill.



Pennsylvania Amphibians and Reptiles
"HERP" SWEET HOME HABITAT CLUE CARDS

The brown water seems to move slowly here, and it is a long way to the other bank where a northern water snake has draped itself on an overhanging branch. A midland painted turtle crawls along the soft, sandy bottom, hiding in the vegetation on the water's edge.



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