STREAMS AS HOMES

In this activity students will examine a section of a stream and surrounding terrain to find and identify habitats for the creatures that live in and near streams. They will also be looking for conditions that affect these habitats. Such an examination is a useful tool in determining the overall health of a stream. This activity is different than others. To lead this activity with facility it is important to keep the following in mind: Knowledge of stream and riparian habitats is almost essential. Just reading the background information may not be enough. Secondly, being at ease engaging students in discussion will also serve you well. This combination will help make the activity pleasurable and rewarding.

Although the pre and post discussions are necessary to provide important information about each topic, it is the activity that is most vital to this unit. Be sure to allow plenty of time to complete the activity.

Pre-Activity Discussion **(Answers can be found in the Background Information section below)**

1. What do animals need to stay alive? (food, oxygen, water, **shelter**)
2. Why is this topic of streams as homes important?
3. What kinds of creatures live in and near streams? What kind of habitats do they need?
4. What is your initial assessment of this portion of the stream in terms of overall health and quality of habitats and why?
5. What key scientific tool will we be using in this activity? (Observation!)

The Activity

Site Selection

Site selection and preliminary examination by the volunteer are crucial in this activity. Ideally, you want a site with as wide a variety of conditions- both good and bad- as possible. Your site will typically be much larger than the sites of the other activity stations. You and the students will be walking along the stream banks and examining the stream, the riparian (streamside) zone, and the surrounding land for habitats that could harbor critters as well as for conditions that affect habitat.

In your preliminary site examination, note the conditions below that relate to habitat. These you will bring up with the students during your walk with them. Advance scouting will prepare you to ask the kids lots of questions as a means of focusing their attention and promoting interest. This is a scientific study, not just a walk in the woods.

1. Turbidity: Is the stream muddy (high turbidity) or clear (low turbidity)? High turbidity leads to sedimentation and filling in of streambed habitat. Sediments also cause water temperatures to rise in summers leading to lower dissolved oxygen.

2. Streambank condition: Are there signs of serious erosion (bare dirt, bank collapses, lots of exposed roots, etc.)? Erosion increases turbidity and causes sedimentation that leads to the destruction of streambed habitat.

3. Riparian (streamside) zone condition: Is there a mix of vegetation including trees, shrubs, grasses, and other non-woody plants? If not, what is missing? A healthy riparian zone offers far more habitat than, say, mowed lawn.

4. Trash and debris: Is there a lot of trash or yard debris in and around the stream? Trash can dam water and cause more sedimentation and it can be a hazard to living creatures.

5. Condition and habitat variety of the stream bottom: Is the stream bottom heavily silted (in poor condition) or are there a variety of habitats? Look for leaf packs, rocks, gravel, woody debris, overhanging vegetation, aquatic vegetation, root wads, riffles, pools, etc. Varied habitat harbors a greater variety and number of critter.

6. Pollutants: Look for pipes entering the stream that could be carrying storm water or worse. Storm drains can cause a number of problems—a flashy stream, sediment, other pollutants (oil, for example).

7. Runoff: Look for impervious surfaces (parking lots, streets, roofs, etc.) and disturbed areas (lawns, farm fields) that could allow water to run off quickly into the stream. These conditions create flashy streams with lots of sediment and a variety of pollutants.

8. Depth of streambed relative to the banks: Is the streambed deeply incised indicating erosion, probably as a result of flash floods? When streams flood easily, creatures get washed away and sediments clog up their homes. Flashy conditions generally result in increased turbidity with the added problems that result.

9. Stream size: If the stream is small, is it well shaded by trees so that it doesn't get too warm in the summer?

10. Invasive plants: Look for garlic mustard, purple loosestrife, non-native buckthorn, non-native thistles, non-native honeysuckle, common reed (phragmites), spotted knapweed and Asian bittersweet. Invasive plants can cause problems by pushing out native plants and, in extreme situations, create monocultures. They may provide food for wildlife though usually it is less nutritious than native species. As with native plants, they can provide shade. Removing them can cause streams to become too warm in summer unless native species are planted in their place.

11. Nuisance plants: Look for plants to avoid such as poison ivy, stinging nettle, multi-flora rose (an alien species) and other brambles with sharp thorns.

12. Animals: Are livestock or geese present in numbers large enough to cause significant bacterial pollution with their feces? Are livestock damaging streambanks by trampling?

13. Other issues: Are there any bad odors, unnatural water coloration, oil sheens, etc.?

This list is not exhaustive. By carefully scouting the stream yourself, you may find other things of interest. You may want to sketch a little map marked with notable features (collapsing bank, old car tire, grocery cart, gravel riffle, etc.) to refresh your memory when you are working with students. (You may also wish to have a few copies of your sketch for students to make notes on.) Your skill as an observer and your ability to help the kids become careful observers will make this a fascinating learning experience.

Equipment

This is a station with great potential to develop the observational skills of the students. Very little equipment is needed. What are needed most are your eyes, your own knowledge of the site, the information contained in this unit, and your ability to draw out the kids through conversation and questions that steer them to greater understanding of stream and watershed ecology.

--Display board
--Data sheets, Pencils and Clipboard
--Walking shoes or boots suitable for the degree of wetness and muddiness of the site
--Field guides to trees and shrubs, flowering plants, birds (These are more for display and for home use as you will not likely have time to use them in a half hour session.)
--Field glasses (optional but helpful for bird identification)
--Hat, sunscreen, water bottle
--Small table for use at your starting point (optional but convenient)

The Stream Walk

There is a lot to cover in this activity. The trick is to balance the information you present and the questions you ask with the opportunity for students to use their own skills to make observations and draw conclusions about the stream and the quality and variety of habitats it offers. As you look for different habitats with the students, keep in mind the observations you made in your advance scouting about the topics above.

As you begin your walk, remind them that in this activity they will be using four very powerful scientific instruments to get important information about the quality of this stream as a habitat for critters—their eyes, ears, nose and brains. Appoint one student- the Recorder- to carry the clipboard with the data sheet. The rest of the group will report their observations to the Recorder. You may wish to rotate this job through the group. The other students should have copies of the data sheet, too, to guide their observations.

As much as possible, allow the students to make the discoveries, but have them pause and ask a leading question if they appear to be passing by a feature worth noting. When necessary, be more direct in pointing out important features.

Post-activity discussion questions:

1. Based on your observations, would this stream make a good home for a rich variety of aquatic life forms? Why or why not? (Students should take into account the physical features of the stream, the riparian zone and the quality of the water.)
2. What do you do in your own lives that affects the quality of the stream and habitats?
3. If there are problems with the site, how could the stream habitats be improved?
4. How does having a variety of good habitats affect the health of the river?

Background Information

Streams and riparian zones are places that are potentially rich in both animal and plant species…if they are healthy. The streams will harbor a great many critters including fish, frogs, turtles, crayfish, clams, snails, mussels, and aquatic insects in both adult and larval

forms. These aquatic insects are called benthic macroinvertebrates. (benthic = bottom, macro = large, invertebrate = animal without a backbone- No, these insects are not truly large but compared to really tiny ones they are macro.) If the riparian zone is healthy, you may find a variety of birds, mammals, amphibians and reptiles living there.

For a stream to be a good home for a variety of organisms, it must support a complex food web. That means there must be variation in the stream itself. Riffles, pools, runs and the streamside itself provide the right kinds of habitat for many different organisms in different stages in their lifecycles. A variety of materials such as logs, leaf packs, stones, gravel and sand are needed to support diversity. The chart below illustrates this point.

Examples for common habitats and some organisms associated with them

Leaf packs: Larvae of mayflies, caddisflies, stoneflies	**Riffles:** Riffle beetles, water penny beetles, larvae of mayflies, caddisflies, stoneflies
Aquatic plants: Fish, gilled snails	**Runs:** Fish
Overhanging vegetation: Fish, Dobsonfly larvae, damselfly and dragonfly nymphs, water striders, whirligig beetles	**Rocks and cobbles:** Crayfish, gilled Snails, riffle beetles, water penny beetles, larvae of mayflies, stoneflies, caddisflies, Dobsonflies,
Woody debris: Fish, water penny beetles, water striders, whirligig beetles, larvae of caddisflies, mayflies, dobsonflies, black flies	**Muddy bottom:** Crayfish, leeches, larvae of alderflies, midges
Root wads along the bank: Crayfish, water penny beetles	**Sandy bottom:** Larvae of alderflies, mayflies, midges
Pools: Fish, crayfish	**Gravel:** Crayfish, mayfly larvae

Streams that are good homes for fish, turtles, frogs, and a host of benthic invertebrates have qualities that make them good neighbors to us. They do not flash flood. They do not destroy our property by tearing away at their banks every time there is a storm. They do not choke our water treatment plants with sediment, which drastically increases the cost of making water fit to drink and to use in industrial processes. They do not fill our reservoirs with silt. If a stream lacks diversity, it is important to ask why since whatever is harmful to diversity may also be harmful to humans.

Having an attractive, healthy stream nearby is a most gracious amenity. Children can play in it; we can perhaps fish or canoe in it; we can appreciate its beauty during the bleakness of winter, the promise of spring, the profusion of life of summer, and the glorious colors of fall. In terms of hard economics, a lovely stream enhances the value of our property. Its existence also reassures us that our species, *Homo sapiens,* does not have to degrade the world in which we live.

For this and all other units, advanced level information is available if desired. Contact the HRWC and request an electronic version of the unabridged manual.

Streams as Homes Data Sheet
In the Stream

What habitats do you find at this site? Check all that are present. Rate them as <u>common</u>, <u>present</u>, or <u>scarce</u>.

Vegetation Types	Stream Bottom Types
_____Aquatic plants	_____Gravel
_____Leaf packs	_____ Muddy bottom
_____Overhanging vegetation (shade)	_____Pools (still water)
_____Root wads along the bank	_____Riffles (water over rocks makes little waves)
_____Woody debris (branches and logs)	_____Rocks and cobbles
	_____Runs (nothing disturbs the flow of the stream)
	_____ Sandy bottom

What problems do you find at this site?

_____ Bank erosion	_____ Oil slick
_____ Impervious surfaces (paved)	_____ Pipe(s) entering stream
_____ Invasive plants (garlic mustard, purple loosestrife, buckthorn, thistle, honeysuckle, etc.)	_____ Trash and litter
_____ Grassy banks with no trees or shrubs	_____ Unnatural color
_____ Muddy water	_____ Other
_____ Odor	

1.	Would this stream make a good home for a rich variety of aquatic life forms? Tell why you think that?

2.	How does having variety of good habitats affect the health of the river?

3.	What can you do to improve this condition?

Streams as Homes Station

Examples for common habitats and some organisms associated with them.

Vegetation Types	Stream Bottom Types
_____Aquatic plants: Fish, gilled snails	_____Gravel: Crayfish, Larvae of mayflies
_____Leaf packs: Larvae of mayflies, caddisflies	_____ Muddy bottom: Crayfish, alderfly larvae, leeches
_____Overhanging vegetation: Fish, Dobson flies	_____Pools: Fish
_____Root wads along the bank: Crayfish, Water penny beetles, Damselfly and Dragonfly larvae	_____Riffles: Riffle beetles, water penny beetle
_____Woody debris: Fish, Caddis fly and Mayfly larvae, Water penny beetles	_____Rocks and cobbles: Crayfish, Gilled Snails, Larvae of mayflies, stoneflies, caddisflies, Dobson flies (hellgrammites), Riffle beetles, Water penny beetles
	_____Runs: Fish
	_____ Sandy bottom: Alderfly larvae

1. Would this stream make a good home for a rich variety of aquatic life forms? Why?
   Answers will vary.

2. How does having variety of good habitats affect the health of the river?
   Streams that are good homes for fish, turtles, frogs, and a host of benthic invertebrates are good neighbors to us. They do not flash flood. They do not destroy our property by tearing away at their banks every time there is a storm. They do not choke our water treatment plants with sediment, which drastically increases the cost of making water fit to drink and to use in industrial processes. They do not fill our reservoirs with silt.

3. What can you do to improve this condition?
   A. **Don't mow right to the edge of the stream.**
   B. **Leave or create an edge of deep rooted plants along the stream banks.**
   C. **Put trash in trash cans**
   D. **Clean up after pets**

Streams as Homes Sample Lesson Narrative

Intro. 5 – 8 minutes. The mission is to make the point that streams are homes, and a healthy stream has lots of different types of homes.

1. My name is _____ and I'm a volunteer with the Streams as Homes station. Please tell me your names. (Go around)
2. So when you think the idea of homes, what do you think about? (Solicit 2 or 3 answers.)
3. When I think about the idea of home, I think about a place where there is food and shelter. When you look at this stream, do you think it looks like a place with food and shelter? (Accept any answers.)
4. What kinds of animals might find food and shelter right in the water? (Answers might include fish, bugs, frogs, etc.)
5. We know that fish live in the stream. What do they find to eat?   (Insects)
6. Where do the insects live? (Accept the answers)
7. Lots of insects lay their eggs in different places in the streams. When the eggs hatch, the larvae also live in the streams. Some of the larvae change into flying insects that lay their eggs in the streams. Different creatures need different kinds of habitats for the different parts of their life cycles.
8. Today we are going to take a walk to find different habitats, or neighborhoods, in and near the stream.
9. Let's take a quick look at this checklist. We are going to look for different kinds of vegetation. Vegetation means plants, and lots of creatures eat plants, or use them for shelter.
10. We are also going to look at different sections of the stream to see if we can find differences in the stream bottom.   We know that a healthy stream has lots of different kinds of plants and animals, and a healthy stream needs to have lots of different kinds of homes for them.

The Walk: 10 – 15 minutes. The mission is to find, observe, describe and check off as many different habitats as possible. If negatives are noticed, call attention to them, describe their negative impact on the habitat and check them off as well. Keep moving so that you visit at least 3 different portions of the stream. (It would be great to pick these 3 out ahead of time so that you know what is there, and can plan what to talk about.) Give examples of organisms that live in the different sections you find.

11. When we get close to the stream, I'm going to ask you to look carefully and tell me what you see. Please don't go in the water, but stay a foot or two away from the edge.
12. (At first stop) Tell me what you notice about the trees here.
13. Are there plants in the water?
14. What is the bottom like?

15. We can check off _____ because _____. It is likely that _____ might live here. (Tell a little something about this organism, if you can.)
16. Repeat for all other stops.

The Wrap Up: 5 minutes. Either return to the station/table or wrap up at last stop.

17. Let's take a look at the data sheet again. Shade helps cool the water. Did we find any over-hanging vegetation (like trees or bushes making shade over the stream)?
18. Did we find any logs in the water? Logs slow down the water, and can help trap food. They can help fish hide.
19. Repeat for other vegetation. Ask "What could people do to help the vegetation along streams?" (Listen for "Plant trees, don't mow the edges, etc.)
20. Did we see any differences in the types of stream bottom? How does having a variety help the stream? (Listen for "Different animals need different kinds of habitats at different times of their life cycles, or different animals have different needs, it's good to have lots of places for animals to live.")
21. Thanks for visiting with me today. It's time for you to go to your next station _____.