4.1 Stream Habitat Walk

The Stream Habitat Walk is an easy-to-use approach for identifying and assessing the elements of a stream's habitat. It is based on a simple protocol known as *Streamwalk*, developed by EPA's Regional Office in Seattle, Washington and consists primarily of visual observation of stream habitat characteristics, wildlife present, and gross physical attributes. A simple in-stream macroinvertebrate evaluation can also be performed. This approach requires little in the way of equipment and training.

The Stream Habitat Walk is most useful as:

- A screening tool to identify severe water quality problems
- A vehicle for learning about stream ecosystems and environmental stewardship

Because the Stream Habitat Walk is not scientifically rigorous, data from this approach are less likely to be used by state and local water quality management agencies than are data from other biological monitoring approaches. However, the Stream Habitat Walk's ease of use, adaptability, and low cost make it a highly attractive approach for many programs whose primary focus is public awareness and citizen involvement.

Step 1—Prepare for the Walk

TASK 1 **Schedule your Habitat Walk**

To provide data that accurately characterize your stream and can be used to document general trends in your area, you should walk the same site at least three times a year, during different seasons. It is usually best to visit your site in early spring, late summer, and fall if you live in a part of the country that experiences seasonal variations in leaf cover, vegetation growth, and water flow. It is a good idea to check with a local aquatic biologist for assistance in determining the best times to schedule monitoring. For purposes of accuracy and consistency, it is best to monitor the same site from year to year and at the same time of the year (e.g., in the spring and, more specifically, in the same month).

TASK 2 **Obtain a U.S. Geological Survey (USGS) topographic map of your area**

One of the most valuable tools for conducting stream monitoring work is a U.S. Geological Survey (USGS) topographic map. These "topo" maps display many important features of the landscape including elevations, waterways, roads, and buildings. They are critical tools for defining the watershed of your study stream. (See Chapter 3 for a discussion of topographic maps.)

TASK 3 **Select and mark the Habitat Walk location(s)**

Choosing the location for stream monitoring is a task defined by the goals of your individual program. Program managers may select sites themselves or in collaboration with local or state water quality personnel. Other programs allow their volunteers to choose the site based on their personal interests. (See Chapter 2 for a discussion on choosing monitoring locations.) If a Watershed Survey is conducted (see Chapter 3), this information should play a role in deciding which areas are the best candidates for the Stream Habitat Walk.

Once a monitoring site is chosen, it should be marked on the topo map. This will document the location and serve as a record in case future volunteers or data users need to find the site.

TASK 4 **Become familiar with safety procedures**

Volunteers must always keep safety in mind while conducting any stream monitoring activity. Provide all Stream Habitat Walk participants with a list of safety do's and don'ts and have them review this list thoroughly. **Chapter 3 covers several important safety concerns that should be incorporated into a stream monitoring program.** Remember, volunteer safety is more important than the data. Some reminders include:

- Let someone know where you're going and when you expect to return. Make sure you have an "in case of emergency" phone number with you before leaving for the field.
- Do not cross streams in high flows.
- Never go into the field alone; always work in teams of at least two people.
- If for any reason you feel unsafe, do not attempt to monitor on that day.

TASK 5 **Gather equipment and tools for the Habitat Walk**

There is nothing more frustrating than arriving at a field monitoring site and not having all your equipment and supplies. Providing volunteers with a checklist of necessary items will help keep them organized. In addition to the basic equipment listed in Chapter 2, you will need the following for the Stream Habitat Walk.

For locating the site

- U.S. Geological Survey (USGS) topographic map of the stream area (supplemented by regular street map if needed)

For recording observations

- Stream Habitat Walk field data sheet

For marking-off the stream stretch of study

- Tape measure, string, or twine (25 yards)

For working in and around the stream

- Thermometer for measuring water temperature (Scientific supply houses sell armored thermometers that are best suited for this purpose, although you can obtain a good thermometer from an aquarium store. Some thermometers need to be calibrated before use. See Chapter 5 for instruction on calibrating and using thermometers.)
- Watch with a second hand or a stopwatch

For observing macroinvertebrates (optional)

- A bucket
- A shallow white pan. (Alternatives: white plastic plate or the bottom of a white plastic detergent jug)
- Tweezers or soft brush
- Ice cube trays (for sorting macroinvertebrates)
- Magnifying glass

TASK 6 **Become familiar with the Stream Habitat Walk field data sheet and the definitions of its elements**

It is important to become familiar with the Stream Habitat Walk field data sheet and its instructions before you begin your Stream Habitat Walk. If you are unclear about any instructions when you are conducting your Walk, just leave that space blank and keep going. You might wish to contact your volunteer program coordinator for further explanation after you have completed your Walk.

At the end of this section is a sample field data sheet. You might find it necessary to modify this sheet slightly to better meet the needs of your volunteers, your ecological region, and your program. When you fill out your field data sheet, base your responses on your best judgment of conditions in a stretch of stream that includes about 50 yards both upstream and downstream of the place where you are standing. If you identify features and problems beyond your chosen 100-yard length, feel free to note them on your map and form. You might want to conduct additional Walks in the area where those features are found.

Instructions on how to fill out the field data sheet are included right on the form. They are also covered in an expanded format, with illustrations, in this text. Although many of the required measures are relatively self-explanatory, it might be a good idea to make copies of these instructions for all volunteer teams to take into the field as an additional training tool.

Step 2—Delineate and sketch your site

TASK 1 **Delineate the site**

Using your tape measure or 25 yards of string or twine, measure off four 25-yard lengths alongside the stream for a total of 100 yards. Start from a point of reference such as a tree, large rock, or bend in the stream.

TASK 2 **Sketch your site on the field data sheet**

On the field data sheet, sketch the 100-yard section of stream. (Fig. 4.3). Drawing the map will familiarize you with the terrain and stream features and provide you and other volunteers with a visual record of your habitat walk. You should walk the 100-yard length from at least one bank.

On your sketch, note features such as riffles, runs, pools, ditches, wetlands, dams, riprap, outfalls, tributaries, landscape features, jogging paths, vegetation, and roads. Use your topo map or a compass to determine which direction is north and mark it on your sketch. If you see important features outside your 100-yard length of stream, mark them on your sketch but note that they are outside the stream reach. Remember to use pencil or waterproof ink when drawing your map or filling out the field data sheets because regular ink will run if wet.

Select a 25-yard section of the site. You will be filling out your field data sheet for this section only. Mark the section on the sketch. If you want to conduct multiple walks, choose another 25-yard section or move to an entirely different location. Even though you will only be completing the data forms for the 25 yard reach, it is important to sketch the full 100-yard section so that you can document the stream features surrounding the evaluated reach.

TASK 3 **Complete the top portion of your field data sheet**

Include stream name, date, and county (or appropriate local designation) of your site, and describe its location as precisely as possible. It is best to stand at or near a permanent marker such as a bridge, abutment, or road. Remember, you or another volunteer will be coming back to the same spot again and again, so be as specific as you can. Some programs might ask you for the latitude and longitude of your location; others might ask for a map reference number or other site identifier.

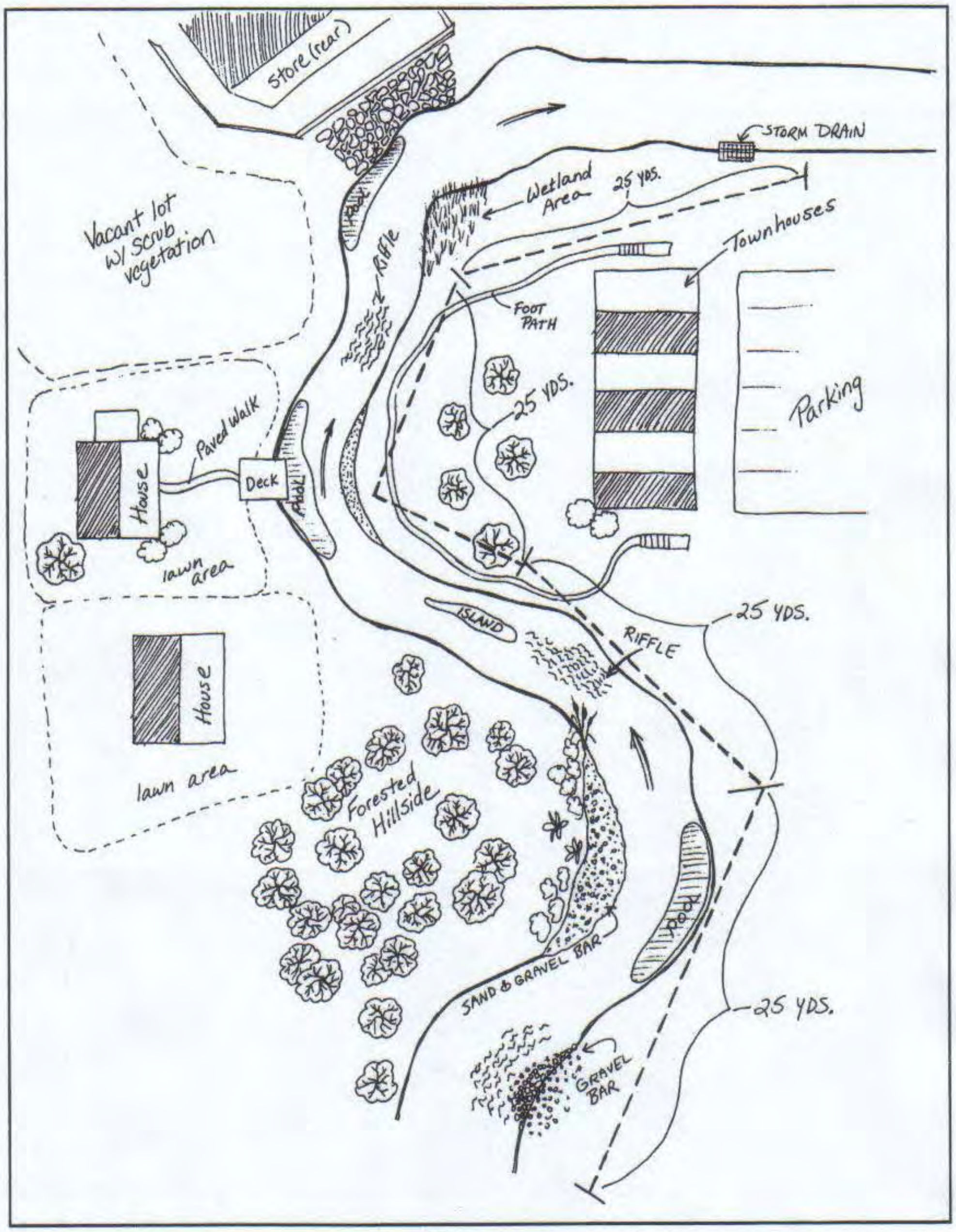
Latitude and longitude information is critical for mapping and for many data management programs. It is also required if the data is to be entered in USEPA's STOrage and RETrieval System (STORET) or used in a Geographical Information System (GIS).

An easy way to determine latitude and longitude is to use a global positioning system (GPS), a hand-held tool that looks like a calculator. GPS units receive signals form orbiting satellites and then use the information from the satellites to calculate the lat/long coordinates of the user. In

Figure 4.3

Example of a stream sketch

Volunteers should note important stream features on their sketch including riffles and pools.



general, these tools are accurate up to 15 meters. GPS units are relatively inexpensive and can be purchased from scientific supply houses and many camping or outdoor stores. Many government agencies are using GPS and might be able to loan a system to your program. Latitude and longitude can also be calculated manually using a USGS topographical map and a ruler (See Appendix C).

Step 3—Conduct the Stream Habitat Walk

Detailed instructions for performing the Stream Habitat Walk begin on page 48 of this section.

TASK 1 **Complete the habitat characterization components of the walk for the 25-yard section of stream: the "In-Stream Characteristics," "Stream Bank and Channel Characteristics," and "Local Watershed Characteristics" sections of the field data sheet**

These elements involve making observations about the stream itself as well as the riparian zone and immediate watershed.

TASK 2 **Complete the "Visual Biological Survey" section of the field data sheet**

This involves simple visual observations of the presence or absence of wildlife and obvious aquatic life in the stream, including fish, aquatic plants, and algae.

TASK 3 **Complete the "Macroinvertebrate Survey" section of the field data sheet**

This is optional and serves as an introduction to the types of life that inhabit some of the microhabitats of the stream—the spaces under and on rocks and in and on twigs and leaves. To conduct this survey, you will need to select the method(s) that best suits your stream. Use the rock-rubbing method in streams with riffles, or use the stick-picking method if your stream does not have riffles. Clumps of submerged leaves may be present in either type of stream and are often an important microhabitat for macroinvertebrates. You may choose to sort through these leaf packs in addition to rock–rubbing or stick–picking.

You will also need some specific equipment (a bucket, tweezers, picnic plate, etc.). Be sure to dress appropriately because you'll probably get wet.

Remember to return the organisms to the stream when you finish the macroinvertebrate survey. Then, check to make sure your field data sheet has been completed as fully as possible.

Step 4—Check data forms for completeness and return forms to program coordinator

After completing the habitat characterization and biological survey, make sure you have completed the field data sheet to the extent possible and that the recorded data are legible. If you are not able to determine how to answer a question on the field data sheet, just leave the space blank. If you leave a space blank, indicate that it is because you are not able to answer the question (e.g., write "not able to answer" or "does not apply" in the space).

Upon completion of the Stream Habitat Walk, present a copy of the field data sheet to your volunteer program coordinator. You may want to keep a copy of the field data sheet, and other appropriate data, for your own records and to evaluate any future discrepancies in the data. **If you have identified an urgent problem, such as leaking drums of chemicals, foul odors, or fish kills, contact your program coordinator or the agency with whom you are working as soon as possible.**

Instructions for completing the Stream Habitat Walk data sheet

For ease of use, the following numbered instructions correspond to the numbers on the field data sheet.

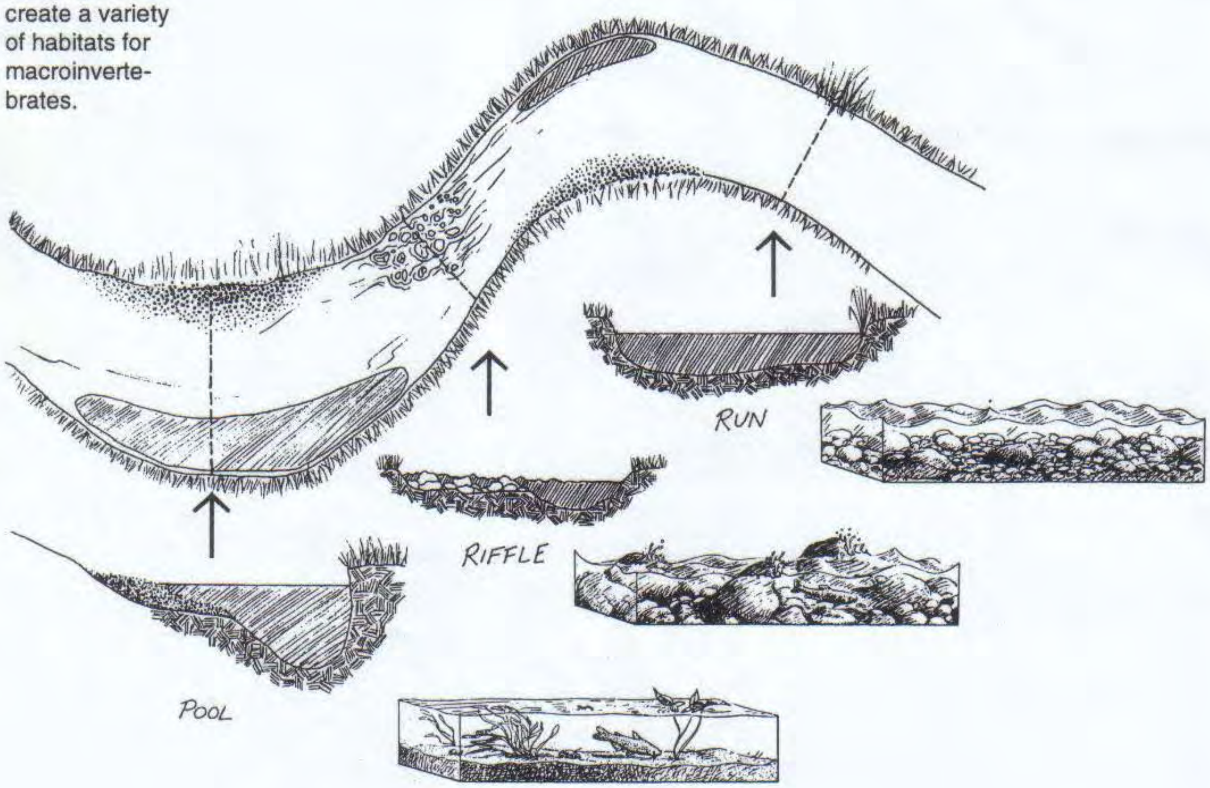
In-stream Characteristics

1. *Pools, riffles, and runs.* A mixture of flows and depths creates a variety of habitats to support fish and invertebrate life. Pools are deep with slow water. Riffles are shallow with fast, turbulent water running over rocks. Runs are deep with fast water and little or no turbulence.
2. *Stream bottom (substrate)* is the material on the stream bottom. Identify what substrate types are present. Substrate types include:
   - *Silt/clay/mud.* This substrate has a sticky, cohesive feeling. The particles are fine. The spaces between the particles hold a lot of water, making the sediments behave like ooze.
   - *Sand (up to 0.1 inch).* A sandy bottom is made up of tiny, gritty particles of rock that are smaller than gravel but coarser than silt (gritty, up to pea size).
   - *Gravel (0.1-2 inches).* A gravel bottom is made up of stones

Figure 4.4

Overview and cross sections of a pool, riffle, and run

Varying flows and depths create a variety of habitats for macroinvertebrates.



ranging from tiny quarter-inch pebbles to rocks of about 2 inches (fine gravel - pea size to marble size; coarse gravel - marble to tennis ball size).

- *Cobbles (2-10 inches).* Most rocks on this type of stream bottom are between 2 and 10 inches (between a tennis ball and a basketball).
- *Boulders (greater than 10 inches).* Most of the rocks on the bottom are greater than 10 inches (between a basketball and a car in size).
- *Bedrock.* This kind of stream bottom is solid rock (or rocks bigger than a car).

3. *Embeddedness* is the extent to which rocks (gravel, cobbles, and boulders) are sunken into the silt, sand, or mud of the stream bottom (Fig. 4.5). Generally, the more rocks are embedded, the less rock surface or space between rocks is available as habitat for aquatic macroinvertebrates and for fish spawning. Excessive silty runoff from erosion can increase a stream's embeddedness. To estimate embeddedness, observe the amount of silt or finer sediments overlying, in between, and surrounding the rocks.
4. *Presence of logs or woody debris (not twigs and leaves) in stream* can slow or divert water to provide important fish habitat such as pools and hiding places. Mark the box that describes the general amount of woody debris in the stream.
5. *Naturally occurring organic material in stream.* This material includes leaves and twigs. Mark the box that describes the general amount of organic matter in the stream.

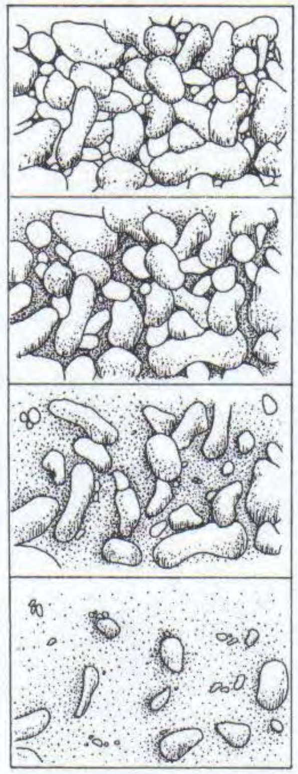


Figure 4.5

A representation of a rocky-bottom stream becoming embedded with sand and silt

As silt settles on the streambed, spaces between the rocks are filled in and the stream becomes more embedded.

6. *Water appearance* can be a physical indicator of water pollution.
   - *Clear* - colorless, transparent
   - *Milky* - cloudy-white or grey, not transparent; might be natural or due to pollution
   - *Foamy* - might be natural or due to pollution, generally detergents or nutrients (foam that is several inches high and does not brush apart easily is generally due to some sort of pollution)
   - *Turbid* - cloudy brown due to suspended silt or organic material
   - *Dark brown* - might indicate that acids are being released into the stream due to decaying plants
   - *Oily sheen* - multicolored reflection might indicate oil floating in the stream, although some sheens are natural

- *Orange* - might indicate acid drainage
- *Green* - might indicate excess nutrients being released into the stream

7. *Water odor* can be a physical indicator of water pollution
   - *No smell or a natural odor*
   - *Sewage* - might indicate the release of human waste material
   - *Chlorine* - might indicate over-chlorinated sewage treatment/ water treatment plant or swimming pool discharges
   - *Fishy* - might indicate the presence of excessive algal growth or dead fish
   - *Rotten eggs* - might indicate sewage pollution (the presence of methane from anaerobic conditions)
8. *Water temperature* can be particularly important for determining the suitability of the stream as aquatic habitat for some species of fish and macroinvertebrates that have distinct temperature requirements. Temperature also has a direct effect on the amount of dissolved oxygen available to the aquatic organisms. Measure temperature by submerging a thermometer for at least 2 minutes in a typical stream run. Repeat once and average the results.

Stream Bank and Channel Characteristics

9. *Depth of runs and pools* should be determined by estimating the vertical distance from the surface to the stream bottom at a representative depth at each of the two habitats.
10. *The width of the stream channel* can be determined by estimating the width of the streambed that is covered by water from bank to bank. If it varies widely, estimate an average width.
11. *Stream velocity* can have a direct influence on the health, variety, and abundance of aquatic communities. If water flows too quickly, organisms might be unable to maintain their hold on rocks and vegetation and be washed downstream; if water flows too slowly, it might provide insufficient aeration for species needing high levels of dissolved oxygen. Stream velocity can be affected by dams, channelization, terrain, runoff, and other factors. To measure stream velocity, mark off a 20-foot section of stream run and measure the time it takes a stick, leaf, or other floating biodegradable object to float the 10 feet. Repeat at least three times and pick the average time. Divide the distance (20 feet) by the average time (seconds) to determine the velocity in *feet per second.* (See Chapter 5, Section 5.1 on flow for a more in-depth discussion of using a float to estimate velocity.)
12. *The shape of the stream bank, the extent of artificial modifications, and the shape of the stream channel* are determined by standing at the downstream end of the 25-yard section and looking upstream.

   (a) The shape of the stream bank (Fig. 4.6) may include.
   - *Vertical or undercut bank* - a bank that rises vertically or overhangs the stream. This type of bank generally provides good cover for macroinvertebrates and fish and is resistant to erosion. If seriously undercut, it might be vulnerable to collapse.
   - *Steeply sloping* - a bank that slopes at more than a 30

degree angle. This type of bank is very vulnerable to erosion.

- *Gradual sloping* - a bank that has a slope of 30 degrees or less. Although this type of stream bank is highly resistant to erosion, it does not provide much streamside cover.

(b) *Artificial bank modifications* include all structural changes to the stream bank such as riprap (broken rock, cobbles, or boulders placed on earth surfaces such as the face of a dam or the bank of a stream, for protection against the action of the water) and bulkheads. Determine the approximate percentage of each bank (both the left and right) that is artificially covered by the placement of rocks, wood, or concrete.

(c) *The shape of the stream channel* can be described as narrow (less than 6 feet wide from bank to bank), wide (more than 6 feet from bank to bank), shallow (less than 3 feet deep from the stream substrate to the top of the banks) or deep (more than 3 feet from the stream substrate to the top of the banks). Choose the category that best describes the channel.

- Narrow, deep
- Narrow, shallow
- Wide, deep
- Wide, shallow

13. *Streamside cover* information helps determine the quality and extent of the stream's riparian zone. This information is important at the stream bank itself and for a distance away from the stream bank. For example, trees, bushes, and tall grass can contribute shade and cover for fish and wildlife and can provide the stream with needed organic material such as leaves and twigs. Lawns indicate that the stream's riparian zone has been altered, that pesticides and grass clippings are a possible problem, and that little habitat and shading are available. Bare soil and pavement might indicate problems with erosion and runoff. Looking upstream, provide this information for the left and right banks of the stream.

- *Evergreen trees (conifers)* - cone-bearing trees that do not lose their leaves in winter.
- *Hardwood trees (deciduous)* - in general, trees that shed their leaves at the end of the growing season.

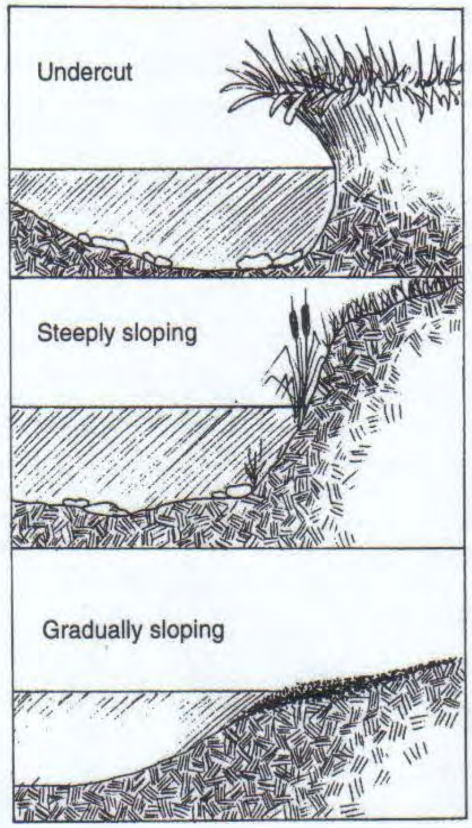


Figure 4.6

Types of streambank shapes

Undercut banks provide good cover for fish and macroinvertebrates.

- *Bushes, shrubs* - conifers or deciduous bushes less than 15 feet high.
- *Tall grass, ferns, etc.* - includes tall natural grasses, ferns, vines, and m 1osses.
- *Lawn* - cultivated and maintained short grass.
- *Boulders* - rocks larger than 10 inches.
- *Gravel/cobbles/sand* - rocks smaller than 10 inches; sand.
- *Bare soil*
- *Pavement, structure* - any structures or paved areas, including paths, roads, bridges, houses, etc.

14. *Stream shading* is a measurement of the extent to which the stream itself is overhung and shaded by the cover identified in 13 above. This shade (or *overhead canopy*) provides several important functions in the stream habitat. The canopy cools the water; offers habitat, protection, and refuge for aquatic organisms; and provides a direct source of beneficial organic matter and insects to the stream. Determine the extent to which vegetation shades the stream at your site.

15. *General conditions of the stream bank and stream channel, and other conditions* that might be affecting the stream are determined by standing at the downstream end of the 25-yard site and looking upstream. Provide observations for the right and left banks of the stream.

    (a) *Stream bank conditions* that might be affecting the stream.

    - *Natural plant cover degraded.* Note whether streamside vegetation is trampled or missing or has been replaced by landscaping, cultivation, or pavement. (These conditions could lead to erosion.)
    - *Banks collapsed/eroded.* Note whether banks or parts of banks have been washed away or worn down. (These conditions could limit habitats in the area.)
    - *Garbage/junk adjacent to the stream.* Note the presence of litter, tires, appliances, car bodies, shopping carts, and garbage dumps.
    - *Foam or sheen on bank.* Note whether there is foam or an oily sheen on the stream bank. Sheen may indicate an oil spill or leak, and foam may indicate the presence of detergent.

    (b) *Stream channel conditions* that might be affecting the stream.

    - *Mud/silt/sand on bottom/ entering stream.* Excessive mud or silt can interfere with the ability of fish to sight potential prey. It can clog fish gills and smother fish eggs in spawning areas in the stream bottom. It can be an indication of poor construction practices, urban area runoff, silviculture (forestry-related activities), or agriculture in the watershed. It can also be a normal condition in slow- moving, muddy-bottom streams.
    - *Garbage or junk in stream.* Note the presence of litter, tires, appliances, car bodies, shopping carts, and garbage.

    (c) *Other general conditions* that might be affecting the stream.

    - *Yard waste (e.g., grass clippings).* Is there evidence that grass clippings, cut branches, and other types of yard waste have been dumped into the stream?

- *Livestock in or with unrestricted access to stream.* Are livestock present, or is there an obvious path that livestock use to get to the water from adjacent fields? Is there streamside degradation caused by livestock?
- *Actively discharging pipes.* Are there pipes with visible openings discharging fluids or water into the stream? Note such pipes even though you may not be able to tell where they come from or what they are discharging.
- *Other pipes.* Are there pipes near or entering the stream? Note such pipes even if you cannot find an opening or see matter being discharged.
- *Ditches*. Are there ditches draining the surrounding land and leading into the stream?

Local Watershed Characteristics

16. *Adjacent land uses* can potentially have a great impact on the quality and state of the stream and riparian areas. Determine the land uses, based on your own judgment of the activities in the watershed surrounding your site within a quarter of a mile. Enter a "1" if a land use is present and a "2" if it is clearly having a negative impact on the stream.

Visual Biological Survey

17. *Wildlife* in or around the stream might indicate that the stream and its adjacent area are of sufficient quality to support animals with food, water, and habitat. Look for signs of frogs, turtles, snakes, ducks, deer, beaver, etc.
18. Are *fish* present in the stream? Fish can indicate that the stream is of sufficient quality for other organisms. Indicate the average size and note any visible barriers to the movement of fish—obstructions that would keep fish from moving freely upstream or downstream.
19. *Aquatic plants* provide food and cover for aquatic organisms. They also might provide very general indications of stream quality. For example, streams that are overgrown with plants could be over-enriched by nutrients. Streams devoid of plants could be affected by extreme acidity or toxic pollutants. Aquatic plants may also be an indicator of stream velocity because plants cannot take root in fast-flowing streams.
20. *Algae* are simple plants that do not grow true roots, stems, or leaves and that mainly live in water, providing food for the food chain. Algae may grow on rocks, twigs, or other submerged materials, or float on the surface of the water. It naturally occurs in green and brown colors. Excessive algal growth may indicate excessive nutrients (organic matter or a pollutant such as fertilizer) in the stream.

STREAM HABITAT WALK

Stream Name: ______________________________

County: ____________________ **State:** ____________________

Investigators: ______________________________

____

____

Site (description): ______________________________

____

____

____

Latitude: ____________________ **Longitude:** ____________________

Site or Map Number: ______________________________

Date: ____________________ **Time:** ____________________

Weather in past 24 hours:

- ❑ Storm (heavy rain)
- ❑ Rain (steady rain)
- ❑ Showers (intermittent rain)
- ❑ Overcast
- ❑ Clear/Sunny

Weather now:

- ❑ Storm (heavy rain)
- ❑ Rain (steady rain)
- ❑ Showers (intermittent rain)
- ❑ Overcast
- ❑ Clear/Sunny

Sketch of site

On your sketch, note features that affect stream habitat, such as: riffles, runs, pools, ditches, wetlands, dams, riprap, outfalls, tributaries, landscape features, logging paths, vegetation, and roads.

PHYSICAL CHARACTERIZATION

In-Stream Characteristics

1. Check which stream habitats are present: Page 48

(You can check more than 1 habitat)

❑ Pool(s) θ Riffle(s) θ Run(s)

2. Nature of particles in the stream bottom at site Page 48

	None/Little	Some	Most
Silt/Clay/Mud	❑	❑	❑
Sand (up to 0.1" in diam.)	❑	❑	❑
Gravel (0.1 - 2" in diam.)	❑	❑	❑
Cobbles (2 - 10" in diam.)	❑	❑	❑
Boulders (over 10" in diam.)	❑	❑	❑
Bedrock (solid)	❑	❑	❑

3. Pick the category that best describes the extent to which gravel, cobbles, and boulders on the stream bottom are embedded (sunk) in silt, sand, or mud. Page 49

θ Somewhat/not embedded (0-25%) θ Mostly embedded (75%)

θ Halfway embedded (50%) θ Completely embedded (100%)

4. Presence of logs or large woody debris in stream: Page 49

θ None θ Occasional θ Plentiful

5. Presence of naturally-occurring organic material (i.e., leaves and twigs, etc.) in stream: Page 49

θ None θ Occasional θ Plentiful

6. Water appearance: Page 49

θ Clear θ Light brown θ Orange
θ Milky θ Dark brown θ Greenish
θ Foamy θ Oily sheen θ Other ________
θ Turbid

7. Water odor: Page 50

θ Sewage θ Fishy θ None
θ Chlorine θ Rotten eggs θ Other ________

8. Water temperature: Page 50

_________ °C *or* _________ °F

Streambank and Channel Characteristics

9. (a) Approximate depth of run(s): Page 50

θ < 1 ft θ 1-2 ft θ > 2 ft

(b) Approximate depth of pool(s):

θ < 1 ft θ 1-2 ft θ > 2 ft

10. Approximate width of stream channel: Page 50

_________ feet θ measured θ estimated

11. Stream velocity: _________ ft/sec. Page 50

12. Looking upstream (100 yds.), pick the description that best fits the shape of the stream bank and the channel. Page 50

(a) Stream bank:

Left		Right
θ	Vertical/undercut	θ
θ	Steeply sloping (> 30°)	θ
θ	Gradual/no slope (< 30°)	θ

(b) Extent of artificial bank modifications:

Left		Right
θ	Bank 0-25% covered	θ
θ	Bank 25-50% covered	θ
θ	Bank 50-75% covered	θ
θ	Bank 75-100% covered	θ

(c) Shape of the channel:

θ Narrow, deep θ Wide, deep
θ Narrow, shallow θ Wide, shallow

13. Looking upstream (100 yds.), describe the streamside cover. Check "1" if present, "2" if common Page 51

(a) Along water's edge and stream bank only:

Left 1	Left 2		Right 1	Right 2
θ	θ	Trees	θ	θ
θ	θ	Bushes, shrubs	θ	θ
θ	θ	Tall grasses, ferns, etc.	θ	θ
θ	θ	Lawn	θ	θ
θ	θ	Boulders/rocks	θ	θ
θ	θ	Gravel/sand	θ	θ
θ	θ	Bare soil	θ	θ
θ	θ	Pavement, structures	θ	θ

(b) From the top of the streambank out to 25 yards.

Left 1	Left 2		Right 1	Right 2
θ	θ	Trees	θ	θ
θ	θ	Bushes, shrubs	θ	θ
θ	θ	Tall grasses, ferns, etc.	θ	θ
θ	θ	Lawn	θ	θ
θ	θ	Boulders/rocks	θ	θ
θ	θ	Gravel/sand	θ	θ
θ	θ	Bare soil	θ	θ
θ	θ	Pavement, structures	θ	θ

14. Pick the category that best describes the extent to which vegetation shades the stream at your site. Page 52

θ 0% θ 25% θ 50% θ 75% θ 100%

15. Looking upstream, note general conditions. Check "1" if present, "2" if severe problem is clearly Page 52

Left 1	Left 2	**Stream Banks**	Right 1	Right 2
θ	θ	Natural streamside plant cover degraded	θ	θ
θ	θ	Banks collapsed/eroded	θ	θ
θ	θ	Garbage/junk adjacent to the stream	θ	θ
θ	θ	Foam or sheen on bank	θ	θ
1	**2**	**Stream Channel**	**1**	**2**
θ	θ	Mud, silt, or sand in or entering the stream	θ	θ
θ	θ	Garbage/junk in the stream	θ	θ
1	**2**	**Other**	**1**	**2**
θ	θ	Yard waste on bank (grass, clippings, etc.)	θ	θ
θ	θ	Livestock in or with unrestricted access to stream	θ	θ
θ	θ	Actively discharging pipe(s)	θ	θ
θ	θ	Other pipe(s) entering the stream	θ	θ
θ	θ	Ditches entering the stream	θ	θ

Local Watershed Characteristics

(within about 1/4 mile of the site; adjacent and upstream)

16. Land uses in the local watershed can potentially have an impact on a stream. Check "1" if present, "2" if clearly having an impact on the stream. Page 53

1	2	**Residential**
θ	θ	Single-family housing
θ	θ	Multifamily housing
θ	θ	Lawns
θ	θ	Commercial/institutional
1	**2**	**Roads, etc**.
θ	θ	Paved roads or bridges
θ	θ	Unpaved roads
1	**2**	**Construction underway on:**
θ	θ	Housing development
θ	θ	Commercial development
θ	θ	Road bridge construction/repair
1	**2**	**Agricultural**
θ	θ	Grazing land
θ	θ	Feeding lots or animal holding areas
θ	θ	Cropland
θ	θ	Inactive agricultural land/fields
1	**2**	**Recreation**
θ	θ	Power boating
θ	θ	Golfing
θ	θ	Camping
θ	θ	Swimming/fishing/canoeing
θ	θ	Hiking/paths
1	**2**	**Other**
θ	θ	Mining or gravel pits
θ	θ	Logging
θ	θ	Industry
θ	θ	Oil and gas drilling
θ	θ	Trash dump
θ	θ	Landfills

BIOLOGICAL CHARACTERIZATION

VISUAL BIOLOGICAL SURVEY

17. Wildlife in or around the stream? *(Mark all that apply)* Page 53

θ Amphibians θ Waterfowl θ Reptiles θ Mammals

18. Fish in the stream? *(Mark all that apply)* Page 53

θ No θ Yes, but rare θ Yes, abundant

θ Small (1-2 in.) θ Medium (3-6 in.) θ Large (7 in. and above)

Are there any barriers to fish movement?

θ Beaver dams θ Waterfalls > 1' θ None

θ Dams θ Road barriers θ Other ________

19. Aquatic plants in the stream. *(Mark all that apply)* Page 53

θ None θ Occasional θ Plentiful

θ Attached θ Free-floating

θ Stream margin θ Pools θ Near riffle

20. Extent of algae in the stream. *(Mark all that apply)* Page 53

(a) Are the submerged stones, twigs, or other material in the stream coated with a layer of algal “slime”?

θ None θ Occasional θ Plentiful

θ Light coating θ Heavy coating

θ Brownish θ Greenish θ Other ________

(b) Are there any filamentous (string-like) algae?

θ None θ Occasional θ Plentiful

θ Brownish θ Greenish θ Other ________

(c) Are any detached “clumps” or “mats” of algae floating on the water’s surface?

θ None θ Occasional θ Plentiful

θ Brownish θ Greenish θ Other ________

MACROINVERTEBRATE SURVEY *(Optional)*

21. If macroinvertebrates were collected from the stream bottom, which type of method/habitat was selected? Page 53

θ Rock-rubbing method: From cobbles and large stones selected from riffles.

θ Stick-picking method: From woody objects in streams with sandy, silty bottoms.

θ Leaf-pack sorting method: From submerged leaves in streams with either a rocky or sandy, silty bottom.

22. Are macroinvertebrates present? Page 54

θ No θ Yes, but rare θ Yes, abundant

23. If present, describe the types of macroinvertebrates found. Page 54

(Mark all that apply)

Wormlike	θ Occasional	θ Plentiful
Snails/clamlike	θ Occasional	θ Plentiful
Insects	θ Occasional	θ Plentiful
Crayfish	θ Occasional	θ Plentiful

COMMENTS: *(Note changes or potential problems such as spills, new construction, type of discharging pipes)*