Streamwalk

The Streamwalk is an easy-to-use tool designed to assess the health of a stream corridor. If you observe water quality problems at your site (e.g., dead fish, oil spills, leaking barrels, bulk trash), you should report these findings to your city or county environmental department right away. Explain the nature and location of the problem.

Before the Streamwalk

1. We encourage you to contact local groups involved in environmental issues in your area. This serves two purposes: one, these groups may be able to provide you with information and background on your Streamwalk site; and two, you may be able to piggyback on an existing program. Visit EPA's Adopt Your Watershed Web page at http://www.epa.gov/adopt to see if there is a group in your watershed you can team up with.

2. Choose the general area for your Streamwalk. **Educators should carefully read the Streamwalk tips on page 24 and safety guidelines on pages 42–44 before beginning this activity. Also, it is strongly recommended that you visit the Streamwalk site in advance to take into account any potential hazards (e.g., broken glass, traffic, steep slopes, holes, rocks, poisonous plants, and insect nests).** You may wish to collect data along a familiar stream, one that is close to your school or on school grounds, or one that does not cascade down a steep mountain side. You may decide to do a series of streams in a watershed to collect baseline data or concentrate your efforts in areas suspected of being polluted. It is recommended that Streamwalks be done four times a year (once each season) at your site.

3. Find a U.S. Geological Survey (USGS) topographic map of your area. These "topo" maps show such things as elevations, waterways, and roads, and they help you see the connections between your stream and its watershed. Topo maps identify the latitude and longitude of your site. Help in defining longitude and latitude is provided on pages 28 and 29. We recommend 7½-minute quad maps (1:24,000 scale, where 11 inches = 4 miles), which are available at outdoor supply stores stores or on-line at http://topozone.com. You may also find one to photocopy at your local library, or you can order directly from USGS. For assistance, call 1-888-ASK-USGS.

4. Now, find your specific Streamwalk site on the topo map. For purposes of Streamwalks, you will characterize 100 feet (or about 65 meters) in either direction from your site. You may do as many sites on the stream as you wish. Just be sure that sites are at least 200 feet apart.

5. Finally, make a copy of the Streamwalk survey data form (pages 25–27). **It is very important that you go through the instructions, the Streamwalk Tips, and safety guidelines on pages 42–44 before you begin your walk.** You will use your map and one survey data sheet per Streamwalk site.

Note: *Several citizen groups and agency representatives worked with EPA's Region 10 office (Seattle, Washington) to develop Streamwalk.*

Instructions for Filling Out Streamwalk Site Survey Data Sheets

Below are directions on how to fill out the Streamwalk Site Survey Data Sheet. Please read these thoroughly before you begin your walk. If, while conducting your Streamwalk, you are not able to determine what the response should be, or if the question itself is unclear, just leave that space blank—but don't stop your walk. Remember this is not a test, and there are no right or wrong answers. **Walks can be done along the stream—you do not need to enter the water. Please be sure to read the tips on page 24 and safety guidelines on pages 42–44.**

Location

Give the stream name, county, and state of your site. Refer to the topo map if you have one. Note: There are some unnamed streams; in these cases you can indicate the stream, lake, or waterbody into which your stream flows and the name and number of the topo map. (If you want to share your information with a local or state environmental agency, it is useful to include the longitude and latitude of your site(s). This step is optional since computing this may be challenging. (See page 25.)

Weather

The concern with weather relates to amount of rainfall, which potentially can affect flow, clarity, and amount of water in a stream. Weather/rainfall reports are available in the daily newspaper or by calling the local Weather Service. Definitions of weather conditions established by the Weather Service are:

- **Rain -** 1/3 inch in 24 hours - light, steady rainfall.
- **Showers** - 1/3–1 inch in 24 hours, intermittent and variable in intensity.
- **Storm -** 1 inch or more rain in 24 hours, usually accompanied by high winds.

Stream Description

Depth and Width Estimates

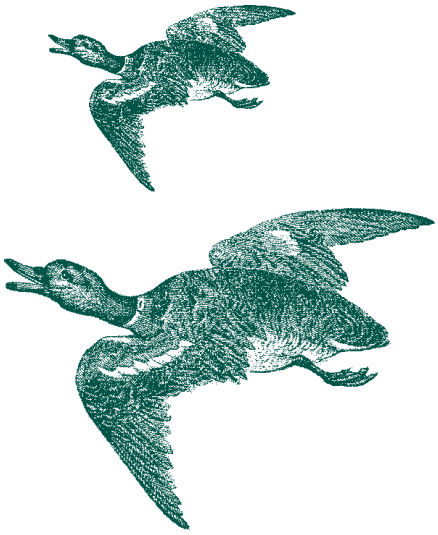
This information provides a description of the stream water at your site. Simply provide an estimate of the stream's width and depth. Do not enter the water—**just provide your best guess**!

Water Clarity

The clearness of the water is observed to determine if sediment pollution (dirt) is entering the stream. Cloudy or different colored water can be a result of natural processes or of land use in the surrounding watershed. Sediments can adversely affect habitat conditions such as food, health of fish, and breeding environment for macroinvertebrates. In some areas, grey or white water can be a result of natural processes such as glacial sources for streams.

Water Flow: Pools and Riffles

The variety of flow in relation to depth creates habitat to support fish and invertebrate life. Pools are deeper than adjacent areas. They provide feeding, resting, and spawning areas for fish. Riffles and/or runs are flows swift in comparison to surrounding areas. Riffles are shallow and fast water, runs are deep and fast water, and pools are slow and deep water.



Stream Channel Cross-Section Shape

Please check the box that matches the shape of the stream channel. If you are unable to see the shape of the bottom and banks, please estimate. You can base your estimate on the flow of water. *The slower the water in the middle of the stream, the flatter the bottom.*

Stream Bottom (substrate)

Indicate the most common type of material on the stream bottom.

- ***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): Sand is made up of tiny particles of rock. It feels soft underfoot.
- ***Gravel*** (0.1–2 inches): A gravel stream bottom is made up of stones ranging from tiny quarter inch pebbles to rocks of about 2 inches.
- ***Cobbles*** (2–10 inches): The majority of rocks on this type of stream bottom are between 2 and 10 inches. The average size is about that of a grapefruit.
- ***Boulders*** (greater than 10 inches): Most of the rocks on the bottom will be large, greater than 10 inches.
- ***Bedrock***: This kind of stream bottom is solid rock.

Width of Natural Streamside Corridor

Streamside corridor, *riparian area* and *zone of influence* are terms that describe the natural vegetated area on either side of the stream. Along with the stream, that area forms the habitat of the river. It includes vegetation that shades the water, holds the soil in place, adds nutrients to the stream in the form of leaves and during flooding, and provides living quarters for streamside wildlife. Estimate as best you can the width of the corridor at your site**. Indicate with an "x" on the bar graph. Note: Left and right are based on looking down stream.** If the vegetation is pasture or landscaped, this is not a natural state, so mark "o."

Streamside Vegetation

Vegetation acts as a filter for sediment and pollution coming in from the land nearby. It provides habitat for the many creatures that are dependent on and influence the stream. Branches, logs, and leaves enter the stream from this region. Vegetation also provides shade, which keeps the water cool. On the data sheet mark all the categories that apply.

- **Conifer:** A cone-bearing evergreen tree or shrub (e.g., a pine tree)
- **Deciduous tree**: A tree that sheds its foliage at the end of the growing season
- **Small trees or shrubs**: Either conifers or deciduous bushes less than 20 feet high.
- **Grasses:** Any of numerous plants with narrow leaves, jointed stems, and spikes or clusters of inconspicuous flowers.

Overhead Canopy (Stream Cover)

This is the amount of vegetation that overhangs the stream. It offers protection and refuge for fish and other organisms, shades the stream and keeps the water cool, and provides "launching" areas for insects that might fall into the river. Estimate, as best you can, about how much of the river is overhung by vegetation and whether the vegetation is grasses, shrubs, or trees. Please check the category that is appropriate for the current condition of your site. For example, if in the winter there are no leaves on the trees in your segment, you might check 0%–25%. However, in the summer when the trees have leaves, you might check 50%–75%.

Artificial Bank Protection

This category includes such streamside modification as riprap (a retaining wall built of rocks or concrete) and bulkheads. It may also include deliberately placed auto bodies, refrigerators, and washing machines. People in the past have thought that such modifications helped stabilize stream banks. Unfortunately, not only do they drastically degrade habitat for streamside and in-stream dwellers, but they also can cause bank erosion in flood conditions. Mark the categories that best describe the condition of the stream bank within your 500-foot segment.

Presence of Logs or Woody Debris in Stream

Logs and woody debris (not twigs and leaves) can slow or divert water to provide important fish habitat such as pools and hiding places. So please mark the general amount of logs and woody debris in the stream. DO NOT REMOVE THEM.

Organic Debris in Stream

The presence of other organic matter in the stream can be both good and bad. Dumped grass clippings are not good for stream health. On the other hand, naturally falling leaves and twigs can be beneficial.

Fish in Stream

Can you see any fish? Mark it down! If you know what kind of fish it is, say so in the space next to the question. If you think there are fish but you cannot see them, mark "no."

Adjacent Land Uses

Adjacent land use has a great impact on the quality and state of the stream and riparian areas. Enter a "l" if the land use is present and a "2" if it is **clearly** impacting the stream. If you cannot determine the type of housing, industry, or development, please make your best estimate.

Conditions

This section is designed to get information about potential problems at your Streamwalk site. Enter a **"1"** if the condition is present and **"2"** if it is severe.

Stream Banks

- ***Natural plant cover degraded:*** Indicate if stream side vegetation is trampled, missing, or replaced by landscaping or cultivation.
- ***Banks collapsed/eroded:*** Note if banks or parts of banks have been washed away or worn down.
- ***Banks artificially modified:*** Indicate if banks have been artificially modified by construction or placement of rocks, wood, or cement supports or lining.
- ***Garbage or junk adjacent to stream:*** Describe human-made materials present.

Stream Channel

***Mud/silt/sand on bottom/entering stream*:** Excessive mud or silt entering the stream and clouding the water can interfere with the ability of fish to sight potential prey. It can also clog fish gills and smother eggs in spawning areas on the stream bottom. Mud/silt/sand can be an indication of poor construction practices in the watershed, where runoff coming off the site is not adequately contained. It can also be a perfectly normal occurrence, especially if, for example, a muddy bottom is found along a very slow-moving segment or a wetland. Use your best judgment.

***Artificial stream modifications*:** Please note if the stream water has been dammed, dredged, filled, or channelized through culverts or if other large-scale activities such as log removal are apparent.

***Algae/scum floating/covering rocks*:** Evidence of algae (very tiny plants that can color the water green or can resemble seaweed) or scum in the water may point to an upstream source adding too much nutrient (fertilizer) to the water.

Foam or sheen: This is a bit of a tricky category because this type of thing can be naturally occurring or a problem. For example, an irridescent or shiny sheen on the water might be from rotting leaves or it might be from some upstream pollutant. If you are not sure, mark it on the checklist.

Garbage or junk in stream: This is your chance to point out very straightforward problems like batteries, tires, home appliances, car bodies, and garbage.

Other

Organic debris or garbage: The purpose is to determine if the stream is being used as a dump site for materials that would not be present naturally. Debris can be anything from a soda can to vegetation brought from outside the stream corridor.

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 stream-side degradation caused by access?

Actively discharging pipes: Are there pipes with visible openings dumping fluids or water into the stream? Please note, even though you may not be able to tell where they come from or what they are discharging. **Do not touch this effluent!**

Other pipes: Are there pipes entering the stream? Please mark even if you cannot find an opening or see matter being discharged.

Ditches: Are any ditches draining into the stream?

Stream Symptoms

Shiny surface or rainbow colors—If you see rainbow colors on the water's surface or if you smell oil (a gas station smell), oil might be polluting your stream. Oil can come from a pipeline leak, a storm sewer, or illegal dumping. Oil kills fish and can make kids who play in the water sick.

Green water—Too much algae. Algae are small plants that are found in the water. Fertilizers from farms and lawns can get into streams and cause too much algae to grow. When algae break down or decompose, oxygen is used up and fish don't have enough to breathe.

Brown or muddy water—Too much dirt or sediment in the water. Dirt clogs fish gills so fish can't breathe. Dirt kills stream insects when it settles to the bottom and buries them. Dirt blocks light to underwater plants, and they die too.

Orange water—Orange water can indicate the presence of iron in the water. Iron can be naturally present where the soils are high in iron. This is not a pollution problem. However, orange water can indicate acidic runoff from mining activities. Acidic water kills fish and other stream life.

Foam or suds—Some foam or suds in the stream is natural. If you see foam in the stream that is more than 3 inches tall, looks like bubble bath, and doesn't break apart easily, detergent may have entered the stream. Soap can come from homes, factories, or car washes. Soap harms stream insects because it breaks the surface tension of the water and insects like water striders sink and drown.

Strange odors—A chemical smell can mean harmful chemicals are polluting your stream. A rotten egg smell can mean sewage is getting into the stream from cows, sewage treatment plants, or people's homes. Sewage or chemicals can make people and animals ill.

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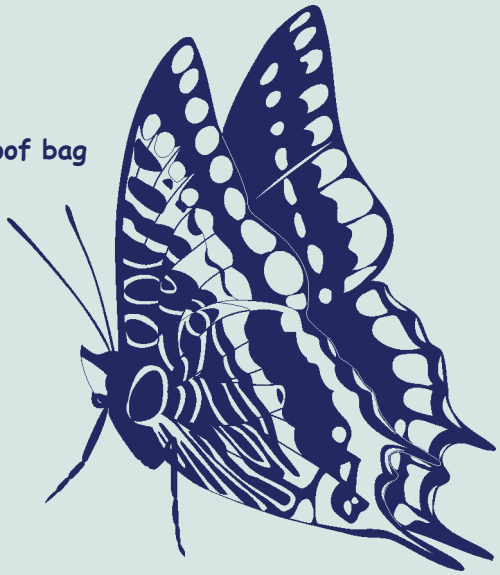
Streamwalk Tips

Also review Safety Guidelines on pages 42–44

- Get the permission of landowners to cross any private land, posted or not. **Do not enter areas without permission**. It is recommended that you use public access points (such as city/county/state parks and campgrounds).
- Only record what you see, not what you have previously seen. For example, if you think fish are present but you can't see them, mark your sheet "no fish present."
- Do not put yourself in danger to gather survey information.
- Be careful of ticks, poison oak, nettles, and insects. Bring repellent. Wear long pants and boots; wind breakers help fend off nettles.
- Watch out for dogs, snakes, alligators, and large animals.
- Do not drink the water—it is unsafe.
- Do not walk on unstable banks; your footsteps could speed erosion.
- Be alert for spawning areas (redds) in the stream. Do not walk on them. They will look like a round or elliptical area of clean gravel about 1–3 feet long. During fall through spring, when redds are evident, try not to walk in the stream. In the summer, if you are careful, the streambed might be the easiest route for conducting your Streamwalk. Be aware that the streambed can be very slippery, uneven, and unpredictable.
- **Do not attempt to walk across streams that are swift and above the knee in depth. You can be swept away in an instant!**
- Be careful of streamside vegetation. Disturb it as little as possible.
- **If for any reason you feel uncomfortable about the stream conditions or surroundings, please stop your Streamwalk immediately. You and your students' safety are much more valuable than the Streamwalk!**

Recommended list of items to take along:

- **Photocopies of topo map of stream to be walked**
- **Comfortable rubber boots**
- **Snag- and thorn-proof clothing that is appropriate for the weather**
- **Clip board with waterproof cover**
- **Streamwalk data forms**
- **Two pencils**
- **Folding ruler or tape measure**
- **Camera and film and/or video recorder in waterproof bag**
- **Leather gloves**
- **Bottled water**
- **Whistle**
- **First aid kit (See page 42 for suggested contents)**
- **Cell phone**
- **If you are away from urban or residential areas, the following are also recommended for safety:**
- **Extra clothes in a waterproof bag**
- **Toilet paper and hand wipes**
- **Fire starter (candle, cheap lighter, tinder)**
- **Flashlight and extra batteries**
- **Global positioning device, compass**
- **Aluminum-foil blanket (for winter excursions)**



Streamwalk Site Survey Data Sheet (Complete One Sheet per Site)

Location

Stream name: _____ Date: _____

County: _____ State: _____

School Name: _____

Contact Name: _____ Phone: _____

Site (name, description or number): _____

_____

(Optional —see instructions on pages 29–30)

Latitude: _____ ° _____ ′ _____ ″ N

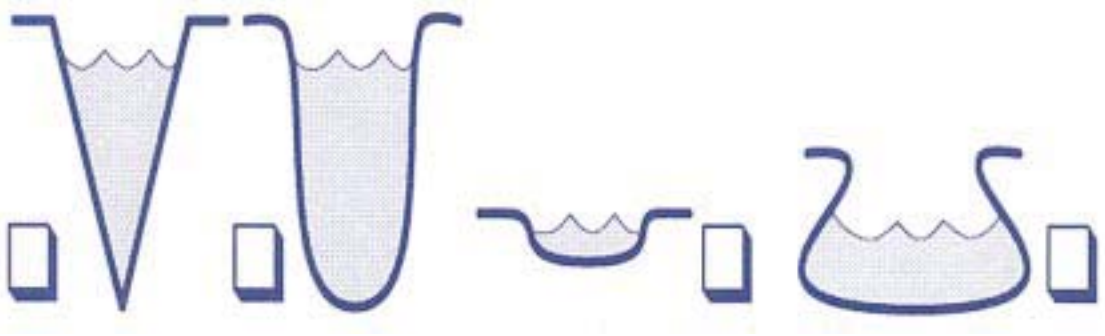
Longitude: _____ ° _____ ′ _____ ″ N

Weather *(see instructions on page 19)*

❑ Clear ❑ Overcast ❑ Rain ❑ Showers ❑ Storm

Stream Description *(see instructions on pages 19)*

1. **Depth *(estimated)*:** _____ feet
   Width *(estimated)*: _____ feet
2. **Clarity: Does water appear** ❑ Clear ❑ Cloudy
3. **Water Flow:** *(check all that apply):* ❑ Pools ❑ Riffles ❑ Runs
4. **Stream Channel Cross Section Shape:** *(at site) (Estimated)*



Streamwalk Site Survey Data Sheet (Complete One Sheet per Site)

5. Stream bottom: *(check the most common)* *(see instructions on page 20)*

- ❑ Clay/Mud
- ❑ Sand (up to 0.1 inch)
- ❑ Gravel (0.1- 2 inches)
- ❑ Cobbles (2–10 inches)
- ❑ Boulders (over 10 inches)
- ❑ Bedrock (solid)

6. Width of Natural Streamside Corridor: (average) *(see instructions on page 20)*

Left looking downstream: _____ meters Right looking downstream: _____ meters

7. Streamside Vegetation: *(see instructions on page 20)*

	None/Sparse	Occasional	Common
Conifers	❑	❑	❑
Deciduous	❑	❑	❑
Small trees and Shrubs (< 20 feet)	❑	❑	❑
Grasses	❑	❑	❑

Vegetation appears ❑ natural ❑ cultivated ❑ mixed (w/weeds)

8. Extent of Overhead Canopy: *(see instructions on page 21)*

❑ 0%–25% ❑ 25%–50% ❑ 50%–75% ❑ 75%–1 00%

9. Extent of Artificial Bank Protection: *(see instructions on page 21)*

❑ 0%–25% ❑ 25%–50% ❑ 50%–75% ❑ 75%–1 00%

10. Presence of Logs or Large Woody Debris in Stream: *(see instructions on page 21)*

❑ None ❑ Occasional ❑ Common

11. Presence of Other Organic Debris in Stream: *(see instructions on page 21)*

❑ Occasional ❑ Common

12. Any fish present? *(see instructions on page 21)*

❑ Yes ❑ No

Other Comments? _____

_____

_____

Site Survey Data Sheet (Complete One Sheet per Site)

Adjacent Land Uses

(see instructions on page 21)

Check "1" if present, "2" if clearly impacting stream:

1	2	
		Residential/industrial
❑	❑	Single-family housing
❑	❑	Multi-family housing
❑	❑	Commercial development
❑	❑	Light industry
❑	❑	Heavy industry
❑	❑	Road/bridge construction
		Roads, etc.
❑	❑	Paved roads or bridges
❑	❑	Unpaved roads
		Construction under way on:
❑	❑	Single-family housing
❑	❑	Multi-family housing
❑	❑	Commercial development
❑	❑	Light industry
❑	❑	Heavy industry
		Agricultural
❑	❑	Grazing land
❑	❑	Feedlots or animal holding areas
❑	❑	Cropland
		Other
❑	❑	Mining or gravel pits
❑	❑	Logging
❑	❑	Recreation

Conditions

(see instructions on page 22)

Check "1" if present, "2" if impact seems severe:

1	2	
		Stream banks
❑	❑	Natural streamside cover degraded
❑	❑	Banks collapsed/eroded
❑	❑	Banks artificially modified
❑	❑	Garbage/junk adjacent to stream
		Stream channel
❑	❑	Mud, silt, or sand in or entering stream
❑	❑	Artificial stream modifications(dams, channels, culverts, etc.)
❑	❑	Algae or scum floating or coating rocks
❑	❑	Foam or sheen
❑	❑	Garbage/junk in stream
		Other
❑	❑	Organic debris (garbage, grass clippings, etc.)
❑	❑	Livestock in or with unrestricted access to stream
❑	❑	Actively discharging pipe(s)
❑	❑	Other pipe(s) entering
❑	❑	Ditches entering

Other Comments? _____

_____

_____

_____

Follow-Up Questions for the Streamwalk

1. What animals or plants did you observe? Write the names or make sketches.

2. What three pieces of evidence did you find for ways that people use this water?

3. What evidence did you find for ways that other animals and plants use this water?

4. What color was the water? Was it clear? Did it smell?

5. From what you learned and observed while visiting the stream, what can you say about the quality of the water? You may want to study the "stream symptoms" on page 22 for some help.

6. Do you think water quality is a problem at this site? What evidence do you have for your answer?

7. We just spent time surveying the land uses adjacent to the site. Do you think this has an effect on the quality of the water? Do you think that there is strong connection between impacts on the land and water quality?

8. Do we have enough evidence to say whether the water is polluted or what it is polluted with? What else might we need to learn? Where can we get some additional information about the quality of our watershed? (Hint: Your state is required to submit information regularly to the Environmental Protection Agency about the quality of your state's watersheds. You can visit the Watershed Information Network (http://www.epa.gov/win) to find your watershed and learn about its health.)

Did You Know?

Water is the only substance necessary to all life. Many organisms can live without oxygen, but none can live without water!

Water makes up about 65 percent of our bodies. Humans and all other animals, as well as plants, require water to live. Without it, we would not be able to survive more than one week!