Appendix 9: Glossary

Watershed and Water Quality Terms

Land use: The way land is used. Some common types of land use are residential (e.g., houses or apartment buildings), commercial (stores), industrial (factories), roads, logging, mining, pasture, forest, or crop agriculture. Land use has a tremendous effect on the health of rivers and streams because it often determines what pollutants, if any, run off the land and end up in the water.

Riparian or streamside zone: The land immediately alongside a river or stream. Most streams need a forested and/or well-vegetated riparian zone of at least fifty feet. Larger streams generally need a wider zone. You can think of a riparian zone as the land that most affects and is most affected by a stream. For example, trees growing in the riparian zone provide shade for the stream, help the riparian zone absorb and filter floodwaters, and stabilize the bank. A combination of trees and other plants in the riparian zone helps filter out pollution before it reaches the stream.

Stream: Many words may be used to describe a stream. For example, a stream may also be called a river, a branch, a fork, a brook, a creek, or a run. The key thing to remember is that a stream contains moving water. Three categories are commonly used:[1]

> **Perennial stream:** A stream that has water in it most of the year, although the amount of water and the speed of the flow may vary with the time of year or amount of rainfall.
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> **Intermittent stream:** A stream that may go dry part of the year as long as the flow, when present, is not merely the result of rain running off the surface of the land.
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> **Ephemeral stream or wet weather conveyance:** A stream that only flows or runs as a direct result of rain. Ephemeral streams are not considered streams under Tennessee law and are not fully protected. Ephemeral streams are still connected to streams and lakes, however, and may affect water quality.

Stormwater: Rain or melted snow that does not soak into the ground, but instead flows over the surface until it joins a stream or wet weather conveyance. This happens most often in developed areas because impervious surfaces, such as buildings and roads, generate the highest volumes of stormwater. High volumes of stormwater can rapidly raise the level of the receiving stream and may cause flooding. Stormwater also picks up pollutants, including fertilizer, bacteria from pet feces, motor oil from cars, salt from roads and sidewalks, and dirt from construction sites and gardens, and carries them into the receiving stream. In cities and towns, storm sewers may channel stormwater off the streets and put it into pipes, but this does not solve the problem because the pipes still direct the stormwater to streams.

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[1] For a complete discussion of how TDEC classifies streams, see TDEC, Division of Water Pollution Control, *Guidance For Making Hydrologic Determinations*, Version 1.4 (May 2011), http://www.tn.gov/environment/water/docs/wpc/guid_hydro_det.pdf.

Watershed: The area of land that drains into a stream or lake. Watersheds can be very small, such as the land that drains into a tiny stream, to very large, such as all the land that drains into the Mississippi River.

Water quality: This refers generally to how healthy a stream is. Water quality evaluations include: (1) testing the physical and chemical characteristics of the water, (2) examining the biology, or life, in the water, and (3) assessing the habitat in and around the water.

> **Chemical and physical characteristics:** Chemical characteristics include the amount of chemicals, such as nitrogen, that are present in the water. Physical characteristics may include flow, temperature, and turbidity, or cloudiness, which often indicates the presence of mud (a leading cause of water pollution in Tennessee). It is common to test for dissolved oxygen, nitrogen, phosphorus, iron, conductivity (the presence of various kinds of salts), pH (acidity), and bacteria.
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> **Stream biology:** Many kinds of fish, aquatic insects, and other creatures live in streams. Measuring the health and abundance of these creatures can indicate how healthy a stream is, because streams that support many types of life are generally healthier than streams that support fewer types. For example, some aquatic insects require very clean water, while others can tolerate more polluted water. Since aquatic insects can tolerate pollution in varying amounts and live in streams over extended periods, they are typically the biological component that citizens and experts use to assess water quality.
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> **Habitat:** Habitat is where animals and insects live. In watershed science, habitat mostly consists of the stream and streamside zone. Habitat assessments often record characteristics associated with the streambed, channel banks, and streamside zone, including the plants that live in or along the stream.

In-Stream Terms

Bank: The raised side of the stream, which may range from a gentle slope to an abrupt shoulder. Sometimes there are a series of banks corresponding to normal low flows, normal high flows, and extreme high flows. These inner banks are sometimes referred to as benches.

Boulder: Rock larger than 10 inches in any dimension.

Channel: The area between banks where a stream normally flows. At low flow conditions, the channel may not be completely filled with water.

Cobble: Rock between 2.5 inches and 10 inches in any dimension.

Embeddedness: The process by which sediment fills the spaces between rocks on a stream bottom. It can range from a small amount of sediment between the rocks to completely filling the spaces and covering the rocks themselves.

Flow: The amount of water in a stream *and* the speed at which it travels. Thus, a deep stream traveling slowly can have the same flow as a small stream traveling quickly. Flow is measured in cubic feet per second (cfs).

Gravel: Rock less than 2.5 inches in any dimension.

Sand: Rock granule less than 2.0 millimeters in any dimension.

Sediment: Material on the bottom or side of a stream that may be carried along with the water when the flow increases. Sediment primarily consists of soil (or mud), sand, silt, and gravel.

Thalwag depth: The depth of a stream, from the stream bottom to the surface of the water, in the deepest part of the channel.

Stream Morphology Terms[2]

Amount of flow: The amount of water flowing in a stream. Stream flow varies throughout the year because rainfall typically is not evenly distributed each month. It also varies seasonally because in winter, deciduous plants do not capture water on their leaves and do not "pump" water out of the ground and into the air. Stream flow can be described graphically as the stream's hydrograph.

Geology: The rocks and soils in the area where a stream is located. Geology affects stream morphology because some soils erode quickly, while others are much more resistant to erosion. For example, stream channels where bedrock is close to the surface cannot easily deepen when the flow increases. As a result, the increased flow will put pressure on the banks, widening the channel and possibly causing flooding.

Stream location: Stream location changes over time. For example, streams tend to erode the outside of bends and deposit sediment on the inside, which gradually alters the stream channel. Stream channels develop over long periods of time, based on normal flow. However, extreme rain events can dramatically increase stream flow and cause unexpected changes to the channel. In addition, human activity that increases the amount of stormwater runoff can increase the rate of bank erosion and straighten a channel as the faster water attempts to move in a straighter line than it would at normal flow.

Stream morphology: Stream form, including its shape, location, and flow.

Stream speed: Stream speed depends on slope, the rate at which the water flows downhill. Mountain streams, for example, flow quickly, with many drops and pools. The bottom is usually rocky because the fast-moving water has cut away the soil. Further down, where the stream is

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[2] For more information about stream morphology, see Dave Rosgen, *Applied River Morphology*, or North Carolina's Stream Restoration Guidebook, http://www.bae.ncsu.edu/programs/extension/wqg/sri/stream_rest_guidebook/guidebook.html.

larger and the gradient is less steep, there are steep areas with rocks, known as **riffles** or rapids. Below these areas of rapid drop are **pools**, deep areas where the water flows very slowly. Sections without riffles or pools, where the water flows freely, are called **runs**. As the stream gets further from steep areas, it slows down and winds around; these curves or bends are known as **meanders**. This is not only true for streams that start in an upland area, but also for ones that develop in relatively flat areas such as West Tennessee and parts of Middle Tennessee. Speed can also depend on the amount of water that is moving downstream. A flooding river moves more quickly than the same river at normal levels.

Riparian or streamside zone: (Also see definition of this term in the Watershed and Water Quality Terms section of this glossary.) The riparian zone affects stream morphology in several ways. For example, a steep-sided stream, running quickly through a gorge or canyon, has little room for excess water to spread out compared to a flat floodplain on a slower moving river. The degree and type of vegetation and the width of the floodplain determine how much excess water can be absorbed during flood events and how well the area resists erosion. If the riparian zone is eliminated or greatly reduced by urbanization or other attempts to control the stream channel by hardening the banks with concrete or rock, increased flooding will result, especially downstream from the modified area.