

Glossary of Stream Monitoring Terms

Baseflow: Stream discharge or flow composed of ground water drainage and delayed surface drainage. Baseflow is typically characterized as that portion of stream flow not related to precipitation-induced runoff.

Best Management Practices: Agricultural and urban land management practices that have been determined to be the most effective, practical means of preventing or reducing pollution from non-point sources.

BOD: Biochemical Oxygen Demand (BOD) is a measure of the quantity of dissolved oxygen necessary per volume of water for the decomposition of organic matter by microorganisms, such as bacteria.

Composite Sample: A combined water sample consisting of a series of discrete water samples taken over a given period of time and mixed according to a specified weighting factor such as stream flow. A composite sample is often collected with the use of an automated sampler over the duration of a runoff event.

Conductivity: A measure of the ability of water to carry an electrical current, related to the amount of ions in the solution.

EPT richness index: A biological index of stream health, expressed as the sum of the number of taxa in three aquatic insect orders: Ephemeroptera (mayflies), Plecoptera (stoneflies), and Trichoptera (caddisflies). These three insect orders are composed primarily of species considered to be relatively intolerant of pollution and environmental alterations. Variations of the EPT index include number of EPT taxa, percentage of EPT taxa, number of EPT individuals, and percentage of EPT individuals in a macroinvertebrate sample.

Flow: Stream or river flow, commonly expressed as cubic feet per second or "cfs".

Flow Weighted Mean Concentration: Similar to normalized yield, the "flow weighted mean concentration" (FWMC) of a water quality variable is calculated by dividing the total mass or load of that variable by the total stream flow, for a given time period. The FWMC is mass normalized for flow, expressed as milligrams per liter (mg/L). Conceptually, a FWMC would be the same as routing all the stream flow that passed by a monitoring site during a given time period into a big, well-mixed pool, and collecting and analyzing one sample from the pool to obtain an average concentration for the water quality variable of interest.

FLUX: An interactive program developed by the U.S. Army Corps of Engineers that allows the user to estimate loads and flow weighted mean concentrations for water quality variables, using grab sample concentration data and continuous stream flow records. The term "load" refers to a mass of material passing through a stream during a given time period.

Grab Sample: A discrete water sample collected at a particular time and place. A grab sample is most often collected manually with appropriate sampling equipment.

Hilsenhoff Biotic Index: A biological index of stream health that measures macroinvertebrate tolerance of organic (nutrient) enrichment. The Hilsenhoff Biotic Index (HBI) is calculated and expressed on a 1-10 scale. An HBI value of 1 suggests the presence of a macroinvertebrate community that is most intolerant of organic enrichment, while an HBI value of 10 suggests the presence of a macroinvertebrate community that is most tolerant of organic enrichment.

Hydrograph: A graph of stream flow during a given time period, often seasonal or annual. MCES hydrographs depict daily average stream flows, in cubic feet per second (cfs).

Load: A "load" is the total amount or mass of a water quality variable passing through a stream during a given time period, often seasonally or annually. A load reflects the combined contributions of surface runoff and ground water discharge from a specific watershed, as measured at the monitoring station. MCES uses water chemistry and stream flow data to calculate annual loads (expressed in tons) using a FLUX program.

Macroinvertebrate: An aquatic invertebrate animal large enough to be seen with the naked eye. Macroinvertebrates include insects, freshwater "shrimp", crayfish, clams, snails, and worms. An analysis of the types and numbers of macroinvertebrates present in a stream, often expressed as a biological "index", is a very useful indicator of water quality and habitat conditions.

Non-Point Source Pollution: Non-point source (NPS) pollution, unlike point source pollution from industrial and wastewater treatment plants, comes from many diffuse sources in urban and rural areas. NPS pollution is primarily caused when runoff from rainfall or snowmelt picks up natural and human-made pollutants from land surfaces and carries these pollutants into ground water, streams, rivers, lakes, and wetlands.

Normalized Yield: For many water quality variables, the more precipitation that falls on a given watershed, the higher the stream loads and watershed yields will be. To help account for spatial and temporal differences in precipitation, a yield can be further divided by the number of inches of water (water yield) contributed to the stream by the watershed during a given time period, providing a "normalized yield" expressed as pounds per acre per inch of water.

Phosphorus: Aquatic plants provide food, oxygen, and habitat for aquatic organisms. However, an excess of plant growth can lead to unsightly algae blooms which cause oxygen depletion and odor upon decaying, making the water unpleasant for recreational activities and unsuitable for aquatic life. Phosphorus, a common component of wastewater treatment plant discharges and urban and agricultural runoff, can stimulate excessive plant growth when phosphorus levels in surface waters are too high.

Point Source Pollution: Point source pollution comes from easily identifiable sources, such as discharges from industrial and wastewater treatment plants.

Rating Curve: A continuous record of stream discharge or flow (hydrograph) is established by developing a mathematical relationship between water stage, which is continuously measured at the monitoring station, and discharge. This stage-discharge relationship, or "rating curve", is developed by pairing stage data with individual point-in-time discharge measurements. To properly develop a rating curve, discharge measurements should be made at a variety of water stages, from low to high. Using the rating curve, all water stages continuously measured at the monitoring station can be converted to flows, thereby establishing a flow record (hydrograph) for a given time period.

River Mile: The distance upstream from the mouth of a river. For example, Le Sueur River Mile 1.3 indicates a location 1.3 miles upstream from the mouth of the Le Sueur River.

Runoff: Rainfall, snowmelt, or irrigation water that runs off the land into streams, rivers, lakes, and wetlands. Runoff frequently picks up natural and human-made pollutants from land surfaces and carries these pollutants into surface waters.

Runoff Event: The response of stream flow to precipitation-induced runoff. After a precipitation event, a runoff event is characterized by an increase in flow from the baseflow condition as watershed runoff reaches the stream, followed by a subsequent decrease in flow to the baseflow condition after watershed runoff passes through the stream. One objective of the MCES stream monitoring program is to sample throughout each runoff event (via composite sampling), to characterize concentrations and loads of key nonpoint source pollutants.

Species (Taxa) Richness: A biological index of stream health, species (taxa) richness is the number of species or taxa present in a biological sample.

Stage: The level or height of the water surface, commonly measured in feet.

Taxon (plural Taxa): An identifiable taxonomic group of aquatic organisms. Common macroinvertebrate taxa, for instance, include class, order, family, genus, and species.

Target Pollutant Load: A target pollutant load is a goal set to limit the amount or load of a pollutant that is being discharged from a watershed via the stream. MCES is developing target pollutant loads for TCMA watersheds, to reduce water quality impacts due to nonpoint source pollution, to help achieve federal and state water quality standards, and to help reduce unnecessary investments in advanced wastewater treatment. Target pollutant loads will be developed through an iterative process that comprehensively assesses stream monitoring data, identifies water quality problems, uses a water quality model to help evaluate the feasibility of target pollutant load goals, and provides support for development of watershed plans that identify management strategies for improvement or protection of stream water quality. MCES intends this to be a collaborative process involving local stakeholders, including watershed management organizations and districts and other local units of government.

TCMA: Twin Cities Metropolitan Area.

Turbidity: A reduction in water clarity or a cloudiness caused by soil particles or organic matter in the water. These particles may harm aquatic life by decreasing light availability for plant growth, increasing water temperature, clogging the gills of aquatic organisms, and covering habitat. Low turbidity values (at or below 25 NTU) generally indicate good water quality.

Watershed: The land area that contributes surface water drainage to a stream. The watershed of a larger stream or river may encompass a number of smaller tributary subwatersheds.

Water Yield: The amount of water flowing through a stream during a given time period divided by the watershed area, expressed as inches of water.

Yield: One way to assess and compare the pollutant loads from watersheds of different sizes is to determine the "yield", or pollutant load per unit area of the watershed. Yield normalizes pollutant load on the basis of watershed area, allowing for more relative comparisons to be made between watersheds. Yield is calculated by dividing the total pollutant load for a given time period by the watershed area, and is commonly expressed as pounds per acre. Pollutant loads and yields are primarily a function of soil type, land use, landscape characteristics, and the amount, timing, and intensity of precipitation.