

Definitions for Various Biological, Chemical, and Physical Parameters Found in Storm Water

BIOLOGICAL

- **Bioassessment:** One important way to understand the health of a water system is by conducting a biological assessment, or bioassessment. This means scientists study the living organisms in a watershed to see how healthy the environment is. Animals like insects, worms, and snails that live in water, don't have backbones, and are big enough to see without a microscope are often used in monitoring.

CHEMICAL

- **pH:** pH expresses how basic or acidic the storm water is, dependent on the water's hydrogen ion concentration. Fluctuating pH can be caused by mine waste discharge, landfill leachate, and industrial or manufacturing effluent, among other sources, and can negatively affect many aquatic species. The ideal pH for most species is typically between 6.5 and 9, and levels outside of that range can cause decreased growth, disease, and even death.
- **Dissolved Oxygen:** Dissolved oxygen (DO) is the amount of oxygen that is present in water. Water bodies receive oxygen from the atmosphere and from aquatic plants. Running water, such as that of a swift moving stream, dissolves more oxygen than the still water of a pond or lake.
- **Heavy metals:** Metals, such as lead, copper, zinc, and arsenic, can leach into storm water from landfills, mines, urban runoff, and municipal wastewater and result in hazardous environmental impacts. Elevated levels of various metals in water bodies can cause gill damage and death in aquatic species, as well as many developmental and neurotoxic effects in humans.
- **Nutrients:** Nutrients, most commonly phosphorus and nitrogen, often enter water bodies due to excess fertilizer from nearby residential or agricultural land uses. Excess nutrients can lead to a process called eutrophication, where algal blooms explode in the area and deplete the aquatic environment dissolved oxygen as they decompose. The water becomes hypoxic, with very low levels of oxygen, and can no longer support aquatic life, creating dead zones where very few organisms can survive.

PHYSICAL

- **Total suspended solids (TSS):** TSS describes the solid particles which are present in the water and do not dissolve. The particles can be sedimentary in nature (of sand, silt, or clay), organic matter, such as decaying leaf debris or animal waste, or from anthropogenic sources, such as vehicle tire wear, exhaust emissions, or construction material. A high TSS contributes to an increased turbidity and, in addition to the negative impacts associated with turbidity, can clog the gills of fish, smother the eggs of aquatic animals and insects, and decrease growth rates.
- **Turbidity:** Turbidity describes the depth of visibility in the water and is primarily impacted by the amount of suspended solids present. Suspended solids include sediment, algae, and other organic matter. Highly turbid water appears cloudy or murky and has a higher absorption of the sun's ray, leading to increased temperatures. High turbidity also prevents deeper penetration of sunlight into the water column, which can obscure the sight of aquatic animals and reduce the growth of beneficial plants. Secchi disks are often used in the field to measure turbidity. A Secchi disk is a circular disk with white and black coloring. They are lowered into the water until the disk is no longer visible, and the depth at which it disappears is recorded as the Secchi depth. The greater the depth, the clearer the water. A lower Secchi depth indicates higher turbidity.
- **Temperature:** The temperature of a water body can fluctuate due to a number of factors, such as seasonal variability, warm water discharge from industrial facilities, warm runoff from impervious surfaces, and high turbidity. Fluctuations in temperature outside of an aquatic species ideal range can lead to high mortality and decreased biodiversity. Warm water also holds less dissolved oxygen, which can create zones of low oxygen levels in which aquatic animals cannot survive.
- **Oil and grease:** Oil and grease are present in storm water as petroleum hydrocarbons. Their sources include vehicular leaks, oil spills, improper disposal of used oil, and engine emissions. Oil exposure through external contact, ingestion, or inhalation can be toxic to aquatic plants and animals. Oil and grease in water bodies can also prevent oxygen transfer into the water, increasing oxygen demand in the water column. Oil and grease can also be considered a chemical parameter, as it can be tested for hydrocarbon levels.

Mock Data Cards

Fold along length, paste to sides together, then cut out the squares.

SCHOOLYARD DRAINAGE This drain collects runoff from a paved playground and landscaped area	FOREST STREAM This sample was taken from a forested stream with light foot traffic and little nearby development.	URBAN DRAINAGE CHANNEL This site is located near a parking lot and roadside drain, downstream of a storm drain inlet
pH: 6.0 Temperature: 28 C Turbidity: 18 JTU Dissolved Oxygen: 3.8 ppm	pH: 8.0 Temperature: 22 C Turbidity: 33 JTU Dissolved Oxygen: 7.1 ppm	pH: 8.5 Temperature: 32C Turbidity: 24 JTU Dissolved Oxygen: 4.5 ppm