Links

Glossary of the Great Lakes | Natural Resources Defense Council | MN DNR - Hydrologic Terms

Conversion Tables

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

A

abiotic:

Not alive; non-biological; for example, temperature and mixing are abiotic factors that influence the O_2 content of lake water whereas photosynthesis and respiration are biotic factors that affect O_2 solubility.

acid:

A solution that is a proton (H^+) donor and has a pH less than 7 on a scale of 0-14. The lower the pH the greater the acidity of the solution.

acidity:

A measure of how acid a solution may be. A solution with a pH of less than 7.0 is considered acidic. Solutions with a pH of less than 4.5 contain mineral acidity (due to strong inorganic acids), while a solution having a pH greater than 8.3 contains no acidity.

acid rain:

Precipitation having a ph lower than the natural range of ~5.2 - 5.6; caused by sulfur and nitrogen acids derived from anthropogenic emissions.

acidification:

The process by which acids are added to a water body, causing a decrease in its buffering capacity (also referred to as alkalinity or acid neutralizing capacity), and ultimately a significant decrease in pH that may lead to the water body becoming acidic (pH < 7).

adhesion:

The molecular force of attraction between unlike bodies that that acts to hold them together.

algae:

Simple single-celled, colonial, or multi-celled, aquatic plants. Aquatic algae are (mostly) microscopic plants that contain chlorophyll and grow by photosynthesis, and lack roots and stems ((non-vascular), and leaves. They absorb nutrients (carbon dioxide, nitrate, ammonium, phosphate and micronutrients) from the water or sediments, add oxygen to the water, and are usually the major source of organic matter at the base of the food web in lakes. Freely suspended forms are called phytoplankton; forms attached to rocks, stems, twigs, and bottom sediments are called periphyton.

alkalinity:

Acid neutralizing or buffering capacity of water; a measure of the ability of water to resist changes in pH caused by the addition of acids or bases and therefore, the main indicator of susceptibility to acid rain; in natural waters it is due primarily to the presence of bicarbonates, carbonates and to a much lesser extent occasionally borates, silicates and phosphates. It is expressed in units of milligrams per liter (mg/l) of $CaCO_3$ (calcium carbonate) or as microequivalents per liter (ueq/l) where 20 ueq/l = 1 mg/l of $CaCO_3$. A solution having a pH below about 5 contains no alkalinity.

anaerobic:

Technically this means "without air" but in limnology it is used synonymously with "anoxic."

aquifer:

A subsurface formation of rock, glacial material, or other deposits that contains water and is capable of storing and yielding water to a well or spring.

anions:

Negatively charged ions.

anoxia:

Condition of being without dissolved oxygen (O_2).

anoxic:

Completely lacking in oxygen.

anthropogenic:

Human caused.

aquatic respiration:

Refers to the use of oxygen in an aquatic system including the decomposition of organic matter and the use of oxygen by fish, algae, zooplankton, aquatic macrophytes, and microorganisms for metabolism.

atmospheric (Barometric) Pressure:

Measure of the pressure of the earth's atmosphere per unit area. It is 760 mm Hg at sea level and decreases with increasing elevation.

attenuation:

Decrease.

aufwuchs:

The community of algae and other microorganisms that attach to surfaces such as rocks, twigs, and aquatic plants; essentially the same as "periphyton" that means "attached algae."

TOP

B

base:

A substance which accepts protons (H^+) and has a pH greater than 7 on a scale of 0-14; also referred to as an alkaline substance.

base Flow:

The portion of stream flow that is not runoff and results from seepage of water from the ground into a channel slowly over time. The primary source of running water in a stream during dry weather.

basin:

Geographic land area draining into a lake or river; also referred to as drainage basin or watershed.

bedload:

inorganic material that moves along the stream bottom in the stream's current. Bedload can be contrasted with suspended solids, which refers to material that moves up in the water column. In a typical summer rainstorm in the Upper Midwest, bedload usually consists of particles at least 250 µm in diameter. Bedload is usually coarser sands, gravel, and possibly even cobbles and boulders in a very strong storm or during the high discharges/velocities brought on in the spring by a large amount of rapidly melting snow. Smaller material is usually in suspension.

benthic:

Refers to being on the bottom of a lake or stream.

Best Management Practice (BMP), nonstructual:

Strategies implemented to control stormwater runoff that focus on pollution prevention such as alternative site design, zoning and ordinances, education, and good housekeeping measures.

Best Management Practice (BMP), structual

Engineered devices implemented to control, treat, or prevent stormwater runoff pollution.

bicarbonate:

The anion HCO_3^-.

bioaccumulation:

The increase in concentration of a chemical in organisms that reside in environments contaminated with low concentrations of various organic compounds. Also used to describe the progressive increase in the amount of a chemical in an organism resulting from rates of absorption of a substance in excess of its metabolism and excretion. Certain chemicals, such as pcbs, mercury, and some pesticides, can be concentrated from very low levels in the water to toxic levels in animals through this process.

bioavailable:

Able to be assimilated (absorbed) by organisms.

Biochemical Oxygen Demand (BOD):

Sometimes referred to as Biological Oxygen Demand (BOD). A measure of the amount of oxygen removed (respired) from aquatic environments by aerobic microorganisms either in the water column or in the sediments. The parameter BOD uses the maximum rate of O_2 consumption over a 5 day period in the dark at 20^0 to estimate the total amount of "biodegradable" organic matter in the system. Typically too insensitive to be useful for pristine lakes and so is used primarily for wastewater "streams" or

systems impacted by organic pollution.

biomass:

The weight of a living organism or assemblage of organisms.

biotic:

Referring to a live organism; see also abiotic.

bioretention:

The use of vegetation in retention areas designed to allow infiltration of runoff into the ground. The plants provide additional pollutant removal and filtering functions while infiltration allows the temperature of the runoff to be cooled.

brownfields:

Abandoned or underutilized properties where development is complicated by real or perceived contamination.

buffer:

A substance which tends to keep pH levels fairly constant when acids or bases are added.

buffering capacity:

Ability of a solution to resist changes in ph when acids or bases are added; the buffering capacity of natural waters is mostly due to dissolved carbonate rocks in the basin; equivalent to acid neutralizing capacity (anc). Typically considered to be exhausted.

buffer zone:

A designated transitional area around a stream, lake, or wetland left in a natural, usually vegetated state so as to protect the waterbody from runoff pollution. Development is often restricted or prohibited in a buffer zone.

TOP

C

calorie:

A basic measure of energy where 1 calorie is equal to the total amount of heat required to raise the temperature of 1 gram of water 1 degree Celsius.

capillary Action:

The action by which water is drawn around soil particles (or any other solid substance like a small bore tube) because there is a stronger attraction between the soil or solid particles and the water molecules themselves.

carbon cycle:

The circulation of carbon atoms through the earth's whole ecosystem.

carbon dioxide:

A gas which is colorless and odorless; when dissolved in water it becomes carbonic acid; CO_2 is assimilated by plants for photosynthesis in the "dark" cycles of photosynthesis.

carbonate ion:

The CO3-2 ion in the Carbonate Buffer System the collective term for the natural inorganic chemical compounds related to carbon dioxide that exists in natural waterways. Combined with one proton, it becomes Bicarbonate, HCO3- and with two protons, Carbonic Acid. The carbonate ion forms a solid precipitant when combined with dissolved ions of calcium or magnesium.

carbonate buffering system:

The most important buffer system in natural surface waters and wastewater treatment, consisting of a carbon dioxide, water, carbonic acid, Bicarbonate, and Carbonate ion equilibrium that resists changes in the water's pH. If acid (hydrogen ions) is added to this buffer solution, the equilibrium is shifted and carbonate ions combine with the hydrogen ions to form bicarbonate. Subsequently, the bicarbonate then combines with hydrogen ions to form carbonic acid, which can dissociate into carbon dioxide and water. Thus the system pH is unaltered (buffered) even though acid was introduced.

carnivores:

"Meat" eaters; organisms that eat other organisms.

catchbasin:

An inlet to a storm or combined sewer equipped with a sediment sump, and sometimes a hood, on its outlet pipe to the sewer. Catchbasins can collect some of the sediment and debris washed off the streets, and help to provide a water seal against the venting of sewer gases. Catchbasins should be cleaned out regularly to function properly.

cations:

Positively charged ions.

channel:

An open conduit either naturally or artificially created that may convey water.

channel erosion:

The widening, deepening (called channel scour), and upstream cutting of a stream channel caused by moderate and extreme flow events. Channel erosion is one way that a stream reacts to changes in flow patterns.

chemical equilibrium:

Concentrations of reactants and products at which a reaction is in balance; there is no net exchange because the rate of the forward reaction is taking place at the same rate of the reverse reaction.

CHEMetrics water quality test kits:

CHEMetrics, Inc. (website: http://www.chemetrics.com/) is one of a number of companies that market a variety of test kits and field and lab instruments for water quality testing. Additional companies commonly cited are Hach and LaMotte, and there are probably numerous others accessible to the reader through various educational resources or scientific lab products catalogues. Water on the Web does not endorse any particular company's products. Some test kits have been "approved" by state or federal agencies for certain types of tests in specific types of water or wastewater.

chlorophyll:

Green pigment in plants that transforms light energy into chemical energy in photosynthesis.

clarity:

Transparency; routinely estimated by the depth at which you can no longer see a sechi disk. Transparency tubes - clear, 60 or 120 cm-long tubes with colored disks on the bottom are used for determining a depth at which a small secchi disk is visible. The clarity of stream water depends on how much sediment, algae, and other materials are suspended in the water.

clay:

very fine inorganic sediments under 2 µm in diameter; not gritty, feels slippery between fingers.

climber:

a macroinvertebrate which moves by climbing on aquatic vegetation.

clinger:

a macroinvertebrate which clings to rocks; may be a very good crawler.

cobble:

a piece of rock about the size of a grapefruit or tennis ball, 6.4 to 25 cm.

collector-filterer:

a macroinvertebrate method of feeding in which the organism uses some sort of netlike apparatus to catch small particles drifting on the current.

collector-gatherer:

a macroinvertebrate type of feeding behavior characterized by collection of all manner of small particles for food.

conductivity (electrical conductivity and specific conductance):

Measures water's ability to conduct an electric current and is directly related to the total dissolved salts (ions) in the water. Called EC for electrical conductivity and is reported in micromhos per centimeter (umhos/cm) which has been recently renamed as uS/cm (microSiemans per centimeter). EC is temperature sensitive and increases with increasing temperature. Most modern probes automatically correct for temperature and standardize all readings to 25°C and then refer to the data as specific EC.

confluence:

the point at which two streams converge.

constructed stormwater wetland:

A water quality BMP, design to have similar characteristics and functions to a natural wetland, with the specific purpose of treating stormwater runoff through uptake, retention, and settling.

consumers:

Organisms that must eat other organisms for their energy metabolism; organisms that cannot produce new organic matter by photosynthesis or chemosynthesis (producers).

convection currents:

Air or water movement caused by changes in density or thermal (temperature) gradients.

conveyance system:

A pipeline, canal, natural channel or other similar facility that transports water from one location to another.

CPOM:

coarse particulate organic matter, defined operationally in streams as organic (nonmineral) matter that is greater than 1 millimeter in diameter, generally derived from terrestrial plant parts and macrophytes.

cyanobacteria:

Bluegreen algae; phylum or organisms that are biochemically bacterial in nature but perform plant photosynthesis.

TOP

D

decomposition:

The breakdown of organic matter by bacteria and fungi.

denitrification:

Anaerobic bacterial process metabolism in which nitrate is used instead of oxygen during the oxidation of organic carbon compounds to yield energy (respiration). The process oxidizes organic carbon and (chemically) reduces nitrate to the gaseous end products N_2 (nitrogen gas) or N_2O (nitrous oxide). This is the major process used in wastewater treatment plants to ultimately convert combined nitrogen to a non-polluting state.

density:

The mass of a substance or organism per unit volume (kg/cubic meter; grams/liter).

depositional habitat:

macroinvertebrate habitat type characterized by slow-moving water/pools.

depression storage:

The volume of water contained in natural depressions in the land surface, such as puddles.

detention:

The storage and slow release of stormwater following a precipitation event by means of an excavated pond, enclosed depression, or tank. Detention is used for both pollutant removal, stormwater storage, and peak flow reduction. Both wet and dry detention methods can be applied.

detritus:

Dead or decaying organic matter; technically called organic detritus to distinguish it from the mineral detritus classified by geologists.

diatom:

Group of algae characterized by glass (silica) cell wall, beautifully ornamented; often the brown stuff attached to rock surfaces.

diel:

A 24 hour period of time.

diffusion:

The movement of a substance from an area of high concentration to an area of low concentration. Turbulent diffusion, or mixing, results from atmospheric motions (wind) diffusing water, vapor, heat, and other chemical components by exchanging parcels called eddies between regions in space in apparent random fashion. Molecular diffusion, which operates in stagnant zones, such as at the bottom sediment-water boundary in a deep lake, occurs much, much more slowly and so is important only on a very small scale such as right at the bottom.

Dipteran:

True flies.

direct runoff:

the runoff entering stream channels promptly after rainfall, exclusive of base flow. Direct runoff equals the volume of rainfall excess (total precipitation minus losses).

discharge:

the volume of water that passes through a given cross section per unit time. Discharge is commonly measured in cubic feet per second (cfs) or cubic meters per second (cms). It is also referred to as flow.

dissolved oxygen (DO or O_2):

The concentration of free (not chemically combined) molecular oxygen (a gas) dissolved in water, usually expressed in milligrams per liter, parts per million, or percent of saturation. Adequate concentrations of dissolved oxygen are necessary for the life of fish and other aquatic organisms and the prevention of offensive odors. DO levels are considered the most important and commonly employed measurement of water quality and indicator of a water body's ability to support desirable aquatic life. Levels above 5 milligrams per liter (mg O_2/L) are considered optimal and most fish cannot survive for prolonged periods at levels below 3 mg O_2/L. Levels below 1 mg O_2/L are often referred to as hypoxic and when O_2 is totally absent anoxic (often called anaerobic which technically means without air). Secondary and advanced wastewater treatment systems are generally designed to degrade organic matter to ensure adequate dissolved oxygen in waste-receiving waters (from North American Lake Management Society.

dissolved solids concentration:

The total mass of dissolved mineral constituents or chemical compounds in water; they form the residue that remains after evaporation and drying. Often referred to as the total dissolved salts (TDS) concentration or dissolved ion concentration. In seawater or brackish water this is approximated by the salinity of the water. All of these parameters are estimated by the electrical conductivity (EC).

dry deposition:

Fine particulate matter and aerosols settling from the atmosphere onto lake and land surfaces during periods with no precipitation.

TOP

E

ecological pyramid:

Conceptual scheme whereby the amount of biomass or energy at each level of the food "chain" decreases as you move from primary producers through the different levels of consumers.

ecoregion:

An environmental area characterized by specific land uses, soil types, surface form, and potential natural vegetation.

ecosystem:

All of the interacting organisms in a defined space in association with their interrelated physical and chemical environment.

electrical conductivity (EC):

See Conductivity.

electromagnetic radiation:

Radiation that travels through space at the speed of light that includes light, radio waves, x-rays, and gamma rays.

embeddedness:

how much a larger particle (usually cobbles or larger gravel) is buried in finer material, typically loose, unconsolidated sands and silts. A rock sitting on a hard, empty tabletop would have zero embeddedness. A rock buried in a bucket of sand would be highly embedded.

equilibrium:

See Chemical Equilibrium.

erosional habitat:

macroinvertebrate habitat type characterized by rapidly moving water/riffles.

estuary:

A semi-enclosed coastal waterbody such as a bay, mouth of a river, salt marsh, or lagoon, where freshwater and saltwater mix. These waters support a rich and diverse ecology.

euphotic zone:

Layer of water where sunlight is sufficient for photosynthesis to occur.

eutrophication:

The process by which lakes and streams are enriched by nutrients (usually phosphorus and nitrogen) which leads to excessive plant growth - algae in the open water, periphyton (attached algae) along the shoreline, and macrophytes (the higher plants we often call weeds) in the nearshore zone.

evaporation:

The process of converting liquid to vapor.

evapotranspiration:

The loss of water to the atmosphere through the combined processes of evaporation and transpiration, the process by which plants release water they have absorbed into the atmosphere.

event mean concentration (EMC):

A method for characterizing pollutant concentrations in a receiving water from a runoff event often chosen for its practicality. The value is determined by compositing (in proportion to flow rate) a set of samples, taken at various points in time during a runoff event, into a single sample for analysis.

Excel:

Refers to Microsoft's Excel spreadsheet software.

excess precipitation:

the precipitation in excess of infiltration capacity, evaporation, transpiration, and other losses. It is also referred to as effective precipitation.

export rates:

Amount of a particular nutrient or contaminant annually transported from its source to a lake or stream; usually related to land uses and expressed per unit area per year.

TOP

F

filter strip:

Grassed strips situated along roads or parking areas that remove pollutants from runoff as it passes through, allowing some infiltration, and reductions of velocity.

fines (or fine material):

sands, silts, and clays, collectively; inorganic material under 2000 µm (2 mm).

fix:

Convert CO_2 to carbohydrate or N_2 to $NH4^+$ (carbon fixation and nitrogen fixation);

flashy stream:

A stream or river that is characterized by dramatic fluctuations in flow, in which sharply higher flows in wet weather can be followed by very low flows in dry weather.

floatables:

Materials found in runoff that are buoyant, such as polystyrene, plastic, some organic material, or cigarette butts.

floodplain:

Can be either a natural feature or statistically derived area adjacent to a stream or river where water from the stream or river overflows its banks at some frequency during extreme storm events.

flow rate:

The rate at which water moves by a given point; in rivers it is usually measured in cubic meters per second (m^3/sec) or cubic feet per second (cfs).

flushing rate:

The retention time (turnover rate or flushing rate), the average length of time water resides in a lake, ranging from several days in small impoundments to many years in large seepage lakes. Retention time is important in determining the impact of nutrient inputs. Long retention times result in recycling and greater nutrient retention in most lakes. Calculate retention time by dividing the volume of water passing through the lake per year by the lake volume.

food chain:

The transfer of food energy from plants through herbivores to carnivores. An example: insect-fish-bear or the sequence of algae being eaten by zooplankton (grazers; herbivores) which in turn are eaten by small fish (planktivores; predators) which are then eaten by larger fish (piscivores; fish eating predators) and eventually by people or other predators (fish-eating birds, mammals, and reptiles).

food web:

Food chains hooked together into a complex interconnected web.

TOP

G

gas solubility:

The ability of a gas to dissolve into another substance.

Geographic Information System (GIS):

A computer system which allows for input and manipulation of geographic data to allow researchers to manipulate, analyze and display the information in a map format.

gravel:

rock pieces 2 mm up to 6.4 cm, pea to marble-sized.

grazers:

Herbivores; zooplankton in the open water zone.

groundwater:

Water that flows below the ground surface through saturated soil, glacial deposits, or rock.

TOP

H

Hach Water Quality Test Kits:

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hardwater:

Lakes that have a high buffering capacity and are not generally sensitive to acid deposition. These lakes have dissolved salt concentrations greater than 120 mg/L.

herbivores:

Plant eaters.

heterogeneous:

Not uniform; patchy.

hydric soil:

a soil that is saturated, flooded, or ponded long enough during the growing season to develop anaerobic (no oxygen) conditions in the upper layers.

hydrogen:

Colorless, odorless and tasteless gas; combines with oxygen to form water.

hydrogen bond:

A type of chemical bond caused by electromagnetic forces, occurring when the positive pole of one molecule (e.g., water) is attracted to and forms a bond with the negative pole of another molecule (e.g., another water molecule).

hydrogen ion:

An individual atom of hydrogen which is not attached to a molecule and therefore has a positive (+) charge.

hydrology:

The study of water's properties, distribution and circulation on Earth.

hydroperiod:

the time it takes for water level to rise and then fall back to normal baseline levels in a given stream for a given amount of rainfall or snowmelt. Streams that have short hydroperiods (those that rise and fall back down quickly) are said to be flashy.

TOP

I

illicit connections:

Illicit connections are discharges to the stormwater system that are not normal stormwater. They could consist of anything from a garage drain that flows to a storm drain to an individual dumping oil down a catch basin. Some discharges may be continuous and other one time.

impaired:

a water body that does not meet the water quality criteria for a designated use (e.g., aquatic life use). Water quality criteria can be based on chemical, physical, or biological conditions. (See index of biotic integrity.)

impervious surfaces:

Land surfaces such as roads, parking lots, buildings, etc that prevent rainwater from soaking into the soil. The water increases in velocity causing more erosion; it warms causing potential heat stress for downstream trout; it picks up roadway contaminants; and the loss of vegetation removes a "sink" for dissolved nutrients - plant uptake.

Index of Biotic Integrity (IBI):

A measure of the condition of a biological community and typically contains metrics related to biodiversity, % pollution tolerant or intolerant species, the balance of trophic (food web) levels, and/or aquatic organism health (deformities, lesions, tumors, etc.).

infiltration:

The process or rate at which water percolates from the land surface into the ground. Infiltration is also a general category of BMP designed to collect runoff and allow it to flow through the ground for treatment.

inflow:

Water flowing into a stream.

inflow and infiltration (I&I):

The penetration of water from the soil into sewer or sanitary pipes through defective joints or connections and/or the penetration of water through the ground water into the subsurface soil.

inorganic:

Substances of mineral, not carbon origin.

ion:

An electrically charged particle.

isothermal:

Constant in temperature.

TOP

J

TOP

K

TOP

L

LaMotte Water Quality Testing Kits:

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landuse:

The primary or primary and secondary uses of land, such as cropland, woodland, pastureland, forest, water (lakes, wetlands, streams), etc. The description of a particular landuse should convey the dominant character of a geographic area and establish the dominant types of human activities which are prevalent in each region.

landscape:

All the natural geographical features, such as fields, hills, forests, and water that distinguish one part of the earth's surface from another part. These characteristics are a result not only of natural forces but of human use of the land as well.

latent heat (energy):

The amount of heat (energy) released from or absorbed by a substance when it undergoes a change of state; also known as Heat of Transformation.

leach:

To remove soluble or other constituents from a medium by the action of a percolating liquid, as in leaching salts from the soil by the application of water.

limnetic zone:

Open water zone.

littoral:

Nearshore out from shore to the depth of the euphotic zone where it is too dark on the bottom for macrophytes to grow.

loading rates:

The rate at which materials (typically suspended sediment, nutrients [N and P], or contaminants) are transported into a water body.

TOP

M

macrophytes:

Higher aquatic plants; in the sense of "higher" evolutionarily than algae and having roots and differentiated tissues; may be emergent (cattails, bulrushes, reeds, wild rice), submergent (water milfoil, bladderwort) or floating (duckweed, lily pads).

marl:

Encrustation of calcium carbonate that forms on plants in high ph/alkalinity lakes and on your faucet from the precipitation of calcium carbonate.

mesotrophic:

Moderately productive; relating to the moderate fertility of a lake in terms of its algal biomass.

mean depth:

The average depth of a stream.

metabolism:

The chemical and physical processes continually going on in living organisms and cells, by which the energy is provided for cellular processes and activities, and new material is assimilated to repair waste.

micronutrient:

Trace nutrients required by microrganisms or zooplankton such as molybdenum and cobalt; nitrogen and phosphorus are considered to be macronutrients.

motile:

Able to move at will.

TOP

N

National Pollution Discharge Elimination System (NPDES) :

A provision of the Clean Water Act that prohibits discharge of pollutants into waters of the United States unless a special permit is issued by the EPA, a state, or (where delegated) a tribal government or and Indian reservation.

natural buffer:

A variable width area maintained with natural vegetation between a pollutant source and a waterbody that provides natural filtration and other forms of protection.

NEMO (Nonpoint Education for Munincipal Officials):

A University of Connecticut educational program for land use decision makers that addresses the relationship of land use to natural resource protection. The NEMO coordinator for Minnesota's North Shore is Jesse Schomberg.

nitrification:

Bacterial metabolism in which ammonium ion (NH_4^+) is oxidized to nitrite (NO_2^-) and then to nitrate (NO_3^-) in order to yield chemical energy that is used to fix carbon dioxide into organic carbon. The process is a type of chemosynthesis which is comparable to photosynthesis except that chemical energy rather than light energy is used. These bacteria are aerobic and so require dissolved oxygen in order to survive.

nitrogen fixation:

The conversion of elemental nitrogen in the atmosphere (N2) to a form (e.g., ammonia) that can be used as a nitrogen source by organisms. Biological nitrogen fixation is carried out by a variety of organisms; however, those responsible for most of the fixation in lakes are certain species of bluegreen algae.

non-motile:

Not able to move at will.

non-polar molecule:

A molecule that does not have electrically charged areas (poles).

non-polar gas:

A gas that is electrically neutral.

nonpoint source:

Diffuse source of pollutant(s); not discharged from a pipe; associated with land use such as agriculture or contaminated groundwater flow or on-site septic systems.

nuisance blooms:

Referring to obnoxious and excessive growths of algae caused by excessive nutrient loading; often due to scum forming cyanobacteria (bluegreen algae) that can regulate their buoyancy to float high in the water column to obtain sunlight.

nutrient loading:

Discharging of nutrients from the watershed (basin) into a receiving water body (lake, stream, wetland); expressed usually as mass per unit area per unit time (kg/ha/yr or lbs/acre/year.

TOP

O

oligotrophic:

Very unproductive; lakes low in nutrients and algae, usually very transparent with abundant hypolimnetic oxygen if stratified.

omnivorous:

Capable of eating plants, fungi and animals.

Ordinary High Water Level (OHW):

The ordinary high water level (OHW) is a reference point that defines the DNR's regulatory authority over development projects that are proposed to alter the course, current, or cross section of public waters and public waters wetlands. For lakes and wetlands, the OHW is the highest water level that has been maintained for a sufficient period of time to leave evidence upon the landscape. The OHW is commonly that point where the natural vegetation changes from predominately aquatic to predominantly terrestrial. For watercourses (rivers and streams), the OHW is the elevation of the top of the bank of the channel. For reservoirs and flowages, the OHW is the operating elevation of the normal summer pool. The OHW is also used by local units of government as a reference point from which to determine structure setbacks from water bodies and watercourses.

organic:

Substances which contain carbon atoms and carbon-carbon bonds.

outfall:

The point of discharge from a river, pipe, drain, etc. to a receiving body of water.

outflow:

Water flowing out of a lake.

outliers:

Data points that lie outside of the normal range of data. Ideally, outliers must be determined by a statistical test before they can be removed from a data set.

oxygen:

An odorless, colorless gas; combines to form water; essential for aerobic respiration.

oxygen solubility:

The ability of oxygen gas to dissolve into water.

TOP

P

parameter:

Whatever it is you measure; a particular physical, chemical, or biological property that is being measured.

partial pressure:

The pressure exhibited by a single gas in a gas mixture.

patch:

a discrete area differing in appearance from its surroundings. Patches can occur at different scales, e.g., patches of different land cover, or patches of different algal communities growing in a stream.

peak discharge:

The greatest volume of stream flow occurring during a storm event.

Performance Standard:

An established amount or limit of a specified pollutant that can be discharged from a land-use activity or BMP.

periphyton:

Attached algae; the green slime that attaches shoreline and bottom vegetation and the brown stuff attached to rock surfaces.

Petri dish:

A shallow, round glass dish + lid used for culturing microorganisms.

pH

A measure of the concentration of hydrogen ions.

pH Scale:

A scale used to determine the alkaline or acidic nature of a substance. The scale ranges from 1-14 with 1 being the most acidic and 14 the most basic. Pure water is neutral with a pH of 7.

phosphorus:

Key nutrient influencing plant growth in lakes. Soluble reactive phosphorus (PO_4^{-3}) is the amount of phosphorus in solution that is available to plants. Total phosphorus includes the amount of phosphorus in solution (reactive) and in particulate form.

photosynthesis:

The process by which green plants convert carbon dioxide (CO_2) dissolved in water to sugars and oxygen using sunlight for energy. Photosynthesis is essential in producing a lake's food base, and is an important source of oxygen for many lakes.

photosynthesizers:

Organisms that produce their energy via phtosynthesis.

phytoplankton:

Microscopic floating plants, mainly algae, that live suspended in bodies of water and that drift about because they cannot move by themselves or because they are too small or too weak to swim effectively against a current.

planktivores:

Animals that eat plankton; usually refers to fish that feed on zooplankton but can also refer to fish that graze on algae; includes invertebrate predators, such as the phantom midge.

polarity:

An unsymmetrical distribution of electron density found in a covalent bond.

polar gas:

A gas which is made up of molecules that have electrically charged areas (poles).

polar molecule:

A molecule in which one structural end (an atom or atoms) possesses a slight negative charge and another structural end possesses a slight positive charge but the charges do not cancel one another out but rather create two separate poles.

polluted runoff:

Rainwater or snowmelt that picks up pollutants and sediments as it runs off roads, highways, parking lots, lawns, agricultural lands, logging areas, mining sites, septic systems, and other land-use activities that can generate pollutants.

pools:

the deeper, often wider areas of a stream that typically have lower water-flow velocities. Sediments are most likely to settle out and collect in a pool. Depositional zone.

ppb:

Part-per-billion; equivalent to a microgram per liter (ug/l).

ppm:

Part-per-million; equivalent to a milligram per liter (mg/l).

predator:

a macroinvertebrate type of feeding behavior characterized by the organism eating other organisms.

pressure (p):

The force exerted per unit area.

primary consumers:

First level of consumers according to the ecological pyramid concept; organisms that eat herbivorous grazers.

primary producers:

Organisms that convert co_2 to biomass. Usually refers to photosynthesizers, but also includes the chemosynthetic bacteria that use chemical instead of light energy to **fix** co_2 to biomass.

primary productivity:

The productivity of the photosynthesizers at the base of the food chain in ecosystems. This refers to the yield of new biomass (plant) growth during a specified time period. The entire year's accumulation is termed annual production. In the open water of lakes it is typically estimated by measured growth rates of phytoplankton (algae), either via O_2 accumulation in light relative to dark bottles of lake water or by the uptake of added radioactive carbon dioxide in sealed bottles of lake water.

productivity:

The time rate of production of biomass for a given group of organisms; essentially the net growth rate of organisms.

profile:

A vertical, depth by depth characterization of a water column, usually at the deepest part of a lake.

TOP

Q

TOP

R

radiation:

The movement of energy through any medium via heat, light or radio waves.

radioisotopes:

Radioactive isotopes; radioactive forms of carbon, phosphorus, and other nutrients are used to measure rates of their absorption into biological communities; radioisotopes derived from fallout from atmospheric nuclear weapons testing are used to date layers of lake sediments

respiration:

The metabolic process by which organic carbon molecules are oxidized to carbon dioxide and water with a net release of energy. Aerobic respiration requires, and therefore consumes, molecular oxygen (algae, weeds, zooplankton, benthic invertebrates, fish, many bacteria, people). Certain bacteria can use nitrate in place of oxygen (denitrifiers) or sulfate (sulfate reducers), but only under anaerobic (anoxic) conditions - typically present only in the sediments or in the hypolimnion after prolonged oxygen depletion has occurred.

riparian zone:

The strip of land adjacent to a natural water course such as a river or stream. Often supports vegetation that provides the best fish habitat values when growing large enough to overhang the bank.

runoff:

Water from rainfall, snowmelt, or otherwise discharged that flows across the ground surface instead of infiltrating the ground.

TOP

S

sanitary sewer system:

Underground pipes that carry only domestic or industrial wastewater to a sewage treatment plant or receiving water.

saturation:

The point at which a substance has the maximum amount of another substance at a given temperature and pressure; also see supersaturation.

scraper:

a macroinvertebrate method of feeding in which the organism scrapes algae off surfaces for food.

secchi disk:

A disk with a 4-6 inch radius that is divided into 4 equal quadrates of alternating black and white colors. It is lowered into a section of shaded water until it can no longer be seen and then lifted back up until it can be seen once again. A small secchi disk is used inside transparency tubes used for measuring clarity in streamwater. Averaging the two depths gives the clarity of the water; see also clarity.

secondary consumers:

Consumers such as plankton eating fish or predaceous zooplankton that eat other zooplankton.

sedimentation:

The removal, transport, and deposition of detached soil particles by flowing water or wind. Accumulated organic and inorganic matter on the lake bottom. Sediment includes decaying algae and weeds, precipitated calcium carbonate (marl), and soil and organic matter eroded from the lake's watershed.

SSO (separate sewer overflow):

Wastewater entering sanitary sewers may be so great, because of blockage, a lack of capacity, inflow and infiltration, or other reasons, that the collection system or sewage treatment plant cannot handle the increased flow. As a result, untreated sewage empties directly into receiving waters, often from manholes or up through sewer connections.

sewage sludge:

The solid portion of sewage that contains organic matter, and a whole community of algae, fungi, bacteria and protozoans that consume it. The terms Biosolids, Sludge, and sewage sludge can be used interchangeably.

shoreline:

The zone where lake and land meet. Shorelands are defined as the lands 1000 ft from the ordinary high water level.

shredders:

a macroinvertebrate method of feeding in which the organism shreds up plant material, usually leaves, for food.

silt:

fine inorganic sediments 2 - 62.5 µm, not gritty.

skater:

a macroinvertebrate who moves by skating on the surface tension of water

solubility:

The ability of a substance to dissolve into another; also see gas solubility.

solute:

A substance which can be dissolved into another substance.

solution:

A homogenous mixture of two substances.

solvent:

A substance which has the ability to dissolve another; also see Universal Solvent.

spate:

rapidly occurring floods of short duration.

specific conductance:

A measure of the ability of water to conduct an electrical current as measured using a 1-cm cell and expressed in units of electrical conductance (EC), i.e. siemans (uS or mS) at 25 C.

specific heat:

The amount of heat required to raise the temperature of one gram of substance one degree Celsius.

stable isotopes:

different forms of naturally occurring elements that differ in weight. For example 15N and 14N both occur naturally, but 14N is much more common. Heavier forms of an element often have a lesser probability of participating in a reaction, so for example, the process of denitrification leads to a build-up of 15N in the sediment. The ratios of different stable isotopes are used as an indicator of sources of food or trophic level in a food chain. Unlike radioisotopes, these isotopes do not undergo radioactive decay, hence they are called "stable".

stormwater discharge:

Precipitation and snowmelt runoff from roadways, parking lots, roof drains that is collected in gutters and drains; a major source of nonpoint source pollution to water bodies and a major headache to sewage treatment plants in municipalities where the stormwater is combined with the flow of domestic wastewater (sewage) before entering the wastewater treatment plant.

storm sewer system:

A system of pipes and channels that carry stormwater runoff from the surfaces of building, paved surfaces, and the land to discharge areas.

stormwater:

Water derived from a storm event or conveyed through a storm sewer system.

stormwater utility:

A utility established to generate a dedicated source of funding for stormwater pollution prevention activities where users pay a fee based on land-use and contribution of runoff to the stormwater system.

stratification:

An effect where a substance or material is broken into distinct horizontal layers due to different characteristics such as density or temperature.

stratified:

Separated into distinct layers.

stratigraphic:

Relating to stratigraphy, the branch of geology which treats the formation, composition, sequence and correlation of the layered rocks as parts of the earth's crust.

substrate:

Attachment surface or bottom material in which organisms can attach or live-within; such as rock substrate or sand or muck substrate or woody debris or living macrophytes.

surface water:

Water that flows across the land surface, in channels, or is contained in depressions on the land surface (e.g. runoff, ponds, lakes, rivers, and streams).

surface tension:

A phenomenon caused by a strong attraction towards the interior of the liquid action on liquid molecules in or near the surface in such a way to reduce the surface area.

supersaturation:

When a substance is more highly concentrated (more saturated) in another substance than is normally possible under normal temperature and pressure.

suspended sediment (SS or Total SS[TSS]):

Very small particles which remain distributed throughout the water column due to turbulent mixing exceeding gravitational sinking; also see turbidity.

suspension:

A heterogeneous mixture in which solute-like particles settle out of solvent-like phase some time after their introduction.

swale:

A natural or human-made open depression or wide, shallow ditch that intermittently contains or conveys runoff. Can be used as a BMP to detain and filter runoff.

TOP

T

TDS:

Total dissolved salts or solids in a volume of water; usually in mg/l; estimated by EC (electrical conductivity).

temperate:

Refers to lakes located in a climate where the summers are warm and the winters moderately cold. The Temperate Zone is between the Tropic of Cancer and the Arctic Circle.

temperature:

A measure of whether a substance is hot or cold.

tertiary consumers:

Larger consumers in the fourth trophic level like adult northern pike, ospreys and humans that eat fish.

thermal stratification:

Existence of a turbulently mixed layer of warm water (epilimnion) overlying a colder mass of relatively stagnant water (hypolimnion) in a water body due to cold water being denser than warm water coupled with the damping effect of water depth on the intensity of wind mixing.

thermocline:

The depth at which the temperature gradient is steepest during the summer; usually this gradient must be at least 1^0C per meter of depth.

topography:

Configuration of physical surface of land; includes relief imprints and locations of all man-made and natural features.

Total Dissolved Solids (TDS):

The amount of dissolved substances, such as salts or minerals, in water remaining after evaporating the water and weighing the residue.

Total Maximum Daily Load (TMDL):

A TMDL or Total Maximum Daily Load is a calculation of the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards, and an allocation of that amount to the pollutant's sources.
Water quality standards are set by States, Territories, and Tribes. They identify the uses for each waterbody, for example, drinking water supply, contact recreation (swimming), and aquatic life support (fishing), and the scientific criteria to support that use.
A TMDL is the sum of the allowable loads of a single pollutant from all contributing point and nonpoint sources. The calculation must include a margin of safety to ensure that the waterbody can be used for the purposes the State has designated. The calculation must also account for seasonal variation in water quality.
The Clean Water Act, section 303, establishes the water quality standards and TMDL programs.
USEPA 12/2002 (http://www.epa.gov/owow/tmdl/intro.html)

tributary:

Feeder stream.

trophic state:

Eutrophication is the process by which lakes are enriched with nutrients, increasing the production of rooted aquatic plants and algae. The extent to which this process has occurred is reflected in a lake's trophic classification or state: oligotrophic (nutrient poor), mesotrophic (moderately productive), and eutrophic (very productive and fertile).

trophic webs:

Conceptual model of the interconnections of species of organisms according to their different feeding groups.

turbidity:

Degree to which light is blocked because water is muddy or cloudy. See also clarity.

turnover:

Fall cooling and spring warming of surface water act to make density uniform throughout the water column. This allows wind and wave action to mix the entire lake. Mixing allows bottom waters to contact the atmosphere, raising the water's oxygen content. However, warming may occur too rapidly in the spring for mixing to be effective, especially in small sheltered kettle lakes.

TOP

U

universal solvent:

A substance that has the ability to dissolve both bases and acids, such as water.

TOP

V

vertical extinction coefficient:

A measure of the ability of a particular water sample to exponentially attenuate(decrease) light shining on it. It is the constant **k** in the equation i (z) = i(0)* exp(-k*z) where z is any depth in meters, and "**exp**" refers to the base "**e" the** for the exponential.

TOP

W

water column:

A conceptual column of water from surface to bottom sediments.

water density:

The ratio of water's mass to its volume; water is the most dense at four degrees Celsius.

watershed:

All land and water areas that drain toward a river or lake; also called Drainage Basin or Water Basin.

watershed storage:

the fraction of watershed area covered by lakes and wetlands, i.e., capable of storing runoff following rainfall events and reducing peak stream flows.

weathering:

The mechanical and chemical breakdown and dissolution of rocks.

wet deposition:

Precipation of all kinds.

wet detention ponds:

A BMP consisting of a permanent pool of water designed to treat runoff by detaining water long enough for settling, filtering, and biological uptake. Wet ponds are also often designed to have an aesthetic or recreational value.

wetlands:

"lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water... Wetlands must have one or more of the following three attributes:
1. at least periodically, the land supports predominantly hydrophytes,
2. the substrate is predominantly undrained hydric soil, and
3. the substrate is nonsoil and is saturated with water or covered by shallow water at some time during the growing season of each year."
(Cowardin et al. 1979).

Winkler Titration Kit:

A "wet" chemistry analytical procedure used to determine the oxygen content of water via the Winkler reaction.

winterkill:

A sudden and dramatic mass fish death caused by insufficient oxygen in a frozen lake.

TOP

X

TOP

Y

TOP

Z

zooplankton:

The animal portion of the living particles in water that freely float in open water, eat bacteria, algae, detritus and sometimes other zooplankton and are in turn eaten by planktivorous fish.

TOP

Conversion Tables

LENGTH		
Metric	**Metric**	**English**
Kilometer	1,000 meters	0.621 miles
Meter	1 meters	39.4 inches 3.28 feet
Centimeter	0.01 meters	0.394 inches
Millimeter	0.001 meters	0.0394 inches 39.4 mils
Micron	0.001 millimeters	0.0000394 inches 0.0394 mils
Angstrom	0.1 microns	0.00000394 inches

- top -

AREA		
Metric	**Metric**	**English**
Hectare (ha)	10,000 m^2	2.471 acres
Section	259 hectares	640 acres 1 $mile^2$

- top -

VOLUME		
Metric	**Metric**	**United States**
1,000 liters	1 cubic meter	1.308 cubic yard
1000 milliliters	1 liter	1.057 quart
1 milliliter (mL)	1 cubic centimeter (cc)	----

- top -

WEIGHT			
Metric	**Metric**	**Comparable Water Volume**	**English (U.S.)**
Metric ton (tonne)	1,000 kilograms	1 cubic meter	2205 lb = 2.2 tons
Kilogram	1,000 grams	1 liter	2.205 lb
Gram	1000 milligrams	1 mL or cc	--
Milligram	1000 micrograms	1 uL (microliter)	--

- top -

CONCENTRATIONS	
1 gram/Liter	%o (part per thousand)
1 milligram/Liter	1 ppm (part per million)
1 microgram/Liter	1 ppb (part per billion)
1 nanogram/Liter	1ppt (part per trillion)