

Glossary

Absorption involves the holding of a substance within the pores of a solid (e.g., a sponge absorbs water).

Acid precipitation - Precipitation (rain, snow, fog) that has a lower pH (and is therefore more acidic) than unpolluted precipitation. The acids are formed when sulphur and nitrogen oxides react with water in the atmosphere.

Acid rock drainage (ARD) - ARD (H_2SO_4) is the product formed by the atmospheric oxidation of the iron-sulphur minerals pyrite (FeS_2) and pyrrhotite (FeS). These relatively common minerals oxidize (or combine with water, oxygen and carbon dioxide) in the presence of bacteria (*Thiobacillus ferrooxidans*) and any other products produced because of these oxidation reactions. ARD neutralization occurs when the pH of ARD is increased by being in contact with basic minerals such as calcite ($CaCO_3$) or dolomite ($CaMg(CO_3)_2$). ARD will also increase in a water body with an elevated pH (e.g., saltwater). Positively charged metallic cations will react to eventually form hydroxides as precipitates.

Active layer - The zone above the permafrost table that experiences seasonal freezing and thawing.

Adsorption is the process by which a substance (gas, liquid or solid) adheres or sticks to the surface of a solid (e.g., PCBs adsorbed to sediment).

Amphipod - A small crustacean of the order Amphipoda, such as the beach flea, which has a laterally compressed body with no carapace.

Analyte - The substance you are analysing in an experiment. For example, if you are carrying out an experiment to determine the amount of calcium in tap water, calcium is your analyte.

Annual hydrograph – a graph that shows the discharge of the river system over a year.

Anoxia - The condition of being without dissolved oxygen.

Base flow – The continuous low flow in a stream or river. The volume of flow in a stream channel that does not result from surface runoff from precipitation, snowmelt or a spring. Groundwater discharge is the source of base flow in most places.

Base metal - Any alloy or pure metal of relatively low value. The term “base” either refers to the metal as basic or low-value, or to the practice of using a higher value metal, such as gold or silver, to coat or “plate” over a base of the lower value metal. Common base metals include brass, bronze, and copper.

Baseline conditions - The state of water quality (usually defined in chemical and biological terms) before a new activity occurs in the watershed that will affect water quality (e.g., mining).

Basin - Geographic land area draining into a lake or river. Also referred to as a watershed.

Bathymetry - The measurement of the depth of bodies of water.





Bed-load sediments - Sediments found at the bottom of a stream in a streambed.

Benthic invertebrates - Invertebrate animals living in the sediment at the bottom of a body of water.

Bioaccumulation - A chemical substance is said to bioaccumulate in an organism (including plants and animals) when it builds up in the tissues to higher levels than the chemical's concentration in the environment. Bioaccumulation occurs when organisms take up and store chemical components at a rate faster than they can be broken down (metabolized) or excreted. The potential of a substance to bioaccumulate is directly related to its potential toxicity. This potential is considered in the regulation of chemicals.

Biofilm - A collection of microorganisms attached to a surface, surrounded by the slime they produce.

Biogeochemical cycling - The cycling of materials through ecosystems as a result of various biological, chemical and geological processes.

Biomagnification - The increasing concentration of toxic substances in the body tissues of animals within each successive link of the food chain. For example, carnivores (high in the food chain) will contain more of a particular toxic substance than animals that eat plankton (low in the food chain). *Bioaccumulation* does not always result in biomagnification.

Biomass - The weight of a living organism or assemblage of organisms.

Biota - The animal and plant life of a region or ecosystem.

Brackish water - Brackish water contains more salts than freshwater but less than the open sea. Brackish water environments are fluctuating environments. The salinity varies depending on the tide, the amount of freshwater entering from rivers or as rain, and the rate of evaporation.

Brine - Water saturated with or containing large amounts of a salt, especially sodium chloride.

Carrying capacity - The maximum population of a particular species that a given habitat can support over a given time.

Chain of custody - A system to guarantee the identity and integrity of a specimen (e.g., water sample) from collection through to reporting of the test results.

Constituent - The physical, chemical or biological component of water quality that is of interest in the water sample(s).

Control basin - A water basin that is believed to have the same baseline conditions as the basin under study.

Copepods - Numerous very small marine and freshwater crustaceans of the subclass Copepoda, which have an elongated body and a forked tail.

Cross contamination - The spreading of contaminants such as trace metals, nutrients, germs, bacteria and/or disease by carrying them from one sample to another.

Cryo-concentration - The concentration of substances in a solution as a result of the lowering of temperature.

Cuvette - A small often transparent laboratory tube.

DDT (Dichlorodiphenyltrichloroethane) - A colourless crystalline compound made by the reaction of trichloromethanal with chlorobenzene. The compound is stable, accumulates in the soil, and concentrates in fatty tissue, reaching dangerous levels in carnivores high in the food chain.

Depth-integrated sample - A composite sample made up of water from different depths. It differs from a grab sample which is taken from only one depth. When taking a depth-integrated sample, the bottle should be lowered close to the bottom before it is raised. It should just become completely filled as it reaches the surface.

Discharge - The volume of water that passes a given point in a given period of time. Also referred to as water flow or water quantity. Discharge is usually indicated by the letter "Q" in hydrologic equations and is measured in m³/sec. A simple hydrologic budget equation is represented as: $Q = P - S - E$, where P = precipitation, S = long-term storage (e.g., glaciers, lakes) and E = evaporation.

Dissolved oxygen - The concentration of free (not chemically combined) molecular oxygen dissolved in water (DO or O₂). Much of the dissolved oxygen in water is provided by photosynthesis.

Ecosystem - A community of interacting organisms together with the chemical and physical factors that make up their environment.

Effluent – Generally refers to wastes, treated or untreated, discharged into surface waters.

Epilimnion - The upper, wind-mixed layer of a thermally stratified lake. This water is turbulently mixed throughout at least some portion of the day and, because of its exposure, can freely exchange dissolved gases (such as O₂ and CO₂) with the atmosphere.

Eutrophic - A very biologically productive water body due to relatively high rates of nutrient input. Conditions can be favourable for high fish production, but oxygen can become depleted if the demand by aquatic organisms becomes too great. There is also a risk of loss of oxygen in deeper water due to oxygen consumption by decaying vegetation.

Event hydrograph – a graph used to describe the way a watercourse responds to either snowmelt or a storm.

Fast-ice - Ice anchored to the sea floor and/or the shore.

Field replicates – Additional samples collected in the same place, at the same time (one after the other), using the same sampling and filtration procedures for each replicate. It does not mean the physical splitting of one sample into separate portions. Field replicates are used to determine how precise the sampling and laboratory analysis is. They also help to figure out contamination or analytical problems. Collecting three or four samples is better than collecting two.

First-order stream - The smallest unbranched tributary in the headwaters of a river system.





Flaw lead - A lead is any fracture or passageway through sea ice. Leads are generally linear in shape. A flaw lead is a lead between the fast ice and the pack ice.

Food web/food chain - Complex network of many interconnected feeding relationships that creates many pathways for the transfer of energy through a biological community.

Frazil ice - Small ice crystals formed in the water column that may adhere to each other to form larger masses.

Freshet - The increased flow of water over a relatively short period of time.

Gossan - The familiar rust-colored stain in rock associated with ARD. At pHs higher than 3.0, ferric iron reacts with oxide (O_2^-) hydroxide ions (OH^-) to form ferric hydroxide, $Fe(OH)_3$, which precipitates as gossan.

Gross primary productivity - The total rate of photosynthetic production of biomass.

Groundwater - Water that occupies pores and crevices in rock and soil, below the ground surface.

Halocline - The location where there is a marked change in salinity. The halocline sharply separates regions differing in salinity. Similar to a thermocline but a function of salt content as opposed to temperature differences.

HCH (Hexachlorocyclohexane) - This chemical has been produced since the Second World War. It is one of the few organochlorine insecticides used on a large scale. Its compounds vaporize easily and are transported to the Arctic through the air.

Hydrograph - A graph showing river discharge over time. (See also *annual* and *event hydrograph*.)

Hydrologic cycle - The continuous circulation of water from the oceans and land to the atmosphere and back again.

Hydrology - The study of water's properties, distribution and circulation on Earth. The study of moving water found in rivers, open channels and runoff moving across open land surfaces.

Hypolimnion - The lower and most dense layer of a stratified lake. It is typically the coldest layer in the summer and the warmest in the winter. It is isolated from wind mixing and typically too dark for much plant photosynthesis to occur.

In situ - An expression meaning "in place". Some parameters need to be measured 'in place' because their readings can be easily changed or influenced if samples are removed from the site. A good example of this is water temperature.

Infiltrate - The entry of water into the ground's surface due to the combined influence of gravity and capillary forces.

Intra-permafrost water - Drainage water within aquifers in open, lateral and isolated talik zones within permafrost which is not subject to annual freezing, has relatively constant extent, and is primarily affected by long-term temperature changes.

Laboratory blanks – Deionized and demineralized samples of water submitted to the lab for analysis along with the genuine field samples. The lab does not know which is which. Lab blanks are used as a way to identify errors in the lab's procedures, such as bottle washing and sample handling. If the lab blanks are handled properly, all analytes should be reported as zero or non-detectable.

Lake overturn - The circulation of water throughout the entire water column. Overturn generally occurs both in spring and fall when the temperature in a lake becomes the same at all depths.

Leachate - Material removed from a medium by the action of a percolating liquid. Contaminated water flowing out of a sewage lagoon or other source of pollution to the water.

Macrophytes - Higher aquatic plants, having roots and differentiated tissues.

Mass balance - A mathematical relationship that shows the amount of a substance already in a body of water plus the amount entering it must equal the amount coming out plus that which stays in the system within a specified time period.

Meroplankton - Meroplankton are organisms which are part of the plankton for only part of their life cycle, usually an early, larval stage. As adults the meroplankton are benthos (including intertidal organisms) or nekton (mid-water).

Mesotrophic - A state between oligotrophic and eutrophic. Such a lake is moderately productive and considered to be moderately fertile in terms of biomass of algae, plants, and fish.

Metazoans - Multicellular animals which have cells differentiated into tissues and organs and usually a digestive cavity and nervous system. Examples of metazoans include **tubellarians** (free-living flatworms), **crustaceans** (aquatic animals with an exoskeleton, distinct body segments with a head, thorax and abdomen, segmented appendages and antennae) and **rotifers** (very small aquatic multicellular organisms having a ciliated wheel-like organ for feeding and locomotion that form part of the plankton).

Microsiemens - A unit expressing the amount of electrical conductivity of a solution.

Natural water quality - The natural state or quality of the water (usually defined in chemical and biological terms) before any changes caused by human activities.

Neap tides - Lower than normal tidal ranges created when the gravitational pulls of the moon and sun are in different directions.

Net primary productivity - Gross primary productivity minus the respiration rate.

Non-point source – A source of pollution that is dispersed and often difficult to identify.

Oligotrophic - Very unproductive water bodies such as lakes low in nutrients and algae. Although generally considered to be young lakes, some oligotrophic lakes will never progress past this stage until environmental conditions allow increased productivity.





One atmosphere - The pressure of the atmosphere at sea level is one atmosphere of pressure or 760 mmHg or 101,325 Pa. The actual atmospheric pressure at a given location varies depending upon altitude and local weather conditions.

Ozone depletion - A decrease in the concentration of ozone (O₃) in the earth's upper atmosphere. Ozone depletion can cause thinning or holes in the ozone layer.

PCBs (Polychlorinated Biphenyls) - A group of toxic chemicals used for a variety of purposes including electrical applications, carbonless copy paper, adhesives, hydraulic fluids, microscope emersion oils, and caulking compounds. PCBs are also produced in certain combustion processes. PCBs are extremely persistent in the environment because they are very stable, non-reactive, and highly heat resistant. Chronic exposure to PCBs is believed to cause liver damage. These chemicals are known to bio-accumulate in fatty tissues. PCB use and sale was banned in 1979 with the passage of the *Toxic Substances Control Act*.

Percolate - Movement of water through pores in soil or rocks to groundwater or saturated zone.

Permafrost - A soil or rock layer that has been frozen for at least two years.

pH - The pH indicates the strength of an acid or basic solution.

Photosynthesize - The process by which the energy of sunlight is captured by organisms, especially green plants, and used to manufacture organic tissue by combining the energy with carbon dioxide and water. Photosynthesis is essential in producing a lake's food base, and is an important source of oxygen for many lakes.

Phytoplankton - Microscopic or small floating plants suspended in the water column of aquatic ecosystems, especially lakes.

Plankton - The collection of small or microscopic organisms, including algae and protozoans that float or drift in great numbers in fresh or salt water, especially at or near the surface, and serve as food for fish and other larger organisms.

Plume - A definable area of water that has properties that differ from the surrounding water. Most often, the difference is in the density. As a result, the water in the plume doesn't mix quickly or very much with the surrounding water.

Point source - A single, identifiable source of a pollutant.

Polynyas - Areas of open water surrounded by sea ice that are caused by currents, tidal fluctuations, wind, upwellings, or a combination of these factors.

Precious metal - A metal that is relatively scarce, highly corrosion-resistant, and valuable, including, silver, platinum, and gold.

Prescribed burning - This is a technique used for management of forests, shrublands, and grasslands in which vegetation is burned on purpose to get rid of flammable materials that build up and to encourage specific types of vegetation to grow.

Pressure ridge - A pressure ridge is formed when sea ice is forced against land or another pack of sea ice.

Primary productivity - The rate at which new plant biomass is formed by photosynthesis. (See also *gross primary productivity* and *net primary productivity*.)

Protozoans - Small, one-celled animals including amoebae, ciliates, and flagellants.

Quantifiable - Capable of being quantified or measured.

Reagent - A substance capable of producing a reaction with another, especially when used to detect the presence of other bodies.

Recharge – When low groundwater supplies are filled to previous (higher) levels, they are said to be recharged.

Reconnaissance survey - The initial field inspection or exploration of an area. It is also sometimes called an orientation survey. This survey is conducted to try out and examine various parts of the planned sampling program.

Replicable - Capable of being repeated. If a program is fully replicable, someone else could repeat any aspect of it at another time.

Representative samples – Samples that closely reflect the actual composition or make-up of the body of water being studied.

Residence time - How long the water stays in the lake. Usually, this is calculated as the lake volume in cubic metres divided by the inflow in cubic metres per second. This figure determines the length of time that it theoretically takes for all water to be replaced in the lake. This can range from days to years and is referred to as the theoretical residence time.

Salinity - Salinity is the measure of the quantity of dissolved salts in seawater.

Salinity-stratified - Two or more horizontal layers formed in the water due to differing salt concentrations. Layers that are higher in salt concentration will lie at a lower depth as they have a higher density, which makes them heavier.

Sievert (Sv) - the unit of radiation dose. It replaces the old unit, a “rem”, where 1 rem=0.01 Sv. One milli-Sievert (mSv) = Sv/1000.

Sink - A compartment or place in the environment where something is stored, for all intents and purposes permanently.

Spring tides – Maximum high and low tide levels created when the gravitational pulls of the sun and moon work together because they pull in the same direction.

Stratification -The separation of lake water into distinct horizontal layers.





Stressor – Something that causes a negative effect on any part of an ecosystem. The stress may be natural (e.g., wind) or caused by humans.

Sub-permafrost water - Drainage water within aquifers below the permafrost, having temperatures equal to, or higher than, zero degrees Celsius.

Supra-permafrost water - Drainage water within aquifers in the active layer that freezes seasonally.

Talik - The unfrozen area below lakes and large rivers.

Thermal stratification - Layering caused by the effects of temperature differences.

Thermocline - The boundary between warm and cold water in a lake.

Thermodynamic equilibrium - This occurs when the amount of heat leaving a system equals the amount of heat absorbed by the system. As a result, the overall heat remains constant with time.

Thermohaline circulation - Throughout the world the density of seawater is controlled by its temperature (thermo) and its salinity (haline). The difference in water densities resulting from these temperature and salinity variations creates global oceanic circulation patterns. This thermohaline circulation brings warm salty water from tropical and subtropical areas towards the poles where the water cools and sinks to great depths.

Tidal range - The maximum distance between daily high and low tides is called the tidal range.

Total suspended solids - Solids suspended in water that can be removed by filtration.

Toxicological effects - The adverse effects of poisons or toxic substances, which are capable of negatively influencing the health of living organisms, usually by chemical means.

Trace metal concentration:

Particulate - The total metal concentration of particulates filtered from water samples that will not pass through a 0.45mm pore size filter.

Dissolved – The total concentration remaining in the water after it has been filtered as above.

Total – The sum of the particulate and dissolved fractions of metals as described above. It is normally measured as the concentration in an unfiltered water sample.

Extractable – The amount of metals detected when acid is used to extract the metals from the particulates combined with the dissolved fraction. It is often considered to be the bio-available fraction.

Travel blanks – Deionized samples of water used to identify contamination or errors in sample collection. Travel blanks will show whether samples have been altered by handling or some other process in the field. They are submitted to the lab for analysis along with the genuine field samples. The lab testing the blank does not know what it is.

Travel spiked blanks – Samples submitted to the lab for analysis that contain a known added concentration of the indicator being measured. The added amount should increase the concentration in the samples by a predictable amount. They are used to test the accuracy of the lab's analysis. Spiked blanks are not routinely used in the field, though they are routinely used in the labs.

Trophic state - The total weight of living biological material in a water body at a specific location and time. The degree to which eutrophication has taken place. Most northern lakes are oligotrophic.

Turbulence - The movement of water in an erratic fashion, often in swirling, whirlpool-like eddies. Gases such as oxygen and waters that would not normally mix due to different densities are mixed as a result of turbulence. Turbulence causes milkiness of the water as sediments from the bottom surface of the stream or river are caught up in the flow. This milkiness is measured and called turbidity.

Ultra-oligotrophic - Nutrient levels lower than in oligotrophic lakes. These conditions are not common but do exist in some northern lakes.

Upwelling - Upwelling occurs when the surface waters are displaced and deeper waters move in to take their place. Bottom water that is colder and more nutrient-rich will flow upward to replace surface water pushed away by winds.

Volatile - A compound that is easy to vaporize, even at a relatively low temperature, is said to be volatile.

Water table - The top of the underground zone filled or saturated with water is called the water table. It can be less than half a metre below the ground's surface or it may be hundreds of metres down, and may rise or fall depending on many factors. Heavy rains or melting snow may cause the water table to rise, or an extended period of dry weather may cause the water table to fall.

Way-point - A specific position along a route that is described according to a geographic coordinate system such as latitude and longitude.

Zooplankton - Microscopic animals living unattached in aquatic ecosystems.



