

# 12. Glossary



## Units of measurement

µm	Micrometre (also known as a micron) → one thousandth of a millimetre (0.001 mm)
µg	Microgram → one thousandth of a gram (0.001 g)
mL	Millilitre → one thousandth of a litre (0.001 L)
ML	Megalitre → one million litres (1 000 000 L)
µS	Microsiemen

Indicator		Unit
N	Nitrogen (NO <sub>3</sub> , NO <sub>x</sub> , TN)	Milligrams per litre (mg/L)
TN	Total nitrogen	Milligrams per litre (mg/L)
O <sub>2</sub>	Oxygen	
P	Phosphorus (phosphates are measured)	Milligrams per litre (mg/L TRP; mg/L FRP; mg/L TP)
Discharge	Volume of water in a given time period	Cubic metres per second (m <sup>3</sup> /s) or megalitres per day (ML/day) or any other measure of volume/time
Dissolved oxygen	Oxygen in the water	Milligrams per litre (mg/L) or per cent (%) saturation (more useful for comparing samples where salinity and water temperature vary)
pH	Acidity or alkalinity (on a scale of 0.1 to 14)	pH units (> 7 is alkaline; < 7 is acidic; 7 is neutral)
Salinity	Electrical conductivity (EC) expressed at a standardised temperature (25 °C), or as a direct reading	Microsiemens per centimetre at 25 degrees Celsius (µS/cm 25 °C) or microsiemens per centimetre (µS/cm) or milligrams per litre (mg/L)
Stream cross-section	Area of cross-section	Square metres (m <sup>2</sup> )
Velocity	Distance over time	Metres per second (m/s)
TSS	Total suspended solids—weight of solids for a volume of water	Milligrams per litre (mg/L)
Transparency	Visual range of water over a distance (depth)	Millimetres (mm)
Turbidity	Light penetration through water	Nephelometric turbidity units (NTU)
Sediment load	TSS × discharge rates	Milligrams per litre (mg/L)



## Definitions

### A

**Abundance:** Presence in relatively large numbers; a measure of macro-invertebrate communities.

**Accuracy:** A measure of the difference between the measured result and the 'true' or expected value.

**Acid:** A substance with more hydrogen ( $H^+$ ) ions than hydroxide ( $OH^-$ ) ions, with a pH value of less than 7.

**Acidity:** A measure of the number of free hydrogen ions ( $H^+$ ) in a solution that can chemically react with other substances.

**Aerobic:** Living or occurring in the presence of oxygen; requiring oxygen.

**Aggradation:** The deposition of sediments by the action of water, wind or glaciers; in waterways, the deposition of sediments eroded from upstream onto the bank and bed of a downstream area (for example, to form bars) by the flow of water.

**Algae:** A collective term referring to several groups of simple photosynthetic plants, mostly microscopic, lacking roots, stems and leaves. Many species exist as single cells, some form simple filaments or colonies and others exist as more complex structures, like the larger seaweeds.

**Algal bloom:** Extensive growth of algae in or on a body of water. Blooms may occur from excess nutrients in water bodies, or from particular climatic conditions.

**Aliquot:** Portion of a total amount of a solution.

**Alkaline:** Containing soluble mineral salts with a pH value higher than 7. Alkaline waters are considered to be hard water.

**Alkalinity:** A measure of the negative ions that are available to react with and neutralise free hydrogen ions (such as in acidic solutions). Some of the most common of these include hydroxide ( $OH^-$ ), sulfate ( $SO_4$ ), phosphate ( $PO_4$ ), bicarbonate ( $HCO_3$ ) and carbonate ( $CO_3$ ).

**Ambient monitoring:** Ongoing monitoring of current conditions to establish baseline or background data that can be used to identify changes or trends in conditions.

**Ammonia ( $NH_3$ ):** Compound of nitrogen and hydrogen; can form  $NH_4$  (ammonium) if solution is more acidic.

**Anaerobic:** Living or occurring without oxygen.

**Analytical data:** Data with a high level of accuracy and precision with a defined low tolerable error range. Data at the analytical level is roughly comparable to the level of data quality attained by current state agency monitoring programs. Analytical data can be used to perform statistical analyses.

**Analyte:** A substance or chemical constituent that is undergoing analysis. For example, when testing for organic matter, the analyte may be ammonia.

**Anoxic:** Lacking in oxygen; at abnormally low levels of oxygen.

**AMG:** Australian Map Grid coordinates, used for accurate location reference.

**ANZECC:** Australian and New Zealand Environment and Conservation Council; provided a forum for member governments to exchange information and experience, and develop coordinated policies and standards in relation to national and international environment and conservation issues; replaced in 2001 by the Natural Resource Management Ministerial Council (NRMMC).

**Aquatic vegetation:** Plants growing in a water body; includes emergent, submerged and floating plants.

**Aquifer:** A layer of porous rock or soil that both holds water and allows this water to percolate through it.

**ARMCANZ:** Agriculture and Resource Management Council of Australia and New Zealand; peak government forum for consultation, coordination and, where appropriate, integration of action by governments on agriculture, land, and rural and urban water issues (1993–2001).



## B

**BACI design:** Before–after control–impact design; principles for the placement of monitoring sites above and below possible pollution points to identify changes in water quality attributable to certain activities.

**Backwater:** A type of channel habitat adjacent to the bank characterised by stagnant or slow-moving water. The direction of flow in a backwater is characteristically the opposite of the stream flow as obstructions and channel form cause the water to recirculate.

**Bar:** A deposit of sediments on the stream bed forming a raised area that extends above the water level.

**Base flow:** The portion of stream flow that comes from groundwater and not surface run-off.

**Baseline:** A measurement, calculation, or location used as a basis for comparison with future data; also, a type of monitoring program to establish current condition.

**Bank:** Sloping ground bordering a river, stream or lake forming the sides of the waterway channel.

**Bank, lower:** The part of a stream bank below the water mark; that is, the part of the bank that is inundated (under water) at the normal water level but is exposed at low water levels.

**Bank, upper:** The part of a stream bank above the water mark; that is, the part of the bank that is not inundated at the normal water level.

**Basin:** An area drained by a given river and its tributaries.

**Benchmark:** A standard or point of reference used for comparison.

**Billabong:** An old river meander that has become blocked off and isolated from the main channel, creating a still body of water on the flood plain; also called an oxbow lake or oxbow lagoon.

**Biomass:** The amount of living material existing at a given instant of time in a specified area or unit of volume.

**Biota:** The total group of organisms (living things) in a particular area, including plants, animals, fungi and bacteria.

**Blank:** An analyte-free solution, substituted for a sample, that is used to test the accuracy of measuring equipment; usually deionised or distilled water.

**Bloom:** An unusually large number of organisms of one or a few species, usually algae, per unit of water.

**Brackish water:** Water that is slightly salty.

**Braided channel:** A stream channel in which high levels of sediment deposition have formed bars and islands that flows must pass around; multiple flow paths within the same stream channel. Braided channels form in areas with highly mobile sediments.

**Buffer zone:** An established zone of perennial grass or other erosion-resistant vegetation that minimises run-off and erosion.

**Buffering capacity:** The ability of a water body to cope with the addition of acid ( $H^+$ ) or base ( $OH^-$ ) without changing its overall pH (see the section ‘Factors affecting pH’ in Chapter 5, page 5–42).

## C

**Calibration:** The act of checking and adjusting the settings of a measuring instrument. This is done by taking a reading of a solution with a known value (a standard solution) to see whether the instrument is reading it correctly. If not, the instrument is adjusted accordingly.

**Calibration blank:** Deionised water processed as a sample. It is the first sample analysed and is used to set the meter to 0 (or 7 for pH).

**Calibration check:** The process of confirming the accuracy of a meter by checking the readings against samples of known value. If the meter does not produce a reading for the sample within the tolerable error range, the meter should be calibrated.

**Catchment:** An area of land that is drained by a stream and its tributaries. In North America, a catchment is known as a watershed.

**Cascade:** A channel habitat consisting of a series of continuous small waterfalls or similar where the water surface is both broken and free-falling.

**Channel:** The section of a stream that contains the main flow.

**Channelisation:** The process of altering the natural channel of a watercourse by deepening, straightening, or lining the bed with cement or other materials to direct the flow of water or prevent flooding.



**Chlorophyll:** The green pigment in plants that enables them to use the energy of the sun for photosynthesis.

**Colorimeter:** An instrument used to measure the concentration of a substance dissolved or suspended in a water sample. It works by measuring the light absorbance (colour) of the water sample after specific reagents have been added, and comparing this with standards to determine how much of the substance is present. (See also **titration**.)

**Comparability:** The extent to which one piece of data can be compared with another.

**Completeness:** Relates to the total number of measurements obtained as a proportion of the number of measurements that were planned or required to be taken.

**Compliance:** A type of monitoring program that assesses whether accepted standards (for example, legal requirements for water quality) have been met.

**Conceptual model:** A mental image of a process, object or system that has been written down or drawn to show the relationships, interactions and outcomes of various elements. An example would be a diagram showing the impacts of new housing development on old farmland and surrounding waterways.

**Confounding factor:** An unwanted factor that influences results.

**Contour bank:** A constructed earth bank used to direct water flow over the land to prevent erosion and drainage problems. The bank follows the contour of the land.

**Control site:** See **reference site**.

**Cross-contamination:** The act of contaminating or polluting a sample with an unwanted substance from elsewhere. A common example of this occurs when sample bottles are not washed correctly before use.

**Cultural heritage values:** Aspects of our past that we want to keep, appreciate and enjoy today and to pass on to future generations.

## D

**Data confidence:** The confidence or certainty with which a set of data meets its defined purpose.

**Data quality:** How reliable or useful data is for a particular purpose. Defined in terms of accuracy, precision and tolerable error ranges as well as the representativeness and potential uses for collected data. Categories include demonstrative (lower level), indicative (medium level) and analytical (higher level).

**Data:** Facts or pieces of information (usually, but not always, quantitative) used to draw a conclusion or make a decision—for example, the readings from a pH meter, the number and type of macro-invertebrates, and the width of the riparian zone are all data.

**Demonstrative data:** Data with reduced levels of accuracy and/or precision, with a high tolerable error range. Data at the demonstrative level is insufficient to make management decisions or perform statistical analysis. Demonstrative data can be used to confer conceptual understanding of waterway condition.

**Diffuse-source pollution:** Pollution for which the source cannot be pinpointed because it comes from many individual sources or from a widespread area (for example, urban and agricultural run-off).

**Discharge zone:** An area where the groundwater moves upward and escapes through the land surface to join surface water—for example, natural springs or an area of stream bed.

**Discharge:** The volume of water moving past a given point for a given period of time—for example, the amount of water moving out of a catchment via a stream channel. Discharge is usually measured in cubic metres per second ( $\text{m}^3/\text{s}$ ) or megalitres per day (ML/day).

**Dissolved oxygen (DO):** The amount of oxygen dissolved in water. Often used as an indicator of water quality because sufficient levels are needed for aquatic life. The unit of measurement is milligrams of oxygen per litre of water (mg/L) or the saturation level of water with oxygen (%).

**Distilled water:** Water that has most of its impurities removed; also known as deionised water.

**Duplicates:** Identical samples tested by different methods or people to validate testing procedures. Duplicate measures are formed by dividing a single sample into a number of subsamples.



## E

**Electrical conductivity (EC):** A measure of how well a substance serves as a channel or medium for electricity. Salty water conducts electricity more readily than pure water, so EC can be used as an indicator of salinity in water quality assessments. The units of measurement are microsiemens ( $\mu\text{S}$ ), millisiemens (mS), or decisiemens (dS) per centimetre ( $/\text{cm}$ ).

**Ecosystem:** A community of different organisms (plants, animals and microbes) that are interdependent on each other, and the chemical and physical factors making up their environment.

**EHMP:** Ecosystem Health Monitoring Program; a regional waterway health assessment program in South East Queensland.

**Ephemeral stream:** An intermittently flowing stream that only flows after rain.

**Emergent aquatic plant:** Any species of macrophyte that has roots in the stream bed but whose plant body reaches above the water surface.

**Electrode:** An electrical lead or wire, attached to an electronic device or circuit, through which current may flow in or out. An electrode is placed into a water sample to test for electrical conductivity.

**Environmental variability:** The natural variations in parameters that occur in the environment. The value of a parameter may change without any human actions due to natural variability.

**Environmentally sensitive area:** An area requiring special management attention to protect important scenic values, fish and wildlife resources, historical and cultural values, and other natural systems or processes.

**Equipment blank:** A quality control measure used to test the equipment being used to ensure that it is not a source of contamination during the sampling process. A sample of analyte-free water is poured over or through decontaminated field sampling equipment prior to the collection of environmental samples.

**Erosion:** The gradual wearing away or removal of land surface materials by the action of water, wind or a glacier. In waterways, eroded material is transported by water and is deposited at other sites downstream (aggradation).

**Estuary:** A body of water adjacent to the sea, typically at the mouth of a river, in which the tide ebbs and flows and fresh water mixes with

sea water. At its mouth it meets the ocean but its upstream limit is marked by the extent of tides.

**Eutrophic:** Term used to describe waters enriched with nutrients, primarily phosphorus but also carbon and nitrogen. This leads to a proliferation of plant life, especially algae, which reduces the dissolved oxygen content and can cause the local extinction of certain animal species.

**Evaporation:** The process by which water or another liquid becomes a gas. Water from the surface of land and water bodies is transformed into vapour and released into the atmosphere due to heat energy from the sun.

**Exotic species:** See **introduced species**.

**Export load:** The measured amount of a given contaminant (such as salt) leaving a catchment over a given period of time.

## F

**Feedlot:** A fenced area where livestock are held for fattening prior to sending to market for slaughter, sometimes containing thousands of animals in an array of pens. This is an intensive form of animal production.

**Fertiliser:** Any substance, natural or manufactured, added to the soil to supply nutrients for plant growth.

**Field blanks:** A quality control measure used to test for and trace sources of artificially introduced contamination.

**Field replicate:** A second (or additional) measure taken of the same parameter at the same time and location using the same methods.

**First flush:** The initial flow of storm water run-off that often contains high concentrations of contaminants that have built up during the previous dry period.

**Floating plant:** Any species of aquatic macrophyte that is not fixed in place but is carried by the water; the plant body floats on the water surface with roots hanging in the water below.

**Flood plain:** An area of low land, adjoining a water body, that is covered by water during a major flood but dry at other times; the area of alluvial deposits laid down during past floods.



**Flow:** The volume of fluid (in this case water) that passes through a passage of any given section in a unit of time; usually reported in units of cubic metres per second ( $\text{m}^3/\text{s}$ ).

**Food web:** The feeding interactions within an ecosystem, usually drawn conceptually as a flow chart to illustrate the flow of energy from one organism to another.

**Framework:** A structured outline that assists in the development and implementation of a strategy or program.

**Fresh water:** Water that contains less than  $800 \mu\text{S}/\text{cm}$  ( $500 \text{ mg}/\text{L}$ ) of dissolved salts.

**Filterable reactive phosphate (FRP):** The phosphate (particularly orthophosphate) in a solution; measured using a colorimetric method, which is the most accurate way to estimate orthophosphate concentrations available for biological uptake.

## G

**Genus** (plural **genera**): Taxonomic classification level for grouping the most closely related organisms; the classification level above individual species.

**Glide:** A channel habitat type that links pools and riffles together, characterised by deep, flowing water and no surface turbulence. A glide is very similar to a run but has low flow and a smooth, glassy surface.

**Groundwater:** Water that infiltrates into the earth and is stored in the rock and soil (aquifer) below the ground surface.

## H

**Habitat:** The living space of a species or community, providing a particular set of environmental conditions.

**Halocline:** Physical separation in a water body of fresh (lower layer) and salt (upper layer) water.

**Headwaters:** The origins of a stream.

**Hydrograph:** A graph of water discharge over time, often used to show seasonal variations in the flow of a body of water.

## I

**In situ:** On site. To examine something in situ means to examine it in the place where it occurs—for example, testing for electrical conductivity directly in the waterway, rather than taking a water sample away to a laboratory.

**Inclinometer:** Instrument for measuring angles of a slope or inclination; also known as a gradient meter or slope gauge.

**Indicator:** A measurement of a physico-chemical, biological or stream or habitat condition. Indicators tracked over time that may show trends and can:

- provide quantitative information about the response of an ecosystem to environmental disturbance or change
- be used to assess the general state of the environment.

**Indicative data:** Data with a moderate level of accuracy and precision with a defined intermediate tolerable error range. Data at the indicative level can be used to perform non-statistical assessments of waterway condition and rehabilitation programs.

**Infiltration:** The movement of water through the pores of soil or other porous medium.

**Inland water:** Includes all groundwater and surface waters upstream of the saline reaches of tidal water. This definition means that the physical boundaries of inland waters in coastal areas will change with rainfall patterns, tidal surges and water extraction regimes.

**Interflow (through-flow):** Precipitation that infiltrates the surface soil and moves laterally or horizontally, through the upper soil horizons above the water table, toward surface waters.

**Intertidal zone:** The area that lies between low and high tide marks.

**Introduced species:** Any plant or animal not native to Australia. Also called non-native, exotic and pest species, introduced plants and animals are usually damaging to Australian environments.

**Inundate:** To cover or overspread (the stream channel) with water.

**Ion:** Electrically charged molecules formed by the loss (negative charge) or gain (positive charge) of an electron.

**Impact site:** See **test site**.



**Instability, bank:** Lack of physical stability of the bank due to the processes of erosion and aggradation of bank sediments.

**Instability, bed:** Lack of physical stability of the bed due to the processes of erosion and aggradation of bed sediments.

## L

**Larva** (plural **larvae**): Developmental stage of an insect in which it proceeds from an egg to a pupa, before developing to an adult.

**Leaf pack:** A submerged layer of leaves from terrestrial plants on the stream bed or bank. Leaf packs provide important in-stream habitat for some water bugs.

**Load:** The volume or mass of a substance in water, derived by multiplying the concentration by the flow rate over a specific period of time.

**Load-based monitoring:** Monitoring to assess the load (total quantity) of pollutants (such as nutrients, sediment and pesticides) entering a waterway.

**Lower bank:** The part of a stream bank below the water mark—that is, the part of the bank that is inundated (under water) at the normal water level but exposed at low water levels.

## M

**Macro-invertebrate:** An animal with no backbone, which is visible to the naked eye; those found in water bodies can include insects, crustaceans and snails. Historically, their abundance and diversity have been used as an indicator of ecosystem health and local biodiversity. They are a key component of the food chain.

**Macrophyte:** Any individual aquatic plant (freshwater or marine) large enough to be seen easily with the unaided eye. Freshwater macrophyte forms include floating, submerged and emergent plants.

**Meander:** A bend in the course of a river, curving from side to side in wide loops.

**Measurement parameter:** Any parameter or variable that is measured to gain information about an ecosystem.

**Megalitre (ML):** One million litres.

**Metabolic process:** The process occurring within living cells that converts energy (from food or sunlight) into molecules that are used by the organism to perform its functions.

**Metamorphosis:** In animals, the period of transformation from larva to adult.

**Microgram ( $\mu\text{g}$ ):** Thousandth of a gram ( $1 \mu\text{g} = 0.001 \text{ g}$ ).

**Micrometre ( $\mu\text{m}$ ):** Thousandth of a metre ( $1 \mu\text{m} = 0.001 \text{ m}$ ).

**Micro-organism:** Single-celled microbes (plants, fungi, animals and viruses) that are invisible to the unaided eye.

**Microparticulate:** Less than  $45 \mu\text{m}$  ( $< 0.045 \text{ m}$ ) in diameter.

**Millilitre (mL):** One thousandth of a litre.

**Mystery sample:** A sample used to test the accuracy of sampling equipment, such as a water quality probe, or the accuracy of analysis being undertaken by laboratories.

## N

**NATA:** National Association of Testing Authorities; Australia's national laboratory accreditation authority.

**Native species richness:** A measure of the diversity and abundance of species native to the sampled area.

**Nephelometer:** Also known as a turbidimeter, this instrument uses reflected light to measure the size or density of solid particles present in a liquid.

**Nitrate ( $\text{NO}_3$ ):** A combination of nitrogen and oxygen found in a dissolved state.

**Nitrogen (N):** A common non-metallic element that is normally a highly soluble, colourless, odourless, tasteless, inert diatomic gas. It makes up 78% of the atmosphere by volume and is a constituent of all living tissues.

**Non-point source pollution (NPS):** A type of pollution for which the source cannot be identified as it comes from many individual places; also called diffuse-source pollution.

**Normal water level:** The amount of water that exists in a waterway under normal (non-drought or flood) conditions, identifiable from the water mark.



**Nutrient:** A compound required for growth by plants and other organisms. Major plant nutrients are nitrogen (N) and phosphorus (P), which, when carried into waterways, contribute to excessive growth of water plants—for example, algal blooms.

**Nymph:** Young, sexually immature stage of certain insects. Nymphs are usually similar to adults in form, especially where partial metamorphosis is undertaken—that is, from egg to nymph to adult.

## O

**Organic matter:** Plant and animal material that can enter a stream in the form of fallen leaves, dead animals, animal manure, sewage, or as a component of soil eroded and washed into the stream.

**Outfall:** The site where liquid discharges from a pipe; applied particularly to the point at which a sewer discharges to a treatment works or receiving water.

**Overclearing:** The removal of trees and shrubs, particularly from steep areas, resulting in accelerated erosion.

**Overgrazing:** Continued grazing of pasture or rangelands at a level that permanently and adversely affects vegetation and leads to land degradation.

## P

**Parameter:** A component of the environment or water (such as salinity, temperature or biodiversity) that is being monitored in order to gain information about the condition of the waterway or surrounding environment.

**Parts per million (ppm):** The number of parts (by weight) of a substance per million parts of liquid.

**Pathogens:** Disease-causing organisms such as bacteria, viruses or fungi.

**Peak flow:** The maximum flow of a waterway.

**Percolation:** The downward movement of water through soil or rocks.

**Permeability:** The ability of a substance (such as soil and rock particles) to allow water to flow through it.

**Permeable:** Allowing fluid to penetrate or pass through.

**Pesticide:** Any chemical or biological agent that kills plant or animal pests. Herbicides, insecticides, fungicides and rodenticides are all types of pesticides.

**pH:** A measure of relative acidity or alkalinity. The pH scale ranges from 0.1 to 14; a value of 7 is neutral, values less than 7 are acidic and greater than 7 are basic or alkaline. The pH scale is logarithmic; a pH of 3 is 10 times as acidic as a pH of 4 and 100 times as acidic as a pH of 5.

**Phosphate (PO<sub>4</sub>):** A salt or ester of phosphoric acid; provides organisms with phosphorus in a useable form; often used in fertilisers and detergents.

**Phosphates:** Tests are performed for three types of phosphate to indicate phosphorus levels:

- condensed phosphates—chains of two or more inorganic phosphorus groups. They are found in laundry and cleaning agents, and can be readily broken up into orthophosphate to become immediately available for biological uptake
- organic phosphates—bound to carbon molecules and found in tissues of plants and animals. They are taken up by bacteria decomposing organic matter, and through chemical digestion.
- orthophosphates—inorganic phosphate that is readily available for biological uptake, especially by plants and algae, and is found in many detergents and fertilisers.

**Phosphorus:** An important nutrient for all organisms, usually found as a phosphate (PO<sub>4</sub>). A non-metallic element with the chemical symbol P, it can absorb light energy and then appear to glow in the dark. It is naturally low in most water, and is therefore a factor limiting growth, but problems arise when excess amounts enter waterways and cause algal blooms. It has low solubility and readily binds with soil particles suspended in the water column.

**Photometer:** An instrument for measuring the intensity of light, or, more especially, for comparing the relative intensities of different lights, or their relative illuminating power.

**Photosynthesis:** The chemical reaction in plants that uses light energy from the sun to convert water and carbon dioxide into simple sugars, and the release of oxygen as a by-product.

**Physico-chemical:** Relating to both physical and chemical properties.



**Pipette:** Eye dropper-like instrument that can measure very small amounts of liquid.

**Point-source pollution:** Pollution that comes from a clearly identifiable source.

**Pollutant:** Any substance that causes pollution, including pesticides, sediment and nutrients, at levels that negatively impact water quality.

**Pollution:** Any harmful or undesirable change in the physical, chemical or biological quality of air, water or soil as a result of the release of chemicals, radioactivity, heat or large amounts of organic matter or sediment.

**Pollution event:** Individual occurrences of high levels of contaminants entering a waterway by accident or through negligence, with significant noticeable effects.

**Potable:** Suitable for drinking (water).

**Pools:** Distinct channel habitats within a stream, with lower velocities and greater depth. The bottom sediments are usually soft. Pools are important habitats for fish.

**Precipitate:** A solid or solid phase separated from a solution.

**Precision:** The degree of agreement among repeated measurements of the same characteristic on the same sample, or separate samples. These measurements indicate how consistent and reproducible the field or laboratory methods are.

**Primary producers:** Organisms such as plants and some bacteria that can manufacture their main energy source from sunlight through photosynthetic processes. They are the base of food webs.

**Protocol:** A defined procedure.

**Pupa (plural pupae):** A developmental stage of some insects between larva and adult.

## Q

**Quality assurance (QA):** The implementation of documented checks on the success of quality control initiatives (for example, replicate samples or analysis of samples of known concentrations) to ensure that the data is of sufficient and consistent quality to meet the need for which it is being collected (for example, management or decision making).

**Quality control (QC):** A system of documented activities to measure and control the quality of data so that it is good enough for its intended use. It includes the implementation of procedures (such as cleaning procedures, contamination avoidance and equipment calibration) to maximise the integrity of data. Quality control procedures are involved in determining what range of error can be tolerated while still meeting your monitoring goals; this is referred to as the tolerable error range (TER).

## R

**Reagent:** A material used to start a chemical reaction—for example, a chemical added to a water sample that causes a colour change (as in colorimetry) by reacting with the nutrients present in the sample.

**Recharge area:** An area of land where the groundwater moves downward and water infiltrates from the surface into the geological formations (such as aquifers) below.

**Reference site:** A site in a pristine condition, or otherwise not affected by the pressure of interest (for example, a pollution source), that is comparable in as many ways as possible to a site that *has* been affected by that pressure. Reference sites are used to perform impact assessments, and are ideally located directly upstream of the point of influence of the pressure.

**Regulated river:** A river in which structures such as dams and weirs have been built to control or divert the flow of water.

**Replication (scientific):** The repetition of a test or experiment to confirm findings or to ensure accuracy.

**Representativeness:** The extent to which measurements reflect the true condition of the attribute being measured.

**Respiration:** The process by which animals and plants absorb and use oxygen from the surroundings and release carbon dioxide.

**Riffle:** A type of channel habitat occurring where rocks and debris in the stream create shallow areas over which the water rushes quickly, causing the water surface to break. Because of the variety of rock sizes in the stream bed, riffles provide many different habitats for macro-invertebrates (water bugs) as well as richly oxygenating the water.



**Riparian:** Of or pertaining to the banks of a body of water.

**Riparian vegetation:** Vegetation that is found on the banks of a river or stream and is directly influenced by the presence of water.

**Riparian zone:** The transition area between a waterway and the surrounding land. The riparian zone occurs between a normal river level and the edge of the flood plain and can vary from 5 m to 100 m or so wide. A healthy riparian zone is generally necessary to maintain a healthy waterway.

**Riprap:** Rock or other material used to stabilise waterway sediments and reduce erosion by reducing hydraulic forces and dissipating the energy of moving water.

**Root overhang or mat:** A dense clump of roots from terrestrial vegetation either partially or completely submerged. Root mats create stream edge habitats and are home to some water bugs.

**Run:** A channel habitat type characterised by fast-flowing water with little or no surface turbulence. Shallow to deeper water flows gently and smoothly over boulders, rocks and gravel and the water surface is not broken.

**Run-off:** The portion of rainfall or irrigation water that flows across the land surface rather than soaking into the ground, eventually running into a water body. It may pick up and carry a variety of pollutants.

## S

**Salinity:** Concentration of salts, measured in milligrams per litre (mg/L) or microsiemens per centimetre ( $\mu\text{S}/\text{cm}$ ).

**Salts:** Ionic compounds (charged molecules) dissolved in water to form a solution; usually chlorides, sulfates, carbonates, sodium, magnesium, calcium and potassium. Salts are capable of conducting electrical current, therefore the more salts present, the greater the capacity of the solution to conduct electricity.

**Saturation, oxygen:** Percentage of oxygen ( $\text{O}_2$ ) dissolved in water compared to the theoretical level of dissolved oxygen (DO) capable of being held in pure still water. Saturation is a better measure of availability of  $\text{O}_2$  to aquatic organisms than milligrams per litre, as it allows direct comparisons between DO results from sites with different salinity and temperature values (both

of which affect DO levels). Supersaturation is when the amount of dissolved oxygen is greater than 100%, and may occur during periods of high photosynthesis.

**Sediment:** Insoluble material suspended in water, consisting mainly of particles derived from rocks, soil and organic materials. Sediment is a major source of diffuse-source pollution to which other pollutants may attach.

**Sediment load:** The amount of solid material that is transported by water.

**Sedimentation (aggradation):** The deposition of sediment from a water way onto locations such as a stream or lake bed, flood plain, river mouth or sea bed.

**Sensitivity:** The detection limits of a method or instrument, which determine its capability to discriminate between two samples that have very similar concentrations.

**Sewage:** Domestic or commercial wastewater that contains human waste.

**Sewerage:** A complete and contained pipe system that facilitates the collection, transportation, treatment and discharge of waste water.

**Scour:** A section of stream bed or flood plain from which sediments and debris have been removed by the force of flowing water.

**Shadow testing:** A comparison of results with professionally collected data in order to assess accuracy.

**SI units:** SI stands for *Système International d'Unités*, a system of measurement that is accepted and used internationally by the scientific community. The use of a standard system improves communication between scientists in different countries.

**Silt:** Very fine sediment particles, approximately the size of sand or clay grains, easily transported by water and contributing to turbidity.

**Siltation:** The deposition of silt by flowing water; a form of aggradation.

**Slumping:** The collapse of a section of stream bank, resulting in the delivery of bank sediments to the stream bed. Slumping is caused by erosion of the bed and banks.

**Solubility:** The ability of a material to dissolve in water or another liquid. Solubility may be expressed as a ratio or may be described using words such as insoluble, very soluble or miscible.



**Stagnant:** Describes a body of water that is motionless or ceases to flow.

**Standard deviation:** A statistical measure used to compare how closely three or more results are clustered around the average value. It is expressed as a  $\pm$  (plus or minus) from the average value.

**Standard, scientific:** The authorized exemplar of a unit of weight or measure, used as a reference point against which other values can be evaluated.

**Storm flow:** The portion of rain that leaves a drainage area in a comparatively short time; also called excess rainfall or surface run-off.

**Stormwater:** Rainwater that runs off the land, frequently carrying various forms of pollution such as rubbish, soil, animal droppings and dissolved chemicals. This untreated water is carried into stormwater channels and discharged directly into waterways.

**Stratification, water:** The formation of layers in a body of water due to differences in conditions such as temperature, light or nutrients. Thermal stratification is an example of this (see **thermocline**).

**Stream bank:** A zone forming the margin of a stream channel, resulting from erosion and deposition processes of the stream. The bank connects the stream to the flood plain. The right and left banks are identified when looking downstream.

**Stream:** A channel with a defined bed and banks, in which surface water flows on a permanent or intermittent basis under natural conditions. Stream types include creeks, springs and rivers.

**Subcatchment:** A continuous area within a catchment, bounded by waterway junctions. Also refers to a scale at which assessment and rehabilitation programs may be conducted.

**Submergent aquatic plant:** A macrophyte that grows with its plant body under the water surface and its roots in the stream bed. Flowers may emerge above the water surface.

**Substrate:** Material forming the bottom of waterways, including:

- sand, silt or clay (particle diameter less than 1 mm). Clay has a sticky, cohesive feeling and sand is made of tiny, gritty particles like sugar
- gravel (particle diameter 1–20 mm)
- cobbles (diameter 2–30 cm)
- boulders (diameter more than 30 cm)
- bedrock (solid).

**Surface run-off:** Water originating from rain, hail or excess irrigation that flows across land surfaces instead of soaking in.

**Surface water:** Water that sits or flows above ground.

**Suspended sediment:** Sediment that is transported by water while held in suspension.

## T

**Thermocline:** The divide within a body of water (such as a lake or deep dam) between the warm water of the upper layer and the cold water below it.

**Through-flow:** The flow of water through the ground; water that is absorbed into the top soil then moves downhill to a water body.

**Tidal range:** The vertical distance between the lowest and highest tides.

**Titration:** A process of determining the concentration of a substance (such as oxygen or nutrients) in solution via a chemical reaction. Titration involves adding a reagent and checking the resulting colour change using a standard colour chart for the element being tested. Alternatively, an instrument (colorimeter) is used to more accurately compare results. The intensity of the resulting colour is proportional to the concentration of the element being tested for in the solution.

**Total nitrogen (TN):** The total amount of nitrogen in a sample.

**Tolerance:** The degree to which an organism is able to endure unusual or unfavourable environmental conditions.

**Tolerable error range (TER):** The range of error (in precision and accuracy) that can be tolerated and still allow monitoring goals to be satisfied and the necessary data quality to be achieved.

**Topographic map:** A map that shows the surface features of a region using lines joining places of the same elevation. Lines indicate the presence and steepness of slopes and valleys; the closer the lines, the steeper the slope.

**Total suspended solids (TSS):** A measure of the amount of solid particles held in suspension (excludes dissolved solids and solids of less than 2.0  $\mu\text{m}$  in diameter).



**Transparency:** A visual gauge of water clarity; a measure of how far visible light is able to pass through water.

**Transpiration:** The process by which water taken up by plants from the soil is evaporated from tiny pores on the leaf surfaces.

**Tributary:** A smaller body of water that flows into a larger one. Natural examples include streams and creeks, while human-made examples include drains and sewerage pipes.

**Trigger (or threshold) value:** A critical point or level at which a major change in conditions occurs. For example, high phosphorus levels lead to eutrophication and algal blooms.

**Turbidity:** A measure of water clarity, affected by the amount of suspended solids such as clay, silt, sand, algae, plankton and micro-organisms in the water column. Turbidity is measured using a spectrometer, which measures the sideward light scattering caused by suspended particles in the water sample.

12-12

## U

**Understorey:** The vegetation growing under trees, including shrubs, herbs, forbs, ferns and grasses.

**Upper bank:** The part of a stream bank above the water mark—that is, the part of the bank that is not inundated at the normal water level.

## V

**Velocity:** The rate of motion, calculated as the distance travelled during a specified time period. It is usually expressed in metres per second (m/s).

## W

**Water body:** Any significant accumulation of water over the earth's surface, both natural and man-made, including rivers, wetlands, lakes, reservoirs and marine waters.

**Water clarity:** A measure of how transparent or clear a water sample is.

**Water cycle:** Movement of water from the atmosphere to the earth and back to the atmosphere through precipitation, run-off, infiltration, percolation, storage, evaporation and transpiration.

**Water level:** The level of the water surface in a waterway, measured as the line where the water surface touches the stream bank.

**Water mark:** A visible mark at the normal water level in the stream that divides the stream bank into upper and lower sections. The water mark can usually be identified by the edge of terrestrial vegetation, changed erosion patterns or a change in sediment types.

**Water level, normal:** The amount of water that exists in a waterway under normal (non-drought or flood) conditions, identifiable from the water mark.

**Water quality criteria:** Maximum concentrations of pollutants that are acceptable for water to meet water quality standards.

**Water quality standards:** Written goals for the quality of water for different uses based on particular use requirements.

**Water regime:** The flow history of a waterway including the timing and frequency of drying, duration and extent of water presence (period and area of inundation), and depth of water.

**Watershed:** A dividing ridge between two catchments, physically defined by high points in the landscape such as mountains, crests of hills or ridges of high ground; also, a North American term for 'catchment'.

**Water table:** The upper surface of the zone of groundwater saturation.

**Wetland:** An area featuring permanent or temporary shallow open water; includes billabongs, marshes, swamps, lakes, tidal flats and reefs.

**Woody debris:** Timber submerged or partially submerged within the stream channel; naturally present in the form of tree trunks, limbs and branches. Woody debris provides important in-stream habitat for water bugs, fish and other aquatic life.