

TROUT IN THE CLASSROOM

Glossary of Terms and Concepts

Abiotic (*adjective*) – A non-living component of the natural environment.

Air Pump (*noun*) – A piece of equipment that connects to an air stone to supply supplemental aeration and circulation and to promote gas exchange (oxygen in, carbon dioxide out) from the tank.

Air Stone (*noun*) – Porous stones attached to the air pump with tubing to help with aeration of the tank by adding dissolved oxygen.

Aeration (*noun*) – The process of adding air. Like all animals, trout need oxygen to survive.

Alevin (*noun*) – At this stage of the lifecycle, trout are not yet free-living; they still feed on attached yolk sacs instead of foraging. The trout is also called a sac fry at this stage because of the attached yolk sac. As the sac gets smaller, the alevin begins to move about. The sac fry remains in or near the redd until its yolk sac is absorbed.

Ammonia (*noun*) – Ammonia is one of several forms of nitrogen that exist in aquatic environments. Compared to other forms of nitrogen, ammonia causes more direct toxic effects on aquatic life.

Anadromous (*adjective*) – Describes fish born in freshwater who spend most of their lives in saltwater and return to freshwater to spawn, such as salmon and some species of sturgeon and trout. Anadromous brook trout are called sea-run or salters, brown trout are called sea trout, and rainbow trout are called steelhead.

Aquatic Benthic Macroinvertebrates (*noun*) – An animal without a backbone that can be seen without a microscope; mostly aquatic insects.

Apex Predator (*noun*) – The predator at the top of the food chain that has no natural predators in its ecosystem.

Autotroph (*noun*) – An organism that can produce its own food using abiotic sources such as sun, light, water, and nutrients.

Balance (Ecological) (*noun*) – The equilibrium and stability that exists in a healthy ecosystem.

Biodiversity (*noun*) – The variation of life in the world or in a specific habitat or ecosystem.

Biotic (*adjective*) – Describes a living organism.

Biotic Index (*noun*) – A biological measurement of the pollution levels in a water body by assessing the diversity and abundance of organisms in an environment and their tolerance to pollution.

Brook Trout (*Salvelinus fontinalis*) (*noun*) – A species of salmonoid fish that is a member of the char family. Brook trout are the only native trout in New York State, and one of the two species of trout raised by the NY Trout in the Classroom program.

Brown Trout (*Salmo trutta*) (*noun*) – A species of salmonoid fish that is a member of the salmon family. They are not native to the United States and are originally found in Eurasia. They are one of the two species of trout raised by the NY Trout in the Classroom program.

Buoyancy (*noun*) – The tendency of a body to float or to rise when submerged in a liquid; the power of a liquid to exert an upward force on a body placed in it.

Capillaries (*noun*) – The smallest blood vessel in a trout's body, which works by picking up oxygen in the water. Fish can control gas exchange or the amount of gas in their swim bladder through the capillaries that are found in the thin membrane of the swim bladder.

Chiller (*noun*) – Helps maintain a cool water temperature. For trout, the ideal temperature is below 60°F; tanks should be kept anywhere from 50-55°F.

Climate (*noun*) – The long-term average of conditions of weather at a place as exhibited by temperature, wind velocity, and precipitation.

Climate Change (*noun*) – A significant and persistent change in the average state of the climate. Climate change occurs in response to shifts in the Earth's environment, including regular changes in Earth's orbit about the sun, re-arrangement of continents through plate tectonic motions, or *anthropogenic* (human caused) changes to the atmosphere.

Conservation (*noun*) – Protection of natural resources for future generations through regulation of use.

Decomposer/Detritivore (*noun*) – Organisms that feed on dead or decaying material (*detritus*), thus assisting with the process of recycling nutrients back into the ecosystem.

Deforestation (*noun*) – The removal of trees from a forest typically for human activities such as logging, livestock grazing, or urban development.

Dissolved Oxygen (*noun*) – Oxygen, from the air, that dissolves into water which is essential for respiration for most aquatic life.

Ecological Pyramid (*noun*) – A diagram that shows the flow of energy among the trophic levels in an ecosystem.

Ecology (*noun*) – A branch of science concerned with the interrelationship of organisms and their environments.

Ecosystem (*noun*) – The interactions between all living and non-living things in a particular environment.

Embryo (*noun*) – The body of the unhatched fish that is visible through the egg. It is nourished by the yolk of the egg and gets oxygen from the water around it. In about eight weeks a little fish wiggles out of the egg to become an alevin.

Endangered Species (*noun*) – Plants and animals that have become so rare they are in danger of becoming extinct.

Extinction (*noun*) – The disappearance of species due to changes to the earth that are caused either by nature or by the actions of people; Species is no longer living or existing.

Extirpation (local extinction) (*noun*) – When a species becomes extinct at the local or regional geographic level. At least one other population can be found elsewhere, but no longer in that local or regional environment.

Eyed Egg (*noun*) – About two weeks after fertilization, the fertilized egg develops eyes. Through the transparent walls of the egg we can see the fish's eye.

Filter (*noun*) – Helps to maintain water quality by removing harmful materials and substances. TIC Tanks typically utilize a canister filter, which can incorporate mechanical, chemical, and biological filtration methods.

Fingerling (*noun*) – At this stage, the fish without a sac is called a fry. The growing fry develops vertical lines along the length of its body called parr marks. These up-and-down spots help it hide in grasses. This protects it from predators. When the fish has parr marks it is called a fingerling or parr.

Food Chain (*noun*) – A linear sequence showing the transfer of energy between different abiotic and biotic components of an ecosystem.

Forest (*noun*) – A dense growth of trees and underbrush covering a large area.

Freshwater (*noun*) – Water containing less than 1,000 milligrams per liter of dissolved salt.

Gravity (*noun*) – An invisible force that pulls objects towards the center of the Earth.

GH (*noun*) – General hardness. Calcium and magnesium are the two most common elements that contribute to GH.

Gills (*noun*) – A part of the trout that allows them to breath underwater. Fish cannot breathe in oxygen the same way humans and other land animals do. The oxygen in the water is not readily accessible to trout and other fish, so capillaries pick up oxygen that is dissolved in the water and allow trout to breathe.

Gonads (*noun*) – The reproductive organs of the trout. Female trout have ovaries and male trout have testes.

Green Infrastructure (*noun*) – Practices designed and constructed to manage stormwater runoff; the use of soils, stones, and plants to mimic the natural movement of water and absorb runoff before it can enter the sewer system or waterbodies.

Greenhouse Gas Emissions (*noun*) – Gases such as carbon dioxide and methane that are released as a result of human activities. These gases trap heat in the atmosphere, leading to global warming and climate change.

Groundwater (*noun*) – Water located underground in porous spaces in soil and openings in rock.

Heart (*noun*) – A muscular, two-chambered organ (humans have four chambers) that is primarily responsible for pumping and circulating blood throughout the fish's body.

Heterotroph (*noun*) – An organism that cannot produce its own food and therefore needs to eat other plants or animals to survive.

Hypoxia (*noun*) – A condition where there isn't enough dissolved oxygen in the water. This forces fish to either swim away or die and can also suffocate plants living in the water. Hypoxia often occurs when there are too many nutrients in the water.

Impervious/Impermeable (*adjective*) – Preventing or slowing water from passing through, such as concrete with water (impervious surface).

Indicator Species (*noun*) – A species that can be used to determine the overall health of the ecosystem they reside in.

Infiltration (*noun*) – the action of passing into or through a substance by filtering or permeating its pore (such as in soil).

KH (*noun*) – Carbonate hardness, or a measure of carbonate and bicarbonate ions in the water. Helps keep pH stable.

Kidney (*noun*) – Organ that helps maintain a balance of salt and water within the body, as well as gets rid of waste products that could harm the trout.

Life Cycle (*noun*) – The sequence of biological changes that occur as an organism develops from fertilization into an adult until its death. The life cycles of many species are synchronized with other species and the annual seasons.

Liver (*noun*) – Organ that detoxifies heavy metals and other potentially harmful elements to which the animal may be exposed. The liver secretes bile through a duct into the gall bladder.

Microorganisms (*noun*) an extremely small living thing that can only be seen with a microscope.

Milt (*noun*) – The seminal fluid of trout (and other aquatic animals). Required for fertilization of eggs during spawning.

Nitrate (*noun*) – NO_3 is formed when plant nutrient and inorganic fertilizer enters water supply sources from septic systems, animal feed lots, agricultural fertilizers, manure, industrial waste waters, sanitary landfills and garbage dumps.

Nitrite (*noun*) – NO_2 is formed by the conversion of ammonia by nitrifying bacteria. Nitrite is toxic to fish because it binds with the

hemoglobin in fish's blood to form methemoglobin, which can result in hypoxia.

Nitrogen Cycle (*noun*) – The natural circulation of nitrogen among the atmosphere, plants, animals, and microorganisms that live in soil and water. In your tank, ammonia, which is a fish waste product, is converted to nitrite and then to nitrate by nitrifying bacteria.

Overfishing (*verb*) – A stock having a harvest rate higher than the rate that produces its maximum sustainable yield; overfishing is a direct result of fishing activities.

Parr (*noun*) – When a trout has parr marks (see below) it is called a fingerling or parr.

Parr Marks (*noun*) – Dark, vertical marks that appear on juvenile trout early in the lifecycle.

Percolate (*verb*) – Describes the process of a liquid (e.g. water) moving through a porous surface (e.g. soil) by the force of gravity.

Permeable (*adjective*) – Allowing water to pass through, such as soil.

pH (*noun*) – Refers to the acidity in water. A pH value between 6 and 9 will support most types of plant and animal life, but trout prefer a more neutral pH between 6.5 to 7.5.

Phosphate (*noun*) – An important nutrient for the growth of aquatic plants and animals in a waterbody. Too much phosphorus can harm aquatic life, water supplies, and recreational uses.

Photosynthesis (*noun*) – A chemical process conducted by plants, algae, and cyanobacteria, where energy from the sun, water, and carbon dioxide from the atmosphere are used to create food. Using the energy from the sun, water and

carbon dioxide from the atmosphere and nutrients, they chemically make their own food.

Pollutants/Pollution (*noun*) – Harmful substances such as oils, chemicals, sediments, and trash that can contaminate or dirty water, air, and land.

Pollution Tolerance (*noun*) – The ability of organisms to survive and reproduce with exposure to pollution.

Precipitation (*noun*) – Any water that falls from the sky as part of the water cycle, whether it be rain, snow, hail, or sleet.

Primary Consumer (*noun*) – The first connection in a food chain between producers and other consumers. These organisms typically eat plants or other autotrophs.

Predator (*noun*) – An organism that hunts and kills other organisms (prey) for its food.

Prey (*noun*) – An organism that is hunted and eaten by a predator.

Producer (*noun*) – An organism that creates its own food, also called an autotroph.

Public Service Announcement (PSA) (*noun*) – A short informational clip that educates an audience or promotes awareness about an important issue. PSAs often contain a catchy slogan in the form of video, audio, or written content.

Rain Barrel (*noun*) – A rainwater harvesting tool that catches stormwater and connects to the existing downspout of a roof.

Rainbow Trout (*Oncorhynchus mykiss*) (*noun*) – A member of the salmon family and native to the Pacific coast. They are identifiable by their dark spots, especially on their tails, and a pink

lateral stripe. Some streams in NY State are stocked with rainbow trout, but they are not raised as part of the NY TIC programs.

Reservoir (*noun*) – A pond, lake, or basin, either natural or artificial, for the storage of water.

Redd (*noun*) – A nest created by a female trout using her tail to clear an area in the gravel for spawning.

Riparian (*adjective*) – Relating to, living or located on the bank of a waterway.

Riparian Buffer (*noun*) – An area next to a waterway that contains a combination of trees, shrubs, and/or other perennial plants that serves as a protective barrier.

River (*noun*) – A large, natural stream of water.

Runoff (*noun*) – Part of the precipitation, snow melt, or irrigation water that does not percolate into the ground resulting in uncontrolled surface streams and rivers.

Secondary Consumer (*noun*) – An organism, usually an animal, that eats primary consumers.

Spawning (*verb*) – The process of a female and male trout releasing their eggs and milt, respectively, into the water. This stage of the trout lifecycle usually occurs in autumn. The female will typically lay between 500 to 1,000 eggs depending on her size, age, and the environment. The fertilized eggs settle into a redd, or trout nest, which the female trout creates prior to spawning.

Steelhead trout (*Oncorhynchus mykiss*) (*noun*) – The anadromous form of rainbow trout, meaning they can migrate to the ocean and then return to freshwater to spawn. The difference between migratory Steelhead and

resident Rainbow Trout can be spotted in their scales, or the shape of their bodies.

Stewardship (*noun*) – Taking personal responsibility to help protect your environment.

Stocking (*verb*) – Releasing fish that were raised in a hatchery into a body of water in order to supplement wild populations where disturbances have occurred.

Stomach (*noun*) – Digests food and retains much needed nutrients. The trout's stomach can easily extend to allow the fish to swallow large prey whole.

Stormwater Runoff (*noun*) – Water from precipitation that lands on rooftops, parking lots, streets, sidewalks, and other impervious surfaces, and flows over the land instead of seeping into the ground.

Swim Bladder (*noun*) – This organ helps the trout swim in the water. As the trout takes in air, it displaces water, meaning it allows for less water to enter, and increases its buoyancy. This allows for the trout to be lighter and able to float upwards.

Taxonomy (*noun*) – Biological classification of organisms into Domain, Kingdom, Phylum, Class, Order, Family, Genus, Species. A helpful reminder is *Dear King Phillip Came Over For Good Spaghetti*. Often portrayed as a downward pyramid, called a taxonomic tree.

Temperature (*noun*) – Refers to how hot or cold an environment is; usually recorded using a thermometer.

Tertiary Consumer (*noun*) – An organism, usually an animal, that eats secondary and primary consumers.

Tributary (*noun*) – A smaller waterway, such as a stream or canal that feeds into a larger body of water.

Trophic Level (*noun*) – The different feeding positions in a food chain. When trophic levels are grouped in an ecological pyramid, they demonstrate the transfer of energy in the ecosystem.

Trout (*noun*) – Ray-finned cold-water fish belonging to the salmonoid family. Often freshwater but can be *anadromous*. Can include species in the *Oncorhynchus* (rainbow trout), *Salmo* (brown trout), and *Salvelinus* (brook trout) genera.

Turbidity (*noun*) – The measure of cloudiness in a liquid due to the suspension of solid particles.

Water Cycle (Hydrologic Cycle) (*noun*) – The cycle of water that evaporates from water bodies into the atmosphere, rises further into the atmosphere to form clouds through condensation, falls onto land as precipitation, and then returns to streams, rivers, and eventually the ocean as runoff.

Water (*noun*) – The liquid that descends from the clouds as rain or snow, forms streams, lakes, and seas. Water is a major component of all living matter. When pure it is odorless and tasteless; freezes at 32° F (0° C) and boils at 212° F (100° C). It is the only substance that can naturally occur as a solid, liquid, and gas.

Water Quality (*noun*) – The biological, chemical, and physical conditions of a body of water; a measure of a waterway's ability to support aquatic life and beneficial uses.

Watershed (*noun*) – An area of land that drains and collects water, by gravity, in rivers, lakes, streams, and underground.