

## Glossary

**Anadromous.** Fish that spend most of their lives in salt water but migrate into fresh-water tributaries to spawn (such as shad and sturgeon).

**Anoxia.** A condition in which no oxygen is present. Much of the ‘anoxic zone’ is anaerobic and contains no oxygen. In this condition toxic hydrogen sulfide gas is emitted in the decomposition process.

**Anthropogenic.** Of human origin.

**Bathymetry.** The physical characteristics—including the depth, contour and shape—of the bottom of a body of water.

**Benthos.** A group of organisms, often invertebrates, that live in or on the bottom in aquatic habitats (such as clams that live in the sediments) and that are typically immotile or have limited mobility or range.

**Bioassay.** A simple biological test that employs an indicator organism to measure the potency of a given substance in a biological system, for example, a test that measures algal growth in response to different nutrient concentrations.

**Bioenergetic.** Study of production, typically on individual scale. Relates principal metabolic responses (respiration, growth, reproduction, activity, excretion, homeostasis) to environmental actors (temperature, forage availability, salinity, oxygen, etc.). Bioenergetic modelling often uses mass balance approach by allocating consumed energy to metabolic responses. This is done by expressing all responses and consumed energy into common units (e.g., calories).

**Biomass.** The quantity of living matter, expressed as a concentration or weight per unit area.

**Canopy former.** Species of underwater bay grass that grow up all the way up to the water’s surface, with leaves extending horizontally along the surface.

**Chlorophyll *a*.** A pigment contained in plants that converts light energy into food. Chlorophyll *a* also gives plants their green color and is used to indicate the amount of microscopic algae growing in a water body.

**Copepod.** A small planktonic crustacean. Copepods are a major group of Mesozooplankton and are important grazers of phytoplankton and food for fish.

**Criterion minimum concentration.** The minimum concentration of a water quality parameter (e.g., dissolved oxygen) required to support survival. Term used to define an acute criterion.

**Criteria continuous concentration.** The longer-term concentration of a water quality parameter (e.g., dissolved oxygen) required to support growth and reproduction. Term used to define a chronic criterion.

**Designated use.** An element of a water quality standard, expressed as a narrative statement, describing an appropriate intended human or aquatic life objective for a body of water. Designated uses for a water body may refer to recreation, shellfishing, water supply and aquatic life habitat.

**Diel cycles.** A 24-hour period that usually contains a day and adjoining night.

**Dissolved inorganic nitrogen (DIN).** The sum of the concentrations of nitrate and ammonia in water. Nitrogen (in its different forms) is a major plant nutrient. In estuaries it is often considered the most important limiting nutrient (the nutrient which, if its concentration is increased, is most likely to result in increasing microscopic plant [algae] growth).

**Dissolved inorganic phosphorus (DIP).** The sum of the concentrations of phosphorus forms available for plant growth. DIP consists mostly of the hydrogen phosphate and phosphate ions,  $\text{HPO}_4^{2-}$  and  $\text{PO}_4^{3-}$ . In freshwater systems it is often considered the most limiting nutrient (the nutrient which, if its concentration is increased, is most likely to result in increasing microscopic plant [algae] growth).

**Dissolved oxygen.** Microscopic bubbles of oxygen that are mixed in the water and occur between water molecules. Dissolved oxygen is necessary for healthy lakes, rivers, and estuaries. Most aquatic plants and animals need oxygen to survive. Fish will drown in water when the dissolved oxygen levels become too low. The absence of dissolved oxygen in water is a sign of possible pollution.

**Epifaunal.** Plants, animals and bacteria that are attached to the hard bottom or substrate (for example, to rocks or debris); are capable of movement; or that live on the sediment surface.

**Epiphyte.** Algae that grow on the surfaces of plants or other objects. The epiphyte does not 'eat' the plant on which it grows, but merely uses it for structural support or as a means to enter the canopy environment. By encrusting leaf surfaces, they reduce the light available to the plant leaves and lead to loss of underwater bay grasses.

**Estuarine species.** A permanent resident of an estuary. Also called a resident species.

**Estuary.** A semi-enclosed body of water, such as the Chesapeake Bay, that has a free connection with the open sea and within which seawater from the ocean is diluted measurably with freshwater derived from land drainage. Brackish estuarine waters

are decreasingly salty in the upstream direction, and vice versa. The ocean tides are projected upstream to the fall lines.

**Eutrophic.** A condition of an aquatic system containing high nutrient concentrations, which fuels algal growth. When the algae die off and decompose, the amount of dissolved oxygen in the water is reduced.

**Filter feeders.** Organisms that filter food from the environment using a straining mechanism, such as gills (e.g., barnacles, oysters and menhaden).

**Hypoxia.** A condition in which only very low levels of oxygen are present.

**Irradiance.** The amount of energy received on a unit area per unit time.

**Larval recruitment.** The transition from the larval stage into the juvenile/adult population.

**LC<sub>50</sub>.** The concentration of a chemical in the environment, e.g., air or water, that kills 50 percent of test species in a given time. It is a common measure of acute toxicity.

**Leaf surface light requirement.** The amount of light at the leaf surface (estimated as the fraction of the light reaching the water surface) that is necessary for the survival and growth of underwater bay grasses.

**Light attenuation.** The absorption, scattering or reflection of light by water, chlorophyll *a*, dissolved substances or particulate matter. Light attenuation reduces the amount of light available to underwater bay grasses.

**Meadow-forming.** Species of underwater bay grass that grow only part of the way up from the bottom to the water surface.

**Mean Low Water.** The average of all the low water heights observed over the National Tidal Datum Epoch.

**Mean Lower Low Water.** The average of all the lower low water heights observed over the National Tidal Datum Epoch.

**Megalopal stage.** Postlarval stage.

**Mesohaline.** Pertaining to moderately brackish water with low to middle range salinities (from 5 to 18 parts per thousand)

**Mesotrophic.** A condition of an aquatic system containing medium nutrient concentrations and, therefore, is between eutrophic (nutrient enriched) and oligotrophic (nutrient poor) conditions.

**Mg liter<sup>-1</sup>.** Concentration unit milligrams per liter.

**Nauplii.** Early egg-shaped larval stage of copepods and other crustaceans. Nauplii are unsegmented and bear three pairs of appendages.

**Nutrients.** Compounds of nitrogen and phosphorus dissolved in water that are essential to plants and animals. Too much nitrogen and phosphorus act as pollutants and can lead to unwanted consequences—primarily algae blooms that cloud the

water and rob it of oxygen critical to most forms of aquatic life. Sewage treatment plants, industries, vehicle exhaust, acid rain and runoff from agricultural, residential and urban areas are sources of nutrients that enter the Bay.

**Oligohaline.** Pertaining to moderately brackish water with low range salinities (from 0.5 to 5 parts per thousand).

**Percent-light-through-water.** The amount of light reaching just above the canopy of underwater bay grasses, expressed as a fraction of the light at the water surface.

**Percent light-at-the-leaf.** Light reaching the leaf surface of underwater bay grasses, expressed as a fraction of the light at the water surface.

**Phosphorus.** A key nutrient in the Bay's ecosystem, phosphorus occurs in dissolved organic and inorganic forms, often attached to particles of sediment. This nutrient is a vital component in the process of converting sunlight into usable energy forms for the production of food and fiber. It is also essential to cellular growth and reproduction for organisms such as phytoplankton and bacteria. Phosphates, the inorganic form, are preferred, but organisms will use other forms of phosphorus when phosphates are unavailable.

**Photic zone.** Layer of a body of water that receives ample sunlight for photosynthesis.

**Photosynthesis.** The process whereby plants utilize carbon dioxide, water, and solar energy to manufacture energy-rich organic compounds (carbohydrates), accompanied by the release of oxygen. ( $\text{CO}_2 + \text{H}_2\text{O} + \text{SUNLIGHT} = \text{C}_6\text{H}_{12}\text{O}_6 + \text{O}_2$ ). The carbohydrates are then available for use as energy by the plant or other consuming organisms. This process is also referred to as 'primary production.'

**Phytoplankton.** Microscopic plants, such as algae, that are capable of making food via photosynthesis. They float and cannot move independent of water currents.

**Polyhaline.** Pertaining to waters with a higher range of salinities (18 to 30 parts per thousand).

**Ppt.** Parts per thousand (used as a measurement of salinity).

**Pycnocline.** The portion of the water column where density changes rapidly because of salinity and temperature. In an estuary the pycnocline is the zone separating deep, more saline waters from the less saline, well-mixed surface layer waters.

**Recruitment.** The residue of those larvae that have: (1) dispersed; (2) settled at the adult site; (3) made some final movements toward the adult habitat; (4) metamorphosed successfully, and (5) survived to be detected by the observer.

**Replicate.** An experiment or laboratory test conducted in the exact same way as a previously performed experiment/test to ensure the observed results can be repeated.

**Salinity.** A measure of the salt concentration of water. Higher salinity means more dissolved salts. Usually measured in parts per thousand (ppt).

**Salinity regimes.** A portion of an estuary distinguished by the amount of tidal influence and salinity of the water. The major salinity regimes are, from least saline to most saline:

- *Tidal fresh* – Describes waters with salinity between 0 and 0.5 parts per thousand (ppt). These areas are at the extreme reach of tidal influence.
- *Oligohaline* – Describes waters with salinity between 0.5 and 5 ppt. These areas are typically in the upper portion of an estuary.
- *Mesohaline* – Describes waters with salinity between 5 and 18 ppt. These areas are typically in the middle portion of an estuary.
- *Polyhaline* – Describes waters with salinity between 18 and 30 ppt. These areas are typically in the lower portion of an estuary, where the ocean and estuary meet.

**Saturation.** The state of a compound or solution that is fully saturated. For example, a condition in which water at a specific temperature contains all the dissolved oxygen it can hold. Dissolved oxygen percent saturation is an important measurement of water quality. Cold water can hold more dissolved oxygen than warm water. Also, high levels of bacteria from sewage pollution or large amounts of decomposing plants can cause the percent saturation to decrease. This can cause large fluctuations in dissolved oxygen levels throughout the day, which can affect the ability of plants and animals to thrive.

**Secchi depth.** A measure of cloudiness or turbidity of surface water determined by the depth at which the ‘Secchi disk,’ a flat black and white disk, cannot be seen any more. It is the greatest depth to which light can penetrate underwater.

**Seiching.** Formation of standing waves in a water body due to wave formation and subsequent reflections from the ends. These waves may be incited by earthquake motions (similar to the motions caused by shaking a glass of water), impulsive winds over the surface, or due to wave motions entering the basin. In the Chesapeake Bay, sustained winds force bottom water onto the shallows through this physical process.

**Serial batch spawners.** Producing relatively few, but large eggs over its extensive spawning season.

**Stratification.** The formation, accumulation or deposition of materials in layers, such as layers of fresh water overlying higher salinity water (salt water) in estuaries.

**Submerged Aquatic Vegetation (SAV).** Rooted vegetation that grows under water in shallow zones where light penetrates. Also known as ‘underwater bay grasses’.

**Subpycnocline.** Bottom mixed layer waters located below the pycnocline layer (see definition for ‘pycnocline’).

**Surficial.** Of, relating to, or occurring on or near the surface of the sediment bottom.

**Thermocline.** A specific depth where the water temperature changes dramatically. Warmer surface water is separated from the cooler deep water. This temperature gradient results in the formation of a density barrier.

**Total Suspended Solids (TSS).** Solids in water that can be trapped by a filter (usually with a pore size greater than 0.45 micrometer). TSS can include a wide variety of material, such as silt, decaying plant and animal matter, industrial wastes and sewage. High concentrations of suspended solids can cause many problems for Chesapeake Bay health and aquatic life. For example, high TSS can block light from reaching underwater bay grasses, increase surface water temperature, because the suspended particles absorb heat from sunlight, and affect the ability of fish to see and catch food.

**Trophic level.** Layer in the food chain in which one group of organisms serves as the source of nutrition of another group of animals.

**Turbidity.** The decreased clarity in a body of water due to the suspension of silt or sedimentary material.

**Underwater bay grass.** Submerged vascular plants often referenced in the scientific literature as submerged aquatic vegetation or SAV, not to be confused with emergent wetland plants.

**Virginia Province saltwater dissolved oxygen criteria document.** EPA's *Ambient Water Quality Criteria for Dissolved Oxygen (Saltwater): Cape Cod to Cape Hatteras* referenced in Chapter III "Literature Cited" section as U.S. Environmental Protection Agency 2000.

**Water clarity.** Measurement of how far you can see through the water. The greater the water clarity, the further you can see through the water.

**Water column.** The open-water environment, as distinct from the bed or shore, which may be inhabited by swimming marine, estuarine or freshwater organisms.

**Water-column light requirement.** The amount of light just above the leaf surface (estimated as the fraction of the light at the water surface) that is necessary for the survival and growth of underwater bay grasses.

**Water quality criteria.** Numeric or narrative description of a water quality parameter that represent a quality of water that supports a particular designated use. Adopted by states, along with designated uses, into water quality standards.

**Water quality standards.** A provision of State or Federal law consisting of a designated use or uses for a water body and a narrative or quantifiable criterion protective of the use(s) describing the desired conditions of the subject waters or water body to which they apply.

**Watershed.** A region bounded at the periphery by physical barriers that cause water to part and ultimately drain to a particular body of water.

**Year class.** Most fish species in temperate waters (like those found in the Chesapeake Bay and offshore Virginia) reproduce during a relatively short (one or two month) period each year. That period may be different for each species. Fisheries

scientists refer to all of the fish of any species hatched during one annual spawning period as a year class. For mathematical purposes, fishery analysts often treat members of the year class as if all fish were hatched on one day.

**Young-of-the-year.** All of the fish of a species younger than one year of age. Usually scientists assign an arbitrary 'birth date' to all fish of a species hatched over a two or three month period in one year. The fish are then assigned to Age 1 status on that birth date. By convention, this is usually January 1.

**Zooplankton.** A community of floating, often microscopic animals that inhabit aquatic environments. Unlike phytoplankton, zooplankton cannot produce their own food, and so are consumers.