WATER QUALITY
Glossary of Terms and Parameter Definitions

MONITORED PARAMETERS

- **PHYSICAL PARAMETERS:** Water temperature, pH, Salinity, Specific conductance (Conductivity), Dissolved oxygen (DO), Dissolved oxygen saturation, Turbidity, Total suspended solids (TSS), Total dissolved solids (TDS), Volatile Suspended Solids (VSS), Color, Alkalinity, Hardness (Mg + Ca), Chloride, Sulfate.

- **BIOLOGICAL PARAMETERS**: Chlorophyll, Fecal coliforms, Enterococcus bacteria.

- **WEATHER CONDITIONS:** Air temperature, Cloud cover, Wind direction, Wind velocity, Weather code.

- **NUTRIENTS:** Ammonia/Ammonium, Nitrite + Nitrate (NOX), Total Kjeldahl Nitrogen (TKN), Total Nitrogen (TN), Total Phosphorus (TP); Orthophosphate (OP).

- **METALS, METALLOIDS, AND NONMETALS:** Aluminum, Antimony, Arsenic, Barium, Beryllium, Cadmium, Calcium, Chromium, Copper, Iron, Lead, Magnesium, Manganese, Molybdenum, Nickel, Potassium, Selenium, Silica, Silicon, Silver, Sodium, Strontium, Tin, Thallium, Vanadium, Zinc.

DESCRIPTIONS OF PARAMETERS

ALKALINITY: Total alkalinity is a measure of water's capacity to neutralize acids. The alkalinity of a waterbody is influenced by the soils and bedrock minerals found in its watershed and by the amount of contact the water has had with them. For example, lakes in limestone regions, which are rich in calcium carbonate, often tend to have higher values for alkalinity. Those in sandy soil regions, which are poor in calcium carbonate, often tend to have lower values. Alkalinity (and its opposite, acidity) can also be influenced significantly by the presence of several different substances such as phosphorus (in phosphatic soils and rocks), nitrogen (from ammonia), silica (from silicates), organic acids (like humic acids), and gases (specifically carbon dioxide and hydrogen sulfide).

CHLORIDE: Chlorides are salts resulting from the combination of the gas chlorine with a metal. Some common chlorides include sodium chloride (NaCl) and

magnesium chloride ($MgCl_2$). Small amounts of chlorides are required for normal cell functions in plant and animal life. Chloride concentrations of between 1 and 1000 ppm (parts per million) are normal in freshwater. Sodium chloride may impart a salty taste at 250 mg/L; however, calcium and magnesium chloride are not usually detected by taste until levels of 1000 mg/L are reached.

CHLOROPHYLL: Chlorophyll is a photosynthetic pigment found in almost all plants and phytoplankton. By measuring the amount of chlorophyll 'a' in a water sample, the amount of algae in the water can be determined. Other photosynthetic pigments often measured along with chlorophyll a are chlorophyll b, chlorophyll c, and carotene. Their colors are all different and found in differing amounts in plants and phytoplankton species.

CLOUD COVER: Measurements of cloud cover are approximated in the field and are recorded from zero cloud cover (cloudless) to 100% cloud cover (complete overcast). Cloud cover influences chlorophyll production, Secchi depth measurements and air temperature.

COLOR: Color is the hue of the sampled water and is determined by using a subjective test which involves comparing the sample with known concentrations of colored solutions. Natural metallic ions (iron and manganese), humus and peat materials, plankton, tanins, and industrial waste influence the color of water bodies. Turbidity can also influence color.

DISSOLVED OXYGEN: Dissolved oxygen (DO) is gaseous oxygen (O_2) present in water. The rate at which oxygen is absorbed by water depends on temperature, salinity and atmospheric pressure and wind velocity. Low temperature, low salinity and lower altitudes are ideal factors for higher absorption of oxygen. Dissolved oxygen may range from near 0 mg/L at springs where no oxygen is present or where there are large populations of fish, high levels of bacteria and even the presence of pollution, to high levels as much as 15 mg/L during high aeration caused by winds as well as high production from aquatic plant life during photosynthesis (e.g., an algae bloom). Dissolved oxygen can indirectly represent the quality of a water body.

ENTEROCOCCUS BACTERIA: Enterococcus is used as an indicator organism whose presence determines the degradation of water quality. Enterococcus is a subgroup of fecal streptococci. The resistance of enterococcus to a wide range of temperatures and pH makes it an ideal and efficient bacteria for lab analysis of water samples.

FECAL COLIFORM BACTERIA: Fecal Coliform bacteria are naturally found in the lower intestines of humans and other animals. The detection of Fecal Coliform bacteria in a water body indicates contamination from human or animal waste.

HARDNESS (Mg + Ca): refers to the concentration of calcium and magnesium ions in the water. These, along with other minerals (Iron), are commonly present in all natural water. Water hardness in most groundwater is naturally occurring from weathering of limestone, sedimentary rock and calcium bearing minerals, and it can also occur in groundwater locally from chemical and mining industry effluent or excessive application of lime to the soil in agricultural areas.

NITRATE (NO_3)/NITRITE (NO_2) as NO_X: Nitrogen comes in many forms including atmospheric nitrogen (N_2), ammonia (NH^3), nitrite (NO_2) and nitrate (NO_3). Kjeldahl Nitrogen (TKN) is a measure of organic nitrogen plus ammonia/ammonium and is used along with NO_2 and NO_3 in determining Total Nitrogen (TN). Much of the nitrogen in surface waters comes from the atmosphere which is converted by nitrifying bacteria to ammonia, and then to nitrites which are both toxic, however, nitrogen-fixing bacteria convert nitrites to nitrates, which is a form of nitrogen necessary for plant growth. As plants, algae, and aquatic fauna die and decay, ammonia and nitrites are produced against the sediment of the water body. These are again converted by bacteria to nitrates which is a nutrient for plant and algae growth. Too much nitrogen causes excessive algae and plant growth, which in turn can lead to numerous water quality problems. Normal levels of Nitrate-Nitrite in unpolluted waters are less than 1 mg/l; levels above 10 mg/l are unsafe for drinking water. Nitrate-Nitrite levels can be elevated by contamination from human and animal waste, decomposing organic matter and fertilizer runoff.

ORTHO-PHOSPHATE: The inorganic form of phosphorus commonly found in waterbodies. This form is readily available for use by aquatic life. The demand of ortho-phosphorus is often so high and chemically reactive that high concentrations of this compound are rare. When dissolved oxygen concentrations are above 2 mg/l, ortho-phosphorus combines with iron and forms a precipitate, which sinks into the sediments and becomes unavailable for algae.

pH: The term pH refers to the concentration of hydrogen ions (H^+) present in the water. If a water sample has more hydrogen ions versus hydroxide ions (OH^-), the water is acidic. If more hydroxide ions are present, then the solution is basic. Measurements of pH are on a scale of 0 to 14 standard units, with 7 being neutral; below 7 acidic, and above 7 alkaline. The pH of a water body plays a significant role on aquatic life. Fluctuations in pH may cause previously trapped toxins in sediment to be released. In addition, slight

variations of ammonia concentrations causing changes in pH can be toxic to fish. Excess storm water runoff from land may saturate saltwater with freshwater, lowering the pH.

SALINITY/CONDUCTIVITY: Salinity is the measure of all salts present in a water body. Salts can include calcium, magnesium, sodium, chloride, bicarbonate, nitrate, potassium, manganese, and sulfate. Units of salinity are most commonly expressed as parts per thousand, ppt or ppth. Salinity and conductivity are directly proportional, the higher the amounts of dissolved salts, the higher the conductance. Conductivity measures the ability of electricity to pass through an aqueous solution. Ions must be present in order to conduct a current. Conductivity is measured in units of millisiemens per centimeter, mS/cm. Both parameters are measured in the field using a field study instrument, whose range is 0 to 70 ppt for salinity and 0 to 80,000 mS/cm of reading for conductivity. Salinity and conductivity are unique for freshwater and saltwater bodies. Tides and storm water events affect salinity concentrations and conductivity measurements. In addition, when precipitation is lower than evaporation, salinity and conductivity values rise. Specific conductance in Volusia County's springs is generally around 2,500 mS/cm with a salinity value of less than 1 ppth (fresh water), whereas conductivity in Mosquito Lagoon is around 40,000 mS/cm and salinity of 28 ppth (salt water).

SECCHI DISK: The Secchi disk is a field instrument used to measure the clarity of water. The disk is 20 cm in diameter with black and white quadrants and is attached to a rope with metric length notations. The test is subjective in that the reader approximates the distance at which the Secchi disk can no longer be viewed as it gets deeper into the water. The Secchi depth is significant in that it separates water levels receiving different amounts of sunlight.

SULFATE: The most common form of sulfur in well-oxygenated waters is sulfate. When sulfate is less than 0.5 mg/L, algal growth will not occur. On the other hand, sulfate salts can be major contaminants in natural waters. Sulfates are a combination of sulfur and oxygen and are a part of naturally occurring minerals in some soil and rock formations that contain groundwater. The mineral dissolves over time and is released into groundwater. In addition, this problem may be related to a community hazard, such as a landfill, leaky fuel tank, pipeline, old septic system, chemical lab, and many other community hazards.

TOTAL COLIFORM BACTERIA: Total coliform is the sum of all forms of coliform present. The detection of coliform colonies indicates that human or animal feces may be present. If coliforms are detected, the sample is then further tested for specific types of bacteria present.

TOTAL DISSOLVED SOLIDS (TDS): Dissolved solids are those materials that are present after the water sample has been filtered and evaporated. The dissolved solids concentration in water is the sum of all the substances, organic and inorganic, dissolved in water. Calcium, magnesium, sodium, potassium, bicarbonate, sulfate, chloride, nitrate, and silica typically make up most of the dissolved solids in water. Combinations of these ions—sodium and chloride, for example—form salts, and salinity is another term commonly used to describe the dissolved solids content of water. Solubility of rocks and soils in contact with the water body influences the amount of dissolved solids present.

TOTAL KJELDAHL NITROGEN (TKN): Total Kjeldahl nitrogen refers to the sum of free-ammonia (NH_3) and organic matter present in a water sample. The value for Total Nitrogen comes from the combined values of TKN and NOx.

TOTAL PHOSPHORUS: Phosphorus occurs naturally in water and is a source of nutrients for aquatic life. Excess phosphorus increases chlorophyll levels through growth of aquatic plants and algae which can result in algae blooms, causing a number of negative impacts in water bodies. Sources of phosphorus pollution varies, but may include human and animal waste, fertilizers and from wastewater containing detergents. Phosphorus concentrations higher than 0.03 mg/l may begin to adversely affect plant life. Total phosphorus is the sum of all phosphorus found in water. This form includes all the phosphorus incorporated in living and dead cells, sediments and other chemicals. Total phosphorus is a good indicator as to the health of a waterbody. Excessive amounts of total phosphorus may indicate high algae populations and may result in fish kills.

TOTAL SUSPENDED SOLIDS (TSS): TSS are the concentration of suspended particles in a sample of water. High concentrations of suspended solids are often caused by excessive concentrations of phytoplankton, zooplankton, particles in storm water runoff, and high winds which re-suspend fine particles of bottom sediments. All of these will reduce light penetration for beneficial aquatic life. High TSS caused by sediments may affect oxygen concentrations by limiting the amount of light available for photosynthesis. Suspended particles may also carry nutrients and pesticides. In addition, these suspended particles absorb heat from sunlight, raising water temperatures. In general, there is correlation between turbidity and total suspended solids, i.e. when turbidity is high TSS are usually also high. The correlation cannot be calculated however due to the variation in size and shape of the particles involved.

TURBIDITY: Turbidity is the measurement of the optical property that causes light to be scattered and absorbed by suspended particles such as plankton, other microscopic organisms, clay, silt, and others. Storm water events typically increase turbidity from particulates in water runoff. Turbidity of a water body impedes light penetration, which ultimately affects submerged aquatic vegetation.

WATER TEMPERATURE: The monitoring of water temperature of a body of water indirectly indicates the types of biological activity occurring at various temperatures. Water temperature also indicates types of species that may be found in the water body. Significant changes in water temperature, $1^{o}C$ to $2^{o}C$ within a 24-hour range, may cause thermal stress or shock to aquatic life. Industry and utility plants' discharge water and storm water may be a source of thermal pollution.

WIND DIRECTION: Wind direction is a subjective test in that it's approximated in the field by the sampler using a compass. Measurements are such that North is 0^{o}, East is 90^{o}, South is 180^{o} and West is 270^{o}.

WIND VELOCITY: Wind speed may influence other parameters such as turbidity, TSS and TDS as it stirs up sediment. Wind speed is determined in the field using a hand held wind meter and is measured in miles per hour (mph). Wind is the primary method for mixing to occur. During mixing, large volumes of surface water are exchanged with deeper water. Once in contact with the atmosphere, the deeper water can absorb oxygen. Often the highest concentration of DO occurs on very windy days.

METALS IN SURFACE WATER

Metals tend to adhere to sediment; they can be carried by suspended sediment in streams and rivers to lakes where the sediment and metals settle to the bottom. The history of metal contamination in a watershed is recorded in the water body sediments, and by collecting and analyzing cores of those sediments, the watershed's contamination history can be reconstructed. Heavy metals can contaminate private wells through groundwater movement and surface water seepage and run-off. Metals from mining operations, petroleum refineries, electronics manufacturers, municipal waste disposal, cement plants, and natural mineral deposits can contribute metals to surface waters and sediment.

ALUMINUM: Aluminum is one of the most abundant elements in the earth's crust and occurs in many rocks and ores, but never as a pure metal. The presence of aluminum ions in streams may result from industrial wastes but is more likely to come from the wash water of drinking water treatment plants. Many aluminum salts are readily soluble; however, there are some that are very insoluble. Those that are insoluble will not exist long in surface water, but will precipitate and settle. Waters containing high concentrations of aluminum can become toxic to aquatic life if the pH is lowered (as in acid rain).

ARSENIC: Some natural sources of arsenic are from rock and soil, volcanic activity, and production of arsenic compounds by some marine animals and plants. Anthropogenic sources of arsenic include mining/smelting of copper, gold, lead and zinc ores; leaching from CCA (chromated copper arsenate) pressure treated wood used to prevent deterioration from fungal attack; agricultural pesticides and herbicides; burning coal and diesel fuel; decolorizing glass in the glass industry; creation of semiconductors in computers and computer chips; and in smaller quantities in making of paint pigments, bullets, fireworks, and some pharmaceuticals.

ANTIMONY: Antimony is used in the fire retardants used in making children's clothing, toys, aircraft, and automobile seat covers. It's used in making ceramic glazes, electronics, batteries, and solder. Antimony is also added to polyester resins and fiberglass composites for such items as light aircraft engine covers. It can also come from discharge from petroleum refineries.

BARIUM: Barium can suggest the presence of industrial waste, mixing of natural saline and brine waters, salt water intrusion, discharge of drilling wastes and metal refineries, and erosion of natural deposits. In addition, barium can be found in landfill leachate, coal waste, paints, corrosion inhibitors, and high octane fuels. It is used to make dyes, fireworks, ceramics, electrical components, and glass, plus it is used as a component in drilling muds.

BERYLLIUM: The major source of beryllium in the environment is the combustion of fossil fuels. Beryllium enters the waterways through weathering of rocks and soils, through atmospheric deposition and through discharges from industrial and municipal operations such as metal refineries and coal-burning factories and from discharge from electrical, aerospace, and defense industries.

CADMIUM: Cadmium enters the aquatic environment through natural and human processes. Through erosion of natural deposits, it is widely distributed in the environment at low concentrations. High concentrations, however, can be found in sewage sludge. Human sources such as mining and urban processes like metal plating, manufacture of batteries, paint pigments, and plastics contribute approximately 90 percent of the cadmium found in surface waters. Cadmium is a non-essential element and it diminishes plant growth. It is considered a potential carcinogen.

CALCIUM: Calcium is naturally present in water. It may dissolve from rocks such as limestone, marble, calcite, dolomite and others. Most calcium in surface water comes from streams flowing over calcium-containing rocks and minerals, and groundwater and underground aquifers leach even higher concentrations of calcium ions from rocks and soil. Calcium is a determinant of water hardness, because it can be found in water as Ca^{2+} ions. Magnesium is the other hardness determinant.

CHROMIUM: Chromium compounds can be found in waters only in trace amounts. The element and its compounds can be discharged in surface water through various industries such as from steel and pulp mills and through erosion of natural deposits. Wastewater usually contains about 5 ppm of chromium. Chromium may be applied as a catalyser, in wood impregnation, in audio and video production and in lasers. Through waste incineration it may spread to the environment when protection is insufficient.

COPPER: Copper is an abundant trace element that occurs naturally in the Earth's crust and surface waters and is found in aquatic systems as a result of both natural and anthropogenic sources. Natural sources of copper in aquatic systems include geological deposits, volcanic activity, and weathering and erosion of rocks and soils. Anthropogenic sources of copper include mining activities, agriculture, metal and electrical manufacturing, sludge from waste water treatment plants, pesticide use and more. A major source of copper in the marine environment is antifouling paints, used as coatings for ship hulls, buoys, and underwater surfaces, and as a contaminant from decking, pilings and some marine structures that used chromated copper arsenate (CCA) treated timbers. Copper can be found as a pure metal in nature and has a high thermal and electrical conductivity. Copper compounds are generally found as copper (II) salts. Copper is an essential nutrient at low concentrations, but is toxic to aquatic organisms at higher concentrations.

IRON: Iron is the fourth most abundant element, by weight, in the earth's crust. Iron is a trace element required by both plants and animals. It is a vital part of the oxygen transport mechanism in the blood (hemoglobin) of all vertebrate and some invertebrate animals. Natural waters contain variable amounts of iron depending on the geological area and other chemical components of the waterway. Iron in groundwater is normally present as ferrous iron, which is soluble. It is easily oxidized to ferric iron or insoluble iron upon exposure to air. This precipitate is orange-colored and often turns streams orange. Ferrous and ferric ions are the primary forms of concern in the aquatic environment. Black or brown swamp waters may contain iron concentrations of several mg/L in the presence or absence of dissolved oxygen, but this iron form has little effect on aquatic life.

LEAD: Lead reaches water bodies either through urban runoff or discharges such as from sewage treatment plants and industrial plants. It also may be transferred from the air to surface water through precipitation (rain or snow). Toxic to both plant and animal life, lead's toxicity depends on its solubility and this, in turn, depends on pH and is affected by hardness.

MAGNESIUM: Magnesium is a common component of water. Magnesium is found in many geologic formations, including dolomite. It's an essential nutrient

for all organisms and is found in high concentrations in vegetables, algae, fish, and mammals. Natural sources contribute more magnesium to the environment than do all human activities combined. Magnesium is found in algal pigments (known as chlorophyll) and is used in the metabolism of plants, algae, fungi, and bacteria. Freshwater organisms need very little magnesium compared to the amount available to them in water. Because there is such little biological demand for magnesium compounds and because they are highly soluble, magnesium concentrations in waterbodies fluctuate very little. Elevated (high) magnesium concentrations, can cause water to be designated as "hard" water. Elevated calcium concentrations can have the same affect.

MANGANESE: Manganese is a mineral that is found naturally in the environment and is one of the most abundant metals on the earth's surface, in air, water, and soil. It can be found in both groundwater and surface water from natural sources or as a result of human activity such as mining and industrial discharge. Manganese is used in various industries, including the manufacture of iron and steel alloys, batteries, glass, fireworks, various cleaning supplies, fertilizers, varnish, fungicides, cosmetics, and livestock feeding supplements. In general, manganese is more prevalent and found at higher concentrations in groundwater than surface water.

MOLYBDENUM: Molybdenum is present in trace quantities in most rocks and soils and at concentrations less than, and often orders of magnitude less than, 10 μg/L in most freshwaters. It is the most abundant transition metal in open seawater (10 ug/L). Molybdenum is a naturally occurring metal that is essential for life. Molybdenum is used to make cast iron, stainless steel, biofuels, solar panels, catalysts, lubricants, and pigments.

NICKEL: Nickel is essential in proper growth and development of certain plants and has vital roles in a wide range of morphological and physiological functions, such as germination of seeds and productivity. However, at high levels nickel alters the metabolic activities of the plants inhibiting enzymatic activity, photosynthetic electron transport and chlorophyll biosynthesis. Nickel is a transition element extensively distributed in the environment, air, water, and soil. It may derive from natural sources and anthropogenic activity. Phosphate fertilizers contain traces of nickel. Nickel is often present in agricultural soils situated near fossil fuel industries. Environmental pollution from nickel may be due to industry, the use of liquid and solid fuels, as well as municipal and

industrial waste. Nickel-based enzymes are well known in bacteria, algae, and plants.

POTASSIUM: Potassium is an important mineral and a nutrient necessary for plant growth and animal nutrition. Because potassium concentrations in freshwaters are generally adequate for meeting the nutritional needs of the biological community, potassium is not usually considered as being a limiting nutrient like phosphorus and nitrogen. Marine waters have higher average potassium concentrations than freshwater. If potassium concentrations in a coastal area waterbody are uncharacteristically high, it may indicate saltwater is seeping through the ground into the waterbody, called saltwater intrusion. Potassium is found in many soils. Natural sources of potassium are numerous in aquatic environments. Man-made sources include industrial effluents and run-off from agricultural areas from fertilizers.

SELENIUM: Selenium is a naturally occurring element present in sedimentary rocks, shales, coal and phosphate deposits and soils. There are around 40 known selenium-containing minerals but all are rare and generally occur together with sulfides of metals such as copper, zinc and lead. Selenium is a nutritionally essential element for animals in small amounts, but toxic at higher concentrations. Selenium bioaccumulates in the aquatic food chain and chronic exposure in fish and aquatic invertebrates can cause reproductive impairments (e.g., larval deformity or mortality). Selenium can also adversely affect juvenile growth and mortality. Selenium is also toxic to water fowl and other birds that consume aquatic organisms containing excessive levels of selenium.

SILICA: Silicon dioxide, also known as silica, silicic acid or silicic acid anhydride is an oxide of silicon most commonly found in nature as quartz and in various living organisms. In many parts of the world, silica is the major constituent of sand. It is used in structural materials, microelectronics (as an electrical insulator), and as components in the food and pharmaceutical industries. Silica is considered an essential micronutrient for microorganisms and diatoms (a type of algae). These organisms use silica to form shells and other protective structures. Diatoms are capable of using large amounts of silica, and diatom populations may be limited when silica is in short supply. Silica concentrations in water are affected by several mechanisms. As diatom populations increase, the rate at which they pull silica from the water also increases, usually in the spring. This can result in a decline of

silica concentrations in the water. Silica is removed from the water column altogether when diatoms die and sink to the bottom, forming silica-enriched sediments. When pH is above 7, the amount of dissolved silica in the water column is affected by the presence of iron and aluminum; either one can reduce the amount of dissolved silica in the water column. The amount of silica in the water column can increase when humic compounds (organic substances that make water tea-colored) are present.

SILICON: Silicon is the most abundant element on earth after oxygen. Silicon compounds are found in all living organisms. Large amounts of silicon can be found in various minerals and it is abundant in oceans and nearly all other waters as silicic acid. In ecosystems, the silicon and phosphorus ratio and the silicon and nitrogen ratio are thought to contribute to the type of algae that will dominate, for example, diatoms versus cyanobacteria.

SODIUM: Sodium is often associated with chloride; common table salt is mostly sodium chloride. Sodium is used extensively in industrial processes, food processing, and in some water softening devices. All waters contain sodium. Sodium is essential to all animals and some microorganisms and plants. As sodium concentrations increase in a waterbody, there can be a continuous transition from freshwater organisms to those adapted to brackish water and then ultimately, to marine (saltwater) organisms. High sodium concentrations can be expected in areas near the coast that receive sodium-enriched groundwater from saltwater intrusion; in areas where evaporation is excessive (perhaps in hot and/or dry climates); and in areas receiving human pollution including agricultural runoff containing fertilizer residues, discharges containing human or animal waste, and backwash from water softeners using the sodium exchange process.

TIN: Tin in the form of Tributyltin (TBT) is a highly toxic biocide that has been used extensively to prevent the growth of marine organisms on the hulls of large ships since 1960. It is a problem in the aquatic environment because it is extremely toxic and is linked to immuno-suppression and imposex (development of male characteristics in females) in snails and bivalves, and can be persistent. Tin is possibly a dietary requirement for a number of organisms as it is part of gastrine, a stomach and intestinal hormone. Plants readily absorb tin, but do not apply it. It usually remains within plant roots. A very small amount of tin in the form of tin oxide naturally occurs in most soils; however, peat contains higher

amounts. Tin is also used for various industrial purposes such as slime control in paper mills, disinfection of circulating industrial cooling waters, antifouling agents, and the preservation of wood. It is a constituent of fire extinguishers, and of electro-industrial wastewater. When security measures are inadequate, tin and tin compounds may end up in the environment.

THALLIUM: Thallium is a toxic heavy metal released into the biosphere from both natural and anthropogenic sources. It is generally present in the environment at low levels; however, human activity has greatly increased its content. Atmospheric emission and deposition from industrial sources have resulted in increased concentrations of thallium in the vicinity of mineral smelters and coal-burning facilities. Thallium and thallium-based compounds exhibit higher water solubility compared to other heavy metals. The toxicity of this element is higher compared to mercury, cadmium and lead.

VANADIUM: Vanadium is found in about 65 different minerals and in phosphate rock, certain iron ores and some crude oils in the form of organic complexes. Vanadium can be found in trace amounts in many types of food, including mushrooms, black pepper, parsley, dill weed, shellfish, beer, wine and grain.

VOLATILE SUSPENDED SOLIDS (VSS): VSS represents the volatile matter present in the solid fraction of the total suspended solids from the water sample. The solids are ignited in an oven at 550oC to 600oC and re-weighed. VSS data is critical in determining the operational behavior and biological concentration throughout the system.

ZINC: Zinc is found naturally in many rock-forming minerals. Because of its use in the vulcanization of rubber, it is generally found at higher levels near highways. It also may be present in industrial discharges. It is used to galvanize steel, and is found in batteries, plastics, wood preservatives, antiseptics, and in rat poison. Zinc is an essential element in the diet. It is not considered very toxic to humans or other organisms.

REGULATORY TERMS

CLASSIFICATION OF WATER BODIES: The Clean Water Act requires that the surface waters of each state be classified according to designated uses. Florida has five classes with associated designated uses, which are arranged in order of degree of protection required:

- **Class I - Potable Water Supplies** - Numerous lakes, creeks, rivers, impoundments and springs throughout the state are used for drinking water.
- **Class II - Shellfish Propagation or Harvesting** - These are generally located in bays, estuaries, and tidal creeks where commercial shellfish harvesting occurs.
- **Class III - Recreation, Propagation and Maintenance of a Healthy, Well-Balanced Population of Fish and Wildlife** - All surface waters of the state are Class III unless described in rule 62-302.400 F.A.C.
- **Class IV - Agricultural Water Supplies -** Generally located in agriculture areas around Lake Okeechobee.
- **Class V - Navigation, Utility and Industrial Use -** Currently there are no class IV bodies of water in Florida.

TMDL: A **Total Maximum Daily Load** is a regulatory term in the U.S. Clean Water Act, describing a value of the maximum amount of a pollutant that a body of water can receive while still meeting water quality standards (Surface Water Quality Standards – Chapter 62-302) (see CLASSIFICATION OF WATER BODIES above). Water bodies that do not meet water quality standards are identified as "impaired" for the particular pollutants of concern--nutrients, bacteria, mercury, etc.--and TMDLs must be developed, adopted and implemented for those pollutants to reduce pollutants and restore the water body. Alternatively, TMDL is an allocation of that water pollutant deemed acceptable to the subject receiving waters.

BMAP: A **Basin Management Action Plan** proceeds from an adopted TMDL and provides a plan of action for stakeholders to implement the strategies in the BMAP to restore water quality. Allocations with required pollutant load reductions are administered to stakeholders and restoration projects are produced and implemented. A periodic re-evaluation of the effectiveness of the BMAP takes place to review progress and make appropriate changes in the plan.

RAP: A **Reasonable Assurance Plan** may be developed prior to and instead of a TMDL for impaired waterbodies when local and state stakeholders have control programs already being implemented to reduce pollutant loadings. Periodic meetings may also take place to determine progress and review water quality trends.

WBID: An acronym for Waterbody Identification coined by the Florida Department of Environmental Protection (FDEP) to identify waterbody segments as a unique unit, such as a lake or segment of a stream, river, or estuary. WBIDs have a unique number associated with each one.

NPDES: National Pollutant Discharge Elimination System. An NPDES permit is typically a license for a facility to discharge a specified amount of a pollutant into a receiving water under certain conditions. Permits may also authorize facilities to process, incinerate, landfill, or beneficially use sewage sludge.

MS4: A Municipal Separate Storm Sewer System is a publicly owned system of conveyances used for collecting or conveying storm water and that discharges to surface waters of the state.

WIN: Watershed Information Network, FDEP's data management platform, successor to STORET (STOrage and RETrieval).