Glossary of Technical Terms

Accretion: The gradual addition of new material on top of older sediments or soils.

Accuracy: The closeness of a measured value to the true value (as opposed to precision).

ACME Project The Aquatic Cycling of Mercury in the Everglades Project. Process-oriented mercury research program organized by the U.S. Geological Survey.

Acre-foot: The volume of liquid required to cover one acre to a depth of one foot.

Adverse Impact: The deterimental effect of an environmnental change relative to desired or baseline conditions.

Agricultural Privilege Tax: An annual tax levied on farming activities in the EAA and C-139 basins to support Phase 1 of the Everglades Program.

Analyte: A chemical species measured in a water sample.

Apple Snails: The Florida Apple Snail (*Pomacea paludosa*) is a gastropod mollusk found commonly in shallow wetland environments in South Florida. It is the primary food of the endangered Everglades Snail Kite.

Aquifer: A porous layer in the ground where water can be stored.

Baseline Period: A specified period of time during which collected data are used for comparisons with future data.

Benthic: Bottom dwelling organisms (e.g., benthic insects).

Best Management Practices: Land, industrial and waste management techniques that reduce pollutant loading from an industry or land use.

Biogeochemistry: The study of the form, fate and movement of elements through biological, geological and chemical materials.

Biomass: The weight of living material, usually as dry mass.

Bulk density: The mass of soil in a given volume.

Chlorophyll: Green pigments found in plants and essential for photosynthesis.

Conductance: The ability of an aqueous solution to carry an electric current; used as a measure of total dissolved solids.

CompQAP: Comprehensive Quality Assurance Plan. A plan for quality assurance in sampling and analytical techniques applied to all monitoring required by the Department.

Decomposition: The action of microorganisms causing the breakdown of organic compounds into simpler ones and the release of energy.

Discharge: The rate of water movement, as volume per unit time (cubic feet per second).

Dissolved organic carbon: The organic fraction of carbon in water that is dissolved (not filterable) (DOC).

8.5 Square Mile Area (8.5 SMA): Area of low-lying land east of the L-31 N levee in Miami-Dade County.

Emergent macrophytes: Rooted vascular plants in inundated areas that extend above the water surface.

Eutrophication: The natural or cultural enrichment of an aquatic environment with plant nutrients leading to rapid ecological changes and high productivity (adj. eutrophic).

Evapotranspiration: The process by which water is released to the atmosphere by evaporation from the water surface or movement from a vegetated surface (transpiration).

Everglades Mercury Cycling Model: An integrated model of mercury cycling being refined under the auspices of DEP, USEPA and SFWMD.

Everglades Stormwater Program: A program to ensure that water quality standards are met at all structures not included in the Everglades Construction Project.

Everglades Trust Fund: A fund created by the law (Ch.97-258) to support ecosystem restoration.

Excursion in water quality data: A constituent concentration that is of potential concern as an apparent violation of a water quality criterion. 'Excursion' indicates some uncertainty in the interpretation of the reported value that must be evaluated by examination of background conditions, ancillary data, quality assurance and historic data before the datum is considered an exceedance or 'violation' of a water quality criterion. DEP is responsible for data review to determine violations of water quality criteria and standards.

Exotic or Invasive Species: Exotic species are kinds of plants and animals not normally found in an area. Often such species are highly invasive and dominating to native forms. Examples of exotic species in South Florida include cichlid fishes, melaleuca trees, Brazilian pepper, Australian pine and torpedograss.

Florida Atmospheric Mercury Study: A study to quantify deposition of mercury from the atmosphere.

Flow-Weighted Mean Concentration: The average concentration of a substance in water corrected for the volume of water flow at the time of sampling; samples taken when flow is high are given greater weight in the average, and flow-weighted concentrations can be used to calculate mass loading at a particular location.

Hectare (ha): A unit of measure in the metric system equal to 10,000 square meters (2.47 acres).

Hydraulic residence time: The length of time that water resides in a body of water or specified area (HRT).

Hydropattern: Water depth and duration, along with the quantity, timing and distribution of surface water to a specific area; critical for maintaining various ecological communities in wetlands.

Hydroperiod: Depth and duration of inundation in a particular wetland area.

Invertebrates: Small animals, such as insects, crayfish, mollusks, and annelids, that do not have a backbone. These animals are often important components of ecosystem food webs and can be indicators of ecosystem status.

Labile phosphorous: Phosphorous that can be assimilated easily by aquatic biota.

Loading (Mass loading): The mass of a material entering an area per unit time (e.g., phosphorus loading into Water Conservation Area 2A as metric tons per year).

Macrophytes: Visible plants found in aquatic environments; sawgrass, cattails, sedges and lilies are examples of macrophytes.

Methylmercury: A particularly toxic organic form of mercury that concentrates in aquatic food webs.

Minimum Flow and Level: Florida Statute requires water management districts to set water levels for each major body of water "at which further withdrawals would be significantly harmful to the water resources or ecology of the area…."

Moving average: The arithematic average of a sequence of data within a data set moved and calculated sequentially to smooth the data and reveal trends (e.g., 12-month moving average TP concentration).

Muck soil: Dark, organic soil derived from the decay of plant biomass.

Nutrients: Elements essential as raw materials for the growth of an organism. For aquatic environments, nitrogen and phosphorus are important as nutrients affecting the growth rate of plants.

Oligotrophic: Refers to an environment low in plant nutrients and productivity; unenriched.

Parameter: A variable or constant representing a characteristic of interest, e.g., conductance is a water quality parameter. Usage of this term is highly subjective and varies greatly across disciplines.

Periphyton: The biological community of microscopic plants and animals attached to surfaces in aquatic environments. Algae are the primary component in these assemblages and periphyton can be very important in aquatic food webs, such as those of the Everglades.

Parts per billion: ppb, equivalent to one microgram per liter.

Parts per million: ppm, equivalent to one milligram per liter.

Phosphorus: An element that is essential for life and limits the growth of plants in the Everglades ecosystem. The following tables summarize all the significant definitions of the phosphorous forms used in this Report.

Basic Definition of Various Phosphorus Forms in Water

P-Form	Definition
Orthophosphate (OPO_4)	The most abundant forms of orthophosphates occurring between pH 5 to 9 in aquatic environments are HPO_4^{-2}, $H_2PO_4^-$, PO_4^{-3}, HPO_4^{-2}, $H_2PO_4^-$ (Stumm and Morgan, 1981). The standard procedure is to analyze OPO_4 on samples that have been filtered through 0.45 µm filter*. When analyzed using colorimetric method, some of the condensed polyphosphates and organic phosphates maybe included in the measurement (see Soluble Reactive Phosphate below) (EPA , 1979; APHA, 1989).
Reactive Phosphate: Soluble reactive Phosphate (SRP) or Total Reactive Phosphate (TRP)	Phosphorus form that responds to colorimetric test without preliminary hydrolysis or digestion. Although reactive phosphate is comprised largely of orthophosphates, it may include easily hydrolyzable inorganic and organic forms of P (APHA, 1989, Baldwin, 1998). Reactive phosphate maybe measured in both filtered* (dissolved SRP, the most commonly measured form of SRP) or unfiltered (total reactive phosphate) (EPA, 1979).
Total Phosphorus (TP)	Sum of organic and inorganic forms of phosphorus. TP is measured on unfiltered water samples that has been subjected to oxidative destruction of organic matter (APHA, 1989).
Total Dissolved Phosphorus (TDP)	Phosphorus form present in water that had been filtered through 0.45 µm membrane* then subjected to oxidative digestion process (APHA, 1989). Includes both dissolved organic and inorganic P.
Organic Phosphorus	Phosphorus fraction that has been formed primarily by biological processes. Organic phosphorus is converted to orthophosphate only by oxidative destruction of the organic matter (APHA, 1989). Total organic P maybe quantified by subtracting dissolved hydrolyzable phosphorus and orthophosphate values from total phosphorus (EPA, 1979). Dissolved organic P maybe quantified by subtracting dissolved hydrolyzable P and OPO_4 from TDP result.
Hydrolyzable Phosphorus	Phosphorus in the sample as measured by the sulfuric acid hydrolysis procedure, and minus pre-determined orthophosphates (EPA, 1979). Includes dissolved and particulate condensed phosphate that is converted to dissolved orthophosphate through acidification of the sample (APHA, 1989). It is referred to as Dissolved hydrolyzable P or Total hydrolyzable P, when measured on filtered or unfiltered sample, respectively.
Particulate Phosphorus (referred to also as Total Suspended Phosphorus)	Phosphorus fraction that is adsorbed or absorbed on soil or sediment particles, and maybe comprised of both organic and mineral forms. This fraction is usually quantified by subtracting TDP from TP. Alternatively, this fraction can be measured by subjecting the particulates collected on 0.45 µm* to a rigid digestion procedure and analyzing the digestate for P (APHA, 1989).

Table continued next page

Basic Definition of Various Phosphorus Forms in Water

Inorganic Phosphorus	Form of P that was not formed primarily by biological processes and is usually a collective term that refers to mineral forms of P such as compounds of either aluminum or iron in acidic media, or calcium in calcareous, alkaline media. This fraction generally represents the sum of OPO4 and acid hydrolyzable P, but some of the organic P maybe released as a result of acid hydrolysis.

*As a standard procedure in environmental water analysis, filtration with 0.45 μm separates particulate P from dissolved P fractions. APHA (1989) states that there is no claim being made that filtration through 0.45 μm is a true separation of suspended and dissolved forms of P, and that it is merely a convenient and replicable analytical technique designed to make a gross separation.

Basic Definition of Various Forms of P in Soils and Sediments

P-Form	Definition
Porewater P	Porewater is defined as the water occupying the space between sediment particles (ASTM, 1996). This is usually the measurement of SRP in porewater retrieved on site using porewater wells or equilibrators, or extracted in the laboratory by centrifugation or filtration or both.
Labile P	A term used to refer to reactive and bio-available forms of P. SRP is the most labile form of P (Rigler, 1956; Hutchinson and Bowen, 1950). The extractants used to quantify labile P fractions in soils and sediments are weak solutions of salts (KCl or NH4Cl) or acids. The most common extractant used for labile organic P is 0.5M $NaHCO_3$ (Ivanoff et al, 1998).
Microbial P	P present in microbial cells. When microbial cells are ruptured, P is released in both solution and labile organic P forms. This is most commonly quantified by pre-treating the soil with chloroform, then extracting with 0.5M $NaHCO_3$ and analyzing the extract for TP and/or SRP (Ivanoff et al, 1998).
Inorganic P (IP)	Adsorbed or absorbed in mineral fractions dominated by compounds of either aluminum or iron in acidic soils, or calcium in calcareous, alkaline soils. To isolate inorganic P from soils, stronger acid concentrations are used, ex. 1M HCl (Ivanoff et al, 1998).
Organic P (OP)	Phosphorus present in nucleic acids, phospholipids, inositols and fulvic acids. Total soil organic P maybe quantified by subtracting soil IP from soil TP. Extraction with sodium hydroxide yields a major fraction of organic P compounds; residual organic P may remain in the soil or sediment after extraction (Ivanoff et al, 1998).
Total P	Sum of all inorganic and organic forms of P. Soil TP is quantified using a rigid oxidative process, such as ignition at high temperature followed by acid extraction of residue or using strong acid oxidants, such as perchloric acid, Kjeldahl reagent (mixture of Cupric sulfate, Devarda's alloy, and sulfuric acid), or nitric-sulfuric acid mixture.

References:

American Society for Testing Materials, 2000a. Section E 1391-94. Standard Guide for Collection, Storage, Characterization and Manipulation of sediments for Toxicological Testing. Annual Book of ASTM Standards, 1996. Volume 11-05.

Ivanoff, D.B., K. R. Reddy, and S. Robinson. 1998. Chemical Fractionation of organic phosphorus in selected Histosols. Soil Sci. 163:36-45.

Hutchinson. G.E., and V.T. Bowen. 1950. Limnological studies in Connecticut, IX. A quantitative radiochemical study of the phosphorus cycle in Linsley Pond. Ecol. 31:194-203.

Rigler, F.H. 1956. A tracer study of the phosphate cycle in lake water. Ecol. 37:550-562.

Baldwin, D.S. 1998. Reactive "organic" phosphorus revisited. Wat. Res. Vol. 32, No. 8:2265-2270.

American Public Health Association. 1989. Standard Methods for the Examination of Water and Wastewater, 17th edition. APHA, Washington, D.C.

Environmental Protection Agency (EPA). 1979. Methods for Chemical analysis of Water and Wastes. EPA, Cincinnati, OH.

Stumm, W. and J.J. Morgan. Aquatic Chemistry. An Introduction Emphasizing Chemical Equilibria in Natural Waters. 1981. John Wiley and Sons, Inc., NY.

Precision:	The reproducability of measurements (low precision yields high scatter in data).
Pyropattern:	The extent and frequency of fires across a landscape.
Quality assurance:	A program to provide a means for a product to meet a defined set of quality standards at a specified level of confidence.
Quality control:	Steps to ensure that quality standards are met.
Reactive gaseous mercury:	A form of gaseous mercury in the atmosphere that is deposited readily in rainfall (RGM).
Recalcitrant phosphorous:	Phosphorous that is tighter, bound, and not readily available to biota.
Regulatory Action Strategy:	A suite of projects and programs being developed to address water quality concerns for structures outside the Everglades Construction Project permit.
Regional Environmental Monitoring and Assessment Program:	A program of the USEPA to conduct regional ecosystem assessments of environmental conditions (REMAP).
Ridge and Slough Landscape:	Hypothesized landscape pattern in the Everglades formed by subtle ridges and sloughs in peat sediments.
Scientifically Defensible:	Information that is supportable using accepted scientific methods of data collection and analysis.
Sheet flow:	Water movement as a broad front with shallow, uniform depth.
Soil or Peat Subsidence:	The loss of organic soil and associated elevation due to decomposition, compaction and burning. This process occurs at a high rate when peat soils of the Everglades region are drained.
South Florida Mercury Science Program	A multi-organizational partnership to advance the science involved with mercury.
Species richness:	The number of species occuring in a particular area for a specified sampling period.

Standards: Accepted or legally mandated measures for comparison of quantitative or qualitative values. State water quality standards are composed of the beneficial use classification, numerical criteria applicable to the classification, the Florida antidegradation policy and several provisions in other rules.

Sulfate-reducing bacteria: Microbes found commonly in sediments that transform inorganic mercury into organic methylmercury as a by-product of their metabolism.

Supplemental Technologies: Advanced wastewater treatment techniques that have the potential to supplement STAs and reduce phosphorus to levels of about 10 ppb.

Total Maximum Daily Load: The level of loading to a body of water that will protect uses and maintain complicance with water quality standards (defined in Clean Water Act).

Trophic level: Groups of organisms using or producing energy at a definable level in nature. Plants are lowest trophic level and are the primary producers of biological energy. Grazing and detritus feeding animals are intermediate, and predators, such as bass, wading birds and raccoons, are in the higher trophic level. Metals like mercury accumulate at higher trophic levels, while most energy in nature is stored in lower trophic levels.

Water Preserve Areas: Parcels along eastern border of Everglades Protection Area that will serve as marshes, reservoirs, and recharge areas to separate natural areas from developed lands to the east. Multipurpose water holding areas located along the western border of the urbanized corridor in South Florida.

Water quality criteria: Constituent concentrations, levels or narrative statements representing a quality of water that supports the most beneficial use of the resource.

Water quality standard: Standards are composed of the most beneficial use of water, water quality criteria applied to that use, and the Florida antidegradation.

Water Year The period from May 1 to April 30 of the following year used as the basis of annual data summaries. Chapter 2 uses a Water Year (WY) based on July 1 to June 30, 2000.