

Quality Manual

for

State of Florida
Department of Environmental Protection
Watershed Monitoring Section

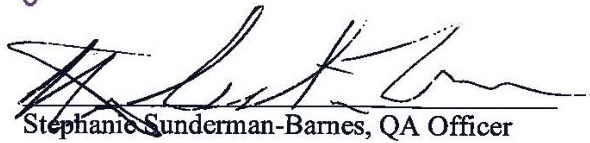
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March 2015


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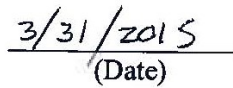

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3.0 Statement of Policy

This Quality Manual for the Florida Department of Environmental Protection's (FDEP) Watershed Monitoring Section (WMS) in Tallahassee, Florida, states the procedures that will be used to ensure that data generated by WMS is of verifiable quality and meets the scientific objectives of the FDEP required by federal and state law, including: sections 104, 106, 305(b), 303(d), 314 and 604 of the Clean Water Act, as amended; 40 CFR Part 31,35, and 131 (EPA); Florida Statute Chapter 403 Environmental Control; Florida Administrative Code Rules 62-160, 62-302, 62-520, and 62-522. The WMS is committed to following good quality assurance (QA) and quality control (QC) management practices to produce all data.

4.0 Ethics Statement

All employees of the FDEP WMS are held to high professional ethical standards in the performance of their duties. All employees are required to read and understand an 'Ethics Statement' attesting to their commitment to honesty and integrity in performance of their duties. Improper, unethical or illegal actions will be dealt with according to the published Administrative Directives of the FDEP.

5.0 Organization and Responsibilities

The WMS encompasses two networks. The Status Monitoring Network (Status Network) is a probabilistic network designed to randomly sample and characterize Florida's fresh water resources and to calculate the proportion of waters meeting water quality standards. The Trend Monitoring Network (Trend Network, previously called the Temporal Variability Network) is a fixed-station-monitoring network designed to detect both short-term variability and long-term trends in targeted waters. Pages 9-12 of the [Status and Trend Monitoring Networks Sampling Manual](#) (WMS Sampling Manual) provides further details regarding the structure and intent of both networks.

The WMS data is collected and generated by in-house FDEP sampling personnel, FDEP Regional Operations Center (ROC) sampling personnel (Southwest, South, Central, and Southeast), three Water Management Districts (Northwest Water Management District, St. John's Water Management District, and South Florida Water Management District) and one local government agency (Alachua County Environmental Protection Department). Each entity participates in data collection for one or both WMS networks. All in-house WMS FDEP sampling personnel are included participants of this Quality Manual, while each external agency is held responsible for producing and managing individual Quality Manuals which address all internal QA/QC activities not bound to them by their contracts or collaborative agreements with WMS. FDEP ROCs are also responsible for producing and managing a Quality Manual which

address all internal QA/QC activities associated with projects that produce data not managed by WMS. Furthermore, all sections of this Quality Manual will apply directly to FDEP WMS personnel and will not include non-FDEP WMS personnel. The WMS is part of the Water Quality Assessment Program in the Division of Environmental Assessment and Restoration.

The WMS is headed by the Environmental Administrator, who is responsible for both the technical and administrative direction of the Section and is committed to the QA program described in this plan.

The Quality Assurance Officer is responsible for the production and timely revision of the Quality Manual and Section Sampling Manual, scheduling all analyses, and for ensuring that regular audits are conducted to demonstrate that the objectives of the Quality Manual and Sampling Manual are being met.

Each sampling entity (FDEP personnel and external agency personnel) is assigned a DEP Project Manager, who manages required contracts (as applicable), handles numerous data review issues, and assists the QA Officer with training and audits. Refer to the [Project Manager Manual](#), pages 1-42 for full project manager duties.

Data management and review is conducted by the Data Manager and staff, who are responsible for collection and processing of fresh water quality monitoring data for both the Status and Trend Networks. They also assist with data management for the Springs Initiative and other special projects. Refer to the [Data Management Standard Operating Procedures](#), pages 1-18 and the [Oracle Generalized Water Information System \(OGWIS\) User's Manual](#), pages 1-26 for full data management duties.

The data analysis staff compile the sampling results for federal and state reporting requirements and public distribution.

An organizational chart describing the relationships of all FDEP WMS staff is provided in Section 11.5.

The FDEP Central Laboratory (Chemistry and Biology Sections) have been selected to perform all analyses for both the Status and Trend Networks until further notice. Refer to the Quality Manuals submitted by these sections for details on QA/QC, organization and responsibilities that are internal to the Central Laboratory.

5.1 Responsibilities of Key Personnel

FDEP WMS firmly believes that all personnel within the Section are vital to the overall quality of data being produced. Therefore, all FDEP WMS employees listed below are “Key Personnel” with a brief description of respective responsibilities. Roles and responsibilities of all personnel are consistent with FA 3200 and 3300 of the FDEP SOPs.

a. Gail Sloane, Environmental Administrator

Supervises the ongoing development and implementation of the statewide Status and Trend monitoring networks. Responsible for developing and directing ground and surface water monitoring programs, providing technical assistance to other monitoring programs in the Program or Division, and providing assistance with the development of water quality standards. Responsibilities also include oversight of in-house staff and contractual relationships with Water Management and FDEP district offices, federal, state, and local government agencies and private firms to implement and maintain network operations. Reviews and approves section Quality Manual annually. Oversees the establishment of specific tasks to analyze data, develop long-term water quality trend information, and ensures that the data are made available to federal, state and to the public. Ensures data are reported to meet requirements in the federal Clean Water Act, state requirements and to the public to assist in making land and water related planning decisions. Assists with technical issues pertaining to the Network. Acts as Agency liaison for Florida Water Resources Monitoring Council. Serves as the financial administrator for a section utilizing differing funding sources, including federal grants (604, and 106), state trust funds (Water Quality Assurance Trust Fund for Ambient Monitoring, and USGS Cooperative) all relating to water quality monitoring programs. Works with division budget personnel regularly to track section budget throughout the fiscal year, authorizes all section expenditures, ensures that funds are spent appropriately and plans future budget needs and activities in a timely manner. Included in these responsibilities are: Coordinating administrative aspects of the Water Quality Trust Fund Ambient Monitoring Network, Supervising staff responsible for developing contracts related to the Network, as well as staff with oversight of field personnel.

b. Stephanie Sunderman-Barnes, Environmental Specialist III (QA Officer)

Provides quality assurance for state-wide surface and ground water Status and Trend monitoring networks. Coordinates sampler training workshop and revises program sampling manual. Maintains section Quality Manual and revises Quality Manual annually. Conducts on-site audits of sampling agencies and field technicians. Schedules laboratory analysis of samples. Reviews results of quality assurance procedures (quarterly reports, equipment blanks, and field blanks). Provides QA oversight for special projects, as needed.

c. Lisa Van Houdt, OPS Environmental Consultant

Provides administrative and technical support to the Florida Water Resources Monitoring Council (Council). Incumbent will participate in all meetings of the Council, and will be responsible for posting required public notices and taking and posting meeting minutes. This position is responsible for tracking Council action items, preparing summary reports, and preparing and

participating in briefings as requested. Position has responsibility to assist coordination with monitoring entities throughout the state, including routine communication with all parties. Incumbent will participate in Watershed Monitoring Section activities, including assistance with preparation of reports required for section/Bureau and Division initiatives, and to meet federal requirements.

d. Shannon Kime, Environmental Specialist III

Coordinates select aspects of Status and Trend network sampling operations within South Florida (DEP South ROC, DEP Central ROC, DEP Southeast ROC, and SFWMD), including data review, sample results notification to landowners and other designated data users, and other related duties as required. Edits data generated by the Monitoring Section, and assists in updating the section's databases. Incumbent will participate in Watershed Monitoring Section activities, including assistance with preparation of reports required for section/Program and Division initiatives, and to meet federal requirements.

e. Kate Muldoon, Environmental Manager

Acts as the principle representative for agency participation in the Florida Water Resources Monitoring Council (FWRMC). This position is the chair of the Florida "Catalog of Monitoring Programs" workgroup, and is the liaison with the University of South Florida Water Atlas team. This person provides coordination with the Catalog project and Water Information Network (WIN) to ensure metadata are compatible between the two applications. This position acts as a contact between coastal and freshwater monitoring for the Division, and assists the FWRMC Coastal Monitoring workgroup. Acts as Project Manager and coordinates select aspects of network sampling operations within Southwest Florida (DEP Southwest ROC), including data review, sample results notification to landowners and other designated data users, and other related duties as required. Edits data generated by the Watershed Monitoring Section, and assists in updating the section's databases.

f. Tom Biernacki, Environmental Manager

Supervises staff working on all aspects of network field sampling operations within the Suwannee and ground water operations in St. Johns regions of the State, including: site reconnaissance, sample collection, data uploading and review, sample results notification to landowners and other designated data users, logistical support, and other related duties as required. Oversees the editing of data generated by the Watershed Monitoring Subsection, and assists in updating the subsection's databases. Assists in coordinating sampling, ensures sampled stations are consistent with Program needs and acts as a contact to help integrate FDEP's Watershed Monitoring Program with other Departmental efforts. In addition to Status and Trend program responsibilities, Tom coordinates and assists with TMDL sampling as

required, and as staff are available. Tom's section also participates with special projects investigations with other groups within the agency.

Tom oversees the development and implementation of GPS standards for the Division of Environmental Assessment and Restoration (DEAR). He instructs Departmental and contractor field staff using differentially corrected Global Positioning System hardware, and related software. Provides technical support for using and trouble-shooting differentially corrected Global Positioning System hardware field computers, field sampling equipment, and related software. Creates a data dictionary or modify an existing one to comply with Locational Data Standards (LDS). He creates GIS files of sampled stations as part of the QA of sampled stations for which he is responsible.

g. Tom Seal, Environmental Specialist III

Coordinates all aspects of network sampling operations within the northwest and northeast regions of Florida with four government agencies: Northwest Florida Water Management District, St. Johns River Water Management District, Alachua County Environmental Protection Department, and the United States Geological Survey (USGS). Tasks include contract management, financial management of invoices, data analysis and review, sample results notification to landowners, and other related duties. Additional tasks include interpreting sediment data produced by the Status Network sampling teams, working with these teams to collect sediment samples for the Department's Me-Hg TMDL project, and managing a contract with the USGS to gauge river discharge at 26 sites in north Florida. Tom is a section liaison to the ESOCs team.

h. Jay Silvanima, Environmental Manager

Development of the WMS data management plan including water quality, biological, chemical, sediment and physical data from the Status and Trend Monitoring Networks. Ensures the maintenance of an Oracle database and interactive applications which incorporate field generated data and allow the review and distribution of field and analytical data. Ensures all data collected by the WMS are loaded into the database. Currently there are over 2 million rows of water quality results in the database collected from 1981 to present. Coordinates the data analysis and reporting of WMS data for the annual statewide Status report, the biennial US EPA 305(b) Report, the triennial Status zone reports, and other periodic reports as necessary. Ensures the smooth and timely flow of data from WMS field sampling and laboratory sources to the Florida STORET database. Ensures that sites collected for the Springs and WMS monitoring networks are geo-referenced in accordance with the Department's and Division's Locational Data Standards. Supervises four OPS employees: Theresa Bouie, Rick Copeland, Chris Sedlacek, and Andy Woeber.

i. Theresa Bouie, OPS Environmental Consultant

This position is responsible for managing an Oracle Database (GWIS) and associated applications used to store, reconnaissance, review, and report Status, Trend, and Springs data. The database houses more than 2.25 million water quality results collected from 12150 stations. This includes 1.17 million results coming from 4995 wells. Due to the constraints of STORET none of the well data are in STORET, nor is there an application available to the public to retrieve these ground water data, therefore public data requests for ground water need to be handled as Ad Hoc queries on the database. Responsibilities include 1) loading approximately 900 new stations and 78,000 results annually for the Watershed Monitoring and Ground Water Protection Sections, 2) loading approximately 6,250 candidate selections for the Status Monitoring Network, 3) deployment and maintenance of an in-house client oracle forms application used for data review, 4) managing the existing Oracle database and associated applications for the Division's changing needs.

j. Andy Woeber, OPS Environmental Consultant

This position is responsible for GIS data analysis, and reporting, including the preparation of each of the Status Monitoring Network's water resource coverages for random site selection. He is occasionally utilized by the ground water protection section for geo-spatial analysis of spring TMDLs and BMAPs. Responsibilities include 1) preparation and maintenance of a geo-database containing the seven water resource coverages (streams, rivers, small lakes, large lakes, canals, unconfined aquifers, confined aquifers) utilized by the Status Monitoring Network, 2) geo-spatial analysis of status data for annual reporting, 3) creation of map products which are used to report status, trend, springs, and Florida Water Resources Monitoring Council data.

k. Rick Copeland, OPS Environmental Consultant

The position is responsible for the statistical evaluation and visual display of ground water and springs data for the Status & Trend Networks including but not limited to monitoring network design, statistical analysis development, and the analysis and reporting of the data. Currently is the alternate member of the Florida Water Resources Monitoring Council (FWRMC), and is Chairperson (co-chaired by SWFWMD) of the state-wide salinity monitoring group (SalNet) coordinated through the FWRMC. Responsibilities include 1) annual analysis and reporting of status and trend ground water and spring monitoring data, 2) ground water and spring trend analysis report writing, 3) monitoring network design and modification to meet Division priorities including but not limited to status and trend monitoring and the determination of prevalence of emerging substances of concern, 4) determination of state-wide ground water resource issues and supplying recommendations on addressing them, and (5) developing an Index of salinity indicators for Florida waters via the FWRMC SalNet workgroup.

l. Chris Sedlacek, OPS Environmental Consultant

This position is responsible for the statistical evaluation and visual display of surface water data for the Status Network, Trend Network, and Springs, including but not limited to monitoring network design, statistical analysis development, and the analysis and reporting of the data. The position is responsible for probabilistic site selection for the Status Monitoring Network. Responsibilities include 1) annual analysis and reporting of status and trend surface water monitoring data including flow adjusted trend analysis, 2) surface water trend analysis report writing, 3) monitoring network design and modification to meet Division priorities including but not limited to status and trend monitoring and the determination of prevalence of emerging substances of concern, 4) implementation of the numeric nutrient criteria through analysis of Status, Trend and Springs Monitoring data for annual reporting in the Water Quality Report Card as discussed under client services in the Division's Business Plan p. 5, 5) biennial assessment of Status and Trend Network data for ATTAINS submittal to USEPA.

Tallahassee Field Team

m. Lori Balinsky, OPS Environmental Specialist III

Reviews and edits data generated by the Watershed Monitoring Subsection Field sampling operations group. Reviews and releases provisional data. Generates and mails result notification owners letters and data reports. Updates the Oracle Generalized Water Information System (OGWIS) database including communicating with the Suwannee River Water Management District to add District well site information to the database. Assimilates data for and writes quarterly quality assurance reports for field sampling operations group. Responsible for assisting in performance of sampling site reconnaissance for Status Network sampling locations for all resources. This duty includes office reconnaissance using GIS software, making phone calls, reviewing in-house documentation, gaining owner's addresses, mailing out sampling permission letters, and any other related tasks. Includes performing field reconnaissance of future sites by traveling to sites and documenting the location using cameras, GPS, and sketch maps.

n. Paul Blair, Environmental Specialist III

Collects surface and ground water samples for the State's Status and Trend Networks following strict protocols and QA procedures. Collection of samples involves comprehensive knowledge of pumps, filters, and working with ground water monitoring pumps, generators and other related sampling equipment. Performs maintenance or facilitates maintenance on sampling equipment. Responsibilities also include cleaning of laboratory, vehicles, and equipment and keeping all related aspects organized. Maintains field sheets and other related documentation for each project.

o. Mike Eckles, Environmental Specialist III

Collects surface and ground water samples for the State's Status and Trend Networks following strict protocols and QA procedures. Collection of samples involves comprehensive knowledge of pumps, filters, and working with ground water monitoring pumps, generators and other related field sampling equipment. Collects surface water samples for the State's Status and Trend Networks following strict protocols and QA procedures. Performs maintenance or facilitates maintenance on sampling equipment and facilities. This includes cleaning of laboratory, vehicles, and equipment and keeping all related aspects organized. Maintains field sheets and other related documentation for each project.

p. Chris Green, OPS Environmental Specialist III

Collects surface and ground water samples for the State's Status and Trend Networks following strict protocols and QA procedures. Collection of samples involves comprehensive knowledge of pumps, filters, and working with ground water monitoring pumps, generators and other related sampling equipment. . Performs maintenance or facilitates maintenance on sampling equipment and facilities. Responsibilities include cleaning of laboratory, vehicles, and equipment and keeping all related aspects organized. Maintains field sheets and other related documentation for each project.

q. Colby Marshall, OPS Environmental Specialist II

Collects surface and ground water samples for the State's Status and Trend Networks following strict protocols and QA procedures. Collection of samples involves comprehensive knowledge of pumps, filters, and working with ground water monitoring pumps, generators and other related sampling equipment. Performs maintenance or facilitates maintenance on sampling equipment and facilities. This also includes cleaning of laboratory, vehicles, and equipment and keeping all related aspects organized. Maintains field sheets and other related documentation for each project.

5.2 Job Descriptions

The WMS consists of several employees (all who are listed above in Section 5.1); please refer to this list in Section 5.1 above for each job description.

5.3 Approved Signatories

Approved signatories within the FDEP WMS are stated as:

Stephanie Sunderman-Barnes, QA Officer
Gail Sloane, Environmental Administrator
Julie Espy, Program Administrator
Thomas Frick, Division Director

5.4 Employee Training

All WMS employees are required to review the Sampling Manual (and/or provide technical assistance in editing and updating the Sampling Manual) on an approximate annual basis. All employees directly related to sample collection are required to attend at least one Sampling Training Workshop every five years (or as needed, before then). These workshops are conducted at least once a year, and training is based on specific FDEP Standard Operating Procedures (SOP) as applied to the Status and Trend Networks sampling programs.

WMS Field samplers performing Habitat Assessments (HA) and Stream Condition Index (SCI) sampling are required to have specific training and demonstrate competency due to the expert judgment exercised during field sampling. Individuals conducting a HA must train with qualified FDEP staff (via workshops and participating in field sampling) and remain in “pass” status for field performance tests. Training should be conducted using the Habitat Assessment Training Checklist (FT3000 found in FA1000). Habitat Assessment testing will be conducted at select streams/rivers located throughout the state, and sites will change every two years or as needed. All field samplers are required to participate in at least one testing event every two years. At all times, a minimum of one sampler from each sampling team must be in pass status in order to perform a Habitat Assessment.

WMS field samplers conducting SCI sampling must train with qualified FDEP staff (via workshops and participating in field sampling) and pass an online SCI knowledge test and field performance test (audit) to demonstrate competence. After passing the initial performance audit, samplers must pass a refresher audit every 5 years to remain in pass status. Training should be conducted using the SCI Training Checklist (SCI1000). SCI audits are administered by the Water Quality Standards Program. At all times, a minimum of one sampler from each sampling team must be in pass status in order to collect a SCI sample.

FDEP WMS sampling personnel are also required to obtain training on Global Positioning System (GPS), Class I Watercraft and Trailering Operation, and safety.

A list of all sampling personnel and their respective training is maintained internally within the Section, and their training is consistent with FA 2100. Furthermore, training records are maintained on each employee who is trained in skills commensurate with their responsibilities.

6.0 Documentation

Sample documentation is of critical importance to the objectives of the Status and Trend Monitoring Networks. Data gathered on these projects are entered into an existing statewide water quality database, and must be properly linked to historical data. The database is also a source of public information and is used for a variety of purposes. The data must be accurate to avoid incorrect evaluations and decisions on the State's water resources. All FDEP WMS documentation requirements are based on the FDEP SOPs.

6.1 Generation, Retainment and Storage of Records

Record keeping practices are consistent with 62-160.240(1) and 62-160.340(1), F.A.C. and FD 1000 of the FDEP SOPs. All records shall be retained for at least 5 years after the completion of the project.

Sample documentation begins in the FDEP Central Chemistry and Biology Laboratories. A label is placed on each container with the request (RQ) number, the major analyte group, a notation if filtration is required, and the preservation method. See the [WMS Sampling Manual](#), page 137, Figure 26.

FDEP WMS provides the sampling agencies with station identification labels (see the [WMS Sampling Manual](#), page 116, Figure 6) that are bar coded to uniquely identify a sample station. The field technicians place these labels vertically on the sample containers and also on the custody sheet. This links the station to the containers and to the custody sheet.

All field documentation is recorded on appropriate field sheets which are supplied by FDEP WMS. Samplers are required to ensure that the most current versions are used by observing the date printed on the forms.

All paper documentation records must be recorded in waterproof ink (except the Habitat Assessment sketch map, which may be drawn in pencil). Erasing or obliteration of records is not permitted. Corrections are made by marking a single line through the error so that it is still legible, and the initials of the individual performing the correction are included. All documentation records are required to be legible.

All documentation requirements regarding initial activities performed by the Central Laboratory (container preparation, supplying sampling kits, RQ information, etc.) are generated, retained and stored internally by appropriate lab personnel.

All documentation regarding sampling procedures (Sampling Manual) are generated, retained and stored electronically (and by hard-copy) by the FDEP WMS QA Officer.

All documentation requirements produced by field sampling personnel are retained and stored by the respective Project Manager.

All documentation regarding data management and review is generated, retained and stored by the Data Manager and the appropriate database software programs (see [Data Management Standard Operating Procedures](#), pages 1-18 and [OGWIS User's Manual](#), pages 1-26).

6.2 Documentation Control and Maintenance

All documentation generated by WMS is controlled and maintained in two manners. All documentation includes a revision date or version number to indicate date(s) of use and to ensure the most current version of the documentation form is being used or referenced. Ensuring the use of current procedures is consistent with FA 3210, 3240 and 3250 of the FDEP Field SOPs and 62-160.210 F.A.C. Furthermore, all documentation contains documentation control blocks such as page numbers and section headings used to identify completeness. Electronic documents maintained by the FDEP WMS QA Officer that are posted for internal or public viewing are lock-protected to prevent editing by anyone other than the QA Officer.

6.3 Types of Documentation/Reports Generated

WMS generates several types of documentation and reports that are listed below. Reports to management are consistent with the procedures outlined in FA 3250 of the FDEP Field SOPs.

Documentation:

- Sampling Manual, including paperwork as described below:
 - o field sheets (ground water, surface water, biology)
 - o custody sheets
 - o labels
 - o micro land use forms
 - o permission forms
 - o log books (calibration, standards and buffers, equipment maintenance, and equipment cleaning)
 - o inventory sheets
 - o field audit forms
- Quality Manual
- Monitoring Design Document
- Data Management and Analysis SOPs
- Project Manager procedures Manual
- Status Network Reconnaissance Manual
- Generalized Water Information System (GWIS) Database Utilities User's Manual
- GPS Basics Manual

- Data dictionaries for field data and GPS location collection based on programmatic standards

Reports:

- Quality Assurance Reports
- Data analysis summary reports from annual ground and surface water monitoring
- Integrated report to EPA for satisfaction of Section 305(b) Clean Water Act requirements
- Report on the Integrated Florida Monitoring Strategy to satisfy section 106 reporting requirements to EPA
- Quality Assurance Project Plan in support of Florida Department of Environmental Protection monitoring activities conducted under sections 104(b)(3), 303(d), 305(b), and 604 of the Clean water Act as amended

6.4 Sample Identification and Data Integrity

Procedures involving accurate sample identification begin with proper sample nomenclature. Refer to [Data Management Standard Operating Procedures](#), page 4-5 for details on how samples are named (based on sampling agency, project codes and collection timeframe).

Once samples are properly named, accurate sample identification continues with the scheduling of samples in the Laboratory Information Management System (LIMS).

Refer to the [WMS Sampling Manual](#), page 13 and the FDEP Central Laboratory Chemistry Section Quality Manual for specific details regarding scheduling.

The sample identification process continues with additional documentation procedures involving the field sheets and custody sheets by including site labels on each form. See the [WMS Sampling Manual](#), page 116, Figure 6 for details. Sample custody is consistent with and follows FD 5000 and FD 7000 of the FDEP SOPs.

Furthermore, accurate sample identification and data integrity remains intact throughout the data review and data analysis process. See [Data Management Standard Operating Procedures](#), pages 1-18 and [OGWIS User's Manual](#), pages 1-26 for details.

6.5 Confidentiality

All records and documents generated by FDEP WMS (except those associated with private property land owners who do not wish to have their personal information disclosed) are public records and may be subject to disclosure according to the guidelines and exceptions published in Chapter 119 of Florida Statutes. The procedures used for release of all data/documentation are detailed in the [Data Management Standard Operating Procedures](#), page 13-15.

7.0 Capabilities

The WMS has proven it is capable of staffing and administration of two statistically sound monitoring networks (Status and Trend). Within these networks, staff are capable of planning, scheduling and collecting high-quality samples for Florida's water resources, and managing all aspects of the associated data review and reporting. The FDEP Central Laboratory in Tallahassee is responsible for all lab analyses performed on the submitted samples.

7.1 Sampling Capabilities

The WMS collects all samples based on procedures outlined in the FDEP SOPs applicable to ground water (FDEP-SOP-001/01 FS 1000, FS 2000, and FS 2200), surface water (FDEP-SOP-001/01 FS 1000, FS 2000, and FS 2100), sediment (FDEP-SOP-001/01 FS 1000 and FS 4000), and biological communities (FDEP-SOP-001/01 FS 7230, FS 7320, and FT 3000; FDEP-SOP-003/11 SCI 1000 and LVI 1000). Sampling for these matrixes includes all applicable FDEP SOP field testing procedures (FDEP-SOP-001/01 FT 1000, FT 1100, FT 1200, FT 1400, FT 1500, FT 1600, and FT 1700). Furthermore, all containers, volumes, preservation, holding times and preservation procedures are consistent with FS 2000, FS 1006, Table FS 1000-2 and Tables FS 1000-4 through FS 1000-9 of the FDEP Field SOPs. Currently, WMS is not utilizing any non-standard field procedures. If conditions warrant, any non-standard field procedures will be approved per FA 2100 and FA 2200 of the FDEP SOPs.

7.2 Sampling Procedures

Specific sampling procedures employed by WMS for ground water are detailed in the [WMS Sampling Manual](#), pages 23-36, November 2014 Addendum pages 11-12, and April 2015 Addendum pages 4-5.

Specific sampling procedures employed by WMS for surface water are detailed in the [WMS Sampling Manual](#), pages 37-44, November 2014 Addendum pages 13-14, and April 2015 Addendum pages 5-8.

Specific sampling procedures employed by WMS for sediment collection are detailed in the [WMS Sampling Manual](#), pages 45-48.

Specific sampling procedures employed by WMS for biological communities are detailed in the [WMS Sampling Manual](#), pages 49-73, November 2014 Addendum pages 15-19, and April 2015 Addendum pages 8-9.

7.3 Test Methods

Table A. lists analytical test methods used for field data and laboratory analyses.

Table A. - Analytical Test Methods

All methods, unless otherwise stated are based on EPA 600/4-79-020, Methods for Chemical Analysis of Water and Wastes, revised March 1983.

SM= Standard Methods for the Examination of Water and Wastewater.

¹From Welch, P. S. 1948. Limnological Methods. McGraw-Hill Book Co., New York. 381p.

Indicator	Analysis Method
pH	DEP-SOP-001/01 FT 1100
Temperature	DEP-SOP-001/01 FT 1400
Specific Conductance	DEP-SOP-001/01 FT 1200
Dissolved Oxygen	DEP-SOP-001/01 FT 1500
Turbidity	DEP-SOP-001/01 FT 1600
Secchi Depth	Welch (1948) ¹ ; DEP-SOP-001/01 FT 1700
Total Depth	Manual/electronic measuring device
Sample Depth	Manual/electronic measuring device
Micro Land Use	WMS Sampling Manual (10/13), Section 4
Depth to Water	DEP-SOP-001/01 FT 2200
Chlorophyll <i>a</i> (suite)	SM 10200 H (modified)
Biological Community (Stream Condition Index, SCI)	DEP-SOP-003/11 SCI 1000
Habitat Assessment	DEP-SOP-001/01 FT 3000
Rapid Periphyton Survey (RPS)	DEP-SOP-001/01 FS 7230
Linear Vegetation Survey (LVS)	DEP-SOP-001/01 FS 7320
Lake Vegetation Index	DEP-SOP-003/11 LVI 1000
Total Coliform	SM 9222B
Fecal Coliform	SM 9222D
Enterococci	Enterolek/QT (ASTM D6503)
<i>Escherichia coli</i>	SM 9223 QuantiTray
Total Organic Carbon	SM 5310 B-00
Nitrate + Nitrite	Method 353.2 Rev. 2.0
Ammonia	Method 350.1 Rev. 2.0
Total Kjeldahl Nitrogen	Method 351.2 Rev. 2.0
Total Phosphorus	Method 365.1 Rev. 2.0
Orthophosphate	Method 365.1 Rev. 2.0
Chloride	Method 300 Rev. 2.1
Sulfate	Method 300 Rev. 2.1
Fluoride	SM 4500 F-C-97
Calcium, Magnesium, Potassium, Sodium	Method 200.7 Rev 4.4
Aluminum, Arsenic, Cadmium, Chromium, Copper, Iron, Lead, Manganese, Molybdenum, Zinc	Method 200.7 Rev 4.4 / 200.8 Rev 5.4
Alkalinity	SM 2320 B-97
Hardness	SM 2340 B
Turbidity (Lab)	Method 180.1 Rev 2.0
Specific Conductance (Lab)	Method 120.1
Color (True)	SM 2120 B
Total Suspended Solids	SM 2540 D-97
Total Dissolved Solids	SM 2540 C-97
Sucralose, Acetaminophen, Carbamazepine, Primidone, Diuron, Linuron, Imidacloprid	EPA 8321 B
TCEP, TDCPP, TCP, Triphenyl phosphate, Triclosan methyl, Galaxolide, Tonalide	EPA 8270 D

Table A. Continued

Indicator	Analysis Method
Sediments: Total Organic Carbon	In-house based on 415.1
Sediments: Total Phosphorus	In-house based on Method 365.4
Sediments: Total Kjeldahl Nitrogen	In-house based on Method 351.2
Sediments: Aluminum, Arsenic, Cadmium, Chromium, Copper, Iron, Lead, Nickel, Silver, Zinc	Method 6010C/6020A
Sediments: Mercury	DEP-SOP-001/01 HG-008-3 (based on EPA 245.5 and EPA 7471B)

7.4 Equipment

All WMS sampling equipment is consistent with FS 1001 and Tables FS 1000-1 through FS 1000-3 of the FDEP Field SOPs.

For ground water sample collection, any combination (or all) of the equipment/instruments listed below may be used:

- pumps (peristaltic or submersible; centrifugal used for well purging only)
- power converters
- gas or electric generators
- tubing
- water level tape / potentiometer (or steel tape and chalk)
- YSI multiprobe (or similar) and all associated standards and buffers
- portable turbidimeter
- GPS equipment (Trimble GeoXT, Geoexplorer 6000 Series, of Geo 7X GPS unit)
- measuring tape
- additional non-equipment supplies (cleaning materials, buckets, gloves, filters, preservatives, brushes, camera, etc.)

For surface water sample collection, any combination (or all) of the equipment listed below may be used:

- Van Dorn sampler / Beta bottle (or similar)
- secchi disk
- measuring tape
- YSI multiprobe (or similar) and all associated standards and buffers
- GPS equipment (Trimble GeoXT, Geoexplorer 6000 Series, of Geo 7X GPS unit)
- additional non-equipment supplies (cleaning materials, buckets, gloves, filters, preservatives, brushes, camera, etc.)

For sediment sample collection, any combination (or all) of the equipment listed below may be used:

- stainless steel corer and extruder
- stainless steel petite ponar
- stainless steel Ekman dredge
- scoops or spoons

- secchi disk
- measuring tape
- YSI multiprobe (or similar) and all associated standards and buffers
- GPS equipment (Trimble GeoXT GPS unit)
- additional non-equipment supplies (cleaning materials, buckets, gloves, syringes, preservatives, brushes, camera, etc.)

For stream condition index sample collection and habitat assessment performance, any combination (or all) of the equipment listed below may be used:

- D-frame dipnet with No. 30 mesh
- collection brush
- 100 meter measuring tape
- flagging tape (or similar)
- YSI multiprobe (or similar) and all associated standards and buffers
- secchi disk
- GPS equipment (Trimble GeoXT GPS nit)
- additional non-equipment supplies (cleaning materials, buckets, gloves, camera, etc.)

For rapid periphyton survey (RPS), any combination (or all) of the equipment listed below may be used:

- ruler
- concave spherical densiometer
- 100 meter measuring tape
- flagging tape (or similar)
- secchi disk
- GPS equipment (Trimble GeoXT GPS unit)
- additional non-equipment supplies (cleaning materials, buckets, gloves, camera, etc.)

For linear vegetation survey (LVS), any combination (or all) of the equipment listed below may be used:

- aquatic and wetland plant identification manuals
- hand lens
- frotus
- 100 meter measuring tape
- flagging tape (or similar)
- GPS equipment (Trimble GeoXT GPS unit)
- additional non-equipment supplies (cleaning materials, buckets, gloves, camera, etc.)

For additional details regarding supplies used for sample collection for the above mentioned matrixes, see the [WMS Sampling Manual](#), pages 23-36 and page 129, Figure

19 for ground water; see the [WMS Sampling Manual](#), pages 37-44 and page 130, Figure 20 for surface water; see the [WMS Sampling Manual](#), pages 45-48 for sediments; and see the [WMS Sampling Manual](#), pages 49-73 for SCI, HA, RPS, and LVS.

7.5 Sample Handling

All activities regarding WMS sample custody, shipment and submittal to the FDEP Central Laboratory are detailed in the [WMS Sampling Manual](#), pages 81-85, and April 2015 Addendum page 10. Sample handling is consistent with and follows FD 5000 and FD 7000 of the FDEP SOPs.

8.0 Equipment and Instruments

All equipment (and associated standards/buffers) used by WMS for calibration procedures are based on procedures outlined in the FDEP SOPs (FDEP-SOP-001/01 FT 1000, FT 1100, FT 1200, FT 1400, FT 1500, FT 1600, and FT 1720) and meet all FDEP SOP specifications for accuracy, reproducibility and design.

8.1 Calibration and Standards

Specific calibration procedures used by WMS for pH, specific conductance, dissolved oxygen, temperature, and turbidity are detailed in the [WMS Sampling Manual](#), pages 17-22 and April 2015 Addendum pages 2-4.

All standards and buffers used in calibration procedures are documented in a log book. An example of a page from the log book is included in the [WMS Sampling Manual](#), April 2015 Addendum page 26, Figure 22.

All calibration procedures are documented as described in the [WMS Sampling Manual](#), April 2015 Addendum pages 22-25, Figure 21. Furthermore, all records are maintained per FT 1000, the FT Series and FD 1000 of the FDEP SOPs. Per FT 1000 and FD 1000, calibration standards and the calibration procedure are traceable to each instrument.

8.2 Equipment Maintenance and Documentation

All instruments and equipment used for sample collection and calibration procedures are maintained and cleaned on an as-needed basis, and all associated documentation regarding maintenance and cleaning is recorded in log books. Furthermore, all decontamination/cleaning and preservation derived wastes are disposed of in accordance with FS 1011 of the FDEP SOPs.

All equipment cleaning is based on FDEP SOPs (FDEP-SOP-001/01 FC 1000). Specific procedures are detailed in the [WMS Sampling Manual](#), pages 93-97, page 110, Table 9,

November 2014 Addendum page 3, and April 2015 Addendum page 12. Furthermore, an example of a page from the cleaning log book is included in the [WMS Sampling Manual](#) April 2015 Addendum page 29, Figure 34.

All instrument and equipment maintenance is based on recommendations made in FS 1007, Table FS 1000-12, and the individual FT series of the FDEP SOPs, and manufacturer recommendations. An example of a page from the equipment maintenance log book is included in the [WMS Sampling Manual April 2015 Addendum](#), page 27, Figure 23.

9.0 Review and Assessment

WMS reviews and assesses the quality of the data being generated by employing quality control measures for both field and laboratory parameters.

9.1 Quality Control Measures

WMS uses several quality control measures to ensure high-quality data is being collected and analyzed for. Quality control samples assess the accuracy and precision of sampling and analytical techniques. The quality control procedures are consistent with FQ 1000 (blanks and other QC samples) and FT 1000 (calibration requirements and acceptance) of the FDEP SOPs.

9.1.1 Field Quality Control

Sampling personnel collect and submit three types of blanks to the FDEP Central Laboratory based on the type of equipment used to collect the actual water chemistry samples. All blanks are collected at a 20% frequency based on the number of samples collected for a specific project over a specific period of time. All blanks are collected using analyte-free (de-ionized) water and are collected in the same manner as actual samples.

Pre-cleaned equipment blanks are collected and submitted as discussed in the [WMS Sampling Manual](#), pages 87-90.

Field-cleaned equipment blanks are collected and submitted as discussed in the [WMS Sampling Manual](#), pages 87-90.

Field blanks are collected and submitted as discussed in the [WMS Sampling Manual](#), pages 87-90.

Duplicates and split samples are not included in the WMS quality control measures.

9.1.2 Laboratory Quality Control

The FDEP Central Laboratory uses multiple internal quality control measures for evaluating the quality of the data being generated and are outlined in detail in the FDEP Central Laboratory Quality Manuals (Bureau, Chemistry, and Biology).

9.1.3 Quality Control Criteria

The results for each quality control measure are assessed using specific acceptance criteria.

For all blank samples submitted to the lab, results must meet the following specifications. The WMS qualifies data which are detected at values less than 10 times the concentration found in the associated blanks. During the data loading process, an Oracle procedure determines if there are any blank detections for the project. If there are blank detections, the highest detected value per analyte is stored. These stored values are then compared with each individual sample value for the analyte. Sample values detected at less than 10 times the value stored for the blank detection are qualified with a 'G' and a comment is inserted for the result stating 'ANALYTE DETECTED IN FIELD COLLECTED BLANK'. The definition of the "G" data qualifier is "A "G" – qualified sample value indicates that the analyte was detected at or above the method detection limit in both the sample and the associated field blank, equipment blank, or trip blank, and the blank value was greater than 10% of the associated sample value. The value in the blank shall not be subtracted from associated samples."

The lab may assign a 'V' data qualifier to data which are found to be associated with method blank detections. The definition of the 'V' data qualifier is "A "V" – qualified sample value indicates that the analyte was detected at or above the method detection limit in both the sample and the associated method blank and the blank value was greater than 10% of the associated sample value. The 10% criterion shall not apply to blank results for biochemical oxygen demand (BOD) or microbiological tests. For BOD tests, the "V" code shall be used for all sample results where the associated method blank result exceeds the maximum blank DO depletion specified in the analytical method. For microbiological tests, the "V" code shall be used for all samples where the associated method blank indicates growth of the target organism. Note: unless specified by the method, the value in the blank shall not be subtracted from associated samples." Additionally, the lab may assign a "J" data qualifier to data which are found to be associated with other analytical laboratory blank detections or quality control failures. The definition of the "J" data qualifier is "Estimated value. A "J" – qualified sample value shall be accompanied by a detailed explanation to justify the reason(s) for designating the value as estimated. Where possible, the organization shall report whether the actual sample value is estimated to be less than or greater than the reported value,

to assist data users in any evaluation of the usability of the sample value. A “J” data qualifier code shall not be used as a substitute for G, K, L, M, S, T, V, or Y, however, if additional reasons exist for identifying the value as an estimate (e.g., laboratory control spike or matrix spiked failed to meet acceptance criteria), the “J” code may be added to a G, K, L, M, T, U, V, or Y qualifier. Examples of situations in which a “J” code must be reported include: instances where a quality control item associated with the reported value failed to meet the established quality control criteria (the specific failure must be identified); instances when the sample matrix interfered with the ability to make any accurate determination; instances when data are questionable because of improper laboratory or field protocols (e.g., composite sample was collected instead of a grab sample); instances when the analyte was detected at or above the method detection limit in an analytical laboratory blank other than the method blank (such as a calibration blank) and, the blank value is greater than 10% of the associated sample value; or, instances when the field or laboratory calibrations or calibration verifications did not meet calibration acceptance criteria, including quantitative or chronological bracketing requirements for field testing data.”

The WMS QA officer reviews the blank results to determine if significant or reoccurring detections are taking place. The WMS QA officer submits a monthly blank detection report to each project manager listing all field collected blanks and any detection greater than the MDL (minimum detection limit). Every three months, these blank detection reports are also sent to all staff at each sampling entity who participate in Status and Trend Network projects. Any significant or reoccurring detection requires the sampling personnel to investigate possible contamination sources and initiate corrective actions accordingly.

All calibration and calibration verification results must meet the acceptance criteria stated in the [WMS Sampling Manual](#), page 17. The accuracy of field test measurements is reflected in the acceptance criteria for continuing calibrations as specified in the FT series of the FDEP SOPs. If data are collected using a field meter that fails to meet calibration verification acceptance criteria, the WMS assigns a “J” qualifier to those data, and adds a comment describing which calibration verifications failed to meet the acceptance criteria.

9.2 Raw Data

These policies and procedures are used to review and assess raw data, laboratory data and project data. All data management is consistent with FD 1200 of the FDEP SOPs.

9.2.1 Data Reduction

Values for conductivity, dissolved oxygen, pH, temperature, secchi depth, depth to water, and sample depth are transferred directly from the sampling instrument to the sampler’s field log sheet. These values are then entered directly into a

computer file by the sampling agency data manager or lead sampler. This raw data is reviewed by the lead sampler, the sampling agency's data manager and the program manager for each entity. For calibration criteria and information, see the [WMS Sampling Manual](#), pages 17-22, and April 2015 Addendum pages 2-4. Refer to the FDEP Central Laboratory Chemistry Section Quality Manual for specific details regarding formulas for calculating final sample results.

9.2.2 Data Verification

Raw field data are reviewed by the sampling agency data manager, lead sampler and the program manager. Field logs and previously collected field data are reviewed for obvious problems or errors.

Each sampling agency data manager, lead sampler and the program manager is responsible for determining that the results of each analytical determination have all associated QC measurements and that the acceptance criteria are met and documented according to protocol. The sampling agency data manager, lead sampler and the program manager are responsible for checking calculations, completing sample preparation, calibration, analysis and instrument logs, and completing all internal custody documentation. Each supervisor is responsible for reviewing this work for completion and correctness prior to authorizing the individual results for release.

The data verification procedures consist of all the QC validations and calculations checks discussed in the FDEP Central Laboratory Chemistry Section Quality Manual. In addition, soundness of all data is evaluated by the nature of the sample, the inter-relationship among the parameters and the historical values, etc. Any discrepancy or inconsistency will initiate a recheck of data or reanalysis of the sample(s). If no reason can be found to invalidate these data, they will be entered into the OGWIS database.

9.2.3 Data Validation

Once the reconnaissance, field, and lab data are received by WMS, the data are loaded into the WMS Oracle database (OGWIS). The data are then considered provisional and must be reviewed by the data generators prior to release to the general public. The provisional data are exported out of the Oracle database and a documentation file is created to enable efficient data review. These files are returned to the data generators for their review. The files include the documentation file, and various exports of the results file. The FDEP Project Manager reviews the station data for all projects in the provisional status for accuracy.

The documentation file contains information on the completeness or lack thereof of the project data, and on the quality of these data. Problems with the project data may be listed in the comments section of the documentation file. All of the sample and blank data are exported to review the data for accuracy.

Specific data correction requests are submitted to the FDEP Project Manager on the Sample Data Correction Request Form, as described in the [Data Management Standard Operating Procedures](#), page 14. Once the requested corrections are made by FDEP staff, the data generators are notified and asked to look over the corrections one final time. Additionally, any problems identified with the data are documented in the project comments dialog box by the FDEP Project Manager at this time. If no errors are found the data are 'released'.

9.3 Corrective Actions

Network personnel responsible for assessing each quality control measure and initiating corrective action if needed are the designated quality assurance officers for the WMS, the FDEP, the Central Chemistry and Biology Laboratories, and the sampling agency. Specific QC measures that initiate corrective action and the types of action that will be taken are listed in Table B., below. Corrective action procedures are consistent with FA 3200 of the FDEP SOPs.

Notification of network personnel of problems and corrective action can be on several levels. Generally, oral communication among QA officers initiates corrective action. In the event a problem fails to be remedied, written communication among the QA officers will serve as official notice of the need for corrective action. Official memoranda between project managers, who are also the contract managers, may occur in the event that corrective action is not being implemented.

Reviews and audits of sampling operations by FDEP personnel are welcomed. Corrective action recommended by FDEP personnel, depending on its nature, may be implemented immediately or at the beginning of a new contract year.

Please refer to the FDEP Central Chemistry Laboratory Quality Manual and the Biology Section Quality Manual for laboratory guidelines concerning corrective action.

Table B. – Corrective Action

QA/QC MEASURE	CRITERIA FOR CONCERN	CORRECTIVE ACTION
Field Blank	Any value > Method Detection Limit	Evaluate: Analyte-free water source and storage, Sample collection and preservation technique, Sample custody
Equipment Blank	Any value > Method Detection Limit	Implement: additional cleaning procedure Evaluate: Analyte-free water source and storage, Equipment storage, Equipment construction, Sample collection and preservation technique, Sample custody
Field Audit	Deviations from WMS QA Manual	See section 9.5, below
Performance (laboratory)	Results exceed targets for accuracy in Lab QA Manual	Lab notification

9.4 Deviations

Significant deviations from standard policies or practices of the WMS are reported to the data generators, data managers and Project Managers and documented with the review reports. Any samples that are prepared or analyzed beyond accepted holding times have a comment and a lab-assigned “Q” qualifier associated with that sample. Similarly, data associated with the failures of any quality control checks are qualified as needed and supporting information is documented in the data’s comments. All other significant observations that do not conform to accepted practices or policies are documented and reported along with analytical results. Those documents may be as letters, interoffice memorandum, appendices to reports or as comments in the WMS database.

9.5 Audits

The WMS conducts both internal and external audits that have been designed to evaluate field sampling protocols, laboratory data quality and all associated documentation.

External audits are performed by the WMS QA Officer for each sampling entity, including in-house FDEP WMS staff, FDEP ROC staff (Southwest ROC, South ROC, Central ROC, and Southeast ROC), contracted agencies (NFWFMD, SJRWMD and Alachua County), and agencies that collect data as part of collaborative agreements (SFWMD).

On an annual basis, external audits will be scheduled for each sampling entity as stated: at least one audit for the Status and/or Trend ground water networks and at least one audit for the Status and/or Trend surface water networks. Project Managers and/or the WMS QA Officer may choose to perform additional audits at their own discretion each year, which will also be considered external audits.

Internal audits are performed by internal staff for each respective sampling entity. Those agencies under contract with WMS are entitled to create individual internal audit schedules and may perform them at their own desired frequencies. Internal audits are not performed on WMS in-house staff and FDEP ROC staff. Instead, the audits are conducted as external audits by the respective Project Manager and WMS QA Officer at the same frequency as other external audits.

All audits (internal and external) are concluded with an audit report that summarizes the overall performance. Deficiencies are noted, and corrective actions are established for each deficiency. In response, sampling personnel are required to submit a plan of corrective action report addressing each deficiency and how they intend to prevent future occurrences. All audit reports are distributed as stated: the original is given to the Project Manager or Contract Manager (for those agencies under contract); copies are provided to each sampling personnel, and the WMS QA Officer. Additional copies are provided as requested by interested parties (internal QA Officers, team leaders, etc.).

Refer to the [WMS Sampling Manual April 2015 Addendum](#), pages 30-35 for the WMS Audit Form that is used for both internal and external audits. All audits are conducted according to the requirements of FA 4200 and 4300 of the FDEP SOPs.

10.0 Consumer Relations

10.1 Review of Proposed Work

Review of work products includes internal agency review for reports written to satisfy requirements not limited to but including Sections 305(b), 106, and section 604 of the Clean Water Act. Further review of reports is provided by regional program administrators at EPA region 4 in Atlanta, Georgia.

Other reports, posters and presentations generated for public distribution are reviewed by immediate supervisors, internal program staff, and Administrators with responsibility for section, bureau and Division programs as specified in section 5.3.

10.2 Complaints

The WMS is committed to resolving complaints and implementing suggestions for improvement. All informal complaints, suggestions or requests for information are

directed to the appropriate supervisor for resolution. If immediate resolution cannot be attained, the matter is passed to the section administrator who may investigate and direct the resolution. Formal written complaints are logged with the section and, after the investigation and resolution, are responded to in writing. Copies of responses are kept for reference.

11.0 Appendix

Items listed in this appendix are available for reference, as specified below.

11.1 Status and Trend Monitoring Networks Sampling Manual (WMS Sampling Manual)

The WMS Sampling Manual including Addenda is available online at: <http://publicfiles.dep.state.fl.us/dear/watershed%20monitoring/documents/WMS-SamplingManual.pdf>.

11.2 Project Manager Manual

The Project Manager Manual is available online at: <http://publicfiles.dep.state.fl.us/DEAR/Watershed%20Monitoring/Documents/WMS-ProjectManagerManual.pdf>.

11.3 Data Management Standard Operating Procedures

The Data Management Standard Operating Procedures document is available online at: <http://publicfiles.dep.state.fl.us/dear/watershed%20monitoring/documents/WMS-DataManagementSOP.pdf>

11.4 Oracle Generalized Water Information System (OGWIS) User's Manual

The OGWIS User's Manual is available online at: <http://publicfiles.dep.state.fl.us/dear/watershed%20monitoring/documents/WMS-GWISManual.pdf>.

11.5 Organization Chart

Figure 1 illustrates the WMS organization chart.

Figure 1. WMS organization chart.

