Quality Plan for Watershed Assessment Section

Florida Department of Environmental Protection

February 2011

Quality Plan

for

State of Florida
Department of Environmental Protection
Watershed Assessment Section

2600 Blair Stone Road
Bob Martinez Center
Tallahassee, FL 32399-2400
(850) 245 - 8416

Prepared by
FDEP Watershed Assessment Section
September 1, 2010
Revised on
February 23, 2011

Signature Page

The undersigned have read and understood this Quality Plan, are charged with managing and improving the quality system and are responsible for ensuring that all staff properly execute the procedures discussed in the plan.

Daryll Joyner, Bureau Chief	(Date)
Julie Espy, Environmental Administrator	(Date)
Nancy Lewis, Environmental Consultant	(Date)
Phil Homann, Environmental Consultant	(Date)
Alan Punshon, Environmental Manager	(Date)
Keith Parmer, Environmental Manager	(Date)
Paul Kurisko, Environmental Manager	(Date)
David Tyler, Environmental Manager	(Date)
Kevin O'Donnell, Environmental Specialist III (QA Officer)	(Date)

Table of Contents

Section	Description	Revision Date
I	**Title Page**	**September 2010**
II	**Signature Page**	**February 2011**
III	**Table of Contents**	**September 2010**
1.0	**Introduction**	**September 2010**
2.0	**Basic Elements of WAS Quality Plan**	**September 2010**
3.0	**Statement of Policy**	**September 2010**
4.0	**Ethics Statement**	**September 2010**
5.0	**Organization and Responsibility**	**September 2010**
5.1	Responsibilities of Key Personnel	**February 2011**
5.2	Job Descriptions	September 2010
5.3	Employee Training	September 2010
6.0	**Documentation**	**September 2010**
6.1	Generation, Preservation and Storage of Records	September 2010
6.2	Documentation Control and Maintenance	September 2010
6.3	Types of Documentation/Reports Generated/Record Storage	September 2010
6.4	Sample Identification and Data Integrity	September 2010
6.5	Confidentiality	September 2010
7.0	**Capabilities**	**September 2010**
7.1	Sampling Capabilities	September 2010
7.2	Sampling Procedures/Containers/Volumes/Preservation/Holding Times	September 2010
7.3	Test Methods	September 2010
7.4	Equipment	September 2010
7.5	Sample Handling	September 2010
7.5.1	Sample Labeling and Forms	September 2010
7.5.2	Chain of Custody	September 2010
7.6	General Strategic Monitoring Strategy	September 2010
7.6.1	Fecal Coliforms	September 2010
7.6.2	Dissolved Oxygen	September 2010
7.6.3	Metals	September 2010
7.6.4	Biological Impairment	September 2010
7.6.5	Effect of Habitat and Hydrology When Determining Biological Impairment	September 2010
7.6.6	Nutrients	September 2010
8.0	**Equipment and Instruments**	**September 2010**
8.1	Calibration and Standards	September 2010
8.2	Equipment Maintenance and Documentation	September 2010
8.3	Hazardous Waste Disposal	September 2010
9.0	**Data Review and Assessment**	**September 2010**
9.1	Quality Control Measures	September 2010
9.1.1	Field Quality Control (blanks, etc.)	September 2010
9.1.2	Laboratory Quality Control (blind samples)	September 2010
9.1.3	Quality Control Criteria	September 2010
9.2	Data Review	September 2010
9.2.1	Data Reduction	September 2010
9.2.2	Data Verification	September 2010
9.2.3	Data Validation	September 2010
9.2.4	Data Use for Impaired Waters Assessment	September 2010
9.3	Corrective Actions	September 2010
9.4	Procedures for Reporting Data Deviations	September 2010
9.5	Audits and Annual QA Report to Management	September 2010
10.0	**Consumer Relations**	**September 2010**
10.1	Review of Proposed Work	September 2010
10.2	Complaints	September 2010

Figures

5.1	Watershed Assessment Section Organizational Chart	**February 2011**

1.0 Introduction

The Florida Department of Environmental Protection (FDEP) Quality Assurance (QA) program involves the implementation of a management system (planning, review, training, and assessment) to ensure that data collection, generation, interpretation, reporting, evaluation and archiving is of sufficient quality to support Department decisions. The effectiveness of our QA program is dependent upon the actions of all FDEP staff, from "front line" employees to management, and as such, QA responsibilities are distributed throughout our organization. One aspect of the QA program is to ensure that FDEP QA activities are carried out according to commitments made to the Environmental Protection Agency as enumerated in the FDEP Quality Management Plan (QMP) (Final 9/2/08).

The FDEP Secretary is committed to implementation of the quality assurance requirements in the QMP and as authorized at Section 403.0623, F.S., and Chapter 62-160, Florida Administrative Code (the FDEP QA Rule, available at: http://www.dep.state.fl.us/legal/Rules/general/62-160/62-160.pdf). It is the Secretary's intent to carry out these obligations and requirements as detailed in the Department's QA Directive 972 (Effective September 18, 2009, available at: http://www.dep.state.fl.us/admin/depdirs/pdf/972.pdf).

In order to execute the components of the FDEP QA Directive, the Watershed Assessment Section (WAS) has developed a quality system. This document describes the steps we take to ensure the scientific and legal defensibility of environmental data we generate or use. It details the process of planning, training, execution, assessment and corrective action we undertake to ensure that environmental data meets our established quality criteria.

2.0 Basic Elements of WAS Quality Plan

All staff in WAS are expected to read, understand and follow the procedures and criteria as described in this plan, and to carry out their assigned responsibilities for effective utilization of our quality system. The Quality Plan explains both the process and criteria by which the WAS quality system is managed. The plan is utilized as an instrument of internal communication to inform our staff of current and future quality assurance activities. It discusses how specific QA duties are assigned to responsible staff. We will revise our Quality Plan as needed, and pledge to ensure the consistent application of procedures and criteria for the generation or use of our environmental data. The Quality Plan will also be used as a training document for new staff and as a reference for experienced personnel. The plan and any revision(s) also serve as an archival record of our formal quality system.

The elements of our plan are consistent with the Department's Quality Management Plan, Quality Assurance Directive, Quality Assurance Rule (Chapter 62-160 F.A.C.), and any current QA activities available at http://www.dep.state.fl.us/labs/bars/sas/qa/index.htm. In addition, we ensure that our plan for all sampling activities, including field-meter testing, is consistent with FDEP SOP FA 3300, available at:

http://publicfiles.dep.state.fl.us/dear/labs/sas/sopdoc/2008sops/fa1000.pdf. Our plan addresses all activities associated with sampling, field testing, lab analysis and data review of any type, including those activities associated with database construction and management. Our plan also discusses how decisions about data use are made based on data quality assessments.

Where appropriate, we cite existing internal and external documents, including training manuals, guidance documents, SOPs, Rules and tables. Quality assurance rule documentation incorporated by reference into Chapter 62-160, F.A.C. is available at: http://www.dep.state.fl.us/labs/bars/sas/qa/index.htm.

3.0 Statement of Policy

This Quality Plan for Watershed Assessment Section (WAS) provides the procedures that will be used to ensure that data generated by the WAS is of verifiable quality and meets the scientific objectives of the FDEP, as required by the Federal Clean Water Act, Chapter 403 of Florida Statutes, Chapters 62-160, 62-302, 62-303, 62-650, and 62-4, F.A.C. The WAS is committed to following good quality assurance (QA) and quality control (QC) management practices to produce all data.

It is the Watershed Assessment Section's policy to:

- Use scientifically valid and legally defensible data for our decisions affecting protection of the environment;
- Have and implement the Quality System described in this document;
- Adaptively manage our Quality System to be consistent with provisions of the FDEP Quality Assurance Management Plan;
- Ensure that each individual is properly trained to execute their assigned functions;
- Implement procedures to evaluate the quality of the data we use and to implement corrective actions when data do not meet our Data Quality Objectives;
- Periodically audit the performance and record-keeping practices of data generators we have responsibility for;
- Implement quality assurance procedures for the management of our data repositories;
- Perform a yearly systematic assessment of our quality assurance activities, including any corrective actions, with the findings submitted to the Standards and Assessment Section.

4.0 Ethics Statement

All employees of the Watershed Assessment Section 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 Responsibility

WAS resides within the Division of Environmental Assessment and Restoration (DEAR), Bureau of Assessment and Restoration Support (BARS). The WAS previously was under the Bureau of Watershed Management, but is now part of BARS as the result of a recent reorganization within the Division. See the WAS organizational chart in Figure 5.1.

The function of our unit involves conducting and/or reviewing Identification of Impaired Surface Waters Rule (IWR) assessments as part of the state's waterbody restoration program for impaired waters.

The WAS is headed by the Environmental Administrator (EA), 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 EA is supported by Environmental Consultants and Environmental Managers, who manage all direct oversight of the implementation of the Impaired Waters Rule (IWR), Chapter 62-303, Florida Administrative Code, and coordinate assessment activities in various geographic areas throughout the state.

A WAS staff member has been designated at the Quality Assurance Officer (QAO), who coordinates and participates in the quality evaluation of program data, and provides oversight to ensure that staff performs their QA functions. The QAO may delegate some responsibilities to properly trained and qualified staff, when appropriate. The QAO conducts systems audits of internal and external data generators (lab and field) and conducts sampling performance audits. The QAO also ensures that corrective actions are implemented for data non-conformance incidents as determined by evaluation of the data against our program's Data Quality Objectives. Additionally, the QAO assists program managers in the development of the Quality System and other logistical aspects of its implementation, such as coordinating associated training needs.

The QAO documents all program QA activities, including training, audits and corrective actions and provides this information to the FDEP Standards and Assessment Section on a periodic basis.

All WAS staff participate in an on-going extensive data review process of both geographic and environmental data related tasks. Data review by section staff are facilitated and supported by additional efforts of the Data Management Section, also known as the STORET Section. Additional data management and data storage are performed by the Environmental Consultants. All WAS staff contribute to the review of data used to support assessment decisions in the area of the state within the scope of their responsibility.

The WAS Technical Support staff, as defined later in this document, compiles the sampling results for federal and state reporting requirements and public distribution.

The FDEP Central Laboratory (Chemistry and Biology Sections) has been selected to perform all analyses for data collected by the WAS until further notice.

5.1 Responsibilities of Key Personnel

Positions in the WAS include administrative, supervisory, professional, technical, and secretarial support. All section activities are coordinated by the EA. The EA evaluates work priorities, assigns projects to appropriate staff, reviews all section work products, and ensures that projects are completed on schedule. The EA also supervises the section's QAO and ensures that quality assurance responsibilities are carried out as required.

The section's workload is divided among three geographic sectors (the West Sector, the East/Central Sector, and the South Sector) and a Technical Support Sector. The primary responsibilities of the West, East/Central, and South Florida Sectors involve conducting and/or reviewing IWR related impairment assessments, including assessing ambient surface water quality data, biological data, and other information (i.e. fish advisory, beach advisory, shellfish downgrade, etc.) available to evaluate the designated uses attainment of state surface waters as indicated by assessment of applicable water quality standards (Chapters 62-302, 62-303, and 62-4, F.A.C.).

To fulfill these responsibilities, each geographic sector creates and updates assessment lists using results from the IWR database, provides assistance and technical suggestions on ambient water quality monitoring programs, and assists in the preparation of assessment reports and the Integrated Water Quality Assessment for Florida 305(b) Report. Coordination with data providers such as district staff, local governments, water management districts (WMDs), private consulting firms, and other data providers throughout the state is ongoing to assure assessment confirmation. This includes verifying the accuracy of station latitude and longitude coordinates, WBID line (watershed) boundaries, providing updates on the National Hydrography Dataset, and leading and/or attending public meetings to present assessment lists and address public comments on each basin assessment.

The Technical Support Sector is responsible for special projects, researching and developing new database tools, solving problems associated with existing tools, development and maintenance of the impaired waters database, and development of the statewide monitoring plans and sections of the 305(b) report.

Additional WAS functions include participating in watershed evaluation projects to assist in the development of TMDLs, including the review of strategic monitoring plans, and collecting and assessing meteorological, hydrological, land use, and/or other information used to assist in preparing natural condition reports and TMDL reports. Field activities include site-reconnaissance of surface waterbodies, designing and conducting intensive field surveys to collect ambient surface water quality data. This includes training on safe boating and trailering, and training on FDEP field monitoring SOPs and QA requirements for the collection of water and sediment samples.

Although all supervisory and professional personnel are assigned to function within a sector, the section's activities require the combined support of personnel from all sectors.

Responsibilities for existing staff are as follows:

a. Julie Espy, Environmental Administrator
Administers the Watershed Assessment Section and coordinates the overall planning, design and implementation of all section activities. Supervises the establishment of specific tasks to analyze data, develops long-term water quality monitoring goals, and ensures that information is made available to the public. Assures that the production of key deliverables are completed on time, assists staff involved in the analysis of environmental data and the preparation of assessment reports, assessment lists and makes recommendations on the approval of TMDL Not Needed and Reasonable Assurance documents.

b. Alan Punshon, Environmental Manager
Develops, in coordination with the WAS staff, annual Strategic Monitoring Plans (SMP) for monitoring activities needed to complement water quality assessments. SMPs are designed to identify and fill in data gaps in routine monitoring and intensive field survey studies. SMPs contain sufficient detail so as to identify locations, samples required, timeframe requirements, and Laboratory Information Management System (LIMS) information. SMPs are also coordinated with Watershed Program stakeholders in light of their ongoing and planned monitoring activities in the targeted basins, as well as, the ambient monitoring program staff in reviewing analyzed probabilistic data in targeted basins in light of TMDL program needs. Information is translated into SMPs as needed to address data gaps identified in basins with water quality problems predicted by the probabilistic network, but unsubstantiated due to lack of stakeholder data. SMPs are provided to the public for review on the Department's WAS webpage.

c. Paul Kurisko, Environmental Manager
Coordinates the overall planning, design and implementation of all section activities for the West Sector (Northwest and Southwest FDEP districts), which includes effectively directing staff and/or conducting assessments of waterbody health through the application of the IWR, resulting in the creation or revisions of assessment lists, using output results from the IWR database. In conducting the assessments, leads other basin team members, including data providers and other interested parties, to assure that all available assessment information obtained, is accurate and is used appropriately in the assessment.

Additional responsibilities include writing and/or assisting in drafting or reviewing Chapters 1-3 of TMDL reports, 4c and 4d assessment documents and evaluating Reasonable Assurance documents. Technical expertise is provided in developing documentation on the assessment process and results including the preparation of basin assessment reports and the 305(b) report. Participation and technical support is provided to other sections within the Division in the development of TMDLs. This may include leading basin teams, participating in BMAP working groups, or

other collaborative activities associated with the development or implementation of TMDLs.

d. Keith Parmer, Environmental Manager

Coordinates the overall planning, design and implementation of all Section activities for the East/Central Sector (Northeast and Central FDEP districts), which includes effectively directing staff and/or conducting assessments of waterbody health through the application of the IWR, resulting in the creation or revisions of assessment lists, using output results from the IWR database. In conducting the assessments, leads other basin team members, including data providers and other interested parties, to assure that all available assessment information obtained, is accurate and is used appropriately in the assessment.

Additional responsibilities include writing and/or assisting in drafting or reviewing Chapters 1-3 of TMDL reports, 4c and 4d assessment documents and evaluating Reasonable Assurance documents. Technical expertise is provided in developing documentation on the assessment process and results including the preparation of basin assessment reports and the 305(b) report. Participation and technical support is provided to other sections within the Division in the development of TMDLs. This may include leading basin teams, participating in BMAP working groups, or other collaborative activities associated with the development or implementation of TMDLs.

e. David Tyler, Environmental Manager

Coordinates the overall planning, design and implementation of all Section activities for the South Sector (South and Southeast FDEP districts), which includes effectively directing staff and/or conducting assessments of waterbody health through the application of the IWR, resulting in the creation or revisions of assessment lists, using output results from the IWR database. In conducting the assessments, leads other basin team members, including data providers and other interested parties, to assure that all available assessment information obtained, is accurate and is used appropriately in the assessment.

Additional responsibilities include writing and/or assisting in drafting or reviewing Chapters 1-3 of TMDL reports, 4c and 4d assessment documents and evaluating Reasonable Assurance documents. Technical expertise is provided in developing documentation on the assessment process and results including the preparation of basin assessment reports and the 305(b) report. Participation and technical support is provided to other sections within the Division in the development of TMDLs. This may include leading basin teams, participating in BMAP working groups, or other collaborative activities associated with the development or implementation of TMDLs.

f. Nancy Lewis, Environmental Consultant

Assigned role of IWR Database Manager, who maintains and routinely adapts all Statistical Analysis System (SAS) code related to processing of data and the Microsoft Access version of output from the routine quarterly processing of data in support of the IWR. Technical support and assistance is provided to WAS management and staff in the interpretation of output and data interpretation related to the use of the output product, and in the use of other tools to assimilate assessment information.

Performs quarterly extractions of data from Florida STORET, the statewide repository of records for all surface water quality data housed in an Oracle database and performs additional extractions and ad hoc queries as needed for the Section to support the assessment of surface waters under the IWR.

Additional responsibilities include providing input and feedback to other sections within the Division, focusing on the data needs specific to the routine processing of IWR data, including any data quality issues. Serve as a team member, with other Division staff and management, in resolving data-related issues and providing data in support of a variety of TMDL activities for both Division personnel and external contractors and other customers. Serves as the point-of-contact for internal software users and software vendors for products specific to the processing of IWR data (SAS products).

g. Phil Homann, Environmental Consultant

Coordinates the overall planning, design and implementation of all Section activities related to developing the FDEP 303(d) and 305(b) Integrated Report, as required by the Federal Clean water Act. This includes working with Watershed Monitoring Section to incorporate water quality data collected for Trends, and Status Networks. Provides technical assistance to WAS staff on the components of TMDLs and/or Water Quality Based Effluent Limitations (WQBELs), including, but not limited to, water quality and hydrological processes and participating in the development and assessment of information necessary to determine waterbody assimilative capacities. Assesses, stores, and tracks large amounts of data for use in assessing waters in Florida. Assessment methods include statistical analyses, biological assessments and other assessment techniques. This function is completed in coordination with other agencies such as the U.S. Environmental Protection Agency, U.S. Geological Survey, WMDs, and local governments.

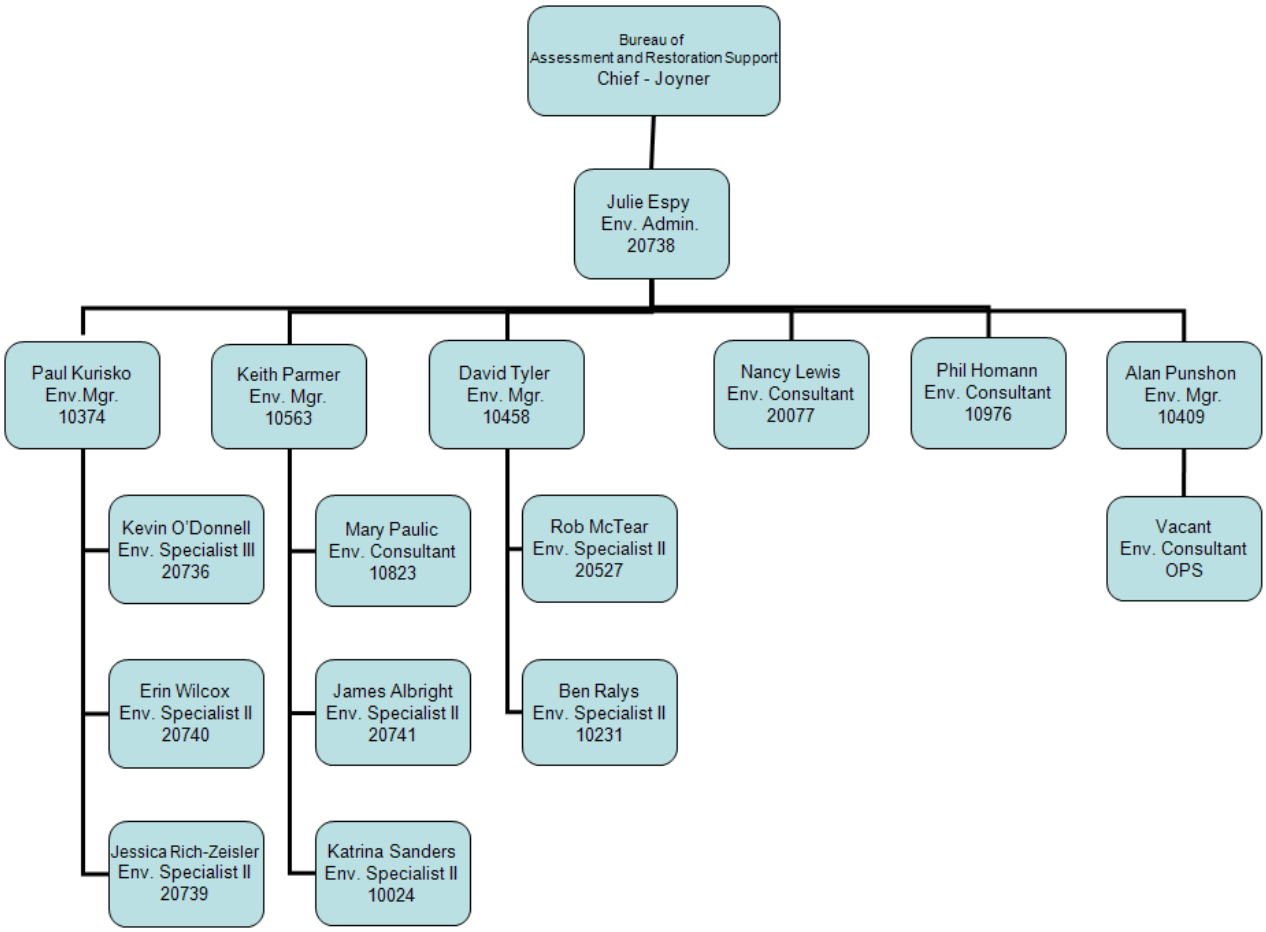
Additional responsibilities include assisting in the preparation and distribution of water quality assessments and lists for the Department through the 305(b) Report for EPA, the EPA WaterBody System which is a computerized data base containing 305(b) information for each REACH, the EPA STORET system. Responds to requests for technical assistance from public, private industry and government agencies on issues regarding the Florida 305(b) Report.

h. Kevin O'Donnell, Environmental Specialist III (Quality Assurance Officer)

Designated as the section's Quality Assurance Officer (QAO) and performs duties and responsibilities as explained in the previous section. Participates or conducts assessments of waterbody health through the application of the IWR, resulting in the creation or revisions of assessment lists, using output results from the IWR database. In conducting the assessments, leads other basin team members, including data providers and other interested parties, to assure that all available assessment information obtained, is accurate and is used appropriately in the assessment.

Additional responsibilities include writing and/or assisting in drafting or reviewing Chapters 1-3 of TMDL reports, 4c and 4d assessment documents and evaluating Reasonable Assurance documents. Technical expertise is provided in developing documentation on the assessment process and results including the preparation of basin assessment reports and the 305(b) report. Participation and technical support is provided to other sections within the Division in the development of TMDLs. This may include leading basin teams, participating in BMAP working groups, or other collaborative activities associated with the development or implementation of TMDLs.

FIGURE 5.1 Watershed Assessment Section Organizational Chart



5.2 Job Descriptions

The Environmental Administrator identified in 5.1(a) maintains the FDEP Position Descriptions for all WAS employees.

5.3 Employee Training

All WAS employees are required to review the Sampling Manual, available at: http://www.dep.state.fl.us/water/monitoring/docs/SamplingManual.pdf 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 WAS sampling programs.

All samplers performing intensive field survey sampling are also required to have specific training and demonstrate competency due to the expert judgment required during field sampling. Individuals conducting an Intensive Survey must train with qualified FDEP staff (via workshops and/or participation in field sampling). Intensive Survey training events are scheduled throughout the year by BARS and/or other sections in the Division.

WAS sampling personnel are also encouraged to obtain training on Global Positioning System (GPS), Class I Watercraft and Trailer Operation (only necessary to act as a boat operator or drive a vehicle towing a boat), and safety training.

Training records are maintained on each employee, by their respective Environmental Manager, who is trained in skills commensurate with their responsibilities.

6.0 Documentation

Sample documentation is a critical data quality objective of the WAS intensive field surveys. Data gathered on these projects is entered into Florida STORET and must be properly linked to historical data, i.e. updates shall be made to existing STORET ID for a station. 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 WAS documentation requirements are based on the FDEP SOPs cited in the QA Rule Chapter 62-160, available at: http://www.dep.state.fl.us/legal/Rules/general/62-160/62-160.pdf.

6.1 Generation, Preservation and Storage of Records

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.

All field documentation is recorded on appropriate field sheets, which are supplied by the FDEP WAS and/or Central laboratory. Samplers are required to ensure that the most current versions are used by observing the date printed on the forms and comparing that date to the date listed for the form in the current version of the WAS Quality Manual.

All paper documentation records must be recorded in waterproof ink. 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, preserved and stored internally by appropriate lab personnel.

All documentation regarding sampling procedures are generated, preserved and stored electronically (and by hard-copy) by the FDEP WAS QAO, the WAS EA, or the assigned designee.

All documentation regarding data management and review is generated, preserved and stored by the Data Manager and the appropriate database software programs.

6.2 Documentation Control and Maintenance

All documentation generated by the WAS is controlled and maintained in essentially 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. Furthermore, all documentation contains documentation control blocks such as page numbers and section headings used to identify completeness. Current documents such as standard operating procedures shall be followed. Ensuring the use of current procedures is consistent with FA 1000, FC 1000 and FD 1000 of the FDEP SOPs and Rule 62-160.210 F.A.C.

6.3 Types of Documentation/Reports Generated/Record Storage and Archiving

The WAS generates several types of documentation and reports that are listed below. Record keeping practices are consistent with Rules 62-160.240(1) and 62-160.340(1), F.A.C., and FD 1000 of the FDEP SOPs.

Documentation related to Intensive Surveys includes

- field sheets (ground water, surface water, sediment)
- custody sheets
- labels
- digital photos
- permission forms
- log books (calibration, standards and buffers, equipment maintenance and equipment cleaning)
- inventory sheets
- field audit forms

Reports

- Quality Assurance Reports
- 303(d) IWR Lists
- 305(b) Integrated Reports
- Basin Status Reports
- Basin Assessment Reports
- TMDL Reports
- TMDL Not Needed (for example, 4c Natural Condition Documentation)
- Annual QA Report (see Section 9.5 for details)
- Reasonable Assurance Reports (RA Plan)

Storage and Archiving:

All records shall be retained for at least 5 years after the completion of the project. All data will be maintained in hard copy form (both in the original raw format and in the Intensive Survey Document) and on computer files. Hard copies are typically kept in the WAS project files (office storage). Data from very large projects will be kept in the project files for at least three years and then archived in the Department's archive file system (warehouse). Backup copies will be made of all electronic data files (backup disks).

6.4 Sample Identification and Data Integrity

Procedures to ensure accurate sample identification begin with proper sample nomenclature. Sample custody is consistent with and follows the FDEP SOPs.

Once stations and samples are properly named, accurate sample identification continues with the samples in the Laboratory Information Management System (LIMS). The sample identification process continues with additional documentation procedures involving the field sheets and custody sheets by including site labels on each form. Accurate sample identification and data integrity remains intact throughout the data review and data analysis process. Refer to the FDEP Central Laboratory Chemistry Section Quality Manual for specific details regarding scheduling available at:
http://publicfiles\PUBFDS\DEAR\Labs\sas\library\qualityplans

6.5 Confidentiality

All records and documents generated by the FDEP WAS (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 Statues.

7.0 Capabilities

The WAS field survey data meets the data quality objectives based on Data Quality Objectives and Data Quality Indicators established in FDEP Directive 972 (QA Directive), and incorporate the concepts and criteria found in FDEP's "Process for Assessing Data Usability", FDEP-EA-001/07 and available at: http://publicfiles.dep.state.fl.us/dear/labs/sas/sopdoc/2008sops/usability_doc.pdf. Within these surveys, staff is 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 WAS collects all samples based on procedures outlined in the FDEP SOPs applicable to surface water (FDEP-SOP-001/01 FS 1000, FS 2000, and FS 2100), and sediment (FDEP-SOP-001/01 FS 1000 and FS 4000). Sampling for these matrixes includes all applicable FDEP SOP field testing procedures (FDEP-SOP-001/01 FT 1000, FT 1100, FT 1200, FT 1300, FT 1400, FT 1500, FT 1600, FT 1700, FT 1800, and FT 1900).

7.2 Sampling Procedures/Containers/Volumes/Holding Times

Sampling is limited to in-situ metered parameter measurements and collection of bottle samples from surface waters for independent laboratory analyses. All containers, volumes, holding times and preservation procedures are consistent with FS 2000, of the FDEP Field SOPs. Sample containers will be prepared and

decontaminated by the Central Laboratory in Tallahassee according to the laboratory's approved comprehensive QA plan and kept in a safe place to avoid damage. Samples will be iced as they are collected and returned to the FDEP Central Laboratory promptly to permit analysis within the proper holding times. Bottle samples will be collected for those parameters that cannot be analyzed in-situ using field meters. The type of sample containers, sample volume, choice of preservation, and the maximum sample holding time for each parameter are described in the Central Laboratory Quality Assurance Plan for the Chemistry Section and Biology Section at http://publicfiles\PUBFDS\DEAR\Labs\sas\library\qualityplans. Pre-cleaned sample bottles will be provided by the laboratory. Section personnel will be responsible for pre-labeling, rinsing, collecting, recording, handling, and returning samples for laboratory analysis in a manner that will ensure sample integrity. Pre-preserved sample bottles may be used to collect samples, but is not recommended. It is at the discretion of the project manager and central laboratory to use pre-preserved sample bottles.

7.3 Test Methods

The table below lists all the analytical test methods used for field data and laboratory analyses.

Table 7.3 Analytical Methods for Intensive Field Surveys

ANALYTE[1]	ANALYSIS METHOD[2,3]
Field Measurements	
pH	EPA 600/4-79-020, Method 150.1; FT 1100
Temperature	EPA 600/4-79-020, Method 170.1; FT 1400
Salinity	FT 1300[3]
Specific Conductance	EPA 600/4-79-020, Method 120.1; FT 1200
Dissolved Oxygen	EPA 600/4-79-020, Method 360.1; FT 1500
Dissolved Oxygen percent saturation	FT 1500[3]
Turbidity	FT 1600[3]
Depth to Water / Reference Point	Steel tape and chalk/electronic indicator[4]
Total Water Depth	Steel tape/electronic measuring device[4]
Light Penetration	FT 1700[3]
Gage Height	Staff gage[4]
Stream Width	Cloth Tape and/or Visual Estimate; FT 1800
Stream Depth	Calculation A/W and/or Visual Estimate; FT 1800
Stream Area	Calculation from Profile and/or Visual Estimate; FT 1800
Stream Velocity	Calculation Q/A and/or Visual Estimate; FT 1800
Stream Flow	Calculation from Profile and/or Visual Estimate; FT 1800
Biology	
Chlorophyll-A[5]	SM 10200 H (modified)

Microbiology	
Fecal Coliform	EPA 600/8-78-017, p. 125 (4); SM 9222 D; SM 9221E
Total Coliform	EPA 600/8-78-017, p. 109 (4); SM 9222 B; SM 9221B
Enterococci	EPA 1600
E. coli	SM 9213 D
Fecal *streptococci*	EPA 600/8-78-017, p. 136 (4)
Sediments	General Sampling FS 4000
Particle Size	SOP-BB15_5
Total Dry Weight	SOP-BB13, SOP-BB14
SOD	FDEP SOP; SESDPROC-010
Total Phosphorus	EPA 365.4
Total Kjeldahl Nitrogen	EPA 351.2
Metals[6]	EPA 6010
Mercury	SOP Hg-008-3 (based on EPA 7471)
ANALYTE[1]	**ANALYSIS METHOD**[2,3]
PAHs[6]	EPA 8270
Organochlorine Pesticides[6]	EPA 8081
Organics	
Total Organic Carbon	EPA 600/4-79-020, Method 415.1, SOP NU-076 (in house)
Nutrients[7]	
Nitrate-Nitrite	EPA 600/4-79-020, Method 353.2
Ammonia	EPA 600/4-79-020, Method 350.1
Total Kjeldahl Nitrogen	EPA 600/4-79-020, Method 351.2
Total Phosphorus	EPA 600/4-79-020, Method 365.1
Orthophosphate	EPA 600/4-79-020, Method 365.1
Inorganic Anions	
Chloride	EPA 600/4-79-020, Method 300.0
Sulfate	EPA 600/4-79-020, Method 300.0
Fluoride	EPA 600/4-79-020, SM 4500-F-C-97
Metals	
Arsenic	EPA 600/4-79-020, Method 200.7
Boron	EPA 600/4-79-020, Method 200.7
Beryllium	EPA 600/4-79-020, Method 200.7
Cadmium	EPA 600/4-79-020, Method 200.7
Calcium	EPA 600/4-79-020, Method 200.7
Chromium III	EPA 600/4-79-020, Method 200.7
Copper	EPA 600/4-79-020, Method 200.7
Iron	EPA 600/4-79-020, Method 200.7
Lead	EPA 600/4-79-020, Method 200.7
Magnesium	EPA 600/4-79-020, Method 200.7
Nickel	EPA 600/4-79-020, Method 200.7
Potassium	EPA 600/4-79-020, Method 200.7
Silver	EPA 600/4-79-020, Method 200.7

Sodium	EPA 600/4-79-020, Method 200.7
Zinc	EPA 600/4-79-020, Method 200.7
Physical Properties	
Alkalinity	EPA 600/4-79-020, Method SM 2320 B-97
Turbidity	EPA 600/4-79-020, Method 180.1
Specific Conductance (Lab)	EPA 600/4-79-020, Method 120.1
Color	EPA 600/4-79-020, Method SM 2120 B-01
Total Suspended Solids	EPA 600/4-79-020, Method 160.1
Total Dissolved Solids	EPA 600/4-79-020, Method 160.2

[1]Analyte measured in unfiltered samples for ground water and surface water matrices unless otherwise noted

[2]Field analytes measured by sampling agency; Biology and Microbiology analytes measured by FDEP Biology Laboratory; all other analytes measured by FDEP Central Chemistry Lab

[3]Methods for Chemical Analysis of Water and Wastes, EPA 600/4-79-020, revised March 1983; Welch, P.S., 1948, Limnological Methods, Blakiston Co., Philadelphia; Environmental Monitoring and Assessment Program Surface Waters: Field Operations Manual for Lakes, EPA 620/R-97/001, 1997; Selenastrum capricornutum printz Algal Assay Bottle Test: Experimental Design, Application, and Data Interpretation Protocol, EPA 600/9-78-018, 1978; Microbiological Methods for Monitoring the Environment- Water and Wastes, EPA 600/8-78-017, 1978; Standard Methods for the Examination of Water and Wastewater (designated SM), 19th Ed., American Public Health Association, Washington, DC, 1995 FDEP SOPs, from http://www.dep.state.fl.us/labs/qa/sops.htm

[4]Measurements using an electronic indicator or measuring device shall follow manufacturer's instructions

[5]Measured only in unfiltered surface water

[6]Measured for sediment analyses

[7]Measured in filtered ground water samples and unfiltered surface water samples, except ortho-phosphate which is measured in both filtered ground water and surface water samples

Non-Standard Methods

The WAS will identify any non-standard procedures in Table 7.3 as NSP. Any non-standard field procedures must be pursuant to FA 2100 and FA 2200 of FA 1000 of the FDEP-SOP-001/01 (March 31, 2008) prior to use.

7.4 Equipment

Any combination (or all) of the equipment listed below may be used by WAS for surface water sample collection:

- Van Dorn sampler (or similar)
- Secchi disk
- Sediment Cups (traps)
- Measuring tape
- Compass
- Depth recorder
- Turner Fluorometer
- Flow meters
- ISCO samplers
- Power converters
- Gas or electric generators
- Tubing
- Water level tape/potentiometer (or chalk tape)
- YSI multi-probe (or similar) and all associated standards and buffers
- GPS equipment (Trimble, Garmin, data logger)
- Pumps (peristaltic, submersible, centrifugal)
- Additional non-equipment supplies (cleaning materials, buckets, gloves, filters, syringes, preservatives, brushes, camera, etc.)

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

- Stainless steel corer
- Stainless steel petite ponar
- Stainless steel Ekman dredge
- Scoops or spoons
- Secchi disk
- Measuring tape
- Compass
- Depth recorder
- Turner Fluorometer
- YSI multi-probe (or similar) and all associated standards and buffers
- GPS equipment (Trimble, data logger)
- Additional non-equipment supplies (cleaning materials, buckets, gloves, filters, syringes, preservatives, brushes, camera, etc.)

7.5 Sample Handling

Details of all activities regarding WAS sample identification, custody, shipment and submittal to the FDEP Central Laboratory meet the data quality objectives identified in the FDEP SOPs.

7.5.1Sample Labeling and Forms

All forms are consistent with FD 9000 of the FDEP SOPs and examples of all forms are incorporated by reference.

When a sampling event is planned, the event is scheduled in LIMS. LIMS generates an “RQ” number (Request ID) for the sampling event, which is linked to each sample bottle requested for the event. Sample submittal forms are generated by LIMS using this information. Field and laboratory data that are stored in LIMS are linked to that sampling event’s RQ number. Data are recorded and stored by unique location/date identifiers.

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.

Prior to sample collection, sample bottles will be properly identified with information pertaining to the location, date, time, name of samplers, type of sample (duplicate, field blank, equipment blank, effluent sample), station and replicate number (when applicable) and recorded on the appropriate form. All containers will be labeled using an indelible ink pen or by attaching an identification tag.

Field data and observations for a sampling trip are recorded on one or more field sheets. Water quality meter data, location information, sample type and preservation are recorded on the sample submittal form. This information is entered into an electronic format compatible with SIM for uploading to STORET.

Once in the field, the samplers will fill in the sample time immediately before taking and filling the sample bottle. Two separate forms will be filled out in addition to the label information. The following information will be recorded on a field data sheet: date, time, location, station number, station description, samplers, weather, sample depth, and any field measurements (dissolved oxygen (DO), specific conductance, temperature, salinity, and pH). The data sheet will also indicate the type of bottle samples collected (sample, blank, or duplicate), note any field decontamination performed, and the sampling sequence. Any errors in the field record sheets will be deleted with a single line through the incorrect entry and initialed. Field sheets will be stored in a 3-ring binder and will be transferred to the project manager at the end of each sampling day.

7.5.2 Chain of Custody

Sample custody is consistent with and follows FD 5000 and FD 7000 of the FDEP SOPs. Sample bottles will be received by the project manager who will sign the form, verify that the sample bottles are clean and pre-labeled (with blank labels), and verify that sufficient bottles have been provided. The project manager will then supervise the field teams as they organize and subdivide the bottles to ensure that each field team has the correct bottles. Bottle labels will include a unique sample identification number.

Custody begins when the sample bottles are received from the FDEP Central Laboratory by WAS personnel. Central Laboratory personnel will provide a signed copy of the FDEP Chain of Custody form with the samples. This form will be used to document all subsequent custody transfers, and will be kept with the project file.

7.6 General Strategic Monitoring Strategy

This section describes DEAR's general sampling strategy for strategic monitoring of surface waters that are potentially impaired, and the tailored strategies for specific parameters/impairment types. The primary focus of strategic monitoring is to collect sufficient data to verify whether waters on the planning list are in fact impaired, and to the extent possible, determine the causative pollutant for waters listed for dissolved oxygen or bioassessment failures. Strategic monitoring plans for most parameters are designed to ensure that, once combined with available recent data, there are at least twenty samples (collected at least four days apart when collected at the same sampling station), with a minimum of five independent sampling events, as required by the IWR. While this section focuses on the Department's sampling strategy, staff should investigate what other QA approved agencies might also be sampling in their respective District, such that the number of samples FDEP has to collect is potentially reduced, or at least coordinated in such a way as to optimize the sampling times and stations in a way to avoid unintended redundancy. Monitoring plans for nutrients are designed to collect at least ten samples over the course of the year, with at least one set of samples taken each calendar quarter. For WBIDs listed for multiple parameters, the sampling strategy is determined by the parameter(s) requiring the greatest number of samples needed for assessment.

The study design includes the scheduling of additional samples so there are sufficient samples for assessment in the event that samples are "lost" due to non-collection (due to poor weather or other factors), or other events (*e.g.,* sample QA deficiencies, qualifier coded data, etc.). If any samples exceed holding times or are deemed unacceptable, sampling staff should re-schedule the samples and contact Alan Punshon to determine if additional data are needed to alleviate deficits. In some cases, sampling will be conducted for de-listing purposes, which requires a large sample size, and Alan Punshon will contact you regarding the correct number of samples needed.

Proper sampling station reconnaissance is vital to the overall sampling process. After conducting a reconnaissance survey of the site, sampling staff should discuss

with supervisory staff at the District and Watershed Assessment Section personnel to determine the best sampling locations. Photos of the sites are part of the reconnaissance, and these photos, along with any additional information about the sites, must be sent to Alan Punshon prior to sampling. The use of existing stations is generally preferable to creating new ones, but new stations may be needed to ensure that sampling is representative of water body conditions.

Samples should not be collected when rainfall is in excess of the 25-year 24-hour storm, when intermittent flow conditions exist, after contaminant spills, or during conditions that would not be representative of the waterbody. To minimize sample contamination, always follow proper sampling techniques, as specified in the QA Rule (62-160) and the associated FDEP Standard Operating Procedures (http://www.dep.state.fl.us/labs/qa/sops.htm). Staff must follow the recently adopted QA Directive (http://www.dep.state.fl.us/admin/depdirs/pdf/972.pdf) and the Quality Manual for the TMDL Program. Training for conducting proper TMDL sampling is available from the Standards and Assessment Section within the Bureau of Assessment and Restoration Support.

The sampling strategy for each of the most common parameter types is described below. In all cases, metered (field) parameters (DO, pH, salinity, sample depth, specific conductivity & temperature) and Secchi depth should also be collected.

7.6.1 Fecal Coliforms

A minimum of twenty fecal coliform samples must be available for the verification period (minimum four days apart and five independent sampling events) and analyzed using a Membrane Filter (MF). A twenty-four hour holding time is in effect when samples are kept at or below four degrees Celsius (Samples held more than the standard 6-8 hours before beginning the testing phase should be marked with a Q, but the policy adopted by the TMDL program is to allow data analyzed in less the 24 hours from the time of sample collection to be used in assessing ambient waters). Coordination between District field personnel and the local contract laboratories performing fecal analysis is crucial in achieving proper holding time.

Enterococci bacteria should also be collected (along with fecal coliforms) in MARINE waters in Districts where the contract laboratories are certified to process Enterococci. Currently the following contracted laboratories are certified to process Enterococci bacteria samples: Sanders Lab (Fort Myers), Advanced Environmental Lab (Gainesville), Flowers Lab (Marathon), Univ. of West Florida Lab (Pensacola), and Flowers Lab (Port St. Lucie). Only the Districts utilizing these laboratories to process fecal coliforms should collect Enterococci bacteria samples in addition to fecal coliforms when sampling in MARINE waters.

7.6.2 Dissolved Oxygen

The primary goals of the DO monitoring for waters on the planning list for potential DO impairment is to collect sufficient DO measurements for verification and the data needed to identify causative pollutants. DEAR is also working with District

staff on DO studies in minimally disturbed streams for developing data needed to revise the Statewide criterion. Please see the document, "Dissolved Oxygen Study for Water Quality Standards Evaluation", for details on that monitoring.

The DO monitoring should, at a minimum, be designed to result in the minimum number of measurements (at least twenty DO measurements collected at least four days apart if sampled at the same station, with a minimum of five independent sampling events). To help identify the causative pollutant, Analyte Suites A or B (for fresh and marine waters, respectively)**,** which includes nutrients (TN and TP), phaeophytin-corrected chlorophyll-a, and BOD should be sampled sufficiently to ensure there are at least 10 nutrient and BOD samples. In streams, Habitat Assessment should always be done to provide information on stream velocity and channelization. Additionally, where conditions are appropriate, a Stream Condition Index (SCI), and Rapid Periphyton Survey (RPS) should also be conducted. Sampling must follow the FDEP SOPs and SCI Primer (http://www.dep.state.fl.us/labs/training/index.htm). Staff conducting Habitat Assessments must test and pass 3 of 5 habitat benchmark sites at least every two years (http://www.dep.state.fl.us/labs/training/index.htm). For streams with a naturally low DO condition, a minimum of two Stream Condition Index (SCIs) samples should be collected, and a third (SCI) should be collected if the first two produce inconclusive results (*e.g.,* one healthy and the other impaired). In lakes where naturally low DO is suspected, Lake Vegetation Index sampling, and Analyte Suite A (for fresh waters)**,** which includes nutrients, chlorophyll-a, and BOD, should be sampled sufficiently to ensure there are at least 10 nutrient and BOD samples.

7.6.3 Metals

All metals listed on the Consent Decree and/or Planning List requires a minimum of twenty samples for determining impairment status. All metals collected should be analyzed using FDEP-recommended methods that have Method Detection Limits (MDLs) appropriate for the criterion. Make sure to ALWAYS schedule test code "W-ICPMS", a type of FDEP laboratory sampling kit, when sampling for silver (Ag), cadmium (Cd), or lead (Pb). For hardness dependent metals criteria (cadmium, chromium III, copper, lead, nickel and zinc) in fresh waters, calcium and magnesium must be sampled at the same time so that hardness can be calculated. Clean techniques described in FDEP-SOP-001/01 FS 8200 "Clean Sampling for Ultratrace Metals in Surface Water" should be used when sampling for mercury (Hg). The FS 8200 document can be found at: http://publicfiles\PUBFDS\DEAR\Labs\sas\sopdoc\2008sops. Training for ultra-trace techniques is available from the Standards and Assessment Section within the Bureau of Assessment and Restoration Support.

7.6.4 Biological Impairment

For waters listed as potentially impaired based on failing bioassessments, the sampling strategy includes both verification of the failed bioassessment and identification of the causative pollutant. For streams, EXCEPT those in the Everglades bioregion, at least one SCI should be conducted (BioRecons should not

be conducted for verification purposes), along with water quality sampling specifically designed to determine the causative pollutant (this could include Analyte Suites A and C, metered parameters, and other organic pollutants, see below).

All personnel scheduled to conduct bioassessments must have completed at least eight hours of FDEP sanctioned field training and passed field audits for the bioassessment to be performed. Biological field evaluations have the potential to contribute an enormous amount of information to an overall water body assessment, but it is critical that staff follow all SOPs, particularly those dealing with proper conditions for the bioassessment (see Primer documents http://www.dep.state.fl.us/labs/training/index.htm).

Sampling to determine the cause of biological impairment is complex, and a site-specific strategy must be developed for each watershed in question, depending upon the natural and human stressors affecting the area. For this to be successful, District samplers must collaborate with DEAR staff in designing the optimum parameter list and sampling frequency. This will require input from District personnel and feedback from DEAR staff. The District investigators should attempt to identify the limitations to the aquatic system based on an evaluation of physical and water quality parameters, and determine the plausible causes of impairment to the system. The SCI Primer provides important information in designing TMDL studies. It should be noted that the TMDL Program only addresses impairment due to pollutant loading, however, habitat degradation and hydrologic modification are very common stressors that may be more responsible for the observed biological degradation than water quality. Therefore, a TMDL stressor identification study must include "custom-made" water quality sampling for the site, as well as address the abiotic components that potentially limit the system.

Sampling could include:

- Physical Indicators
    - Landuse in the affected area [the Landscape Development Intensity Index, Brown and Vivas (2007) is particularly useful for determined human impacts];
    - Morphologic features of the system (*e.g.,* Rosgen stream morphology), including factors such as stream order, etc.;
    - Hydrologic modifications in the area (using the Guidelines for Hydrological Disturbance Scoring);
    - Habitat Assessment (FDEP SOPs or similar suitable approach for waterbody types not covered by the SOPs);

- Chemical/Water Quality Indicators, with sampling targeted for those contaminants likely to be present based upon human influences in the watershed:
    - Organic contaminants, including the parameters listed in Section 62-302.530;
    - Inorganic contaminants, including the parameters listed in Section 62-302.530; and
    - Physical/chemical parameters (*e.g.,* pH, DO, etc.).

- Biological Indicators
    - Rapid Periphyton Survey to determine potential habitat smothering related to nutrient inputs;
    - Stream Condition Index.

7.6.5 Effect of Habitat and Hydrology When Determining Biological Impairment

If possible, sites for TMDL studies should be established in areas where habitat and hydrology are not limiting to biological communities so that the effects of water quality can be more accurately evaluated. If this is not possible, the study should provide information on how habitat and hydrology affect the aquatic life uses attainable in the system, as both factors have adverse effects on the biological expectations of waters in Florida. Lack of suitable habitat or smothered habitat (by sediment or algae) and artificial channelization are often more important than water quality in limiting the biological potential of a system. Stream sites with artificial channelization scores lower than 7 and overall habitat assessment scores below 80 will likely fail the SCI due to these physical limitations. Stagnant (low flow) conditions often result in decreased SCI scores due to limited inundated habitat and unfavorable velocities for stream organisms. High flows can also be detrimental to SCI sampling by creating conditions where colonized habitat is not available. The Guidelines for Hydrological Disturbance Scoring below (which assesses human disturbances, not natural events such as hurricanes or extreme droughts) should be followed. Past studies indicate that Hydrologic Disturbance Scores higher than 7 tend to result in failed SCIs.

Hydrological Disturbance Scoring

Best 1-2 points	Flow regime as naturally occurs (slow and fairly continual release of water after rains), few impervious surfaces in watershed; high connectivity with ground water and surface features delivering water (e.g., sandhills, wetlands; no ditches, berms, etc.)
Slight disturbance 3-4 points	Flow regime minimally changed; some water withdrawals; some wetland drainage, some impervious surfaces in watershed, some ditching
Moderately altered 5-6 points	Flow regime moderately altered; hydrograph moderately flashy (scouring after rain events with subsequent reductions in flow), groundwater pumping evident; much wetland drainage, topographic alterations reduce natural water input; more impervious surfaces throughout watershed, dams/control structures change normal water delivery schedule
Poor 7-8 points	Flow regime highly altered; hydrograph very flashy (scouring after rain events with subsequent reductions in flow, leading to stagnant or dry conditions, related to large amounts of impervious surfaces and/or ditching throughout watershed); water withdrawals & impoundments/control structures severely alter flows, large amounts of impervious surfaces
Very poor 9-10 points	Flow regime entirely human controlled; hydrograph very flashy (scouring after rain events with subsequent reductions in flow, leading to stagnant or dry conditions, related to impervious surfaces and ditching throughout watershed); water withdrawals & impoundments fundamentally alter the nature of the ecosystem

If habitat and hydrology do not appear to be stressors limiting the biology, then water quality degradation is the likely factor, and the causative pollutant must be identified. The water quality sampling regime should be custom-made to assess the human influences associated with the system. For example, if agriculture or urban landscapes are common in the area, pesticides and metals should be sampled in addition to the routine Analyte Suites. For additional guidance on indentifying a causative pollutant, contact Alan Punshon, and he will work with the Standards and Assessment Section in designing an effective study.

7.6.6 Nutrients

All water bodies listed as potentially impaired for nutrients are sampled for Analyte Suites A and B. Deficits in corrected chlorophyll-a (seasonality), TN or TP always determine the number of samples required. For any water body type, at least one sample for corrected chlorophyll and the TN and TP series must be collected in each calendar quarter with a minimum of 10 samples being collected. All three components of the TSI (TN, TP, and chlorophyll-a) should be collected during the same sampling trip so that we can calculate the Trophic State Index (for lakes), and TN to TP ratios (for all water types).

For additional QA guidance, refer to the Official FDEP Field SOPs (as referenced in the QA Rule). http://www.dep.state.fl.us/labs/qa/sops.htm or contact the Standards and Assessment Section.

8.0 Equipment and Instruments

All equipment (and associated standards/buffers) used and maintained by the Watershed Evaluation and TMDL Section (WET) or WAS for calibration procedures are based on procedures outlined in the FDEP SOPs (FDEP-SOP-001/01 FT 1000, FT 1100, FT 1200, FT 1300, FT 1400, FT 1500, and FT 1600) and meet all FDEP SOP specifications for accuracy, reproducibility and design.

8.1 Calibration and Standards

Field instrument calibration follows the requirements for frequency and acceptance criteria as outlined in FT 1000, and the FT Series of the FDEP SOPs. The specific FT series that are applicable are identified in Table 7.3.

All standards and buffers used in calibration procedures are documented in a log book and records are maintained in an Excel Spreadsheet by appropriate staff. The acceptability of field supplies and equipment are specified in FC 1001 and 1002, FD 2000, FT 1000 and the FT series of the FDEP SOP.

In particular, 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 is traceable to each instrument.

8.2 Equipment Maintenance and Documentation

Preventive and corrective maintenance follow FS 1007, FT 1000, and the FT Series of the FDEP SOPs.

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.

All equipment cleaning/decontamination is based on FDEP SOPs (FDEP-SOP-FS 1001 and FC 1000). All instrument and equipment maintenance is based on recommendations made in the individual FT series of the FDEP SOPs and manufacturer recommendations.

8.3 Hazardous Waste Disposal

Waste disposal is consistent with FS 1011 of the FDEP SOPs.

9.0 Data Review and Assessment

The Watershed Assessment program understands the need to evaluate the quality and usefulness of environmental data prior to making decisions. We conduct the following review procedures to determine the usability of data for determination of use support for state surface waters. These procedures are based on Data Quality Objectives and Data Quality Indicators established in FDEP Directive 972 (QA Directive), and incorporate the concepts and criteria found in FDEP's "Process for Assessing Data Usability", FDEP-EA-001/07 and available at: http://publicfiles.dep.state.fl.us/dear/labs/sas/sopdoc/2008sops/usability_doc.pdf. The WAS 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

WAS uses several quality control measures to ensure high-quality data are collected and analyzed within the section. Quality control samples assess the accuracy and precision of sampling and analytical techniques. 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. Additionally, the quality control procedures are consistent with FQ 1000 (blanks, duplicates and other QC samples) and FT 1000 (calibration requirements and acceptance) of the FDEP SOPs. These quality control measures apply to data collected by WAS staff, but cannot be validated for all water quality data collected by other sampling entities that may potentially be used in the Impaired Waters assessment. Each of these entities is responsible for adhering to the FDEP QA Rule and SOPs as data providers to the agency.

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 based on the number of samples collected for a specific project over a specific period of time (typically 5%). All blanks are collected using analyte-free (de-ionized) water and are collected in the same manner as actual samples.

9.1.2 Laboratory Quality Control

In addition to the extensive quality control measures the FDEP Central Laboratory uses internally, the WAS is available to participate in evaluating the quality of the data being generated by the laboratory. Analytical Reference Samples (also referred to as Standard Reference Samples, SRS, or Lab Spikes) prepared by the United States Geological Survey (USGS) would be supplied to selected WAS sampling personnel. These blind water samples are submitted to the laboratory as actual samples.

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 specifications detailed in the FDEP Central Laboratory Chemistry Section Quality Manual available at: http://publicfiles\PUBFDS\DEAR\Labs\sas\library\qualityplans.

Results for Analytical Reference Samples must meet the acceptance criteria established by USGS. Results are compared to the USGS most probable values and standard deviations. Furthermore, the results are calculated as a percentage of the USGS results (should be between 80-120%).

9.2 Data Review

These policies and procedures are used to review and assess raw data, laboratory data and project data.

9.2.1 Data Reduction

There is relatively little data reduction required for the metered parameters measured by the WAS. Most parameters (dissolved oxygen, temperature, conductivity, pH, fluorescence, salinity, incident light, and water level) are read directly from the instrument and entered onto the field data sheet. Each field sheet includes the name of the sampler and the data recorder if different. Stream flow point velocities will also typically be read directly from the flow meter.

In cases where metered parameters were taken over the station depth, data may be depth averaged (simple arithmetic average) for data presentation (downstream or temporal plots). All plots or tables presenting depth averaged data will indicate that the data has been averaged over the depth. DO data taken using YSI Multi-probe models 6920 (or 6900 Series), 6600, or 600 XLM will be corrected for the measured salinity and temperature. The saturation DO and percent DO saturation may be calculated using measured salinities and temperatures. Salinity values may also be calculated from measured conductivities and temperatures. Flows will be calculated using point velocities measured in-stream using a cross-section method. A variety of spreadsheets and basic computer programs are used to perform the necessary calculations.

Data entered on field sheets are simply entered into computer worksheets for any required processing. Data entry is conducted by either the project manager or by an Environmental Specialist (ES) in the WAS. If an ES enters the data, the project manager will proof the data. 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 lead sampler and the project manager. Field logs and previously collected field data are reviewed for obvious problems or errors.

Each lead sampler and the project manager are 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 lead sampler and the project manager are responsible for checking calculations, completing sample preparation, calibration, analysis and instrument logs, and completing all internal custody documentation. Each sector 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 representativeness 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 appropriate database.

9.2.3 Data Validation

Once the reconnaissance, field and lab data are received by the WAS, the field and lab data are loaded into the Laboratory Information Management System (LIMS). The data are then considered provisional and must be reviewed by the data generators and then are uploaded to Florida STORET.

Specific data correction requests are submitted to the STORET Manager or appropriate Coordinator. Any additional problems identified with the data should be documented in the project comments.

9.2.4 Data Use for Impaired Waters Assessment

As mentioned previously, the function of our unit involves conducting and/or reviewing IWR assessments as part of the state's waterbody restoration program for impaired waters. For a detailed description of how water quality data collected for the identification of impaired surface waters of the state is used in the impaired waters assessment, please see the biennial Integrated Water Quality Assessment for Florida: *305(b) Report and 303(d) List Update* available on the section's webpage at:
http://www.dep.state.fl.us/water/watersheds/assessment/index.htm

Additional information on the use of water quality data in the impaired waters assessment is described in the *2010 Submittal of 303(d) List Updates and Support Documentation*, available at the EPA's webpage: http://www.epa.gov/region4/water/tmdl/florida/index.html.

9.3 Corrective Actions

The personnel responsible for assessing each quality control measure and initiating corrective action if needed are the designated quality assurance officers for the WAS, the FDEP, the Central Chemistry and Biology Laboratories. All corrective action procedures are consistent with FA 3200 of the FDEP SOPs. Specific QC measures that initiate corrective action and the types of action that will be taken are listed in **Table 9.3a** below.

Notification of 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 official notice of the need for corrective action. Official memoranda between project managers, who are also the contract managers, may be used 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 year.

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

Table 9.3a – Corrective Action

QA/QC MEASURE	CRITERIA FOR CONCERN	CORRECTIVE ACTION
Field Blank	Any value > Method Detection Limit	Analyte-free water source and storage Equipment storage Sample custody
Equipment Blank	Any value > Method Detection Limit	Cleaning procedure Analyte-free water source and storage Equipment storage Sample custody
Performance (laboratory)	Results exceed targets for accuracy in Lab QA Manual	Lab notification

9.4 Procedures for Reporting Data Deviations

The reporting of unacceptable results (failure of calibration, holding times, etc.) is consistent with the reporting requirements outlined in the FT 1000 series. Significant deviations from standard policies or practices of the WAS 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 qualifier (remark code) associated with that sample. Similarly, the failures of any quality control checks are noted as comments with the data. 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 in the form of letters, interoffice memorandum, appendices to reports or comments in the WAS database.

9.5 Audits and Annual Report to Management

The Annual QA Report will be prepared by the WAS's QAO and submitted to the EA. Reports to management are consistent with the procedures outlined in FA 3250 of the FDEP Field SOPs. The WAS QAO will provide information for the report identified in the list of items below. Any information regarding on site inspection of field equipment, boats, trailers, maintenance of equipment, etc. identified below that can be provided by the Watershed Evaluation and TMDL Section, will be incorporated by reference in the report.

1. An on-site inspection of the physical facilities used for maintenance, calibration, and storage of field equipment,

2. A visual inspection of all field meters and a review of the maintenance logs for each meter,

3. A detailed review of field sampling protocols, field calibration procedures, field decontamination procedures, and field custody documentation, including a summary of the quality assurance objectives for measurements of data in terms of precision, accuracy, and method detection limit.

4. An examination of randomly selected field, laboratory, and auxiliary data records,

5. A determination whether planned quality control procedures are being implemented,

6. A list of deficiencies that must be addressed to correct or improve the sampling system and the corrective actions.

There are currently no regularly scheduled audits from external sources.

10.0 Consumer Relations

10.1 Review of Proposed Work

Proposed field sampling is scheduled under the supervision of the Environmental Administrator. An internal field sampling schedule is available to Section personnel on a calendar posted in the room 238 within the Bob Martinez Center. Proposed laboratory work is scheduled through LIMS.

10.2 Complaints

The WAS 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 Environmental Administrator who may investigate and direct the resolution. Formal written complaints are logged with the section and following the investigation and resolution, are responded to in writing. Copies of responses are kept for reference.