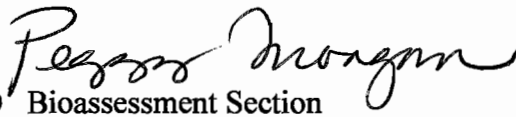


Quality Assurance Manual

For

**Benthic Macroinvertebrate Sampling and Laboratory Analysis
Bioassessment Program, Watershed Restoration Team
Florida Department of Environmental Protection
SWD
13051 N. Telecom Parkway
Temple Terrace, FL 33637**

Prepared by: 
FDEP SWD Bioassessment Section



Peggy Morgan - Environmental Scientist III



Gitta Schmitt - Environmental Specialist II



Michael Schuman – OPS II

Table of Contents

Section	Description	Page #	Revision Date
	Title Page	1	04/14/09
	Table of Contents	2	04/14/09
	Tables	3	04/14/09
	Figures	3	04/14/09
1.0	Statement of Policy	4	04/14/09
2.0	Ethics	4	04/14/09
3.0	Confidentiality	4	04/14/09
4.0	Organization and Responsibility	4	04/14/09
4.1	Organizational Structure	4	04/14/09
4.2	Key Personnel and Position Descriptions	5	09/16/10
4.3	Quality Assurance Status	6	04/14/09
5.0	Biology Lab Services	6	04/14/09
5.1	Macroinvertebrate Methodology Procedures	6	04/14/09
5.2	Biological Reports	7	04/14/09
6.0	Documentation	7	04/14/09
6.1	Biological Indices	7	04/14/09
6.2	Document Control and Maintenance	7	04/14/09
6.3	Field and Lab Documentation	9	04/14/09
6.4	Sample Identification, Chain of Custody and Sample Acceptance	9	04/14/09
7.0	Biological Equipment and Handling	11	04/14/09
7.1	Sampling Capabilities and Procedures	11	04/14/09
7.2	Field Sampling Equipment	11	04/14/09
7.3	Sample Handling	13	04/14/09
7.4	Chemical and Sample waste disposal	13	04/14/09
7.5	Surface water samples	13	04/14/09
7.6	Biology Laboratory Equipment	13	04/14/09
7.7	Procedures for Reporting Exceptions	14	04/14/09
8.0	Field and Laboratory Biological Data	14	04/14/09

8.1	Field Data	15	04/14/09
8.2	Laboratory Data	15	04/14/09
8.3	Data Verification	16	04/14/09
8.4	Data Validation	16	04/14/09
9.0	Training, Review and Assessment	16	04/14/09
9.1	Personnel Training	17	04/14/09
9.2	Quality Control	18	04/14/09
9.3	Corrective Actions	19	04/14/09
9.4	Audits	20	04/14/09
10.0	Consumer Relations	21	04/14/09
10.1	Scheduling of Work	21	04/14/09
10.2	Complaint Handling	21	04/14/09
10.3	Confidentiality	21	04/14/09
	References	21	04/14/09
	Appendix	22	04/14/09

Tables

Table Number	Description	Page Number	Revision Date
5.1.1	Macroinvertebrate Methodology Procedures	6	04/14/09
7.1.1	Sampling Capabilities and Procedures	11	04/14/09
7.2.1	Macroinvertebrate Sampling Equipment List	12	04/14/09
7.6.1	Biology Laboratory Equipment List	13	04/14/09
9.1.1	Procedures followed for Biological Training	17	04/14/09
9.2.2	Biology Laboratory QC Procedures	18	04/14/09

Figure Number	Description	Page Number	Revision Date
Figure 4.1.1	SWD Biology Lab Organizational Structure	5	04/14/09

1.0 Statement of Policy

The SWD Watershed (SWD) Management and Resource Monitoring Program of the Florida Department of Environmental Protection collects biological data for use by the Department for a variety of projects and uses. The Biology staff conducts field sampling and laboratory analyses of marine and freshwater benthic macroinvertebrate communities, and collects associated surface water parameters. In accordance with Chapter 62-160.210(1) F.A.C., the SWD Watershed Restoration and the Bioassessment Program follow the applicable collection and quality control protocols and requirements described in DEP-SOP-001/01 (12/03/08). This Quality Manual is intended to provide guidance for the Section in performing these studies and analyses. The SWD Management and Bioassessment Programs believe in sound and useful Quality Assurance/ Quality Control management practices.

2.0 Ethics

All employees of the DEP SWD Biology Laboratory are held to high professional ethical standards in the performance of their duties. All employees are required to read, understand and sign 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 Florida Department of Environmental Protection.

3.0 Confidentiality

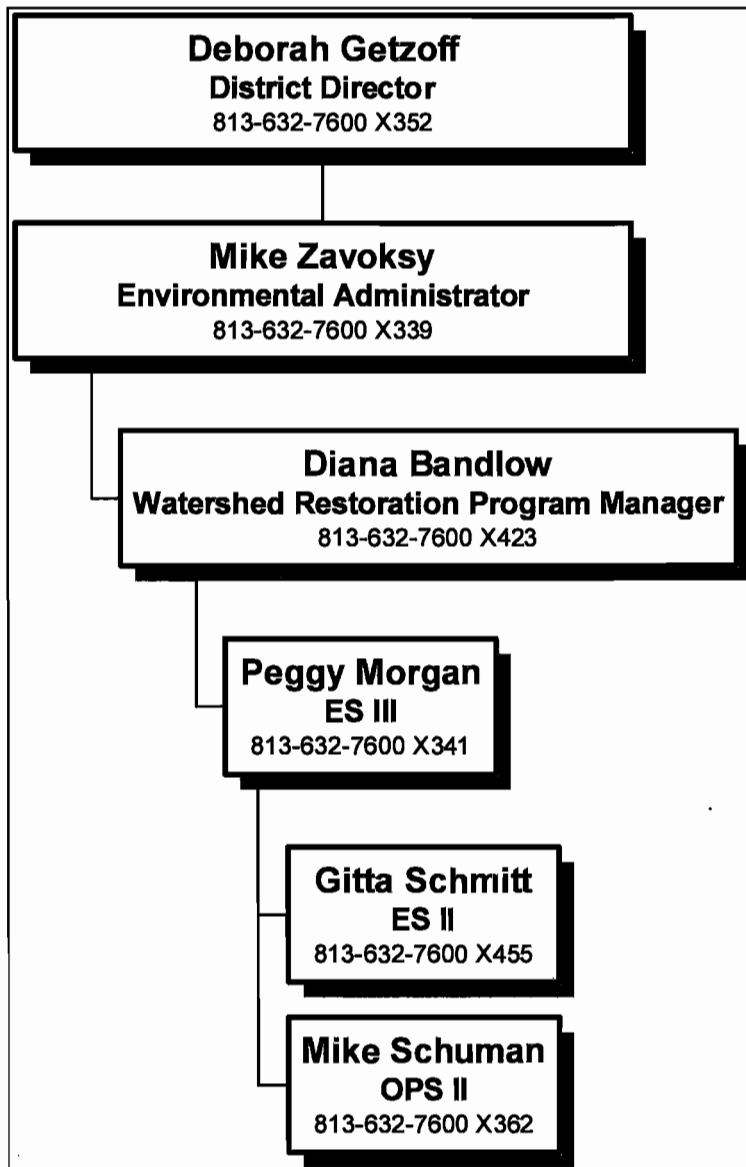
All data and reports generated by the SWD Biology Laboratory are public record according to Chapter 19 of Florida Statutes. Should the SWD lab be closed, all records and materials will be turned over to the Florida Department of Environmental Protection.

4.0 Organization and Responsibility

4.1 Organizational Structure

The SWD Biology Laboratory is within the Watershed Management Section of the SWD Office of DEP in Tampa, FL. The laboratory has two full time biologists and other trained staff that work in the field and enter data according to workload. The Biology Lab Organizational Structure is shown in Table 4.2.1.

Figure 4.1.1. Biology Lab Organizational Structure



4.2 Key Personnel and Position Descriptions

***A. Peggy Morgan: Environmental Specialist III.**

Biology Lab Manager. Supervises and conducts biological sampling and taxonomic identification and writes resulting reports. Administrator and Quality Control Officer of the Biological Database for the SWD

***B. Gitta Schmitt: Environmental Specialist II.**

Conducts biological sampling and assists with data analysis and report writing.

*C. Michael Schuman, OPS II
Conducts biological sampling and biological data entry.

D. Charles Thompson, OPS I TMDL
Assists with biological sampling

E. Jonathan Seiler, OPS II TMDL
Assists with biological sampling

F. Jason Jendrucko TMDL
Assists with biological sampling

(* - Indicates the individual is an approved signatory for purposes of this program.)

4.3. Quality Assurance Status

A. Peggy Morgan, Gitta Schmitt and Michael Schuman are in compliance with DEP audit procedures for Habitat Assessment, Stream Condition Index (SCI), Biorecon and Lake Vegetative Index (LVI) as per FDEP's Quality Assurance Rule, Chapter 62-160.650.

B. Charles Thompson is in compliance with DEP audit procedures for Habitat Assessment and LVI as per FDEP's Quality Assurance Rule, Chapter 62-160.650.

C. Jonathan Seiler and Jason Jendrucko are in compliance with DEP audit procedures for Habitat Assessment as per FDEP's Quality Assurance Rule, Chapter 62-160.650.

5.0 Biology Lab Services

The SWD Biology Laboratory performs biological assessments of surface waters and taxonomic analysis of benthic macroinvertebrates and aquatic macrophytes. Personnel also collects associated surface water samples for chemical analysis as per the SWD Quality Assurance Manual and DEP SOP 001/01.

5.1 Macroinvertebrate Methodology Procedures

Table 5. 1.1 Biological Methodology References

Method (Index)	Source	Procedure (Section of DEP-SOP-001/01 and 002/01), respectively
Stream Condition Index (SCI)	Macroinvertebrates	FS 7420, LT7200, LT 7900
Biorecon	Macroinvertebrates	FS 7410, LT7100

Lake Condition Index (LCI)	Macroinvertebrates	FS 7460, LT 7300, LT7900
Lake Vegetation Index (LVI)	Macrophytes	FS 7310, LT 7500
Hester-Dendy	Macroinvertebrates	FS 7430
Cores	Macroinvertebrates	FS 7440
Habitat Assessment	Field Data	FT 3000

5.2 Biological Reports

The following types of reports are prepared for management and the public:

- Ecosummary reports. These reports summarize results from a single SCI, LVI or Biorecon. They are created by the SW District Biologists, reviewed by Central Lab staff and posted on the DEP website.
- Watershed or Basin Reports. These are reports specific to a watershed or waterbody, summarizing results from one or more sampling sites
- Bioassessment reports and/or memos. These are reports specific to an impact assessment performed by the SW District biologists. These reports or memos are used by the SW District management to determine violations by surface water facilities or illegal activities in surface water and wetlands.

6.0 Documentation

The current DEP SOP 01/001 and 02/001 shall be followed, ensuring the use of current procedures is consistent DEP Field SOPs and 62-160.210 F.A.C.

6.1 Biological Indices

Field data sheets are generated for all bioassessment activities. Hard copies of these sheets as well as lab bench sheets and reports are retained in accordance with the Department's Records Management policies (see 6.2.2 below)

6.2 Document Control and Maintenance

6.2.1 Chapter 119 of Florida Statutes

Chapter 119 of Florida Statutes sets standards for public records. These standards apply to laboratory records regardless of whether the laboratory is in operation.

Chapter 119, F.S. can be found at this Internet address:

http://www.flsenate.gov/statutes/index.cfm?App_mode=Display_Statute&URL=Ch0119/titl0119.htm&StatuteYear=2000&Title=-%3E2000-%3EChapter%20119

6.2.2 Directive 335

The Department of Environmental Protection's Records Management Policy is set in Directive 335. It can be found at this Internet address:
<http://www.dep.state.fl.us/admin/depdirs/pdf/335.pdf>

The general retention time for laboratory records is at least 5 fiscal years after project completion. Data collected for management decisions that may result in legal challenges will be retained for an additional 5 fiscal years. Included in, but not limited to this category are compliance and enforcement actions, TMDL water body listing and delisting, and rule development.

After the required retention time, records are destroyed, usually by recycling. Records are destroyed after completion of a Records Disposition Form, which includes approval by the Department's Records Management Liaison Officer. The Records Disposition form is kept as a permanent record.

All data is entered into the appropriate DEP biological data base for permanent storage.

6.2.3 Florida Department of Environmental Protection Records Retention Schedule - Laboratory Records

Record keeping practices for field procedures are consistent with 62-160.240(1). Record keeping practices for laboratory procedures are consistent with 62-160.340(1), F.A.C. and LD 1000 of the DEP SOPs DEP SOP 02/001. All data is entered into the appropriate DEP Biological data base for permanent storage.

6.2.3.1 Field Data Sheets

This record series consists of, but is not limited to notebooks or files containing field sheets for habitat assessment and surface water parameters taken in association with biological samples

Retention:

- a) Record copy. 10 fiscal years provided applicable audits have been released.
- b) Duplicates. Retain until obsolete, superseded or administrative value is lost.

6.2.3.2 Raw Laboratory Data

This record series consists of, but is not limited to raw data generated by the /Biology laboratories from analytical samples of macroinvertebrates and macrophytes.

Retention:

- a) Record copy. 10 fiscal years provided applicable audits have been released.
- b) Duplicates. Retain until obsolete, superseded or administrative value is lost.

6.2.3.3 Final Reports

This record series consists of, but is not limited to final reports of biological samples collected by the Biology laboratory. Reports detail sample results for macroinvertebrate, macrophyte, habitat assessment and related surface water data.

Retention:

- a) Record copy. 10 fiscal years provided applicable audits have been released.

b) Duplicates. Retain until obsolete, superseded or administrative value is lost.

6.3 Field and Lab Documentation

6.3.1 Field and Lab Forms

The following forms are consistent with FS 7000 of the DEP SOPs. Those in bold type are generated by the SWD Watershed Management and Monitoring Program. These forms are included in Appendix A. The rest are statewide DEP SOP forms and can be found at this website: <http://www.floridadep.org/labs/qa/forms.htm>

The forms and types of reports listed below in bold text are created in house.

- **Water Quality Data Sheet**
- **Sample Custody Log**
- **Chain of Custody**
- Physical/Chemical Characterization Form, FD 9000-03
- Stream/River Habitat Assessment Field Sheet, FD 9000-05
- Stream/River Habitat Sketch Sheet, FD 9000-04
- Lake Habitat Assessment Field Sheet, FD 9000-06
- Composite Lake Sampling Form, FD 9000-02
- **Individual Taxonomic ID Sheet for Slide Mounted Specimens**
- Stream BioRecon Field Sheet, FD 9000-01
- **Macroinvertebrate Taxonomic Data Sheet**
- **Macroinvertebrate Sorting QA Log**

6.4 Sample Identification, Chain of Custody and Sample Acceptance

6.4.1 Sample Identification

Stations sampled throughout the SWD are identified by a unique STORET number, which is assigned immediately after the first sample event. Biological samples from these sites are identified by a numeric system, which utilizes the geographical coordinates of the site, specifically the latitude/longitude coordinates. Stations are also given a nickname, which consists of the prefix TP for streams and L for lakes, followed by sequential station numbers derived from the Program sample list, which is kept current. Sites for specific point source studies utilize prefixes that describe the water body being tested.

Macro-invertebrate sample status is tracked through the use of the **SWD Biology Laboratory Sample Control Log** and Quality Assurance Documentation. Upon receipt in the lab samples are logged into the **Macroinvertebrate Sample Control Sheet** with the following information:

- Water Body Name
- STORET Station #
- Sample ID #
- Sample Collection Team
- Lab Check-in Date
- Original Sorter
- Date Sorted
- Location of Sample
- Identifying Taxonomist
- ID Date
- Sample Disposition
- Notes

6.4.2 Chain of Custody

Sample custody is consistent with and follows FD 5000 of the DEP SOPs. The **SWD Sample Custody Form** will be the Chain of Custody for macroinvertebrate samples. Upon returning to the laboratory with samples the sampling group will date and sign the Chain of Custody entries on the field sheet releasing the samples to the laboratory. The Chain of Custody includes the following fields:

Completed by sampler:

- 1) Delivered by (person's initials)
- 2) Location
- 3) Date
- 4) Time

Completed by laboratory staff

- 1) Received by (person's initials)
- 2) Location
- 3) Date
- 4) Time

The laboratory personnel will fill out the Chain of Custody entries on the field sheets relating to the condition of the samples. Laboratory personnel must review field data sheets to ensure all necessary data has been recorded. Should there be doubt on the samples' suitability for testing, samples do not conform to the description provided, or the test required is not fully specified, laboratory personnel will consult the client (sampler) before proceeding. Any corrections to the field sheet should be made by the data recorder, if necessary, or by laboratory personnel. Corrections are to be made by striking through the error with a single line, which is initialed by employee making correction. Corrections should be made on the same day of the sampling event and, therefore, do not need to indicate date of each correction. Changes to the field data sheet made after sample date must show date of correction. Any deviations will be documented with appropriate codes or comments. Samples will be stored in a refrigerator located in a limited access area of the laboratory.

7.0 Biological Equipment and Sample Handling

This QA Manual covers the biological and physical-chemical aspects of the field and laboratory capabilities of the SWD Watershed Management and Monitoring program. Surface water sampling capabilities of the biology lab staff are included in the SWD Quality Assurance Manual for surface water.

7.1 Sampling Capabilities and Procedures

Procedures for general Biological Community sampling is outlined in Section FS7000 of DEP SOP-001/01

Table 7.1.1 Sampling Capability and Procedures

Method (Index)	Source	Procedure (Section of DEP-SOP-001/01 and 002/01), respectively
Stream Condition Index (SCI)	Macroinvertebrates	FS 7420, LT 7200, LT 7900
Biorecon	Macroinvertebrates	FS 7410, LT 7100
Lake Condition Index (LCI)	Macroinvertebrates	FS 7460, LT 7300, LT 7900
Lake Vegetation Index (LVI)	Macrophytes	FS 7220, LT 7500
Hester-Dendy	Macroinvertebrates	FS 7430
Cores	Macroinvertebrates	FS 7440
Habitat Assessment	Field Data	FT 3000
Qualitative Periphyton Sampling	Periphyton	FS 7220
Rapid Periphyton Survey	Periphyton	FS 7230

7.2 Field Sampling Equipment

Sampling equipment is consistent with FS 1001 and Tables FS 1000-1 through FS 1000-3 and Figure FS 1000-1 of the DEP Field SOPs. All containers, volumes preservation, holding times and preservation procedures are consistent with FS 2000, FS 1006, FS 7000, Table FS 1000-2 and Tables FS 1000-4 through FS 1000-9 of the DEP Field SOPs. Equipment for surface water sampling not found in this table can be found in the SW District's Quality Control Manual.

Table 7.2.1 Macroinvertebrate Sampling Equipment List

Equipment Type	Use	Parameter Groups	Restrictions/ Precautions
Hester-Dendy multiplate sampler	Sampling	Benthic macroinvertebrate	(1) (3)
D-Frame Dip net	Sampling	Benthic macroinvertebrate	(2)
Sieve	Sampling	Benthic macroinvertebrate	(2)
Densimeter	Measuring canopy	Canopy Cover	None
Bucket	Sampling	Benthic macroinvertebrate and Phytoplankton algae	None
Formalin	Sample preservation	Benthic macroinvertebrates, periphyton algae	(4) (5)
Ethanol	Sample preservation	Benthic macroinvertebrates	(5)
Lugol's solution	Sample preservation	Phytoplankton algae	(6)
Waders	Sampling	Benthic macroinvertebrate, periphyton, macrophytes & phytoplankton	None

1. Plates that have been contaminated with toxicants or preservatives cannot be reused.
2. Sieve must be a U.S. Standard No. 30 (28 meshes per inch, 0.595 mm openings). Dip-net mesh must be no larger than U.S. No. 30.
3. Vandalism can be a problem at sites with public access.
4. Formalin should be buffered to a neutral or slightly alkaline level with sodium bicarbonate.
5. Hazardous/flammable
6. Will stain skin, clothing

Samples and field data will be completed in accordance with DEP- SOP-001-01.

Samples will be handled with a SWD 's Field Sheet Chain of Custody. Samples to be analyzed by the Tallahassee laboratory will be entered into the Tallahassee LIMS system before the sample date. The SWD laboratory will record Tallahassee Laboratory data provided in the Analysis Reports.

7.2.1 Sampling Equipment Maintenance

Each dipnet will be inspected for tears and rejected should any be found. The net hood will be replaced with a new 600 mm mesh hood. All additional sampling equipment listed in Table 5.2.1 will be inspected prior to each use and repaired or replaced. In some cases, this will entail shopping the item to the manufacturer for repair. In other cases, the

equipment can be repaired in-house. Maintenance and care of multiprobe meters is outlined in the SW District's Quality Control Manual.

7.3 Sample Handling

Sample handling is consistent with FD 5000, FD 7000 and LD 7000 of the DEP SOPs.

Central Laboratory in Tallahassee:

Sample requests (RQ) to be sent to the Central Laboratory in Tallahassee must be pre-approved in the Laboratory Information Management System (LIMS). Sampling events requiring analytical work by the Central Laboratory in Tallahassee must be scheduled with the Central Laboratory prior to sending samples. LIMS requests will be written in the LIMS system to schedule Tallahassee laboratory work. The Tallahassee Laboratory will send coolers with proper sample containers for each scheduled event.

7.4 Chemical and Sample waste disposal

Waste disposal is consistent with FS 1011 of the DEP SOPs and the SW District's Quality Control Manual. Formalin waste is poured down the sink by permission of the City of Tampa's WTP at Hooker's Point. Biological samples are bagged and disposed of by the City of Tampa Utilities.

7.5 Surface water samples

Surface water samples collected by Biology Laboratory staff will be in accordance with the SWD Quality Control Manual and DEP SOP-01/001 Equipment decontamination procedures follow FC 1000 and FS 1001 of the DEP SOPs.

7.6 Biology Laboratory Equipment

All laboratory equipment and materials are referenced in Sections FS7000, LT7100, LT7200 and LT7300 of DEP SOP 002/01. Table 5.4 summarizes equipment used daily and all others are referenced by the SOPs.

7.6.1 Biology Laboratory Equipment

Figure 7.6.1 Biology Laboratory Equipment List.

Equipment	Activity	Procedure (DEP SOP 002/01 Section)
US Standard No. 30 Sieve	Rinsing macroinvertebrates	FS7420, FS7460, LT7200 LT7400, FS7430

Forceps	Sorting and identifying invertebrates	LQ7400, LT7100, LT7200, LT7300, FS7400
Petri dishes	Sorting and identifying invertebrates	LQ7400, LT7100, LT7200, LT7300, FS7400
Glass vials, 1, 2 and 4 dram	Specimen storage	LQ7400, LT7100, LT7200, LT7300, FS7400
Microscope slides and coverslips	Macroinvertebrate identification	LQ7400, LT7100, LT7200, LT7300, FS7400
Immersion Oil	Macroinvertebrate identification	LQ7400, LT7100, LT7200, LT7300, FS7400
Glass jars, various sizes	Sample storage	LQ7400, LT7100, LT7200, LT7300, FS7400
Denatured Ethanol, 70%	Sample and specimen preservation and storage	LQ7400, LT7100, LT7200, LT7300, FS7400
Formalin	Sample and specimen fixation	LQ7400, LT7100, LT7200, LT7300, FS7400
Leica M275 Stereoscope (2)	Macroinvertebrate identification	LQ7400, LT7100, LT7200, LT7300, FS7400
Olympus Phase Contrast Microscope BX51	Macroinvertebrate identification	LQ7400, LT7100, LT7200, LT7300, FS7400
Nikon Phase Contrast Compound Microscope	Macroinvertebrate identification	LQ7400, LT7100, LT7200, LT7300, FS7400
Leica Wild M3C Phase Contrast Microscope	Macroinvertebrate identification	LQ7400, LT7100, LT7200, LT7300, FS7400

7.6.1 Biology Laboratory Equipment Maintenance

All microscopes are to be serviced by an accredited professional on an annual basis. All other lab equipment will be replaced as needed when depleted or found to be contaminated or broken.

7.7 Procedures for Reporting Exceptions

The laboratory will make every effort not to deviate from the bioassessment procedures. If circumstances arise that require deviations from standard policies or practices of the laboratory those deviations will be documented with the analytical reports. Result codes and comments will be used to qualify data reports. Any deviations will be reported to the client and will be documented in all related records.

8.0 Field and Laboratory Data

8.1 Field Data

All data management is consistent with FD 1200 of the DEP SOPs. Field data will be collected in accordance DEP- SOP-001-01.

8.1.1 Raw field data

The notebooks, field sheets and laboratory bench sheets shall be the source for all original/raw data. The results will be written in ink on the field data sheet and filed in the Biological Laboratory.

8.1.2 Habitat and physicochemical data

Habitat and physicochemical data is entered into DEP's Statewide Biological Database (SBIO) and the National STORET database.

8.2 Laboratory data

8.2.1 Macroinvertebrate data

Macroinvertebrate identifications and count data are recorded on laboratory bench sheets. These data are entered into the macroinvertebrate module of the Biology Section's SBIO computer software, a 4th Dimension database front-end to an Oracle database on the departmental server. Species names are selected from a master list contained in the database to prevent typographical errors and any new species that are verified by the Central Laboratory Database Administrator before being added to the master species list. Two taxonomists proof original bench sheets against data entries to confirm the count information, correct species are entered, and data are associated with the correct station, replicate, and date. A data retrieval module permits data subsets to be gathered for further analyses. Prior to statistical analysis, the database program crosschecks sample dates and station designations. Calculations of macroinvertebrate indices, population density, diversity, and other measures of community status are achieved through the use of other program modules in conjunction with various commercial statistics programs. Population density is expressed as individuals/m² for Hester-Dendy and dredge samples. For timed qualitative sampling, population components are expressed as proportional percentages of the community encountered.

8.2.2 Vascular Plant Data

Vascular plant species names and presence are recorded on field forms and entered into the Vascular Plant Database (VPDB), a 4th Dimension database front-end to an Oracle database on the departmental server that interacts with SBIO. Species names are selected from a master list contained in the database to prevent typographical errors and any new species that are verified by the Central Laboratory Database Administrator before being

added to the master species list. Two taxonomists proof original bench sheets against data entries to confirm the count information, correct species are entered, and data are associated with the correct station, replicate, and date. A data retrieval module permits data subsets to be gathered for further analyses. Prior to statistical analysis, the database program crosschecks sample dates and station designations. Calculations of the Lake Vegetative Index (LVI), relative percentage of exotic, native and sensitive taxa and other community structure parameters are achieved through the use of other program modules in conjunction with various commercial statistics programs.

8.3 Data Verification

8.2.1. Field data

One analyst will enter the data from the field habitat assessment and physicochemical characterization forms into SBIO and a second analyst verifies the content and accuracy of each entry. Once this process has been completed all entries are marked complete by the data administrator, which results in the calculation of the habitat score and permanent storage in SBIO

8.2.2 Laboratory data

One analyst will enter the data from the macroinvertebrate bench sheet into SBIO while a second analyst verifies the content and accuracy of each entry. Once this process has been completed all entries are marked complete by the data administrator, which results in community variables and scores being calculated and stored. All data are permanently stored in SBIO on the FDEP Server.

8.4 Data Validation

For field data verified as described in 8.2.1 above, habitat assessment variables and scores and physicochemical data are stored electronically in SBIO. For macroinvertebrate data verified as described in 8.2.2 above, community variables and scores are calculated and stored electronically in SBIO.

Central Laboratory administrators are responsible for daily and weekly backups of all biological data entered and checked into SBIO and VPDB on a daily basis, and hard copy backups on a weekly basis. The latter is stored in a secure location other than the Martinez building in Tallahassee.

9.0 Training, Review and Assessment

9.1 Personnel Training

Procedural references for field and lab biological training is shown in Table 9.1.1

Table 9.1.1 Procedures followed for biological training

Activity	Procedure
Biological sampling	FS 7000
Habitat assessments	FT 3000
Biological analyses	LT 7000
Biology Lab Quality Control	LD 1000

9.1.1 Field Sampling Biological Training.

9.1.1.1 Internal Training

The roles and responsibilities of personnel are consistent with FA 1000 of DEP SOPs. Field staff training is consistent with FA 2100. Biological training is consistent with FS 7000. All field/laboratory personnel are adequately experienced and/or receive(d) necessary training for the duties they are to perform. Experienced personnel are responsible for training new employees in accordance with FS7000. Training records are maintained on each employee who is trained in skills commensurate with their responsibilities. Training files contain certification that each analyst has read, understood, and agreed to perform the most recent version of the field and laboratory methods (DEP-SOP-001/01 and FS 7000). Personnel are required to annually review all Standard Operation Procedures (SOPs) that pertain to the work they perform within the program. Establishment of experience and/or training must be documented for each employee. The latest official versions of SOPs are located on the FDEP Internet site (<http://www.floridadep.org/labs/sop/index.htm>) and are accessible to all personnel involved in field and/or laboratory activities. Hard copies of SOPs are kept by the QA Officer as well as the Program Manager, and are carried by personnel when field sampling.

9.1.1.2 External Training

Biological training is provided at the Statewide Biocriteria Committee Meetings held four times a year, and organized by the Central Laboratory

9.1.2 Macroinvertebrate Taxonomy Training

9.1.2.1 Internal Training

Experienced personnel will train new employees in accordance to LT 7000 and LQ 1000.

9.1.2.2 External Training

The DEP Biocriteria Committee and the Florida Association of Benthologists (FAB) both sponsor taxonomic workshops for taxonomic identification training. These workshops result in official certification that the participating biologist successfully demonstrates the ability to taxonomically identify the macroinvertebrate group presented in the workshop. Employees may take advantage of any other external training, provided they are presented by accredited experts and approved by supervisory personnel

9.2 Quality Control

9.2.1 Field QC Checks

The Field QC measures are consistent with FQ 1000 of the DEP SOPs. Each time a grab sample is pulled, the dredge is inspected to determine that it has closed completely and that no material has been lost. Dip nets are inspected before use to assure that no holes are present. At least three pseudo-replicates are used for Hester-Dendy Multiple samples. For each type of macroinvertebrate sampling performed one in ten samples are taken in duplicate and analyzed.

9.2.2 Biology Lab QC Checks

The Laboratory QC measures are consistent with LT 7000 and LQ 1000 of the DEP SOPs. Biology Laboratory quality control references are listed in Table 8.1.2

Table 9.2.2 Biology Laboratory QC Procedures

Activity	Source	DEP SOP 002/01 Section
Rinsing and sorting Dipnet samples	Macroinvertebrates	LQ7200
Taxonomic Identification	Macroinvertebrates	LQ7200

References approved for use in the identification of organisms are listed in Appendix A of the Quality Assurance Manual for the Biology Section FDEP Tallahassee 12/31/03. Species diagnoses are consulted before a final identification is made. In addition, a reference collection is maintained (and continually updated) so that organisms from a given sample can be compared to an already verified "type" material. Organisms that cannot be positively identified by use of references and/or knowledge of the biological staff will be sent to outside experts for identification. These analyses are generally performed as part of a more extensive study and interpretive reports including results of the QA checks detailed in Sections 11 and 12 are generated as part of the final study report

9.2.2.1 Macroinvertebrate sample sorting efficiency

Macroinvertebrate sample sorting efficiency is performed in accordance with FS 7000 and DEP-SOP-002/01 LT7000. At least 10% of the aliquots sorted by each taxonomist are randomly selected and resorted. The QC criteria is 95% cumulative efficiency

9.2.2.2 Macroinvertebrate taxonomic identification efficiency

Taxonomic identification efficiency is performed in accordance with FS 7000 and DEP-SOP-002/01 LT7000. Taxonomic identification efficiency is assessed and tracked for each District taxonomist through the ongoing FDEP Taxonomic Quality Control Round Robin program. Twice a year every taxonomist must submit to Tallahassee a list of the macroinvertebrate samples completed during the previous 6 months. From that list Tallahassee staff randomly select a sample to be submitted for complete re-analysis by another taxonomist in a different lab. Original ID's and counts vs. QC ID's and counts are tracked by use of an electronic resolution form. Tallahassee staff prepares and provides a spreadsheet summarizing cumulative performance for each taxonomist. The QC criteria is 95% cumulative efficiency.

9.2.2.3 Vascular plant taxonomic identification

Aquatic plants are identified in the field is performed in accordance with FS 7000 and DEP-SOP-002/01 LT7000. Specimens requiring laboratory scrutiny to identify are taken back to the laboratory. Specimens are sent to a professional taxonomist for verification. Verified specimens are housed in a reference herbarium collection for use in identification and training.

9.3 Corrective Actions

Corrective action procedures are consistent with FA 3200 and LQ 1000 of the DEP SOPs.

9.3.1.1 Macroinvertebrate sample sorting

If it is determined from a QC check that an individual has overlooked more than 5% of the organisms in a sample, each sample processed by that individual will be checked until picking efficiency is acceptable (DEP SOP 002/01 Section LQ7410). Individuals who sort benthic macroinvertebrates samples are responsible for checking the picking efficiency of co-workers. For evaluation of picking efficiency, the sediment and plant residue are placed in glass jars and not discarded. A co-worker then examines this residue, looking for any organisms that may be remaining.

9.3.1.2 Taxonomic identification

If it is determined (through expert verification or changes in taxonomy) that an incorrect or obsolete name is given to an organism, appropriate changes in data sheets and computer databases are made to reflect the corrected nomenclature. These changes are limited in scope to a given study. Any corrective actions for picking and taxonomic

deficiencies is approved by the appropriate supervisor. External sources that initiate corrective action include knowledge gained through training workshops and new reference material, and taxonomic verification by experts. Laboratory personnel are notified of problems and corrective action through discussion with supervisor, and in conjunction with performance evaluation procedures.

9.4 Audits

9.4.1 Internal Audits

Audits are conducted according to the requirements of FA 1000 of the DEP SOPs

Annually, all field procedures will be internally reviewed and evaluated for appropriateness by the subsection field supervisors from the Central Laboratory. These internal field system audits will include: proper choice of macroinvertebrate sampling procedures (dip net, dredge, Hester-Dendy, and coring devices), algal sampling procedures (phytoplankton grabs, periphytometers), water sampling procedures (bacteria, nutrients, chlorophyll *a*, algal growth potential, organics, metals, and toxicity bioassay), and habitat assessment for the sampling goals. Additionally, log books, field sheets, calibration logs, and other documentation will be investigated to ensure that QA/QC concerns are properly addressed. These program components will be evaluated against the requirements of DEP-SOP-001/01 and DEP-SOP-002/01 and deficiencies will be noted and addressed.

Additionally, audits are continually performed through the observation of the analysts by supervisory personnel.

9.4.2 External Audits

9.4.2.1 Taxonomic Round Robin Program

Statewide consistency of taxonomic identifications is achieved through DEP's Taxonomic Round Robin Program, administered by the Central Laboratory. On a quarterly basis, each District biologist sends a sample to a different district to verify their identifications. The difference and resolutions are recorded on the DEP Macroinvertebrate Taxonomic Round Robin Resolution Form. The cumulative taxonomic efficiency requirement is 95%.

10.0 Consumer Relations

10.1 Scheduling of Work

Prior to commencement of any new work, the Biology Laboratory Manager shall review the new work to ensure that the laboratory has the appropriate facilities and resources to perform such work. Scheduling of all work is performed during regular section meetings as well as through direct communication with the Laboratory Supervisor.

10.2 Complaint Handling

Every effort will be made to resolve complaints in the best manner possible. Any resolution must take into account all facility and personnel requirements and if possible measures to prevent reoccurrences of the situation.

10.3 Confidentiality

All records and documents generated by the DEP Central District Laboratory, except those associated with active criminal investigations, are public records and may be subject to disclosure according to the guidelines and exceptions published in Chapter 119 of Florida Statute

References

Department of Environmental Protection Standard Operating Procedures for Field Activities (DEP-SOP-001/01) – February 1, 2004, Florida Department of Environmental Protection Bureau of Laboratories Environmental Assessment Section, Tallahassee, FL.

Department of Environmental Protection Standard Operating Procedures for Field Activities (DEP-SOP-002/01) – February 1, 2004, Florida Department of Environmental Protection Bureau of Laboratories Environmental Assessment Section, Tallahassee, FL

Quality Assurance Manual for the Biology Section FDEP Tallahassee - 12/31/03, Biology Section, Florida Department of Environmental Protection Bureau of Laboratories, Tallahassee, FL.

SWD Quality Control Manual – 3/24/05, Chemistry Lab, Florida Department of Environmental Protection, Tampa, FL

Appendix I

Lab Forms for SWD Biology Lab

(those forms that are not referenced on DEP website)

The forms are consistent with LD 7000 of the DEP SOPs

A. Taxonomic Identification Form.....Page 22

B. SCI Sample Sorting Log.....Page 23

C. SCI and Biorecon Benthic Invertebrate Identification Form.....Page 24

D. Benthic Invertebrate Data Sheet (Replicated Methods).....Page 27

E. Marine Benthic Invertebrate Data Sheet.....Page 29

F. Individual Identification Form for Slide Mounted Taxa..Page 31

A. Taxonomic Identification Log

Project _____

[illegible]

B.SCI Sample Sorting Log
Watershed Management Assessment Section, FDEP SWD

Project: _____

[illegible]

Sample location _____ **Total number** _____
Collection date _____ **Sorted by** _____
Storet number _____ **Ided by** _____

[illegible]

COLEOPTERA	1	V		1	V
			LEPIDOPTERA		
			OLIGOCHAETA		
MOLLUSCA					
			HIRUDINEA		
HEMIPTERA					
			TROMBIDIFORMES		
MEGALOPTERA			OTHER		
CRUSTACEA					

Q/A sort?	Date	Initials	Comments
Q/A id?	Date	Initials	Comments
Entered into SBIO?	Date	Initials	Comments
Marked complete?	Date	Initials	Comments

28

E. Marine Benthic Invertebrate Data Sheet

Sample location _____
Collection date _____ Sorted by _____
Storet number _____ Ided by _____

	1	2	3	V		1	2	3	V
Amphipoda					Mysidae				
					Tanaidae				
					Decapoda				
					Other Crustacea				
Isopoda									

[illegible]

Q/A sort?	Date	Initials	Comments
Q/A id?	Date	Initials	Comments
Entered into SBIO?	Date	Initials	Comments
Marked complete?	Date	Initials	Comments

INDIVIDUAL TAXONOMIC IDENTIFICATION SHEET FOR SLIDE MOUNTED SPECIMENS

SITE: _____

DATE: _____ STORET: _____ IDENTIFIER: _____

#	identification	#	identification	#	identification
1		46		91	
2		47		92	
3		48		93	
4		49		94	
5		50		95	
6		51		96	
7		52		97	
8		53		98	
9		54		99	
10		55		100	
11		56		101	
12		57		102	
13		58		103	
14		59		104	
15		60		105	
16		61		106	
17		62		107	
18		63		108	
19		64		109	
20		65		110	
21		66		111	
22		67		112	
23		68		113	
24		69		114	
25		70		115	
26		71		116	
27		72		117	
28		73		118	
29		74		119	
30		75		120	
31		76		121	
32		77		122	
33		78		123	
34		79		124	
35		80		125	
36		81		126	
37		82		127	
38		83		128	
39		84		129	
40		85		130	
41		86		131	
42		87		132	

43		88		133	
44		89		134	
45		90		135	