# FIELD PLANNING AND MOBILIZATION

This SOP is advisory; however, the following procedures are designed as best management practices, for use as guidance for designing and implementing a field sampling program and when selecting a laboratory. This SOP may be used in conjunction with all other DEP SOPs applicable to the field sampling event, project or program.

# LABORATORY SCHEDULING

## Selecting a Laboratory

##### Consumer Responsibilities

Each organization that uses laboratory services has certain responsibilities to ensure that the laboratory has the appropriate credentials, and that the data are useable for the intended needs, and acceptable to DEP. A consumer's responsibilities include:

##### Evaluating the Laboratory

##### Ensure that the laboratory has the proper credentials, such as certification from the Florida Department of Health, Environmental Laboratory Certification Program (DOH ELCP).

##### Ensure that the laboratory can produce data of a quality that will be acceptable to DEP.

##### Thinking in Terms of Quality not Dollars: A laboratory that produces data that are not acceptable to DEP usually means that the laboratory will need to repeat the work. It is more cost effective to select a laboratory that will meet the quality needs of the project even if that laboratory is not the lowest bidder.

##### Continuing Evaluation: In order to ensure that the laboratory provides data of a consistent quality, do not rely on just the initial evaluation of a laboratory. Other quality control measures will provide the ability to continuously evaluate the laboratory data quality.

##### Evaluating the Reported Data: Review the final laboratory reports against the original expectations and acceptable quality control measures.

##### Asking Questions: The consumer has the right to question laboratory results and receive a logical and clear response. An informed client increases the probability of quality data and data acceptability.

### Identifying Laboratory Needs

The consumer should be able to identify these critical needs before considering any laboratory:

##### The purpose for which the data are needed.

##### The consumer must determine DEP's expectations for data quality in terms of the precision, accuracy, and detection limit (reporting level or criteria) for each reported value.

##### Examples include: permit compliance at some specified concentration levels; compliance monitoring at specified reporting levels; and site cleanup to specified soil and water criteria levels.

##### The benefits of using contracted versus in-house analytical services.

##### The specific laboratory services that are required:

##### Sample collection and/or sample analysis.

##### Types of samples (groundwater, drinking water, soils, sediments, hazardous wastes, etc.).

##### The sample delivery schedule including:

##### The number of samples to be collected.

##### The frequency with which samples will be submitted to the laboratory.

##### The types of matrices to be analyzed.

##### The test methods that must be used (normally found in the permit requirements, consent orders, contracts, or relevant rules).

##### The expected quality based on DEP's requirements.

##### The expected turnaround time for laboratory analysis.

##### The deliverables, including the report format.

##### Field related services such as:

##### Sample collection

##### Sample containers

##### Sample preservation

##### Equipment rental or cleaning services; or

##### Instrument calibration services.

##### The required laboratory credentials such as certification.

##### The identification of key personnel in the consumer's organization that will be interfacing with the laboratory:

##### Administrative contact: Usually responsible for obtaining laboratory services.

##### Technical or Quality Control contact: Usually a person who will be evaluating the laboratory's performance.

##### Sample control contact: Usually a person who will be scheduling services with the laboratory.

##### Understanding of the current market price for the tests to be performed.

##### Gather information on pricing from several laboratories.

##### Request current and historical pricing schedules.

### Evaluating the Laboratory

##### Laboratory Credentials

##### The laboratory must hold National Environmental Laboratory Accreditation Program (NELAP) certification from the Florida Department of Health's Environmental Laboratory Certification Program (DOH ELCP).

##### Out-of-state laboratories must be either certified by DOH, or be NELAP-certified by another state **with secondary accreditation** by DOH.

##### The laboratory must be certified for the test technology, analyte, and matrices that will be requested. This does not apply to analysis for drinking water.

##### Request a copy of the Current Certification and Analyte Sheets (must be for the current fiscal year which runs July 1 to June 30).

##### Verify the certification through the DEP Web Site, or the DOH offices.

##### On-Site Visit

Conduct an on-site visit to verify the laboratory's capabilities and to determine if the laboratory has the equipment and personnel resources necessary for proposed services.

##### The laboratory must show a willingness to meet the client's needs.

##### The laboratory (both the analytical and administrative areas) must appear organized.

##### The analytical staff must be knowledgeable about the services to be provided. At least one person (supervisor or analyst) must be experienced in performing all activities on the proposed scope of work.

##### The administrative staff must appear organized.

##### The laboratory must have the capacity to accommodate the proposed scope of work in terms of personnel and equipment.

##### Laboratory Performance Evaluation

##### Blind Check Samples: Prior to contract signing or any agreement, submit a set of blind check samples to the laboratory.

##### A blind check sample is a sample in a real matrix (water, soil, sediment, etc.) that appears to be a real sample, except that the submitter has a list of the components and their known concentration values.

##### Submit the sample(s) to the laboratory as a routine sample(s).

##### Evaluate the results of the reported values against the certified values in the sample(s).

##### The values must be within the laboratory's stated precision for the measurement.

##### Customer Satisfaction

##### Obtain a list of current and previous clients.

##### Call several of the clients to determine:

###### Satisfaction with laboratory

###### Were problems resolved satisfactorily?

###### Reasons for not using the laboratory (if applicable)

###### Reasons for using the laboratory

##### Fiscal Stability

##### Request a copy of the current financial statement.

### Contracting

##### Purpose

##### Provide a detailed list of the scope of services to be contracted.

##### Include the purpose for which the data are to be used (permit, compliance, etc.).

##### Key Contacts: Identify key contacts for both laboratory and client:

##### Administrative: Dealing with billing, contract writing, invoicing, etc.

##### Technical: Dealing with data, and quality control issues and problems.

##### Sample Control: Dealing with scheduling, shipping supplies, sample receipt.

##### Anticipated Needs: Specify:

##### The schedule of activities;

##### The expected number of samples, analytes, matrices and tests; and

##### Field support services, including containers, preservatives, cleaning and calibration services.

##### Expectations

##### Certification

##### The laboratory must maintain certification for the analyte, technology, and matrices to be performed.

##### The laboratory must immediately notify its clients if the certification status for any analyte changes.

##### The laboratory must state that it will generate all results in strict compliance with the National Environmental Laboratory Accreditation Conference (NELAC) Standards.

##### The laboratory must flag and justify any results that were not generated in accordance with NELAC.

##### Analytical Expectations

##### Provide a list of analytical methods to be performed and the matrices for each method.

##### Provide a copy of the permit, QAPP, Sampling Plan or other document that outlines DEP's requirements.

##### Specify the expected turn-around time for the analyses.

##### Specify the shipping schedule if sample containers or supplies are to be provided.

##### Container/Equipment Services: State the scope of container and equipment services:

##### Precleaned Containers: Types and Numbers

##### Must be cleaned according to DEP SOP procedures (see FC 1000) or purchased precleaned from a vendor.

##### Provide copy of procedures, if the laboratory does not follow the DEP SOP procedures.

##### Determine if containers must be certified clean by either the laboratory or the vendor.

##### Preservatives

##### Premeasured into containers, where appropriate.

##### Provided in appropriate containers with dispensing implement.

##### Appropriately labeled with type of preservative, lot number and expiration date.

##### Equipment

##### Type and numbers.

##### Condition of equipment (precleaned, etc.).

##### Equipment must be cleaned according to DEP SOP procedures (see FC 1000). Obtain a copy of the laboratory procedures if the laboratory does not follow the DEP SOP procedures.

##### Determine if equipment must be certified clean by the laboratory.

##### Equipment Calibration

##### The calibration method;

##### The frequency of calibration;

##### Preventative maintenance on instrument;

##### Certification statement verifying the calibration; and

##### Documentation of all maintenance and calibrations in laboratory records.

##### Quality Control

##### State adherence to NELAC quality control requirements.

##### Specify any additional quality control measures that are required but are different from NELAC.

##### Specify acceptable ranges for spikes, duplicates, surrogates, and other QC measures if appropriate.

##### Custody/Sample Tracking

##### Specify adherence to NELAP documentation and record keeping requirements.

##### State a time-period for retaining all records if greater than 5 years.

##### Make arrangement for transfer of records should the laboratory go out of business or transfer ownership before the records retention time period has lapsed.

##### Specify the level of custody (routine, legal, etc.).

##### Minimum Reporting Levels

##### Provide the laboratory with the minimum acceptable values to be reported (method detection limit, etc.).

##### Describe contingencies if these levels cannot be met.

##### Reporting Format

##### All analytical reports issued by the laboratory must comply with DEP and NELAP reporting requirements.

##### Specify whether the information must be provided as hardcopy, electronic or both. If electronic, specify the format for submission.

##### The use of appropriate DEP data qualifiers (see 62-160, F.A.C, Table 1) should be specified.

##### Deliverables: In addition to the NELAP-compliant report, specify any other deliverables that must be provided with the laboratory report such as:

###### Laboratory Quality Control results;

###### Field Quality Control results;

###### Performance Test results;

###### Copies of all raw data and associated records;

###### Written narrative of the analytical event; and/or

###### Description of any modifications to methods.

##### Subcontracting

##### The laboratory must inform the client **before** any analytical services are subcontracted to another laboratory.

##### The laboratory must ensure that the subcontracted laboratory meets the same qualifications and requirements as the primary laboratory.

##### If the results from subcontracted laboratories are incorporated into the final laboratory report, the subcontracted results must be clearly identified.

##### Method Modifications

##### The laboratory must identify any modifications that have been made to the requested analytical methods.

##### The client must be notified of any method modifications prior to use in the laboratory and must provide written consent.

##### Dilutions

##### Negotiate how multiple dilutions will be handled. They may be considered a separate analysis and therefore an additional cost.

##### Agree to pay for the analysis of dilutions only if:

##### The sample concentration exceeds the calibration range and the laboratory was not aware of the expected sample concentration; or

##### A dilution is required to quantitate all required components.

##### Penalties and Consequences

##### Negotiate penalties or other consequences (no payment) for these problems:

###### Failure to provide data or associated (expected) information;

###### Failure to meet deadlines;

###### Failure to provide acceptable data; and

###### Failure to meet contract requirements.

##### Consider these consequences:

###### Costs of resampling;

###### Fines incurred because of unacceptable data;

###### Costs associated with having evaluated and/or processed unacceptable data; and

###### Reanalysis costs (if reanalysis is due to laboratory error or failed QC).

##### Reserve the right to reject data. If any data are used, laboratory should be paid according to negotiated terms.

### On-going Evaluation

##### Monitor laboratory's performance against the specific contract requirements.

##### Continue to use blind QC samples as a measure of routine performance.

##### Vendor supplied samples;

##### Samples prepared to a known concentration; or

##### Split samples with another laboratory.

### Data Review

##### Review the data for logical trends:

##### Are the reported concentrations different from the routine (expected) levels?

##### Is the same value reported for the same analyte (except non detects) in the same set of samples or over a historical period of time?

##### Do the parts add up to the total?

##### Ortho phosphate must be less than total phosphate.

##### Total nitrate-nitrite must be equal to nitrate plus nitrite.

##### Total values must be greater than or equal to dissolved values.

##### Are different but related analyses consistent?

##### High turbidity and high total suspended solids.

##### High turbidity and increased method detection limits for other tests.

##### Do results indicate a sample collection problem?

##### High dissolved oxygen in groundwater.

##### High turbidity and elevated metals results.

##### Are the QC check samples within acceptable ranges?

##### Are the ranges reasonable?

##### Are non-detects reported correctly (should be a value with a "U")?

##### Over the history of laboratory use, were any QC problems reported?

##### Is there any laboratory or field blank contamination?

##### Do the reports contain all required information?

### Ask Questions

##### Ask questions if:

###### There are problems associated with the data review.

###### The QC check sample data are not acceptable.

###### The laboratory consistently reports the same QC failure.

###### The laboratory uses different methods than requested.

###### The laboratory subcontracts analyses without notifying the client.

###### The laboratory does not meet contract requirements.

###### The laboratory misses holding times.

###### The laboratory fails to provide requested resource(s) (containers, calibration, etc.) in a timely manner.

###### There any doubts about the acceptability of the data.

###### Detection limits are above the expected values and the laboratory provides no reasonable explanation.

## Scheduling Services

##### Notify the laboratory about the analytical and equipment needs at least a week in advance of the actual sampling trip.

##### Even if the trip is routine (monthly, weekly, quarterly compliance sampling), provide the laboratory with a written request. Include:

###### Number and types of samples to be collected;

###### Test methods to be performed;

###### Expectations for quality control acceptance criteria (if not already listed in a contract);

###### Estimated numbers of each type of container;

###### Required preservatives, including whether the laboratory will dispense premeasured quantities into the sample containers;

###### Preservation supplies such as graduated, disposable pipets;

###### Additional preservatives (even if the containers are pre-preserved);

###### Sampling equipment including material construction;

###### Shipping containers;

###### Forms (both courier and transmittal/custody forms);

###### Any calibration services;

###### Estimated time of delivery;

###### Expected turn-around time;

###### Special needs such as "requires legal chain of custody" or "requires 24-hour turn- around time";

###### Data processing services (such as completing regulatory forms); and

###### Expected contamination levels. This is important if a highly contaminated site is sampled.

# TRIP PLANNING

##### Ensure that everyone involved with the event understands the purpose of the trip:

##### Review the associated sampling plan, quality assurance project plan or permit requirements.

##### Review the applicable safety plans and site files, including site maps and location information.

##### Determine the number of people that will be required to complete the sampling activities within the allotted time frame. For safety and efficiency, a field team should consist of at least two people.

##### Identify sampling team member(s) and schedule a meeting of the sampling team.

##### Develop a detailed itinerary and schedule.

##### Plan to sample from the least contaminated to the most contaminated sampling point.

##### Plan to work downstream to upstream in flowing water.

##### Review personnel training and make assignments based on experience.

##### Ensure that at least one trained, experienced individual is part of the team.

##### Review the SOPs and any associated documents (sampling plan, quality assurance project plan, permit, etc.).

##### Review project/site files for unusual procedures or site peculiarities.

##### Review the safety plan and discuss contingencies (weather, broken equipment, site access, etc.).

##### If the sampling event is more than 3 - 5 days, a written contingency plan is recommended.

##### If a boat will be used, a float plan is highly recommended.

##### At a minimum discuss and have available:

##### Phone and directions to nearest emergency facility;

##### Phone number(s) of supervisor and/or project manager;

##### Locations of power lines and underground utilities; and

##### Expected environmental hazards.

##### Schedule the date for deployment and the duration of the sampling event.

##### Obtain the necessary entry permits, keys, etc.

##### Identify name(s) and phone number(s) of landowner, tenant or other responsible party.

##### Assemble any needed maps, directions and site descriptions. Include information on:

##### Traffic conditions and/or traffic patterns; and

##### Parking areas.

##### Identify the number of sampling points, and for each sampling point:

##### Determine the matrices that will be sampled;

##### Identify the specific analyses to be performed per matrix;

##### Identify the sampling equipment needs based on the matrix and analytes to be collected. Include tubing, mixing implements and other support equipment;

##### Based on the analytical tests and the matrices, determine the number and types of sample containers;

##### Based on the analytical tests and the matrices, determine the types of preservatives that will be needed;

##### Determine what field measurements must be made; and

##### Identify transportation mode to reach the location (boat, truck, etc.) and reserve appropriate vehicles and/or vessels

##### Calculate the total number of each container types (both preserved and unpreserved).

##### Determine the total number of sampling equipment sets (tubing, mixing trays, coring devices, etc.) that will be needed for the sampling event.

##### Notify the laboratory of the trip and arrange for necessary containers, preservatives and other supplies (see FM 2200).

##### Assemble all materials needed to create field records (notebooks, forms, transmittal forms, etc.).

# EQUIPMENT AND SUPPLY PREPARATION

##### Sampling Equipment: Assemble all equipment identified in FM 3000, section 8.

##### Inspect equipment for cracks, breaks, and other signs of wear.

##### If necessary, repair any equipment and document the repairs in appropriate maintenance logs.

##### Reclean any equipment that was cleaned but not protected from the environment (stored on dusty shelves).

##### If not already clean, decontaminate equipment according to FC 1000.

##### Clean all transport ice chests and water transport containers (see FC 1190 and FC 1180, respectively).

##### Check to make sure fuel and battery powered pumps are working.

##### See "Field Sample Collection Equipment Checklist".

##### Field Measurements: Assemble field instruments to make the measurements identified in FM 3000, section 6.6.

##### Inspect instruments for damage.

##### Repair and/or replace parts as necessary, and document in appropriate maintenance logs.

##### Assemble the appropriate calibration standards and supplies.

##### Determine the accuracy of the instruments by either performing an initial calibration and initial calibration verification, OR continuing calibration verification before leaving the base of operations. Document the calibration and calibration verification steps.

##### See "General Field Support Equipment Checklist”, item 7.

##### Documentation: Assemble field record supplies:

###### Notebooks, and/or forms (consider waterproof paper for working in aquatic environments and/or inclement weather)

###### Indelible/waterproof pens, pencils if using waterproof paper

###### Clipboards

###### Cameras

###### GPS unit, if needed

###### See "General Field Support Equipment Checklist “.

##### Sample Containers: Assemble the appropriate types of sample containers or obtain them from the contracted laboratory. See "General Field Support Equipment Checklist", item 8.

##### Preservatives: Assemble preservation supplies if not provided by the laboratory.

##### Discard any old solutions; clean containers; and prepare fresh solutions.

##### See "General Field Support Equipment Checklist", item 2.

##### Field Decontamination Supplies: Assemble field decontamination supplies.

##### Discard any old solutions; clean containers; and prepare fresh solutions.

##### Discard analyte-free water and obtain fresh water.

##### See "General Field Support Equipment Checklist", item 1.

##### Shipping Supplies: Assemble shipping supplies:

##### Determine nearest point to obtain ice;

##### Marking pens, shipping labels, tape, custody seals (if required);

##### See "General Field Support Equipment Checklist", item 3.

##### Vehicles:

##### Make sure vehicle maintenance is up-to-date.

##### Check fluids.

##### Check tire pressure.

##### Check fuel and fuel supply.

##### See "General Field Support Equipment Checklist", item 10.

##### Safety Equipment: Assemble any needed safety equipment:

###### Protective gloves.

###### Protective clothing including boots.

###### Protective eyewear.

###### SCUBA gear or other supplied air supply.

###### First aid kit.

###### Drinking water.

###### Float plan.

###### Address and phone numbers for nearest emergency room.

###### See "General Field Support Equipment Checklist", item 6.

##### **Appendix FM 1000**

Tables, Figures and Checklists

General Field Support Equipment Checklist

Field Sample Collection Equipment Checklist

**Decontamination Supplies**

Basins, buckets or bowls to hold wash water and various rinse waters

Brushes or other implements to clean equipment

Detergents

Liqui-Nox or equivalent

Alconox or equivalent

Acids

Nitric

Hydrochloric

Solvents

Pesticide grade

isopropanol

Other:

Protective wrapping

Foil

Untreated Plastic bags

Bubble wrap

Analyte-free water

Distilled in HDPE

Deionized in HDPE

Organic-free in HDPE, Teflon or glass

Dispensing bottles

HDPE for acids and detergents

Teflon for solvents and organic-free water

Paper towels or other absorbent material

Containers for IDW

**Preservation Supplies**

Acids

Nitric

Hydrochloric

Sulfuric

Dechlorination reagents

Sodium thiosulfate

Ascorbic acid

Sodium hydroxide

Dispensing devices

Graduated disposable plastic pipets

Glass Pasteur pipets

Bulbs

Premeasured reagents in vials

Narrow range pH paper (range of no more than 3 pH units)

pH range of 1 – 3

pH range of 11 – 14

pH range of 6 – 8

Cyanide processing

Sulfide test paper

Precipitating Chemical

Cadmium nitrate or

Cadmium carbonate or

Lead nitrate or

Lead carbonate

KI starch paper

Ascorbic acid

Filter paper

**Sample Transportation Supplies**

Ice chests

Wet ice

Sealing tape

Shipping labels

Shipping forms

Bubble wrap

Plastic bags

Vermiculite

Custody seals

**Documentation Supplies**

Notebooks/logs/field forms

Pens and markers (waterproof)

Sample container labels/tags

Custody tags

Custody/transmittal forms

Clipboard

Camera

Battery

Memory card

GPS equipment

Calculator

**Reference Materials**

Site maps and directions

QAPP

Sampling plan

SOPs

Itinerary

Float plan

Contingency plan

**Health & Safety Supplies**

Cell phone

First aid kit

Drinking water

Protective gloves

Insect repellent

Sunscreen

Numbers for nearest emergency facilities

Safety goggles

Applicable MSDS sheets

Respirators

Fire extinguisher

Hard hats

Flotation jackets

Cable cutters

Traffic cones

SCUBA gear

SCBA gear

Other personal protection gear

**Field Measurement** **Equipment**

Lint-free tissues

Flow-through cells

pH meter

4, 7 & 10 buffers

Conductivity meter

Solution at expected conductivity

DO meter

Turbidimeter

Gel or Formazin standards

Residual chlorine

Secondary or primary standards

Secchi disk

MultiProbe meter

**Sample Containers**

Extractable Organics

Volatile Organics

Nutrients

Glass

Plastic

Inorganic Non-metallics

Glass

Plastic

Physical Parameters

Glass

Plastic

Metals

Glass

Plastic

Microbiology

Glass

Plastic

Whole Effluent Toxicity

Tissues

Macrobenthic invertebrates

Periphyton

Sediment/Soil volatiles

Sediment/Soil

Remember:

Extra containers

Extra VOC septa

**Filtration Equipment**

1 µm filter units

0.45 µm filters

Peristaltic pump

Pressurized bailers

Syringe with Luer-Lok fitting

Tripod filter with pressure/vacuum source

Forceps for handling filters

**Vehicles**

Truck

Fuel

Boat

Fuel

Motor

Paddles/oars

Safety vests

**Miscellaneous Supplies**

Hip boots

Chest waders

Rain gear

Tool kit

Extra batteries

Stopwatch

**Groundwater**

Pumps

Peristaltic

Centrifugal

Variable speed submersible

Submersible

Variable speed bladder

Bladder

Tubing

Teflon Sets

Polyethylene Sets

Polypropylene Sets

Vinyl Sets

Rubber Sets

Tygon Sets

Bailers

Teflon

Stainless steel

Polyethylene

Acrylic

PVC

Support Equipment

Graduated containers for measuring purge water

Containers for holding purge waters

Water level measuring device

Plastic sheeting

Lanyard material

Reels

Energy source for pumps

**Surface Water**

Pumps:

Peristaltic

Automatic composite sampler

Other

Tubing

Teflon™ Sets

Polyethylene Sets

Polypropylene Sets

Vinyl Sets

Rubber Sets

Tygon Sets

Bailers

Teflon

Stainless Steel

Polyethylene

Acrylic

PVC

Grab Sampling Devices:

Dipper

Kemmerer

Alpha water sampler

Niskin

Beta sampler

Retrieval lines

Mixing Implements

Churn splitter

**Wastewater**

Pond sampler

Dippers

Peristaltic pump

Tubing

Teflon Sets

Polyethylene Sets

Polypropylene Sets

Vinyl Sets

Rubber Sets

Tygon Sets

Kemmerer

Van Dorn

Nansen

Alpha bottle

Beta bottle

Niskin

DO dunker

Automatic composite sampler

Tubing

Teflon Sets

Polyethylene Sets

Polypropylene Sets

Vinyl Sets

Rubber Sets

Tygon Sets

Bailers

Plastic

Teflon

Stainless steel

Scoops

Plastic

Teflon

Stainless steel

Beakers

Plastic

Teflon

Stainless steel

Buckets

Plastic

Stainless steel

**Sediments**

Dredges

Petersen

Ponar

Ekman

Young Grab

Van Veen

Shipek

Orange-peel grab

Smith-McIntyre grab

Drag buckets

Winch

Cable/line

Messenger

Coring Devices

Stainless steel

Glass

Plastic

Teflon-lined

**Soil**

Bucket auger

Split spoon sampler

Stainless steel shovel

Garden shovel

Stainless steel trowel or scoop

Plastic trowel or scoop

Trenching device

Coring Devices

Stainless steel

Glass

Plastic

Teflon-lined

Shelby tube

EnCore

**Waste**

Stainless steel scoop

Stainless steel spoons or spatulas

Stainless steel push tubes

Stainless steel auger

Stainless steel Ponar dredge

Glass coliwasa

Drum thief

Mucksucker

Dipstick

Stainless steel bacon bomb

Stainless steel bailer

Teflon bailer

Peristaltic pump

Stainless steel split spoon

Roto-hammer

Glass tubing

**Shellfish**

Seine

Trawl

Bucket type/double pole

Tong/Double handed grab

Line or cable operated grab bucket

Petersen

Ponar

Ekman

Orange-peel grab

Biological or hydraulic dredge

Scoops/shovels

Scrapers

Rakes

D-traps

Processing Equipment

Holding trays

Stainless steel shucking knife

Calipers or ruler

Aluminum foil

Plastic bags

**Finfish**

Electrofishing devices

Seines

Trawls

Angling

Gill net

Trammel net

Hoop, fyke & pound nets

D-traps

Processing Equipment

Holding trays

Measuring board or ruler

Stainless steel descaler

Stainless steel scalpel

Balance

Aluminum foil

Plastic bags

**Biological Community Sampling**

Phytoplankton

Van Dorn

Alpha bottle

Lugol’s solution

Periphyton

Periphytometer

Microscope slides

100% buffered formalin

Nylon twine

Rapid Periphyton Survey

Spherical Densiometer

Ruler to measure a 10 cm distance

Qualitative Periphyton Sampling

Stainless steel spatula/spool

Stainless steel forceps

Suction bulb

Preservative

Buffered formalin

Lugol’s solution

M3

Resealable plastic bags

White picking pan

Benthic Macroinvertebrates

Forceps

Transfer pipettes

White picking pans

10X hand lens

Alcohol-filled jars

Dip net (30 mesh)

Hester-Dendy

Coring device

Dredge

Ekman

Petite ponar

30 mesh box sieve

**Macrophytes**

Resealable plastic bags

Permanent marker

Aquatic and wetland plant identification manuals

Hand lens

Binoculars

Frotus

Cooler with ice

Camera

GPS unit

Compass

100m tape

1m PVC pipe, marked at 0.5m increments