



Protocols for Collecting Water Grab Samples in Rivers, Streams, and Freshwater Wetlands



Tom Danielson, Maine Department of Environmental Protection
17 State House Station, Augusta, ME, 04333
(207) 287-7728 Thomas.J.Danielson@maine.gov

December 2004
DEPLW0637



**Bureau of Land and Water Quality
Division of Environmental Assessment
Biomonitoring Program**

**Standard Operating Procedure
Methods for Collecting Water Grab Samples**

- 1. Applicability.** This standard operating procedure (SOP) applies to the collection of water grab samples for water chemistry analysis [generally for nutrients and metals, see section C (1), below] from wadeable rivers, streams, and freshwater wetlands in Maine.
- 2. Purpose.** The purpose of this SOP is to provide standardized methods for collecting water grab samples from wadeable rivers, streams, and freshwater wetlands in Maine.
- 3. Definition.** A water grab sample is a sample of river, stream or freshwater wetland water collected for the purpose of analyzing its constituent water chemistry.
- 4. Responsibilities**
 - A. Program Leader (variable, depending on program collecting samples):
 - (1) Manage contract with laboratory performing analyses [e.g., Health and Environmental Testing Laboratory (HETL) in Augusta, ME].
 - (2) Manage grant funds.
 - (3) Purchase and maintain supplies not provided by laboratory performing analyses.
 - (4) Update SOPs.
 - (5) Coordinate with the Rivers Unit, Division of Watershed Management, and other partners during selection of sampling locations and scheduling of field teams.
 - (6) Coordinate and provide training opportunities for field study teams.
 - (7) Participate as a member the project team, including field studies.
 - (8) Manage database (generally Microsoft Access or Excel)
 - (9) Analyze and disseminate data.
 - B. Others (as appropriate):
 - (1) Assist in procurement of programmatic funds.
 - (2) Provide technical guidance in regards to sample methods, data analysis, and selection of sampling locations.
 - (3) Participate as a member of a field study team as time allows.
- 5. Guidelines and Procedures**
 - A. Sampling period and location. Variable with project for which samples are collected.



B. Supplies

- (1) Water samples
 - (a) Water quality kits from HETL, which include containers for all sample parameters [see section C (1) below] and preservatives as required
 - (b) Disposable gloves (for sampling trace metals)
 - (c) Long-handled plastic dipper (for wetland sampling)
 - (d) Large sampling container or wide-mouth plastic mixing jug with lid
 - (e) HETL chain of custody sheets
- (2) Miscellaneous supplies
 - (a) Permanent marker
 - (b) Pencil
 - (c) Cooler with ice

C. Collecting Water Grab Samples in Field

- (1) Water samples for the river and stream or the wetland program are collected for all or a subset of the following parameters: Total P (TP), Soluble Reactive Phosphorus (SRP-P); Total Kjeldahl-N, Nitrate/Nitrite-N, Ammonia-N; Sulfate; Dissolved and Total Organic Carbon; Chlorophyll *a*; Total Suspended Solids, Total Dissolved Solids; Chloride; Cadmium, Chromium, Copper, Iron, Lead, Magnesium, Manganese, Nickel, Zinc, Calcium, Potassium, Sodium; Silica; Alkalinity (as CaCO₃); pH; Specific Conductance; and True Color.
- (2) Record HETL sample kit number on program-specific Data Sheet.
- (3) Collect water samples before stirring up the stream or wetland bottom, or collect samples upstream of agitated water. For rivers and streams, collect samples (choosing OPTION 1 or 2, below, as appropriate) while standing on edge of water or on a rock. If this is not possible, reach upstream as far as possible to avoid collecting stirred up water. For wetlands, collect samples (using OPTION 3, below) by canoeing or carefully wading into the wetland if possible.
- (4) If sampling trace metals, wear disposable gloves.
- (5) Avoid touching the inside or lip of the sample bottles or caps.
- (6) OPTION 1 (recommended for hard-substrate and regular-flow streams)
 - (a) Rinse sample containers (excluding Erlenmeyer flask for sampling TP and cubitainer for sampling Total Suspended Solids) in stream water three times.
 - (b) Hold uncapped bottle upside down and submerge it.
 - (c) Tip bottle upright and allow water to fill bottle.
 - (d) Remove bottle from water and screw on cap.
- (7) OPTION 2 (recommended for soft-sediment and low-flow streams)
 - (a) Use large, clean container to collect water.
 - (b) Rinse container in stream water three times.
 - (c) Collect stream water.
 - (d) Rinse sample containers (excluding Erlenmeyer flask for sampling TP and cubitainer for sampling Total Suspended Solids) three times with small amount of sample water.



- (e) Fill smaller containers with water from large container. To ensure even mixing of sample water, gently swirl water in large container each time before water is decanted into smaller container.
- (8) OPTION 3 (wetlands)
 - (a) Use a clean long-handled plastic dipper and wide-mouth plastic mixing jug to collect water from a standing position or from canoe.
 - (b) Thoroughly rinse mixing jug and dipper three times with sample water.
 - (c) Fill mixing jug using long-handled dipper to collect water from just below the surface. Avoid collecting floating organic material by carefully clearing an opening in any surface film using the closed end of the dipper. Replace cover of mixing jug and transport back to truck in upright position.
 - (d) Back at the truck, mix large container once thoroughly with the lid on, then rinse sample containers (excluding Erlenmeyer flask for sampling TP) three times with small amount of sample water.
 - (e) Fill smaller containers with water from mixing jug. To ensure even mixing of sample water, gently swirl water in mixing jug each time before water is decanted into smaller container.
- (9) If sampling trace metals, dispose of gloves in regular garbage.
- (10) Store and transport samples in cooler with ice.
- (11) Complete HETL chain of custody sheet.
- (12) Drop off samples at HETL at end of day or early the next morning (store samples in refrigerator overnight) with HETL chain of custody sheet.

D. Quality Control

- (1) At the beginning of each field season, all MDEP staff and field personnel who will collect water grab samples will have a training/refresher session to (re)familiarize themselves with the contents of this SOP.
- (2) Field: for every 10 water grab samples collected for laboratory analysis, 1 duplicate sample must be collected at a random station and processed by the same laboratory.
- (3) Laboratory: quality control samples analyzed in the laboratory are specified in the respective SOPs and generally include duplicate, spiked, and blank samples.

6. References. HETL Standard Operating Procedures as follows:

- A. Analysis of Total Phosphorus
- B. Analysis of Ortho Phosphorus (used for the analysis of Soluble Reactive Phosphorus)
- C. Analysis of Total Kjeldahl Nitrogen in Waters
- D. Analysis of Nitrate+Nitrite in Groundwater, Surface Water, and Wastewater
- E. Analysis of Ammonia in Water
- F. Analysis of Sulfate
- G. Determination of Total and Dissolved Organic Carbon in Water)



- H. Chlorophyll (Note: this is not a HETL SOP but they use this method for the analysis of Chlorophyll *a*)
- I. Analysis of Total Suspended Solids
- J. Analysis of Total Dissolved Solids
- K. Analysis of Chloride in Waters
- L. Analysis of Trace Metals in Water/Wastewater
- M. Dissolved Silica Preparation Step
- N. Analysis of Total and Bicarbonate Alkalinities
- O. The Analysis of pH in Drinking Water, Wastewater, Groundwater, and Surface Water
- P. Analysis of Conductivity
- Q. Analysis of Color in Waters



Addendum - List of edits to existing SOP

SOP section	Old text	New text
<i>Edited in November 2006</i>		
5. Guidelines and Procedures, C. Collecting Water Grab Samples in Field, subsection (1)	Water samples for the river and stream or the wetland program are collected for all or a subset of the following parameters: Total P (TP), Ortho-phosphate, soluble reactive Phosphorus (PO ₄); Total Kjeldahl-N, ...	Water samples for the river and stream or the wetland program are collected for all or a subset of the following parameters: Total P (TP), Soluble Reactive Phosphorus (SRP-P); Total Kjeldahl-N, ...
5. Guidelines and Procedures, C. Collecting Water Grab Samples in Field, subsection (2)	Record sample kit number and HETL tracking number on program-specific Data Sheet.	Record HETL sample kit number on program-specific Data Sheet.
6. References, D.	Analysis of Nitrate+Nitrite in Drinking Water, Groundwater, Surface Water, and Wastewater	Analysis of Nitrate+Nitrite in Groundwater, Surface Water, and Wastewater
6. References, G.	TOC-SM505A (total and dissolved organic carbon)	Determination of Total and Dissolved Organic Carbon in Water
6. References, L.	Analysis of Trace Metals in Drinking Water	Analysis of Trace Metals in Water/Wastewater
6. References, N.	Analysis of Total Alkalinity	Analysis of Total and Bicarbonate Alkalinities