

Standard Operating Procedure 1: Pre and Postseason Tasks, version 1.0

Pre and postseason work largely entails visual or mechanical assessment of required equipment (see below). The following lists outline the minimum requirements in order to properly prepare field equipment for use.

Preseason Tasks Starting in February:

- 1) Compliance is completed/renewed every five years — ensure it is up to date.
- 2) Ensure Hydrolabs® are functioning properly by cleaning and calibrating (see SOP 6).
- 3) Purchase ethanol, bags, scrubbers, label tape, Hydrolab parts and calibration solutions, waders etc.
- 4) Check waders for leaks or damage. Repair damage or dispose of waders.
- 5) Remark/repair all measuring poles, depth sticks etc. (make sure the depth is accurate as the tips may wear).
- 6) Check Portable Invertebrate Box Sampler (PIBS) and Surber nets for holes -- repair or replace.
- 7) Check PIBS foam. Replace if ripped or badly worn.
- 8) Make new data sheets for the current year – use waterproof paper (see SOP 16).
- 9) Select sites (i.e. secondary) to be visited during the monitoring season.
- 10) Inventory sampling nets -- order or repair if needed.
- 11) On April 1, put new batteries in all aquatic macro equipment (Hydrolabs/flowmeters).
- 12) Calibrate both flowmeters to zero using the manual.
- 13) Get protocols, JHAs, and other materials ready for crew training.
- 14) Update and send out activity notice for the year.

Postseason Tasks Starting before Temporary Employees Leave:

- 1) Take batteries out of flowmeters.
- 2) Inspect all equipment and note/tag problems.
- 3) Ensure there is one good set of equipment that can be quickly put into operation in case a problem arises during the winter.
- 4) Ensure data is correct and reviewed with data manager before final acceptance.
- 5) Ensure all GPS data is downloaded and correct.
- 6) Check Hydrolabs every two to three weeks throughout the year and replace fluids and replaceable parts as needed.

Postseason Maintenance of Macroinvertebrate Collection

Since 1986, Shenandoah has retained all of the macroinvertebrate samples collected at the park. After enumeration and their QA/QC checks, the contractor will put each sample in one to two vials topped with 70% ethanol. Vials should be glass and have a lid with a good ethanol proof seal. At times two vials are necessary to accommodate larger crayfish but the vial labels should relay that information (e.g. vial 1 of 1, or vial 1 of 2). This gives four to eight vials per site which is a lot to maintain. Once they arrive at Shenandoah they are unpacked and placed in

cardboard herbarium trays, by year. These trays are stored in the “Gas House”, in herbarium style cabinets. This building is heated but not air conditioned.

Shenandoah currently retains over 5,000 sample vials. Once every 12 to 18 months, the vials are checked and topped off as needed. Vials needing to be topped off are recorded in a log kept for that purpose. Parafilm is used on chronically leaking vials. At this time only a handful of chronically leaking vials have been transferred to new vials due to time restraints. It typically takes about 11 to 16 hours to go through all of the vials, top off the vials that need it, and record everything in the log. Four gallons of 95% ethanol are normally used for this endeavor and cut to 70% strength.

Aquatic Macroinvertebrate Monitoring Field Equipment Checklist

General Equipment

- ___ Radios (2) (check battery)
- ___ First Aid Kit
- ___ Data Sheets (1 set per site)
 - ___ Site Info Sheet/Discharge Sheet/Habitat Sheet
- ___ Metal Clipboard
- ___ Pencils
- ___ Camera
- ___ Hip Boots (1 pair/person – or more if cleaning is not feasible b/w streams)
- ___ Frame Backpack
- ___ 1-2 Large Backpacks (chem., etc.)
- ___ Waders Backpack
- ___ Compass
- ___ GPS
- ___ Camera
- ___ Bucket and tub for soaking gear
- ___ Soap for soaking gear
- ___ Drinking Water
- ___ Lunches

Stream Chemical Measurements

- ___ Hydrolab® Multi-Sensor Unit
- ___ " data Display System
- ___ " cable
- ___ " weighted sensor guard
- ___ " 3 extra “C” batteries

Macroinvertebrate Sampling

- ___ PIBS
- ___ Surber (for low water conditions)
- ___ D-frame net

- ____ Vegetable brush
- ____ Forceps (2 hard, 2 soft)
- ____ Plastic bags (8 per site for double-bagging 3 quantitative samples and 1 qualitative sample)
- ____ Label maker & tape
- ____ Ethyl alcohol (1 gallon, 95% denatured; 10 to 15 gallons needed annually)
- ____ Plastic Cooler or bucket (for transporting samples in vehicle)

Flow & Physical Site Measurements

- ____ 30 m tape
- ____ 100 m tape
- ____ MMB flow meter; 2 extra “D” batteries
- ____ Top setting metric wading rod
- ____ Clinometer
- ____ Cobble stick
- ____ Wading staff

Equipment Descriptions

Portable Invertebrate Box Sampler:

The Portable Invertebrate Box Sampler (PIBS) is the preferred quantitative sampler used in this protocol. The foam-lined bottom establishes a thorough seal by taking the shape of the stream substrate, therefore, the PIBS is effective on irregular cobble substratum as well as on pebbles and gravels. In addition, the PIBS is completely enclosed, with wire mesh on the front side and solid side walls, so organisms cannot escape or drift in while sampling is in progress. The square shape and the edges at the bottom make it easy to attach to a backpack frame for transporting to remote areas. If the PIBS is attached to the backpack frame so that the catch net is up, the net can be inverted toward the wire mesh and used to carry the samples. The PIBS should have a 363um mesh catch net. Do not use two different devices at a stream site on the same occasion.

Surber Sampler:

The Surber Sampler is used for quantitative sampling in water too shallow for the use of the PIBS. The surber sampler is not as effective at preventing organisms from escaping during sampling because it is not completely enclosed and does not fit closely to irregular substratum. The Surber should have a 363um mesh catch net. Do not use two different devices at a stream site on the same occasion.

D-Net (marked):

The D-net is used for the qualitative sampling to sample all available habitat types that are found in the sites. The handle has washers screwed to the end to reduce wear and is marked in centimeters for depth measurements that are too deep for the cobble stick.

Cobble stick:

The cobble stick is a short length of $\frac{1}{2}$ or $\frac{3}{4}$ inch PVC marked in centimeters on one side, and has the substrate sizes marked on the other to quickly determine the difference between gravel, cobble, and boulder. A length of 70 cm is appropriate for most park streams.

Plastic Buckets:

Plastic five-gallon buckets are used for storing and transporting soap solution for cleaning (i.e. soaking) gear between sites.

Plastic Tubs:

The large colored tubs are used for soaking and cleaning waders. The black rectangular tubs are used for cleaning the other gear.

Bucket Pack:

This pack frame is needed to carry the PIBS.

Backpacks:

The specific number of packs needed on any particular day is largely dictated by the number of participating crew. For most park streams, the number of packs equals the number of crew minus one, since one individual is needed to carry the PIBS on the bucket pack. Every person on the crew will be required to transport either the PIBS, or regular backpack loaded with sampling or personal gear. Several pack sizes and styles are available to accommodate individual needs.

Extra Batteries:

The Marsh-McBirney flow meter takes two D batteries. An extra pair should be kept in each crew vehicle.

100 m Tape:

The 100 m / 300 ft open reel fiberglass measuring tape is used to measure the total lengths and to mark transect locations at the monitoring sites. Each 10 m interval (i.e. transect) on the tape has been marked with colored electrical tape.

30 m Tape:

This shorter (30 m/100 ft.) measuring tape is used for measuring stream widths at each of the 10 m cross sections and for delineating width intervals when measuring stream flow and should be marked every 30 cm with a sharpie for quick substrate and depth measurements. Consider taking two when you have larger crews to facilitate habitat and discharge measurements at the same time.

Hydrolab® Multi-Parameter Units:

Complete Hydrolab units consist of a number of components including the multi-sensor unit, data display system, cable, weighted sensor guard.

MMB Flow Meter:

The primary unit for measuring stream velocity is the Marsh-McBirney model 2000 “Flo-Mate”. It requires two D batteries.

Top Setting Metric Wading Rod (metric):

This device serves to position the flow meter probe at the appropriate depth in the water column for measuring stream velocity.

Compass:

While not a critical component of the macroinvertebrate or stream sampling effort, a hand-held compass should be included with the sampling gear for all of the interior sampling sites.

Clinometer:

This is a small hand-held instrument used for measuring the percent (%) gradient of stream sites. In using the clinometer, hold the instrument such that the round side-window faces to the left. The instrument is aimed by tilting it up or down until the hairline in the middle of the window is at the top edge of the point to be measured. ***Make sure to read and record the percent (%) scale.***

GPS Unit:

GPS units currently in use are Garmin handheld units. Trimble units can be used if higher accuracy is needed. Coordinate all GPS activities with the lead biological technician.

Hand-Held Radios w/Batteries:

All hand-held radios are equipped with rechargeable batteries that should be checked prior to leaving for the field. Due to the location of monitoring sites in steep watersheds, the whip antenna should be installed on one of the units for better transmission/reception. The crew should pack at least two of these portable radios with batteries in the field at all times. Careful attention needs to be paid to the repeater the radio is set on for proper reception and transmission. ***Radios are not waterproof.***

First Aid Kit:

Items in the first aid kit include CPR mask, bandages of various sizes, an eye dressing unit, gauze, adhesive tape, iodine, ophthalmic solution, aspirin tablets, forceps, scissors, instructions and other useful items.

Site Directions:

Specific site directions are on file and electronic copies are available on the O:drive (O:\WORKING\AQUATIC\Site_Directions). They are also accessible through the database. Hard copies are available in “Aquatic Program Files” cabinet in the lower NCR office. Each day, the appropriate field copy should be made on waterproof paper on which individual sites should be highlighted.

Data sheets:

The full suite of data sheets required for each site includes the “Site Form” or cover form, “Habitat Form”, and the “Discharge Form”. These should all be copied onto waterproof paper as needed each day from originals located in the central files. Multiple copies of all data sheets should be taken into the field each day. Extra data sheets should be kept in each of the vehicles “just in case”.

Metal Clipboards:

At least one of the aluminum clipboards will be required at each site. Clipboards contain copies of empty and completed data sheets, site directions, and pencils.

Pencils:

All data is recorded in pencil using mechanical pencils. Always ensure that a supply of these is present or on person before leaving for the field.

Soap:

Dawn dish detergent or equivalent for soaking gear in the field or at the office.

Salt:

Salt for soaking waders at the office.

Plastic Bags:

Bags for storing aquatic macroinvertebrate samples.

Scrub Brush:

Scrub brush for scrubbing rocks in the PIBS or Surber.

Drinking Water:

Each person on the crew is responsible for packing an adequate supply of drinking water for the anticipated conditions of the day. A MSR filter is provided for crews. It is particularly important to plan ahead for the longer hikes and to anticipate personal water needs accordingly

Lunches:

Each person on the crew has different metabolic rates and other physiological factors and must plan accordingly.

SOP Revision History

All protocols, regardless of how sound they are originally, require modification as new and different information becomes available. SOP version numbers increase incrementally by tenths (e.g. version 1.1, version 1.2...etc.) for minor changes. Major revisions should be designated with the next whole number (e.g., version 2.0, 3.0, 4.0 ...). Small changes or additions to existing methods will be reviewed in-house by Shenandoah or Mid-Atlantic Network staff. However, if a complete change in methods is sought, an outside review is required.

Revision History Log:

Prev. Version #	Revision Date	Author	Changes Made	Reason for Change	New Version #