

SOP 1.2 – Site Visit Procedures and Collection of Field Data for Benthic Macroinvertebrate Monitoring.

This document provides the guidelines for the monthly procedures to collect benthic macroinvertebrate samples at designated field sites.

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I. Checklist of Equipment and Supplies

These items should be carried with the sampling staff to the sampling reach:

Safety:

☐ Emergency Supplies

- ☐ SPOT Personal Locator Beacon
- ☐ Cell Phone with Emergency Contact #'s
- ☐ First Aid Kit

☐ Stream Safety Equipment

- ☐ Hip boots/waders
- ☐ Wading shoes/boots
- ☐ Personal flotation devices

Sampling Equipment:

- ☐ D-nets (500µm)
 - ☐ 2 D-nets
- ☐ 1 Sieve Buckets (500µm)
- ☐ Forceps (4)
- ☐ Measuring Tape
- ☐ 2 100-meter
- ☐ Photo reference stick (1 meter)
- ☐ Surveying Pins (12)
- ☐ 5-Gallon Bucket with lid

Miscellaneous Supplies:

- ☐ Large Backpack
- ☐ Clipboard with internal storage
- ☐ Mechanical pencils (5)
- ☐ Sharpies (2)
- ☐ Extra blank weatherproof cardstock

Sampling Supplies:

- ☐ Sample Containers
 - ☐ 32-oz jars (2 per site)
 - ☐ 64-oz jars (1 per site)
- ☐ 95% Ethanol (1 L per site)
- ☐ Printed weatherproof labels (2 per site)
- ☐ Blank weatherproof cardstock (2 per site)

Electronic Equipment:

- ☐ iphone/ipad
- ☐ Handheld GPS units

Documentation:

- ☐ MIDN BMI SOPs
- ☐ Sampling site list (see attached)
- ☐ State based sampling methods
 - ☐ VA Piedmont
 - ☐ VA Coastal Plain
 - ☐ PA Piedmont

Data Sheets (per site):

- ☐ MIDN Macroinvertebrate Biomonitoring Field Sheet
- ☐ Stream Habitat data sheet
 - ☐ VA Piedmont (High Gradient)
 - ☐ PA Piedmont (High Gradient)
 - ☐ VA Coastal Plain (Low Gradient)

II. Navigating to Field Sites

Benthic macroinvertebrate sampling reaches are collocated with water quality monitoring locations. See the MIDN water quality monitoring protocol for detailed descriptions of the streams monitored.

A. Locating Sites

- (1) See Field Season Preparation guidance (SOP 1.1) for the list of sampling locations
- (2) Follow guidance from NPSTORET Site Documentation to navigate to co-located water quality monitoring site from parking area (export and print from NPSTORET database if needed)
 - a. Use ArcGIS online or Garmin GPS units to find water quality tree tag if staff have not been to site before

B. Demarcating Reach

Benthic macroinvertebrate sample are collected within a 100 meter reach of the stream. This reach is demarcated by measuring the length of the stream using a tape following the thalweg of the stream from the water quality monitoring location.

- (1) From tree tag:
 - a. Refer to list of sampling location (SOP 1.1) to determine exact placement of sampling reach
 - b. Find upstream/downstream extent of sampling reach
 - i. Locate additional tree tags at the upstream (0 meters) and downstream (100 meters) extent of sampling reach
 1. If upstream/downstream extent cannot be located, delineate stream reach from water quality tree tag (see § V. B. below)
 - ii. Walk the banks of the entire reach to survey available sampling habitat within the reach

III. Collection of Benthic Macroinvertebrate Samples

Care should be taken to avoid disturbing any habitat within the sampling reach prior to the collection of sample materials. The approximate sample locations within the sample reach should be determined prior to entering the stream by walking along the stream banks to identify target locations for collection equipment. Collection of sample materials should proceed from the downstream extent of the reach toward the upstream extent.

A. Collection of benthic macroinvertebrate samples in the VA Coastal Plain

- a. Refer to state based guidance for the collection of sample materials
 - i. 2008. Biological Monitoring Program Quality Assurance Project Plan for Wadeable Streams and Rivers. VADEQ Biological Monitoring Program, Richmond, VA

B. Collection of benthic macroinvertebrate samples in the VA Piedmont

- a. Refer to state based guidance for the collection of sample materials
 - ii. 2008. Biological Monitoring Program Quality Assurance Project Plan for Wadeable Streams and Rivers. VADEQ Biological Monitoring Program, Richmond, VA

C. Collection of benthic macroinvertebrate samples in the PA Piedmont

- b. Refer to state based guidance for the collection of sample materials
 - i. Shull, D. R., and J. Lookenbill (editors). 2018. Water Quality Monitoring Protocols for Streams and Rivers. Pennsylvania Department of Environmental Protection, Harrisburg, Pennsylvania.

IV. On-Site Processing of Samples

On-site processing of sample materials should be minimized to the removal of large debris (e.g., sticks, large rocks, etc.) following state based guidance (see section III above). Once all sample materials have been collected at a field site:

A. Transfer sample materials

- (1) Select appropriate container, either:
 - a. 1: 1 liter jar
 - b. 1: 2 liter jar
 - c. 2: 1 liter jars (etc.)
- (2) Label outside of jar
 - a. Fill in date field on appropriate pre-printed adhesive label(s)
 - b. Place label on the exterior of jar
- (3) Transfer sample materials from D-net/Sieve bucket to sample container
 - a. Inspect D-net/sieve bucket to ensure all organisms were removed from sampling equipment
- (4) Use blank weatherproof cardstock to add a second label inside the jar, include:
 - a. Site ID: e.g., BOWA_04
 - b. Sample Type: e.g., Virginia Piedmont
 - c. # of jars: e.g., 1 of 1
 - d. Sample Date: e.g., 2018March15
 - e. Initials of collector: e.g., NTD
- (5) Preserve the sample
 - a. Fill the sample container with 95% ethanol so that all sample materials are saturated with sample jar in an upright position
 - b. Replace sample lid, ensure lid is hand tight
- (6) Hold sample container in 5 gallon bucket with other gear until all data are collected and returned to vehicle
- (7) Initiate MIDN Macroinvertebrate Biomonitoring Field Sheet
 - a. Populate Site ID, Date, Observers fields
 - b. Record sample type
 - i. Circle habitats sampled and number of jabs in each habitat on the in-stream transect data sheet

V. In-stream Habitat Characterization, Water Quality and Photo Points

Additional data are collected during the site visit after the sample materials have been collected and preserved.

A. Collection water quality data

- (1) Collect water quality data (see Dammeyer and Weed 2017 for detailed guidance)
 - a. Place water quality meter in the stream at the water quality monitoring site (tree tag)
 - i. See MIDN Water Quality monitoring protocol for detailed guidance
 - b. Record water quality data on in-stream transect/water quality data sheet

B. Delineate Stream Reach

- (1) Check site list table (SOP 1.1) to see if semi-permanent (e.g., tree tags, etc.) markers are present at site, if not:
 - a. Use 100-meter tape to delineate stream reach
 - i. If this is required prior to sample collection take care to not disturb habitat by staying on the bank and avoiding areas which will be sampled
 - b. Stretch tape along stream following the thalweg of the channel
 - i. Use survey pins, rocks, overhanging limbs to keep tape parallel with thalweg

C. Collect Photos

Photos are collected regarding in-stream habitat at 5 equally spaced transects along the 100 meter sampling reach (0, 25, 50, 75, 100 meters).

- (1) Navigate to transect reference point at the upstream extent of sampling reach (0 meters)
 - a. Where possible tree tags/spike and whiskers will be used mark locations of each transect along sampling reach
- (2) Obtain photo points to document stream and bank conditions using iphone/ipad/digital camera from the mid-channel at each of the transects
 - a. 4 photos are taken at each transect of the stream and banks in this order (alphabetically based on direction of photo)
 - i. Downstream: taken from the midpoint of the transect
 - ii. Left bank (facing downstream): taken from right bank- place 1 meter photo reference stick in bank at the edge of the wetted width
 - iii. Right bank (facing downstream): taken from left bank- place 1 meter photo reference stick in bank at the edge of the wetted width
 - iv. Upstream: taken from the midpoint of transect
- (3) Record any additional information/relevant notes on data sheet

VI. Stream Habitat Assessment

Stream habitat assessment procedures employed by the Commonwealths of Virginia and Pennsylvania are adopted/based on the EPA's Rapid Bioassessment Protocols.

A. Record Stream Habitat Assessment Observations

- (1) A Refer to EPA guidance for the collection of stream habitat data in VA
 - a. Barbour, M.T., J. Gerritsen, B.D. Snyder, and J.B. Stribling. 1999. Rapid Bioassessment Protocols for Use in Streams and Wadeable Rivers: Periphyton, Benthic Macroinvertebrates and Fish, Second Edition. EPA 841-B-99-002. U.S. Environmental Protection Agency; Office of Water; Washington, D.C.
- (2) A Refer to PA guidance for the collection of stream habitat data in PA
 - a. Shull, D. R., and J. Lookenbill (editors). 2018. Water Quality Monitoring Protocols for Streams and Rivers. Pennsylvania Department of Environmental Protection, Harrisburg, Pennsylvania.
- (3) If possible, 2 or more experienced staff estimate each score independently and come to consensus on final score
- (4) Record observations on appropriate EPA RBP Stream Habitat data sheet, either;
 - a. EPA High Gradient (VA Piedmont)
 - b. EPA Low Gradient (VA Coastal Plain)
 - c. PA High Gradient (PA Piedmont)