

# Macroinvertebrate Sampling Method in Alabama's Non-wadeable Streams and Rivers

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## Introduction

- Larger streams and rivers in the Piedmont, Southwestern Appalachians, Ridge and Valley, and parts of the coastal plain ecoregions of Alabama are characterized by large but relatively shallow riffles separated by long, non-wadeable pools and runs. Prior to 2010, the Alabama Department of Environmental Management (ADEM) used its Intensive Multi-habitat Macroinvertebrate Bioassessment (WMB-I) protocol to sample a 300-foot reach established in shallow riffle and shoreline areas of these stream types.
- In 2010, a non-wadeable macroinvertebrate sampling protocol was developed and implemented to increase sampling reach length for collection of more representative samples from non-wadeable rivers and streams (Figure 1 and 3). In general the criteria are >100mi<sup>2</sup> in area, >150ft wide, and >4ft. in depth.
- Target Waterbody Types:
  - Fully non-wadeable streams and rivers.
  - Larger streams and rivers characterized by large but relatively shallow riffles separated by long, non-wadeable pools and runs. "Tweeners" that are not fully wadeable and not fully unwadeable.
- ADEM's sampling period is Oct-Nov, coinciding with typically lower flows.
- An optimal crew consists of four members; however sampling can be successful with a two person crew. Sampling time with a four member crew is approximately 3-4 hours, but with a two person crew sampling may take as long as 6-8 hours.



Figure 1. Non-wadeable and large-shallow stream reaches

## Equipment and Supplies

- sit-on-top kayaks
- 2 paddles per boat
- 24 small sample containers for each boat
- Chain-of-Custody Form(s)
- 1 HA/PC form per boat
- 2 'A' Frame Kick Nets per boat
- White labeling tape
- GPS
- Sounding rod for each boat
- 100% Denatured Ethanol
- 2 Plastic Elutriation Trays per boat
- 2 #30 Sieves per canoe
- Camera
- 2 life jackets per boat
- 1 clip board per boat
- Pencils, permanent markers
- 2 bags per boat for containers, sieves, and trays
- Bungee cords, rope, tie downs

## Methods

- Sampling Period: Oct-Nov
- 500 meter reach
- 6 transects, 100 meters apart
- When necessary, samples collected using two 2-person sit-on-top kayaks
  - One team collects all samples from RB
  - One team collects all samples from LB
- At each transect:
  - Available habitats are sampled
  - Total effort for each bank equal to WMB-I method
- Revision to EPA method:
  - Samples collected from one bank at each transect
  - Each bank sampled an equal number of times

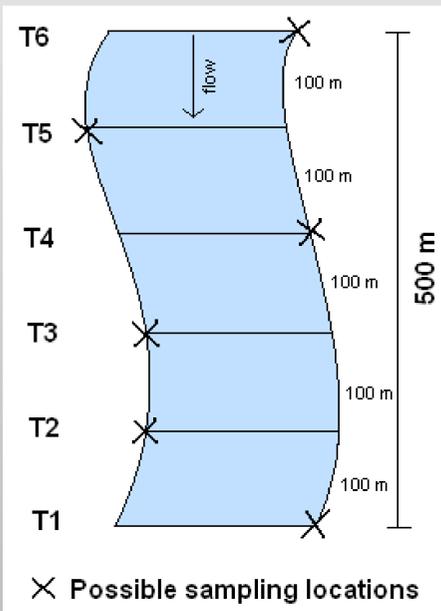


Figure 2. 500 meter reach with six transects 100 meters apart.



Figure 3. Macroinvertebrate sampling in Non-wadeable streams and rivers.

## Collection of WMB-I Samples

Only one bank is sampled at each transect (Figure 2). The number of samples collected from each habitat depends on availability (i.e., some transects may yield more samples than others). Habitats are stored in separate containers, and banks are kept separate. All samples are collected within  $\pm 5$  m upstream and downstream of a transect, if practical. Samples are collected at a depth of  $\leq 1$  m, and sample collection should not extend past the middle of the stream.

- **Riffle**  
An 'A' frame kick net is positioned upright on the stream bed while a 1m x 1m area upstream is physically disrupted using feet and/or hands. 2 reps per bank.
- **CPOM**  
One CPOM collection is no more than 3 handfuls of CPOM. Approx 1/2 bucket per bank.
- **Rock/Log**  
The surfaces of rocks and/or logs and sticks are washed into a kick net. The surfaces are vigorously brushed or rubbed to dislodge all attached fauna. One rock or log wash equals one sample collection. 3 rocks and 3 logs per bank.
- **Root/bank**  
A 1m length jab (using a kick net) of cut bank with exposed roots equals one sample collection. 3 reps per bank.
- **Macrophyte Beds**  
A 0.5m x 1m area of macrophyte bed is physically disturbed. Then it is sampled using a sweeping motion with a kick net. 3 reps per bank.
- **Sand**  
The area sampled is 1m long and in differing flow regimes. The kick net is shuffled along the bottom with a shaky, scooping action approximately 2-3cm below the surface of the sand. 3 reps per bank.

## Additional Information Required

### Determining Substrate Composition

- Non-wadeable
  - After collecting samples at a transect, each boat determines the substrate composition for that transect using a sounding rod. The substrate type, depth, habitat, and velocity are recorded at 5 intervals on each transect on the field data sheet.
  - Habitat assessment/physical characterization (HA/PC) datasheets are completed for each bank.
- Large/shallow reaches (aka, "Tweeners")
  - Visual assessment of habitat availability is recorded for each bank.
  - Habitat assessment/physical characterization (HA/PC) datasheets are completed for each bank.

## Sample Processing

All samples are preserved in the field using 100% denatured ethanol. In the lab (approximately 2 days after sample collection and preservation), the ethanol is decanted from each sample container using a #30 sieve and is replaced with 90% denatured ethanol to preserve the fragile, soft bodied organisms. All samples for each habitat are kept separate for comparison to ADEM's WMB-I method. The organisms are picked from each sample in the lab. If it is estimated that >100 organisms will be picked from a single sample, then the sample is subsampled. A taxonomist identifies the organisms to genus level (or lowest possible level).