

SAVEM—SAMAB's Southern Appalachian Volunteer Environmental Monitoring Program

Water Quality Monitoring Methodology Notes

I. Methodology

- A. Fish-community monitoring is being used as a biological indicator of watershed health only in the Little Tennessee River watershed.
 1. Fish samples are taken and species identified to determine an “Index of Biotic Integrity” score. This score can be used to determine rankings of water quality, from poor to excellent.
 2. This method is limited to watersheds that contain volunteer or other professional expertise with fish shocking and fish identification to species level.
 3. For a more complete description see Karr 1981, Karr and Dudley 1986, for determining the Index of Biotic Integrity (IBI) and subsequently modified by Saylor and Ahlstedt 1990 and McLarney 1995 for the conditions of this watershed.
- B. The Izaak Walton League Save Our Streams Modified Rocky Bottom Sampling Method (see <http://www.sosva.com/method.htm>) is being used as a biological indicator of watershed health in the Upper Clinch River watershed, Holston River watershed, and Nolichucky River watershed. . It may also be used in 2003 in the Watauga River watershed [NC portion], and Coosawatee watershed.
 1. This method works for the SAMAB program because
 - a. It was developed in concert between Virginia Tech and Virginia Department of Environmental Quality, and that State of Virginia agency accepts volunteer data collected through this protocol;
 - b. It is volunteer friendly;
 - c. Five of the six watersheds that are being monitored by the SAMAB program flow into the Upper Tennessee River system, and the Tennessee Valley Authority accepts this volunteer data; and
 - d. Volunteers in each of the watersheds monitor certain headwater areas and smaller streams in National Forests and along the Appalachian Trail, places where fish biomonitoring is less effective.
 2. Each volunteer monitoring team has members who have been trained in the SOS protocol. Training is provided by Virginia SOS certified monitors, watershed coordinators for respective volunteer groups, and/or the SAMAB monitoring program coordinator and water-quality-monitoring design-team leader.
 3. The SOS benthic monitoring protocol is based around
 - a. A sample of 200 benthic macroinvertebrates;
 - b. Identification of benthic macroinvertebrates to family level;
 - c. Tally of macroinvertebrates into tolerant and intolerant classification; and
 - d. Application of metric scoring system to determine acceptability (score of 7–12) or unacceptability (score of 0-6) of sample results.
- C. The University of North Carolina–Asheville Volunteer Water Information Network water chemistry sampling method is being used as a chemical indicator of watershed health in the Nolichucky River watershed and the Watauga River watershed. It is likely to be employed also at select locations in the Holston River watershed.

1. This method works for the SAMAB program because
 - a. The UNCA VWIN lab is certified by the State of North Carolina;
 - b. This program has an excellent history with over 200 monitoring sites located throughout 11 western NC counties, not including the SAMAB program sites;
 - c. The program offers an excellent partnering opportunity with both sources of matching funds and the educational infrastructure offered by the University of North Carolina system;
 - d. UNCA VWIN's monitoring protocol is volunteer friendly; and
 - e. There exists a need to monitor water quality at headwater springs, such as those at high impact areas along the Appalachian Trail, and water chemistry sampling is more volunteer friendly than newer biological monitoring protocols involving salamanders or other indicators.
 2. Sampling protocol includes
 - a. Grab samples taken by trained volunteers in bottles furnished and washed after each use by VWIN—quarterly samples and two random storm events; and
 - b. A chain of custody form.
 3. Sampling sites were strategically determined through planning process between SAMAB program coordinator and each respective volunteer group and its leadership.
 4. Water chemistry criteria include
 - a. turbidity;
 - b. total suspended solids;
 - c. pH;
 - d. alkalinity;
 - e. conductivity;
 - f. orthophosphate;
 - g. ammonia; and
 - h. nitrogen.
 5. Samples are refrigerated and delivered to VWIN lab within 48 hours for analysis.
- D. Other monitoring methodologies include
1. Water chemistry sampling in Upper Clinch watershed—analysis conducted by private State of Virginia certified lab;
 2. Bacteriological sampling in Nolichucky watershed—analysis conducted by Tennessee Valley Authority lab;
 3. Bacteriological sampling in Watauga River watershed—analysis conducted by Town of Boone, NC wastewater treatment lab; and
 4. Bacteriological sampling in Holston River watershed—mobile lab owned and operated by Upper Tennessee River Roundtable.
- E. Relevant Tools
1. SOS Benthic Monitoring
 - a. seine nets with 1/16" mesh;
 - b. field microscope;
 - c. forceps;
 - d. sorting trays;

- e. monitor's guide;
 - f. rubber gloves—for use in known impaired streams; and
 - g. thermometer.
2. IDEX Colilert e-coli mobile reusable monitoring lab—in Holston River watershed only (www.idexx.com/Water/Products/colilert/index.cfm)
 - a. Consists of non-disposable UV light, incubator, sealer, rubber insert and disposable colilert reagents, sampling trays, colilert sampling vessels;
 - b. Sampling involves QAPP procedures.
 3. VWIN sampling—Holston, Watauga, Nolichucky watersheds
 - a. 4 oz. leak proof/break resistant high density polyethylene bottles with polypropylene caps.
 4. Fish biomonitoring—Little Tennessee Watershed
 - a. Dip nets;
 - b. Fish shockers.