AUDUBON NATURALIST SOCIETY
WATER QUALITY MONITORING PROGRAM
QUALITY ASSURANCE – QUALITY CONTROL PLAN
JULY 2018

I. Project Description

The Audubon Naturalist Society received grant support from the Chesapeake Bay Trust to conduct a pilot water quality monitoring workshop in the spring of 1992. Subsequently, we established a Steering Committee to help guide our efforts to develop a training and monitoring program. Under the guidance of the Committee, we established the following goals for our water quality program:

- To increase the public's knowledge and understanding of conditions in healthy and degraded streams within watersheds surrounding the Washington, D.C. metropolitan area; and

- To create a bridge of cooperation and collaboration between citizens and natural resource agencies concerned about water quality protection and restoration.

Since 1992, ANS has operated a Water Quality Program that has generated important data on stream health at 45 different sites throughout Montgomery County, Maryland, and Washington, D.C. In 2017 ANS added its first site in Howard County, Maryland. At one time, ANS also operated a Water Quality Program in Northern Virginia.

Water quality factors to be measured at each site include identification of macroinvertebrate populations to class, order, and, for aquatic insects, to family level and sometimes to genus; stream habitat assessment; air and water temperature; and pH. Data collected are entered onto a paper data survey form in the field. Data from the forms is entered into and stored in a Salesforce database, from which reports can be generated.

During all ANS-sponsored water quality activities, participants will be covered by the Audubon Naturalist Society's liability insurance plan.

In 1997, ANS received funding through Section 319 of the Clean Water Act. The U.S. Environmental Protection Agency and the Maryland Department of Natural Resources administered the grant. Part of the work program for the Section 319 grant included review and revision of this ANS Quality Control/Quality Assurance document by the Steering Committee.

II. Project Objectives

The objectives of the ANS water quality program are:

- To collect information about macroinvertebrate populations, habitat conditions, and some abiotic factors that provide important indicators of water quality trends;

- To deliver reconnaissance data of known quality and provide observational information about the areas(s) monitored; and

- To begin the program within the Rock Creek, Cabin John Creek, and Watts Branch watersheds and expand our efforts into the Paint Branch, Northwest Branch, Patapsco, Great Seneca, Rock Run, Muddy Branch, Hawlings River, Dry Seneca, Little Seneca, Little Bennett, Sligo Creek, and Little Falls watersheds.

III. Volunteer Training and Testing

Water quality team leaders are required to attend one or more training sessions. These sessions include:

- An introduction to the volunteer's role in assessing the environmental health of streams using macroinvertebrate indicators;

- Stream habitat assessment techniques;

- Stream temperature and pH measurement procedures;

- An introduction to watershed observation skills;

- An introduction to macroinvertebrate orders and indepth instruction on aquatic insect families, macroinvertebrate adaptations, and use of a key to identify macroinvertebrates.

Field programs are scheduled to reinforce and develop skills in macroinvertebrate identification and stream habitat observations.

Participants in the program will be asked to take a test in macroinvertebrate identification before the beginning of the spring monitoring season. The test can be administered on an individual basis at other times as well. The test will determine the monitor's ability to identify aquatic insects, mollusks, and flat worms to family level; certain crustaceans to order; and leeches and worms to class. Representative samples of each major aquatic insect order (stonefly (Plecoptera), mayfly (Ephemeroptera), true fly (Diptera), fishflies, dobsonflies, alderflies (Megaloptera), dragonflies and damselflies (Odonata) and beetles (Coleoptera)) will be included. Participants may use their keys during the test.

Only those who successfully pass the test (correctly identifying 24 of 26 specimens) will be assigned a monitoring site with identification responsibilities. These persons will be given team leadership responsibilities. Participants interested in monitoring who decline to take the quiz or who do not achieve a passing score will be assigned to a monitoring team as collection and

logistics assistants. Team participants will be encouraged to take/retake the test to improve their identification skills and strengthen their role on the monitoring team.

A voucher collection of common aquatic macroinvertebrates found in Montgomery County streams has been established as an educational tool for aiding in macroinvertebrate identification and testing and will be maintained at ANS headquarters.

IV. Macroinvertebrate Collection Methods

At each workshop and data collection event, a standardized macroinvertebrate collection method will be introduced and reinforced. Our sampling method is based on the protocols of the Maryland Biological Stream Survey. Our minimum impact monitoring philosophy attempts to be sensitive to the populations of macroinvertebrates that we are observing and to the fragile habitats which support them. After collection and identification of macroinvertebrates in the field, organisms will be returned to the streams unless further identification is necessary.

V. Macroinvertebrate Identification Methods

The key to macroinvertebrate population data accuracy is extensive training in macroinvertebrate identification to order and family level, follow-up field experience, and data collection events. Refresher and retraining courses are given periodically throughout the year.

Field opportunities include instruction in identification techniques such as counting number of legs, identifying gills, antennae, segmentation, size, and behavior characteristics, including preferred habitat and movement. A PowerPoint slide show is presented at each class to teach how to distinguish differences and similarities between common orders and families of macroinvertebrates. This is followed up by lab work focusing on identification using voucher specimens and field workshops in collecting and identifying live specimens.

Monitors are encouraged to acquire books and dichotomous keys that will help them identify aquatic insects to family level. In addition, ANS has developed keys to common families of aquatic insects. These are disseminated during advanced identification classes. Teams are expected to use their keys in the field to help with identification. If macroinvertebrates cannot be reliably identified in the field, teams are instructed to preserve specimens in a vial with a solution of 70% ethyl alcohol. ANS staff or other experts identify the specimens in the lab and report back to the team with proper identification. Teams are also asked to preserve and send in certain uncommon macroinvertebrates or those that are difficult to identify in the field for confirmation of the field identification.

VI. Stream Habitat Assessment

The second component of the volunteer monitoring project will be to make observations of stream habitat. Since spring 2011, we have used the same habitat assessment forms as

Montgomery County's Watershed Management Division of the Department of Environmental Protection. These cover the same information as the MBSS Spring and Summer Habitat Data Sheets and EPA's habitat assessment parameters for high gradient streams, as described in *Rapid Bioassessment Protocols for Use in Wadeable Streams and Rivers*, 2nd Edition (1999).

VII. Temperature

Armored thermometers reading from -5.0 degrees Celsius to +45.0 degrees Celsius, from LaMotte Chemical Products, are used to measure air and water temperatures. Water temperature is taken in three places, and then averaged for recording purposes. Temperature data, including the time of day, is recorded on the data sheet used by each team. Conversion formulas are listed on the data sheet to enable monitors to record temperatures in Celsius and Fahrenheit.

At the beginning of each monitoring season, all thermometers used in the program are tested in a pan of water taken from a stream. Thermometers that register a 0.5 degree Celsius or greater deviation are retired from the program.

VIII. pH

PH of water within the sampling area will be taken using a Mini pH Test Kit by Aquarium Pharmaceuticals, Inc. or the equivalent. According to Elizabeth Yuster, aquatic biologist and member of the Steering Committee, in tests comparing the Mini pH Test Kit with electronic pH meters, results of the Mini Kit have consistently matched those of the more sophisticated equipment. Water collection and test procedures occur as specified in test kit instructions and results are recorded on the data sheet. The kits measure pH levels in a range from 6.0 to 7.6 in two-tenth increments.

IX. Data Management

After completing a stream survey at the monitoring station, monitors enter their data into an online input form. Audubon Naturalist Society staff and specially-trained volunteers review the data before approving it for inclusion in the Salesforce database. Monitors also send in paper forms as a backup copy for long-term storage and review as needed.
Data collected by ANS monitors will be submitted to the Montgomery County Department of Environmental Protection, the Maryland Department of the Environment, the Maryland Department of Natural Resources, the District Department of Energy and Environment, the National Park Service, EPA Region 3, and the Chesapeake Bay Program.