



MIAMI
CONSERVANCY
DISTRICT



Volunteer Stream Monitoring Training Manual

Miami Conservancy District

May 2005

Volunteer Stream Monitoring Training Manual

Third Edition

Published by The Miami Conservancy District 2004

Miami Valley Stream Team is sponsored by:

**Miami Conservancy District
38 E. Monument Ave.
Dayton, OH 45402
(937) 223-1271
www.miamiconservancy.org**

**Montgomery SWCD
10025 Amity Road
Brookville, OH 45309
(937) 854-7645
www.montgomeryswcd.org**

**Five Rivers MetroParks
1375 E. Siebenthaler Ave.
Dayton, Ohio 45414
937-275-PARK
www.metroparks.org**

This manual was written by Sarah Hippensteel and adapted from the second edition of the Hoosier Riverwatch Volunteer Stream Monitoring Training Manual.

The second edition of the Hoosier Riverwatch Manual was written by Lyn Hartman and Mandy Burk in 2000. The first edition was written by Sarah Hippensteel in 1997. Hoosier Riverwatch is a program of the Indiana Department of Natural Resources - Division of Soil Conservation.

The large-scale graphics were created by Sarah Beth Lauterbach unless otherwise indicated.

**For more information on Miami Valley Stream Team,
the Great Miami River Watershed,
or The Miami Conservancy District, please visit our website:
www.miamiconservancy.org**

This manual is printed on recycled paper.

Table of Contents

<i>Welcome to Miami Valley Stream Team</i>	5
<i>How do Volunteers Get Started?</i>	5
<i>Chapter 1- Introduction</i>	5
Water Quality Monitoring	11
Safety!	12
Chemical Safety	13
<i>Chapter 2 - Designing your Water Study</i>	4
Identifying Your Watershed	4
What is Water Pollution and Where Does it Come From?	5
What is Your Watershed Address?	6
Great Miami River Watershed	8
Setting Goals	10
Planning a Water Study	10
Quality Assurance and Quality Control	11
<i>Chapter 3 - Habitat Study</i>	13
What is the riparian zone?	14
Citizens Qualitative Habitat Evaluation Index (CQHEI)	15
Site Map	20
<i>Chapter 4 - Chemical Monitoring</i>	41
Eight Chemical Tests	41
Chemical Parameters and Test Procedures	43
DISSOLVED OXYGEN	44
E. coli	48
pH	49
BIOCHEMICAL OXYGEN DEMAND (5-Day)	52
WATER TEMPERATURE CHANGE (1 mile)	54
TOTAL PHOSPHATE (PO ₄) and Orthophosphate	56
NITRATE (0-1, 0-10 mg/L)	60
Chemical Monitoring Worksheet & Data Sheet	66
Chemical Monitoring Data Sheet Instructions	68
<i>Chapter 5 - Biological Monitoring</i>	71
Benthic Macroinvertebrates	71
Taxonomic Key to Benthic Macroinvertebrates	76
How to Complete the Biological Monitoring Data Sheet	81
<i>Chapter 6 - Data - What's Next?</i>	103
Data Analysis, Action & Evaluation	103
Guide for Water Quality Ranges	104
Pollution Indicators Table	105
Habitat Parameters for Selected Macroinvertebrates	106
Volunteer & Organization Registration	109
Stream Site Registration	111
Record-keeping Form	112
<i>Appendix A - Equipment</i>	113
<i>Appendix B - Glossary</i>	119
<i>Appendix C - Suggested Reading</i>	123
<i>Appendix D - Watershed Group Contacts</i>	127
<i>Appendix E - References</i>	129

Chapter 1- Introduction

Welcome to Miami Valley Stream Team

The Miami Valley Stream Team is a volunteer water quality monitoring program. It was started in the Great Miami River Watershed by The Miami Conservancy District and Five Rivers MetroParks to increase public awareness of water quality issues and concerns by training volunteers to monitor stream water quality. Miami Valley Stream collaborates with agencies and volunteers to:

- ◆ Increase public involvement in water quality issues through hands-on training of volunteers in stream monitoring and cleanup activities.

- ◆ Educate local communities about the relationship between land use and water quality.

- ◆ Provide water quality information to citizens and organizations working to protect the Great Miami Valley's rivers and streams.

The Miami Valley Stream Team will assist you and your organization in understanding the importance of protecting local streams. Voluntary participation is the key to the success of the watershed-wide stream monitoring and education program. This manual provides information to help you begin a successful water quality monitoring program.

How do Volunteers Get Started?

To become a trained volunteer - it is recommended that you thoroughly read this manual and attend a Miami Valley Stream Team training workshop. Workshops are free and open to the public, and provide hands-on monitoring experience. Contact The Miami Conservancy District at (937) 223-1271 for a current training schedule.

Training introduces citizens and educators to water quality monitoring utilizing habitat, chemical, and biological assessment methods. The training focuses on the use of Hach chemical testing kits, seine nets, and quality assurance and control techniques for good data collection. The sessions are about 6 hours in length and take place both inside and out of doors. Volunteers are then able to perform stream testing and teach others how to monitor.

Water Quality Monitoring

What is trend monitoring?

Trend monitoring is the primary testing method used by Miami Valley Stream Team. To get an accurate picture of a stream's water quality, tests have to be performed on a regular basis over a period of years. Trend monitoring provides a broad view of the stream allowing the seasonal variations to be sorted out from long-term changes. In order to get useful data for trend analysis, a group should consider the long-term commitment involved in this type of monitoring.

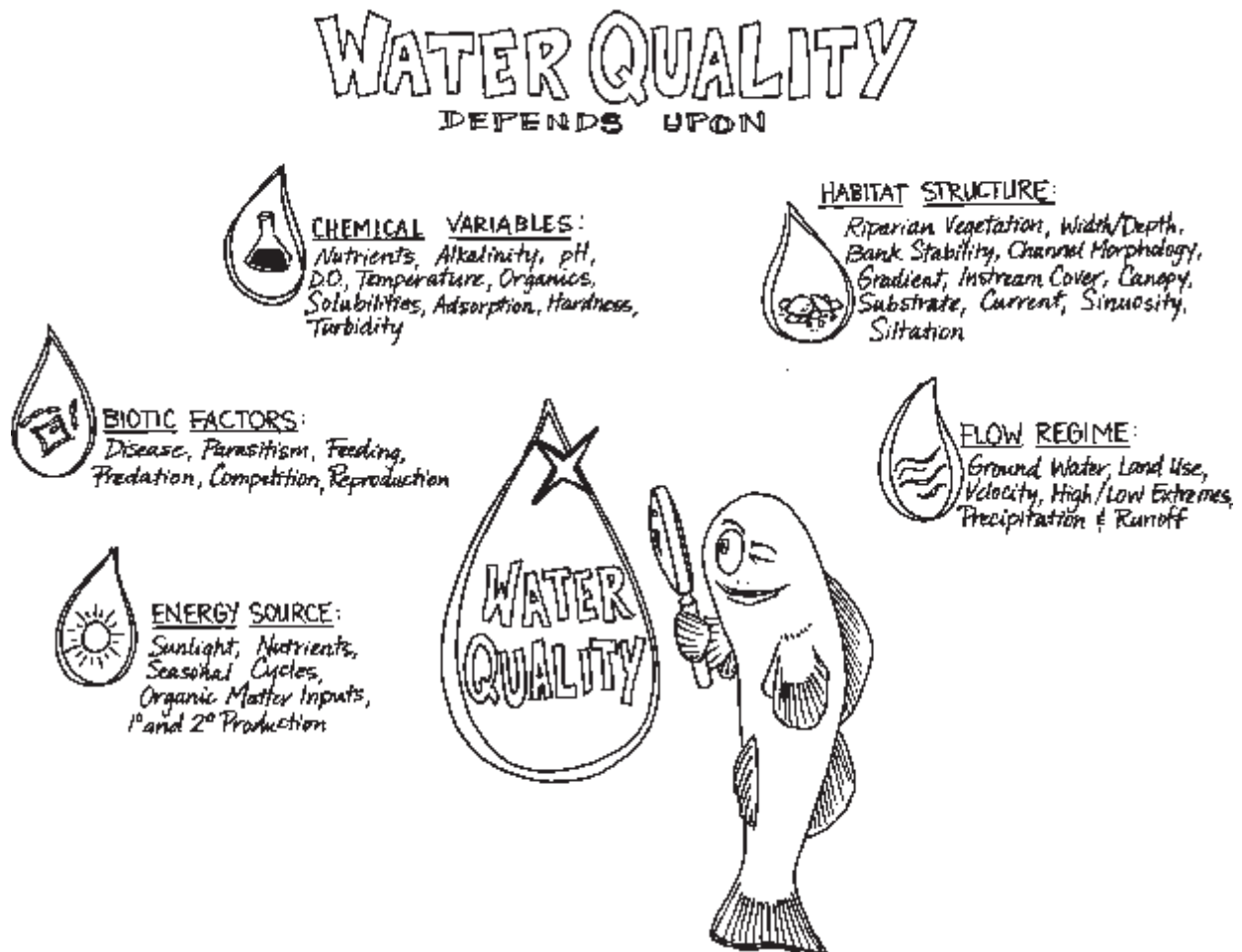
What parameters are used?

Water quality is determined by a variety of factors (See figure below). But due to time and resource constraints, Miami Valley Stream Team volunteers only monitor a fraction of the possible parameters. These parameters are listed below:

Habitat - land use, substrate, flow, depth, riparian vegetation, stream shape, erosion

Chemical - dissolved oxygen, nitrate nitrogen, total phosphate, orthophosphate, turbidity, pH, biochemical oxygen demand (BOD), temperature change

Biological - benthic macroinvertebrates and fish identification



Safety!

Safety is the critical first step in any volunteer stream monitoring program. All volunteers should read the following safety precautions prior to beginning any monitoring activities.

- ✓ **Take a buddy along!** Always monitor with at least one partner. Always let someone else know where you are, when you intend to return, and what to do if you do not return on time.
- ✓ **Honor private property rights.** Never cross a landowner's property without permission.
- ✓ **Never wade in swift or high water.** Do not wade if depth is greater than knee-deep. Do not monitor if the stream is at flood stage. Any stream is dangerous in times of flooding.
- ✓ **Never drink the water in a stream.** Bring water from home and be very wary when eating and drinking if your hands have been in contact with stream water.
- ✓ **Beware of polluted streams that are known to be unsafe for handling.** Check with your County Health Department or the Ohio Environmental Protection Agency for information on bacterial and/or toxic contamination of local waterways. As a rule, treat every stream as if it were polluted - wear waders, rubber gloves, and protective eyewear.
- ✓ **Have a first aid kit on hand.** At least one team member should have first aid/CPR training.
- ✓ **Develop a safety plan.** Find out the location and telephone number of the nearest telephone and write it down. Locate the nearest medical center and write down directions for traveling there. Have each volunteer monitor complete a medical form that includes emergency contacts, insurance information, and pertinent health information such as allergies, diabetes, epilepsy, etc.
- ✓ **Listen to weather reports.** Never monitor if severe weather is predicted or if a storm occurs.
- ✓ **Be very careful when walking in the stream.** Wear shoes that are in good condition and have traction. Rocky-bottom streams can be very slippery and may contain deep pools. Muddy-bottom streams may also prove dangerous where mud, silt, and sand have accumulated in sinkholes. If you must cross the stream, use a walking stick to steady yourself. Watch for barbed wire fences or sharp, rusty objects (e.g., car bodies, appliances) that may pose a particular hazard.
- ✓ **Do not walk on unstable stream banks.** Disturbing these banks-including the vegetation growing upon them-can accelerate erosion and lead to a collapse.
- ✓ **Beware of animals.** Watch for irate dogs, farm animals, wildlife (e.g., snakes), and insects such as ticks, mosquitoes, and hornets. Know what to do if you are bitten or stung.
- ✓ **Beware of plants.** Watch for poison ivy, poison oak, sumac, and other skin-irritating vegetation.
- ✓ **If you drive, park in a safe location.** Be sure your car doesn't pose a hazard to other drivers and that you are not trespassing. If you are sampling from a bridge, take special precautions. Watch out for passing traffic and never lean over the bridge unless you are firmly anchored.

Chemical Safety

The chemical reagents supplied in the testing kits are laboratory grade reagents. Some of the chemicals are concentrated, some are irritating, some are poisonous and some will just make you itch. Please read thoroughly the directions and the Materials Safety Data Sheets provided with each chemical test kit.

- ✓ **Wear safety goggles and rubber gloves.** Avoid contact between chemical reagents and your skin, eyes, nose, and mouth. Never use your fingers to stopper a bottle when shaking a solution.
- ✓ **Do not mix chemicals indiscriminately.** Use only the designated chemicals in specified amounts when performing tests.

- ✓ **Provide wash water** at the monitoring site to wash any chemicals from the eyes or the body.
- ✓ **Know chemical clean-up, disposal, and first aid procedures.** Wipe up all spills when they occur. Use sealed plastic containers filled with an absorbent material (e.g., kitty litter) to store waste before disposal. Separate hazardous nitrate waste (Hach kit) from all other waste. If accidental consumption of chemical reagents occurs, contact your local poison control office listed below.
- ✓ **A first aid kit may not be enough.** In addition, carry such safety equipment as life buoys, life jackets, river rescue throw bag, a flashlight, a whistle, a cell phone, and insect repellent.

Phone numbers for EMERGENCY only:

Ohio Poison Control Center	800-222-1222
HACH Company	800-227-4224
Rocky Mountain Poison Center	800-623-5716

First Aid Kit

Your first aid kit should contain the following items (at a minimum):

- Telephone numbers of emergency personnel
- Several Band-Aids for minor cuts
- Antibacterial soap or alcohol wipes
- First aid cream or ointment
- Several gauze pads 3-4" square for deep wounds with excessive bleeding
- Aspirin or other pain reliever/fever reducer
- A needle and tweezers for removing splinters
- A first aid manual that outlines diagnosis and treatment procedures
- A single-edged razor blade for minor surgery and cutting tape to size
- A 2" roll of gauze and a triangular bandage for large wounds
- A large compress bandage to hold a dressing in place
- A 3" wide elastic band for sprains, applying pressure to bleeding wounds
- If a participant is sensitive to bee stings, include their doctor-prescribed antihistamine
- An eyewash to flush chemicals