

# Appendix A - Equipment

## Check list

The following supplies may be useful in monitoring the water quality of your local river or stream:

### Site Assessment

- ⇒ Maps (e.g., 7.5" topographic map, county property maps indicating property boundaries)
- ⇒ Compass and survey tape for marking boundaries
- ⇒ Clipboard, writing utensils, and laminated copies of chemical, biological, and habitat data sheets
- ⇒ Tape measure or twine marked in one-meter/foot lengths
- ⇒ Stopwatch for measuring stream flow
- ⇒ Apple, orange, or other biodegradable object that can be floated to measure stream flow
- ⇒ Yardstick or other device to measure depth

### Biological Assessment

- ⇒ Kick seine net, dip net, or other tools for collecting benthic macroinvertebrates
- ⇒ Sieve and trays for sorting biological samples (ice cube trays work well)
- ⇒ Tweezers, hand lens, magnifying glass, and possibly a microscope
- ⇒ Glass vials or jars filled with isopropyl alcohol or white vinegar for storing insects
- ⇒ Handmade Hester-Dendy Substrate Sampler to use in waterways too deep to enter on foot

### Chemical Assessment

- ⇒ Chemical water quality testing equipment will vary with the type of monitoring you wish to pursue. Equipment for each test will vary in range, sensitivity, and cost depending on the use of chemical or electronic materials. Some equipment can be made by hand.
- ⇒ If using an electronic pH meter, need pH buffer and a small screwdriver for calibrating.
- ⇒ Handmade extension sampling rod
- ⇒ Distilled water for rinsing sampling bottles and tubes
- ⇒ Secchi disk or handmade turbidity tube
- ⇒ 2 containers filled with kitty litter to store waste materials (one for nitrate and one for other waste)
- ⇒ Material Safety Data sheets for every chemical being used

### Safety

- ⇒ Boots or waders (WARNING: Never put children in chest-high waders because they can fill with dangerous amounts of water if submerged.)
- ⇒ Rubber gloves and protective eyewear
- ⇒ First Aid kit that includes eyewash
- ⇒ Washing water, soap, and a towel

### Other Supplies

- ⇒ Drinking water
- ⇒ Calculator
- ⇒ Camera for documenting site
- ⇒ Computer and Internet access for entry of water quality data
- ⇒ Trash bags or other waste containers for a streambank clean-up

# ***Where to Purchase Equipment***

## **CHEMICAL TESTING KITS**

**Hach Co.**  
PO Box 389  
Loveland, CO 80539  
(800) 227-4224  
[www.hach.com](http://www.hach.com)  
\* Stream Survey Water  
Testing Kit #27120-00

**LaMotte**  
PO Box 329  
Chestertown, MD 21620  
(800) 344-3100  
[www.lamotte.com](http://www.lamotte.com)  
\* water quality testing kits

**Earth Force**  
1908 Mount Vernon Ave  
Alexandria, VA 22301  
(703) 519-6877  
[www.earthforce.org](http://www.earthforce.org)  
\* GREEN Standard and  
Low-Cost Water Kits

## **NETS**

**Nichols Net and Twine Co.**  
2200 Highway 111  
Granite City, IL 62040  
(800) 878-6387  
\* Stream Monitor Kick Seine  
\* Aquatic Dip Net (Like "D"-net)

**Ben Meadows Co.**  
PO Box 80549  
Chamblee, GA 30366  
(800) 628-2068  
\* D-frame Net #224902  
\* Transparency Tube #22196

## **E-COLI TEST**

**Micrology Laboratories**  
PO Box 340  
Goshen, IN 46527  
(888) EASY-GEL  
[www.micrologylabs.com](http://www.micrologylabs.com)  
\* E-coli test kit- EASYGEL

## **RIVERS CURRICULUM**

**Dr. Bob Williams**  
Southern Illinois University  
(618) 650-3788  
[www.siu.edu/OSME/river](http://www.siu.edu/OSME/river)  
\*Biology, Earth Science,  
Chemistry, Mathematics, Language Arts, Geography

## **BOOKS and MANUALS**

**Kendall Hunt Publishing**  
PO Box 1814  
Dubuque, IA 52004  
(800) 228-0810  
\* *Field Manual for Global Low-Cost WaterQuality Monitoring*  
by Mitchell and Stapp

**Jones and Bartlett Publishers**  
40 Tall Pine Drive  
Sudbury, MA 01776  
(800) 832-0034  
\* *Aquatic Entomology*  
by McCafferty

**U.S. EPA - OWOW**  
401 M Street, SW  
Washington DC, 20460  
(800) 490-9198  
\* *Volunteer Stream  
Monitoring Methods Manual*  
Doc. #841B97003

**Adopt-A-Stream Foundation**  
600-128th Street SE  
Everett, WA 98208  
(206) 316-8592  
\* *Streamkeeper's Field Guide* by Murdoch and Cheo

This list contains just a few of the many science equipment suppliers available. It is not intended to be an endorsement of any product or company.

# ***How to Clean and Care for Equipment***

## **Nets**

To ensure that no contamination occurs between sampling sites, make sure that all nets and organism collection equipment have been cleaned of all organisms and matter. Be sure to rinse them thoroughly before transporting to another location.

## **pH Meter**

Using the HACH Company's portable pH meter catalog number 44350-00, Pocket Pal Tester. After each use, turn off the pH meter. This will lengthen the life of the battery. If the batteries die, they can be replaced with appropriately-sized watch-type batteries. If the bulb (glass electrode) cracks, the pH meter must be replaced and should be properly disposed.

## **Turbidity Tubes**

*(From the Minnesota Citizen Stream Monitoring Program, "Stream Reader" Spring 2000)*

If you monitor a stream that is on the murky side, chances are the walls of your turbidity tube have clouded up. Try cleaning the inside of your tube by filling it three-quarters full with tap water, add a couple drops of dish soap, and push a clean, soft rag or washcloth down the tube with the end of a broom handle, scrubbing the sides. If you take the stopper out of the bottom, be sure to fit it back into the tube securely.

If your tube has a release tube and valve, it may become crimped. Try moving the position of the clamp on your release valve from time to time. By doing this, the tube won't break down and get crimped in any one spot.

# How to Make Your Own Equipment

Not all of your water monitoring equipment has to be purchased through a catalog or at a store. Nets and other sampling supplies can be made at home.

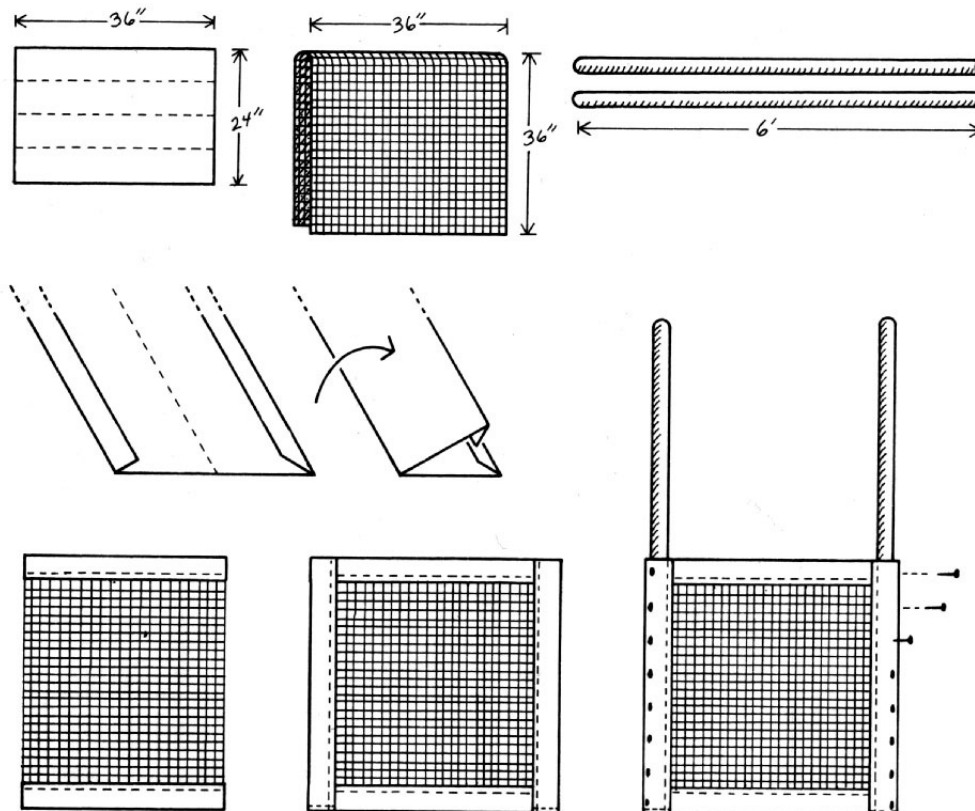
## Kick Seine Net #1

Materials:

- ⇒ 3 foot by 6 foot piece of nylon or fiberglass screening (white, if you can find it)
- ⇒ 4 strips of heavy canvas (6 inches by 36 inches)
- ⇒ 2 broom handles or wooden dowels (6 feet long)
- ⇒ finishing nails
- ⇒ sewing machine and thread
- ⇒ hammer
- ⇒ iron and ironing board

Directions:

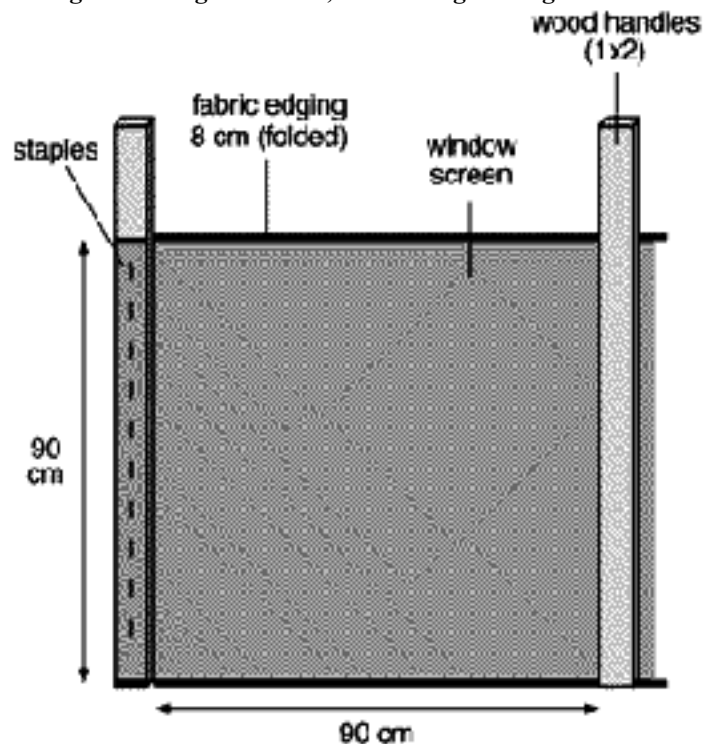
1. Fold screening in half (3 foot by 3 foot).
2. Fold edges of canvas strips under 1/2 inch and press with iron.
3. Sew 2 strips at top and bottom of screening, then use remaining 2 strips on the sides of the screening to make casings for handles. Sew bottom of casings shut.
4. Insert handles into casings and nail into place with finishing nails.



## Kick Seine Net #2

Directions:

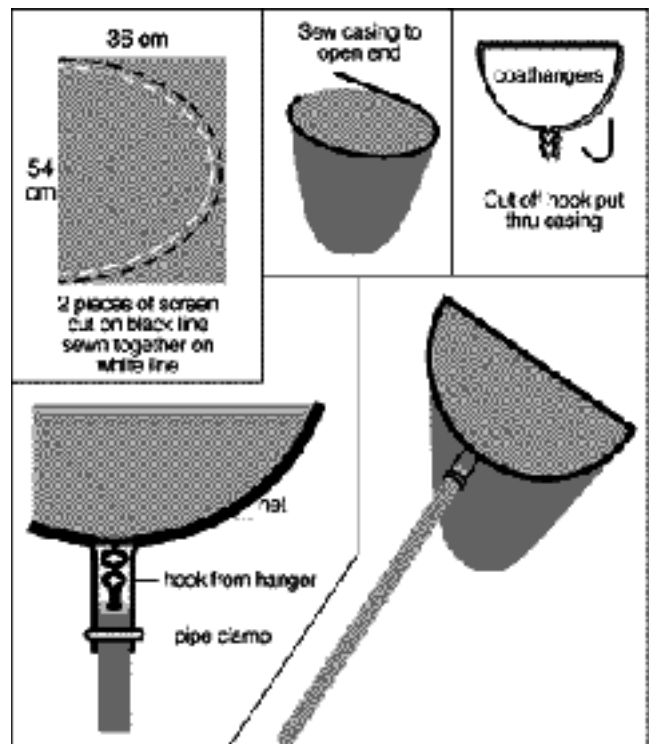
1. Fold one 8 x 122 cm strip of fabric over one of the long screen edges and sew, reinforcing the edge.
2. Repeat for the other long edge.
3. Attach screen to poles with staples, making the poles even with the bottom of the screen and extending to form handles at the top.
4. Wrap screen around poles several times and staple again to reinforce the edges.



## Dip Net

Directions:

1. Cut a net shape from the 36 x 53 cm pieces of nylon screen (see diagrams) and sew them together.
2. Edge the open end of the net with heavy fabric, leaving an opening to form a casing to insert the hanger.
3. Cut hooks from hangers and untwist the wires.
4. Use duct tape to tape the hangers together to make your frame heavier.
5. Insert a wire through the casing and twist ends back together at opening.
6. Drill a hole in the tip of the wooden handle large enough to insert the ends of the hangers into the hole in the pole. Secure the net to the pole by using the hook you cut from the hanger and using the pipe clamp or duct tape to secure the hook to the pole.

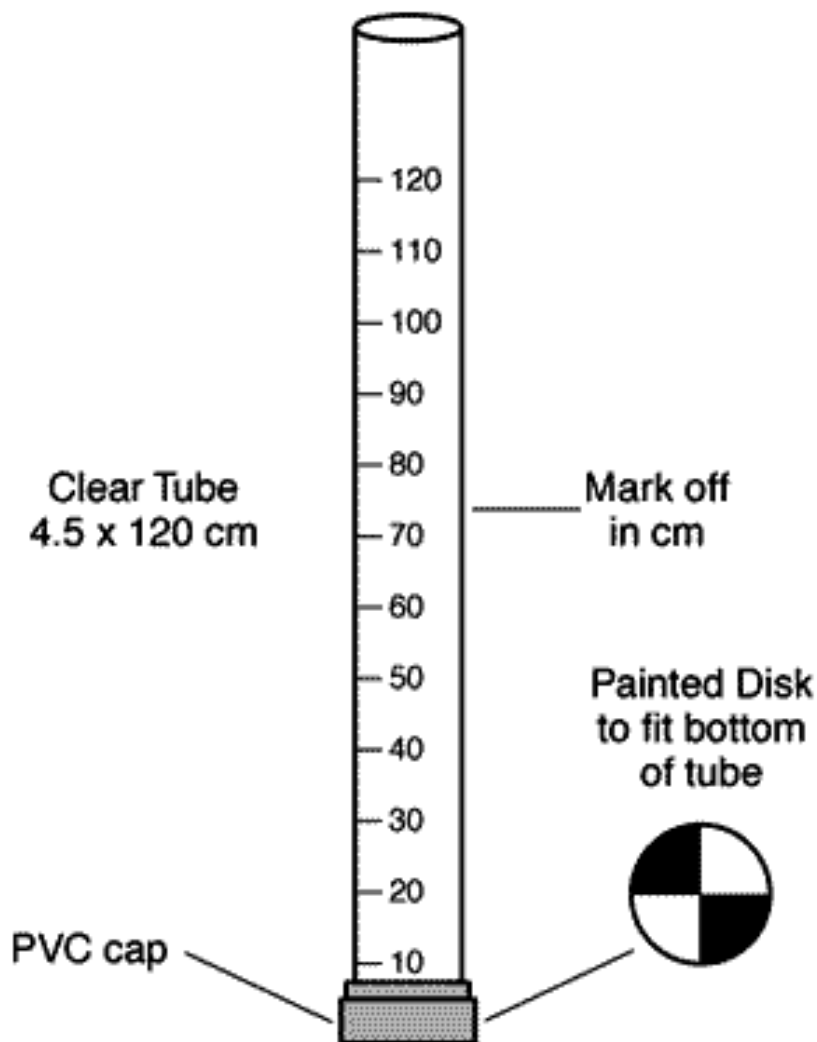


## Turbidity Tube

*For instructions on how to correctly use the turbidity tube see Chapter 5 Chemical Monitoring.*

### Directions:

1. Obtain a 1 and 1/2 inch plumbing cap and a length of florescent light bulb tube cover (2 feet works great). On the inside of the plumbing cap, use a permanet black marker to draw the diagram pictured below.
2. Place the plumbing cap over one end of a clear tube. Cap should fit tightly so water cannot leak out. If necessary - use glue to secure the cap.
3. Use a marker and meter stick to make a scale on the side of the tube, beginning at the disk with 0 cm. Or mark on a piece of tape and stick it to the outside of the tube.



## Appendix B - Glossary

### A

**acid mine drainage:** Waters of low pH (less than 6) from mining areas.

**algae:** Small plants which lack roots, stems, flowers, and leaves; living mainly in water and using the sun as an energy source.

**alkalinity:** A measurement of water's ability to neutralize acid.

**aquatic habitat:** All of the areas in a stream, lake or wetland that are occupied by an organism, population or community.

**aquifer:** Any geological formation containing water, especially one that supplies water for wells, springs, etc.

### B

**banks:** The portion of the stream channel which restricts the movement of the water out of the channel during times of normal water depth. This area of the stream is characterized as being the exposed terrestrial areas on either side of the stream.

**benthic:** An adjective which describes all things associated with the bottom, or sediments of a stream.

**bedrock:** Unbroken solid rock, overlain in most places by soil or rock fragments.

**biochemical oxygen demand (BOD):** An empirical test in which standardized laboratory procedures measure the oxygen required for the biochemical degradation of organic material, and the oxygen used to oxidize inorganic materials, such as sulfides and ferrous iron.

### C

**channelization:** The straightening of a stream or the dredging of a new stream channel to which the stream is diverted. A channelized stream is straight with little or no meanders.

**class:** A taxonomic rank which falls under the taxonomic rank of Order.

**cobble streambed:** A watercourse predominately lined with naturally rounded stones, rounded by the water's action. Size varies from a hen's egg to that used as paving stones.

**complete metamorphosis:** The type of insect development that includes four stages; egg, larva, pupa, adult.

**conservation practice:** An engineered structure or management activity that eliminates or reduces an adverse environmental effect of a pollutant and conserves soil, water, plant, or animal resources.

### D

**drainage basin:** The total land area draining to any point in a stream. A drainage basin is composed of many smaller watersheds.

**Dissolved Oxygen (DO):** The amount of oxygen dissolved in water. Generally, proportionately higher amounts of oxygen can be dissolved in colder waters than in warmer waters.

### E

**ecology:** The relationship between living things and their environments or the study of such relationships.

**effluent:** A discharge of partially or completely treated pollutants into the environment; generally used to describe discharge into the water.

**emergent plants:** Plants rooted in the bottom of the watercourse, that rise above the water surface.

**erosion:** The wearing away of the land surface by wind or water.

**eutrophic:** A highly productive water body, can be caused or accelerated by the input of large amounts of nutrients from human sources.

**eutrophication:** Natural eutrophication is the process of lake aging. Cultural eutrophication occurs when nutrients are added from agricultural runoff, sewage, or other sources.

**Escherichia coli (E. Coli):** A bacterium of the intestines of warm-blooded organisms, including humans, that is used as an indicator of water pollution for disease producing organisms.

## ***F***

**floodplain:** An area on both sides of a stream where flood waters spread out during high rains. The surface may appear dry for most of the year, but it is generally occupied by plants that are adapted to wet soils.

**fecal coliform bacteria:** The portion of the coliform group which is present in the gut or feces of warm-blooded animals. The presence of fecal coliform bacteria in water is an indication of pollution and potential human health problems.

**food chain:** A transfer of energy in a sequence of organisms (algae, fish, etc.) in a community in which each member of the chain feeds on the member below it.

## ***H***

**habitat:** The area in which an organism lives.

**herbaceous vegetation:** Plants having a stem that remains soft and succulent during the growing, not woody.

## ***I***

**incomplete metamorphosis:** The type of insect development that consists of three stages; egg stage, a nymph stage and an adult stage.

**indicator organism:** Organisms which respond predictably to various environmental changes, and whose presence or absence, and abundance, are used as indicators of environmental conditions.

**inorganic:** Any compound not containing carbon.

**intermittent stream:** A watercourse that flows only at certain times of the year, receiving water from springs or surface sources; also, a watercourse that does not flow continuously, when water losses from evaporation or seepage exceed available stream flow.

**invertebrate:** An organism without a backbone.

## ***J***

**JTU's - Jackson Turbidity Units:** a unit of measurement commonly used in electronic turbidity meters that indicate how far light can penetrate into a water sample before the cloudiness of the sample cuts the light. Similar to NTU's or Nephelometer Turbidity Unit.

## ***L***

**lake:** A body of fresh or salt water of considerable size, whose open-water and deep-bottom zones (no light penetration to the bottom) are large compared to the shallow-water (shoreline zone, which has light penetration to its bottom).

## ***M***

**macroinvertebrates:** Animals lacking backbones that are large enough to be visible without the aid of a microscope.

**meanders:** Sinuosity, or snake-like curving of a natural stream channel.

**metamorphose:** To change into a different form, such as from an insect pupa to an adult.

**methemoglobinemia:** The presence of methemoglobin in the blood, making the blood useless as a carrier of oxygen.

Methemoglobin, a compound closely related to oxyhemoglobin, is found in the blood following poisoning by certain substances, such as nitrate. Young babies, both human and animal, are particularly susceptible to methemoglobinemia, leading to a condition known as "blue baby" which if untreated can cause death.

**mollusk:** Soft-bodied (usually hard-shelled) animals such as clams or mussels.

## **N**

**nitrogen:** A limiting nutrient for the aquatic environment. Nitrogen is considered to be limiting because it is needed by the plants and animals in the stream in moderate amounts. When present in higher amounts, such as large amounts of fertilizer runoff from local farm fields, large algal blooms occur which cause a depletion of dissolved oxygen.

**nonpoint source pollution:** A type of pollution whose source is not readily identifiable as any one particular point, such as pollution caused by runoff from streets and agricultural land.

**nutrient:** Any substance which is necessary for growth of living things.

**nymph:** A juvenile, wingless stage of an insect.

**NTU - Nephelometer Turbidity Units:** a unit of measurement commonly used in electronic turbidity meters that indicate how far light can penetrate into a water sample before the cloudiness of the sample cuts into the light. Similar to Jackson Turbidity Units.

## **O**

**order:** Taxonomic grouping of related families of organisms.

**organic material:** Any compound containing carbon.

## **P**

**pathogenic:** Capable of causing disease.

**pH:** The measurement of acidity or alkalinity on a scale of 0 - 14. A pH of 7 is neutral, less than 7 is acidic, and more than 7 is alkaline (basic).

**phosphorus:** An essential plant nutrient that, in excessive quantities, can contribute to the eutrophication of water bodies.

**photosynthesis:** Process by which green plants use sunlight to produce food.

**perennial stream:** A watercourse that flows continuously throughout the year and whose upper surface generally stands lower than the water table in the area adjacent to the watercourse.

**pollution sensitive organisms:** Those organisms which cannot withstand the stresses applied on the aquatic environment by pollution.

**pollution tolerant organisms:** Those organisms which can withstand many of the stresses applied to an aquatic environment by pollution.

**point source pollution:** Pollutants originating from a "point" source, such as a pipe, vent, or culvert.

**pond:** A body of fresh or salt water, smaller than a lake, and where the shallow-water zone (light penetration to its bottom) is relatively large compared to the open water and deep bottom (no light penetration to the bottom).

**pools:** In a watercourse, an area often following a rapids (riffle), which is relatively deep with slowly moving water compared to the rapids.

**pupa:** The stage of an insect in which it is enclosed in a protective case while changing from larva to an adult.

## **R**

**riffle:** In a watercourse, an area often upstream of a pool, which is relatively shallow with swiftly moving water compared to the pool.

**riprap:** Any material (such as concrete blocks, rocks, car tires or log pilings) which are used to protect a stream bank from erosion.

**riparian zone:** An area, adjacent to and along a watercourse, which is often vegetated and constitutes a buffer zone between the nearby lands and the watercourse.

**runoff:** Water from rain, snowmelt, or irrigation that flows over the ground surface and runs into a water body.

## **S**

**sediment:** Soil, sand, and minerals washed from land into waterways.

**sedimentation:** The process by which soil particles (sediment) enter, accumulate and settle to the bottom of a waterbody.

**septic odor:** The sulfur (rotten egg) smell produced by the decomposition of organic matter in the absence of oxygen.

**sewage:** The organic waste and wastewater produced by residential and commercial establishments.

**sewage treatment plant:** A facility designed to remove organic pollutants from wastewater.

**silt:** Fine particles of soil or rock that can be picked up by air or water and deposited as sediment.

**siltation:** The process of silt settling out of the water and being deposited as sediment.

**submergent rooted plant:** An aquatic plant whose roots are in the watercourse's bottom with the upper part of the plant submerged below the surface of the water.

**substrate:** The surface upon which an organism lives or is attached.

**species:** A unit of classification for a group of closely related individuals.

**stream bed:** The bottom of a stream where the substrate and sediments lay.

**stream depth:** A measurement of the depth of a stream from the water's surface to the stream bed.

**stream flow:** The amount of water moving in a stream in a given amount of time.

## **T**

**tolerant species:** An organism that can exist in the presence of a certain degree of pollution.

**topographic map:** A map representing the surface features of a particular area.

**total coliform bacteria:** A group of bacteria that are used as an indicator of drinking water quality. The presence of total coliform bacteria indicates the possible presence of disease-causing bacteria.

**total suspended solids:** Whole particles carried or suspended in the water, such as silt, sand or small algae or animals, that cause a green or brown color in the water. These substances can be filtered out of the water and weighed.

**total dissolved solids:** Substances that are dissolved in the water which can color the water brown or yellow. Tannic acids that leach from tree roots or from decomposing leaves can color the water brown to black due to dissolved chemicals. This color does not disappear by filtering the water.

**toxicity:** A measurement of how poisonous or harmful a substance is to plants and animals.

**turbidity:** The presence of sediment in water, making it unclear, murky or opaque.

**trend data:** Data or measurements of a stream system which will show how particular characteristics changed over time.

## **U**

**urban runoff:** Water which has drained from the surface of land which is used for urban uses, such as paved roads, subdivisions and parking lots.

## **W**

**wastewater:** Water carrying unwanted material from homes, farms, businesses and industries.

**water quality:** The condition of the water with regard to the presence or absence of pollution.

**watershed:** The entire surface drainage area that contributes water to a stream or river. Many watersheds which drain into a common river make a drainage basin.

**woody vegetation:** Plants having a stem or trunk that is fibrous and rigid.

# Appendix C - Suggested Reading\*

## Water Quality Monitoring Resources

---

\*All prices subject to change.

**Field Manual for Global Low-Cost Water Quality Monitoring.** 2nd ed. 1997. M.K. Mitchell and W.B. Stapp. 334 pp. \$20. Illustrated guide to methods for conducting most common water quality monitoring tests, including turbidity, phosphorus, nitrogen, fecal coliforms, insect collection, and watershed land use analysis. This book is used by most school and volunteer groups in Indiana as standard methods for water testing. ISBN# 0-7872-2375-1 Available from: Kendall Hunt Publishing Co. P.O. Box 1840, Dubuque, IA, 52004. Tel. (800) 338-8309.

**Streamkeeper's Field Guide: Watershed Inventory and Stream Monitoring Methods.** T. Murdoch and M. Cheo. 1996. \$29.95 Adopt-A-Stream Foundation, Everett, WA. 296 pp. ISBN 0-9652109-0-1. Excellent manual on citizen assessment and monitoring of streams and watersheds. Available from: The Adopt-A-Stream Foundation, 600 128th Street SE, Everett, WA 98208. Tel. (206) 316-8592. (The foundation also has guides on wetland assessment and several beautiful posters on streams, wetlands, and salmon.)

**Pond and Brook: A Guide to Nature in Freshwater Environments.** M.J. Caduto, 1990. Excellent introduction to aquatic biology, from wetlands and deep lakes to streams and vernal ponds, for the amateur naturalist, including hands-on projects and activities. ISBN 0-87451-509-2. \$12.95. Available from: Patricia Ledlie Bookseller, Inc., Buckfield, Maine 04220. Tel or FAX (207) 336-2778 (and at most larger bookstores).

**Rapid Bioassessment Protocols for Use in Streams and Rivers: Benthic Macroinvertebrates and Fish.** EPA/440/4-89-001. & **Macroinvertebrate Field and Laboratory Methods for Evaluating the Biological Integrity of Surface Waters.** EPA/600/4-90/030. 256 pp. These two publications explain the standard methods used by EPA for sampling insects and fish in streams. Available from: Clean Lakes Program, Assessment and Watershed Protection Division (WH-553), U.S. Environmental Protection Agency, 401 M Street, S.W., Washington, D.C. 20460, Tel. (513) 569-7562.

**The Volunteer Monitor.** National newsletter of water quality monitoring in which issues address home construction of monitoring equipment, collecting and analysis of data, and networking. Available from: River Network, 520 SW 6th Ave., Suite 1130, Portland, OR 97204, [volmon@rivernet.org](mailto:volmon@rivernet.org), Tel. (503) 241-9256.

## Stream Resources

**Better Trout Habitat: A Guide to Stream Restoration and Management.** C.J. Hunter. 1991. Island Press. 320 pp. ISBN: 0-933280-77-7. A less technical illustrated guide to stream restoration techniques, including streambank stabilization and fish habitat rehabilitation. Most work addressed in the book would require state or federal permits on private or public land and should be designed by a competent professional engineer. Available from: Island Press, Box 7, Covelo, CA 95428. Tel. (800) 828-1302. (Catalogs from Island Press include an excellent listing of unusual books on environmental issues.)

**Entering the Watershed: A New Approach to Save America's River Ecosystems.** B. Doppelt, M. Scurlock, C. Frissell, and J. Karr. 1993. Island Press. 462 pp. ISBN 1-55963-275-5. Describes current and proposed laws and regulations for protection of stream resources. Available from: Island Press, Box 7, Covelo, CA 95428. Tel. (800) 828-1302.

**Stream Ecology: Structure and Function of Running Waters.** J.D. Allen. 1995. Chapman & Hall, New York, NY. 388 pp. ISBN 0-412-35530-2. Technical description of the scientific concepts guiding research in stream ecosystems. Available from: Patricia Ledlie Bookseller, Inc., Buckfield, Maine 04220. Tel. or FAX (207) 336-2778.

**Stream Hydrology: An Introduction for Ecologists.** N.D. Gordon, T.A. McMahon, and B.L. Finlayson. 1992. John Wiley & Sons, New York, NY. 526 pp. ISBN: 0-471-93084-9. Technical book on engineering hydrology, fluvial geomorphology, and hydraulics with examples of their biological implications. Appropriate for students and researchers with some training in ecology or engineering. Available from: Patricia Ledlie Bookseller, Inc., Buckfield, Maine 04220. Tel. or FAX (207) 336-2778.

**Managing Habitats for Conservation.** W.J. Sutherland and D.A. Hill. 1995. Cambridge University Press, New York, NY. 399 pp. ISBN 0-521-44776-3. Valuable reference to options and solutions for managing wildlife habitat in different kinds of ecosystems. Useful for land managers, landscape architects, and conservationists. Available from: Patricia Ledlie Bookseller, Inc., Buckfield, Maine 04220. Tel. or FAX (207) 336-2778.

**Riparian Landscapes.** G.P. Malanson. 1993. Cambridge University Press, New York, NY. 296 pp. ISBN 0-521-38431-1. Valuable reference on options and solutions for managing riparian habitat. Useful for land managers, landscape architects, and conservationists. Available from: Patricia Ledlie Bookseller, Inc., Buckfield, Maine 04220. Tel. or FAX (207) 336-2778.

## **IDENTIFICATION KEYS**

**Aquatic Entomology: The Fishermen's and Ecologists' Illustrated Guide to Insects and Their Relatives.** W.P. McCafferty. Jones and Bartlett. 448 pp. ISBN 0-86720-017-0. \$55. Illustrated keys to the majority of the aquatic insect species that are found in Indiana and useful ecological information on each species. McCafferty is a professor at Purdue University, so many of the species are common to the midwest. Available from: Jones and Bartlett Publishers, Inc., 20 Park Plaza, Boston, MA 02116. Tel. (800) 832-0034.

### **The Fishes of Ohio.**

**A Guide to Common Freshwater Invertebrates of North America.** J. Reese Voshell. ISBN 0-939923-87. A brand new volume about macroinvertebrates! This book is smaller in size (not information) and price than many others. Available from: McDonald and Woodward Publishing.

**Freshwater Invertebrates of the United States.** R.W. Pennak. 1989. 628 pp. A very thorough volume with keys to species or genus of each group. \$45. Available from: Reiter's Scientific & Professional Books, 2021 K Street, NW, Washington, DC 20006. Tel. (202) 223-3327.

**Aquatic Plant Identification Deck.** University of Florida. Sixty-seven laminated "cards" riveted together with a clear photograph of the aquatic plant on the front and general information about identification and habitat of the species on the back. Some tropical species are not relevant, but most of the species are found in Indiana. \$8. Available from: University of Florida, Tel. (904) 392-1799 or (904) 392-1764.

**A Manual of Aquatic Plants.** N.C. Fassett. 1957. University of Wisconsin Press, Madison, WI. 405 pp. ISBN 0-299-01450-9. Well-illustrated technical key to aquatic plants in the Midwest region. Available from: Patricia Ledlie Bookseller, Inc., Buckfield, Maine 04220. Tel or FAX (207)336-2778.

**How to Know the Freshwater Algae.** G.W. Prescott. 293 pp. ISBN 0-697-04754-7. \$20. and **How to Know the Aquatic Plants.** G.W. Prescott. 158 pp. ISBN 0-697-04775-X (spiral bound) or 0-697-04774-1 (cloth). \$20. Illustrated keys to the majority of the algae and aquatic plant species in the US. Order both from larger book stores.

**Newcomb's Wildflower Guide.** L. Newcomb. 1977. Little, Brown, and Company, Boston, MA. 490 pp. ISBN: 0-316-60442-9. One of the easiest and best organized illustrated keys to use for identification of wildflowers, flowering shrubs, and vines. Available from: Patricia Ledlie Bookseller, Inc., Buckfield, Maine 04220. Tel. or FAX (207) 336-2778.

**Field Guide to Freshwater Mussels of the Midwest.** K.S. Cummings and C.A. Mayer. 1992. Illinois Natural History Survey. 194 pp. ISBN: 1-882932-00-5. Illustrated keys to the majority of the mussel species in the Midwest. Includes color photos of all species. A booklet of color pictures based on this book is also available from U.S. Fish and Wildlife Service in Ft. Snelling (Minneapolis), Minnesota. Available from: Illinois Natural History Survey, Natural Resources Building, 607 East Peabody Drive, Champaign, Illinois 61820.

## **LAKE MANAGEMENT RESOURCES**

**The Waterfront Property Owner's Guide.** 1979. 58 pp. Information on how water quality problems are caused and provides suggestions on actions that the individual property owner can take to protect and improve water quality conditions in lakes and streams. Available from: The East Central Florida Regional Planning Council, 1011 Wymore Road, Suite 105, Winter Park, FL 32789, Tel. (305) 645-3339.

**Life on the Edge...Owning Waterfront Property.** 1994. 95 pp. Gives advice on selecting waterfront property and stewardship responsibilities of shoreline property owners in protection of water quality, open space, and natural beauty. Sections on aquatic plants and federal, state (Wisconsin), and local laws pertaining to waterfront property. Available from: University of Wisconsin-Extension, Lake Management Specialists, College of Natural Resources, University of Wisconsin, Stevens Point, WI 54481, Tel. (715) 346-2116.

**A Primer on Limnology.** Second Edition. 1992. B.A. Monson. 54 pp. Introduction to physical, biological, and chemical structure of lakes, lake classification, human influences, and process for organizing a lake study. Available from: Water Resources Research Center, College of Natural Resources, University of Minnesota, Room 302, 1518 Cleveland Avenue, N., St. Paul, MN 55108.

**Lake Smarts: The First Lake Maintenance Handbook.** 1993. S. McComas. 215 pp. Guide to affordable projects to help clean up, improve, and maintain lakes and ponds, including aquatic plant control, sediment, on-site waste disposal, undesirable fish, and waterfowl management. Developed for Midwestern states. \$18.95 paperback. Available from: Terrene Institute, 1717K Street, N.W., Suite 801, Washington, D.C. 20006-1504, Tel. (202) 833-8317.

**Our Nation's Lakes: A National Catalog of Lake Information Materials.** Wisconsin Lake Management Program, 1990, 37 pp. Listing of information available from natural resource agencies across the country. Pub. WR-242-90. Available from: Wisconsin Department of Natural Resources, Bureau of Water Resources Management, P.O. Box 7921, Madison, WI 53707, Tel. (608) 267-3579.

**Monitoring Lake and Reservoir Restoration.** R.E. Wedepohl, et al., EPA 440/4-90-007, 1990, and "The Lake and Reservoir Restoration Guidance Manual" by H. Olem and G. Flock (eds), EPA 440/4-90-006, 1990. Developed to help users identify, describe, and define lake problems, evaluate available management practices, develop and implement a site-specific management plan. Available from: Clean Lakes Program, Assessment and Watershed Protection Division (WH-553), U.S. Environmental Protection Agency, 401 M Street, S.W., Washington, D.C. 20460.

**Volunteer Lake Monitoring: A Methods Manual.** EPA 440/4-91-002, 1991, 124 pp., and "National Directory of Volunteer Environmental Monitoring Programs" EPA 841-B-94-001, 1994, 531 pp. Methods for monitoring lake conditions, including algae, aquatic plants, dissolved oxygen, and other characteristics. Listing of groups involved in water quality monitoring. Available from: Clean Lakes Program, Assessment and Watershed Protection Division

***Volunteer Stream Monitoring Training Manual***

(WH-553), U.S. Environmental Protection Agency, 401 M Street, S.W., Washington, D.C. 20460.

**Lake Leaders Handbook.** 1995. Contains the “largest collection of specialized lake management information for citizen leaders ever brought together in one document” to support responsibilities of lake organization leadership, including topics on formation and operation of lake associations, motivation of volunteers, planning for the lake future, understanding government (!), running a proper meeting, insurance coverage, grants, educational programs, lake management, land use regulations, directory of lake managers, and publications list. Available from: UWEX-LAKES PROGRAM, ATT: Robert Korth, College of Natural Resources, University of Wisconsin, 2100 Main Street, Stevens Point, WI 54481-3897.

## Appendix D - Watershed Group Contacts

### **Friends of the Great Miami River**

515 Wyoming Ave  
Cincinnati, OH 45215  
(513) 761-4003

### **Honey Creek Watershed Project**

4191 River Ridge Road  
Dayton, OH 45415  
(937) 898-3495

### **Indian Lake Watershed Project**

324 Co. Rd. 11  
Bellefontaine, OH 43311  
(937) 593-2946

### **Loramie Valley Alliance**

822 Fair Rd.  
Sidney, OH 45365  
(937) 492-4768

### **Lower Mad River Protection Project**

4400 Gateway Blvd.  
Springfield, OH 45502  
(937) 328-4600

### **Mad River Steering Committee**

1512 S. US Hwy 68, Suite B100  
Urbana, OH 43078  
(937) 484-1526

### **Middle Great Miami Watershed Alliance**

201 W. Main Street  
Troy, Ohio 45373  
(937) 440-3945

### **Stillwater Watershed Project**

1117 South Towne Court  
Greenville, OH 45331  
(937) 548-1752

### **Three Valley Conservation Trust**

5920 Morning Sun Rd.  
Oxford, OH 45056  
(513) 524-2150

### **Upper Great Miami Watershed Protection Project**

P.O. Box 3  
Port Jefferson, OH 45360  
(937) 456-8143

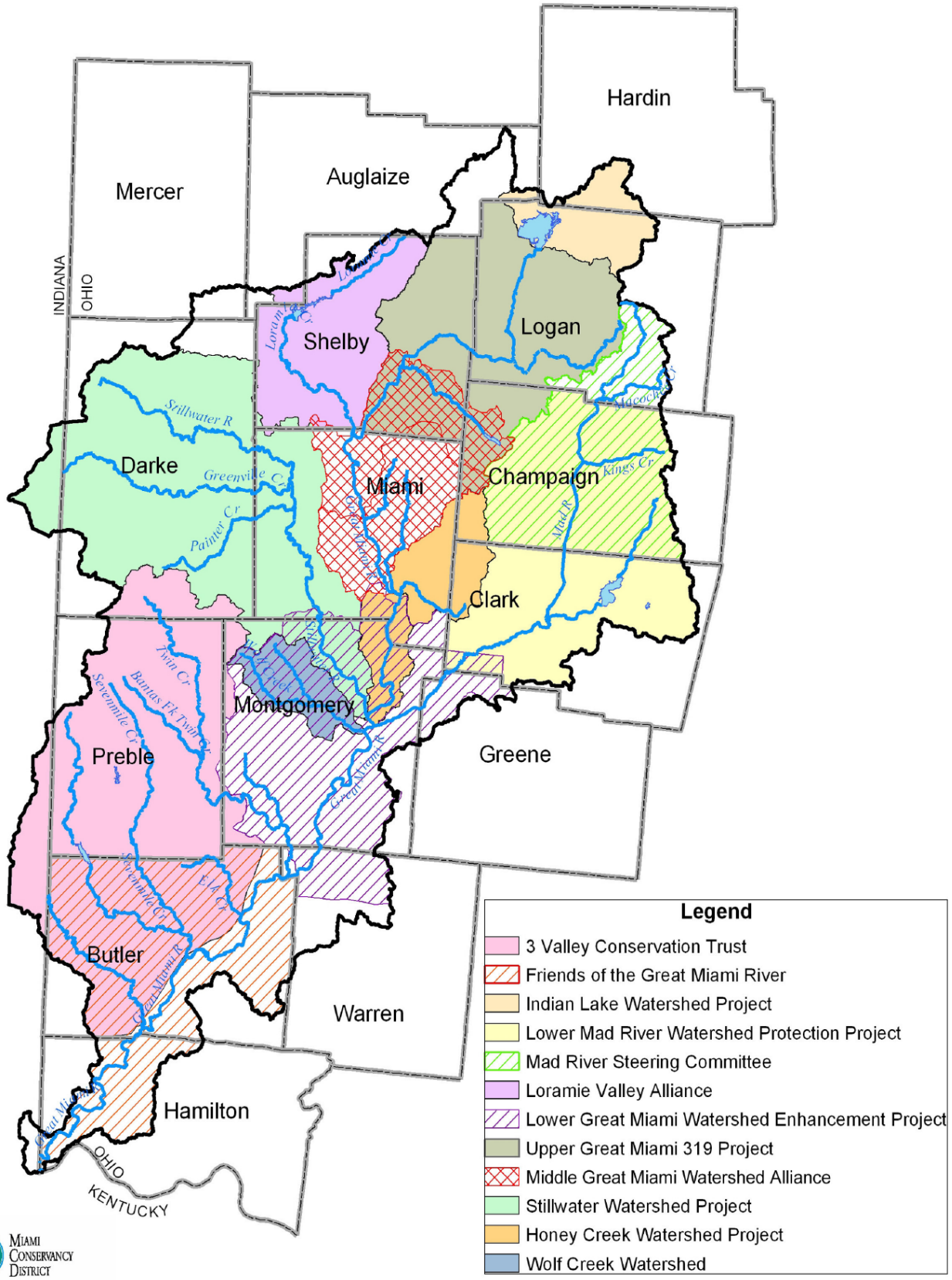
### **Watershed Enhancement Program**

c/o Miami Valley Regional Planning Commission  
40 W. 4th Centre, Suite 400  
Dayton, OH 45402  
(937) 223-6323

### **Wolf Creek Project**

10025 Amity Rd.  
Brookville, OH 45309  
(937) 854-7645

# Community Based Watershed Programs of the Great Miami Watershed



May 1st 2003

## Appendix E - References

- Blair, Jane, ed., 1996. *Student Watershed Research Project: A Manual of Field and Lab Procedures*. Third Edition. Saturday Academy. Oregon Graduate Institute of Science and Technology.
- Cruz, Javier, 2000. *Streamwalk Training Manual*. Thames River Basin Partnership Initiative.
- Earth Force/GREEN, 2000. *Water Studies for Younger Folks: A Water Activities Manual for Elementary School Students*. (Based on the *Field Manual for Water Quality Monitoring*. Mitchell, M. and W. Stapp.)
- Farthing, Patty, et.al., 1989. *The Stream Scene- Watersheds, Wildlife, and People*. Oregon Department of Fish and Wildlife, Watershed Education Project.
- Faulds, Ann M. et.al., Macroinvertebrate ID Flash Cards. Earth Force - GREEN.
- Global Learning and Observations to Benefit the Environment (GLOBE), 1997. *Teacher's Guide*.
- GREEN/LaMotte, 1999. *Water Monitoring Kit Manual*. Code 5848.
- Karr, James R., et.al. 1986. *Assessing Biological Integrity in Running Waters, A Method and its Rationale*. Illinois Natural History Survey Special Publication 5.
- Kopec, J. and S. Lewis, 1989. *Stream Monitoring: A Citizen Action Program*. Ohio Department of Natural Resources, Division of Natural Areas and Preserves; Scenic Rivers Program.
- Larson, Meg, 2000. *Teacher Training Manual*. Clinton River Watershed Council.
- Loren, et. al., *Save Our Streams Monitor's Guide to Aquatic Macroinvertebrates*. Izaak Walton League of America.
- McCafferty, P.W., 1981. *Aquatic Entomology: The Fishermen's and Ecologist's Guide to Insects and their Relatives*. Jones and Bartlett Publishers, Inc. Massachusetts.
- Merritt, R.W. and K.W. Cummins, 1984. *An Introduction to the Aquatic Insects of North America*, Second Edition. Kendall/Hunt, Dubuque.
- Minnesota Pollution Control Agency, Spring 2000. *Stream Reader: Newsletter of the Minnesota Pollution Control Agency*. Citizen Stream-Monitoring Program.
- Mitchell, M. and W. Stapp, 1997. *Field Manual for Water Quality Monitoring*. Kendall-Hunt Publishers, Iowa.
- Murdoch, T. and M. Cheo, 2001. *Streamkeeper's Field Guide*. The Adopt-a-Stream Foundation, Everett, Washington.
- Natural Resource Conservation Service, 1996. *Water Quality Indicators Guide - Surface Waters*. Kendall-Hunt Publishers, Iowa.

Ohio Environmental Protection Agency: Division of Surface Water, 1996. *Biological and Water Quality Study of the Middle and Lower Great Miami River and Selected Tributaries*, Columbus, Ohio.

Ohio Environmental Protection Agency: Division of Surface Water, 1995. *Biological and Water Quality Study of the Upper Great Miami River and Selected Tributaries*, Columbus, Ohio.

Rand, G. and A. Petrocelli, 1985. *Fundamentals of Aquatic Toxicology*. Hemisphere Publishing Corp., New York.

Stapp, W. and M. Mitchell, 1997. *Field Manual for Global Low-Cost Water Quality Monitoring*. Kendall-Hunt Publishers, Iowa.

U.S. Environmental Protection Agency: Office of Water, 1995. *Volunteer Stream Monitoring: A Methods Manual*, Washington, D.C.