Chapter 1

Welcome and Introduction

- Level 1 Volunteer Water Quality Monitoring Training Notebook -

The Stream Team Volunteer Water Quality Monitoring (ST VWQM) Program is a partnership between the **Citizens** of Missouri, the Missouri Department of Conservation (**MDC**), the Missouri Department of Natural Resources (**DNR**) and the Conservation Federation of Missouri (**CFM**).

- **Citizens** – The Volunteer Water Quality Monitoring Program is an opportunity for citizens to learn about water quality and get involved in protecting Missouri's water resources. Our mission is to involve as many conservation-minded citizens as possible to protect and restore Missouri's flowing water resources. We appreciate your help.
- **MDC** is responsible for managing Missouri's forest, fish and wildlife resources and is concerned about water pollution because it can impact these resources.
- **DNR** is the regulatory agency in Missouri and has authority over water, air, solid waste, hazardous waste and mining. DNR also has responsibility for state parks, energy, geology and land survey.
- **CFM** is an organization for citizens concerned about Missouri's natural resources and environmental issues, and is the Missouri affiliate of the National Wildlife Federation.

Goals of the Volunteer Water Quality Monitoring Program:

- Inform and educate citizens about the conditions of our streams
- Establish a monitoring network
- Enable citizens to make informed decisions
- Halt the degradation of streams

Water quality monitoring is one of the many activities offered by the Missouri Stream Team Program and is the only activity that requires training. Nearly all volunteer monitors enrolled in this program are also members of a Stream Team.

The objectives of the Missouri Stream Team Program are as follows:

- To organize concerned citizens addressing stream problems at the grassroots level
- To address stream issues on a local basis by involving members of the communities and educating them on the importance of water quality and conservation of natural resources
- To draw together public and private resources to make solutions happen across jurisdictional lines
- To help communities appreciate streams as positive assets through education and group involvement in the Program

The ST VWQM Program takes a holistic approach noting that **a stream is a reflection of its watershed**. High quality water in a watershed is a function of good physical, chemical and biological properties that can sustain all uses.

The Task before Us

Monitoring the quality of water is essential for an understanding of the conditions of water resources. It provides a basis for effective policies that promote wise use and management of those resources. One of the goals of the 1972 Clean Water Act is "to restore and maintain the chemical, physical, and biological integrity of the Nation's waters."

The Act states that it "is the national goal that wherever [possible, a]…goal of water quality which provides for the protection and propagation of fish, shellfish, and wildlife and provides for recreation in and on the water be attained..."

United States EPA 2012 Water Quality Assessment Report

The United States Environmental Protection Agency (EPA) compiles the 305(b) Water Quality Assessment from all 50 states, territories and tribes. In 2015, the assessment reports that 30% of the Nation's 3.533 million river/stream miles are assessed (monitored) by states and tribes. Of the 1,046,630 rivers/streams miles assessed, 54% are impaired for one or more uses. Of the remaining river/stream miles 45% are considered good and fully support all uses. However, 1% are considered good but threatened by pollution. Figure 1 illustrates the relationship of the total river/stream miles that have been assessed in the United States to **impaired** river/stream miles. The **designated uses** include support for fish, shellfish, and wildlife protection/propagation, recreation, agriculture, aquatic life harvesting, public water supply, industrial, and aesthetic value. A waterbody is considered impaired if the quality of the water is not good enough to be used as intended. When states identify waters that are impaired, they describe the pollutants or processes causing or contributing to the impairment. Figure 2 illustrates the breakdown of the leading sources of stream impairment in the United States.

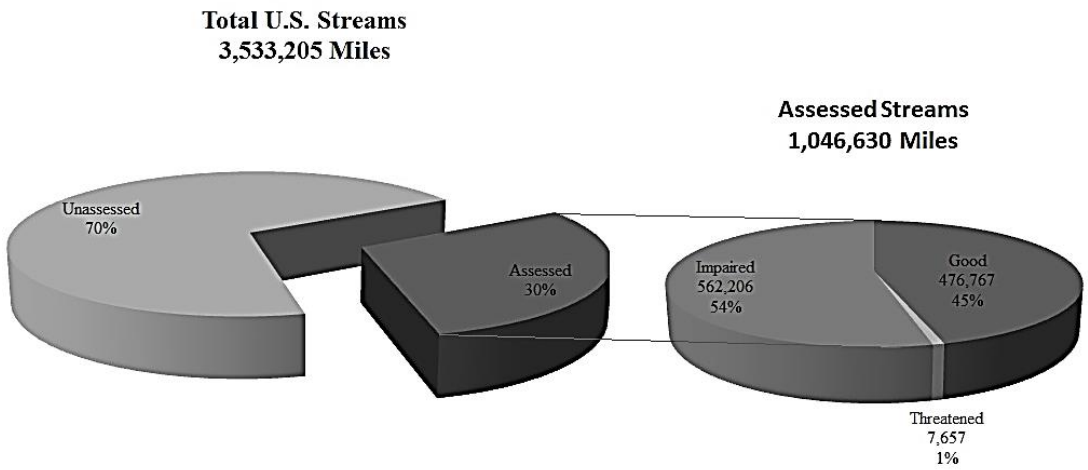

Figure 1. Assessed Rivers and Stream Miles

Values from: National Summary of Water Quality Attainment in Assessed Rivers and Streams 2015, EPA

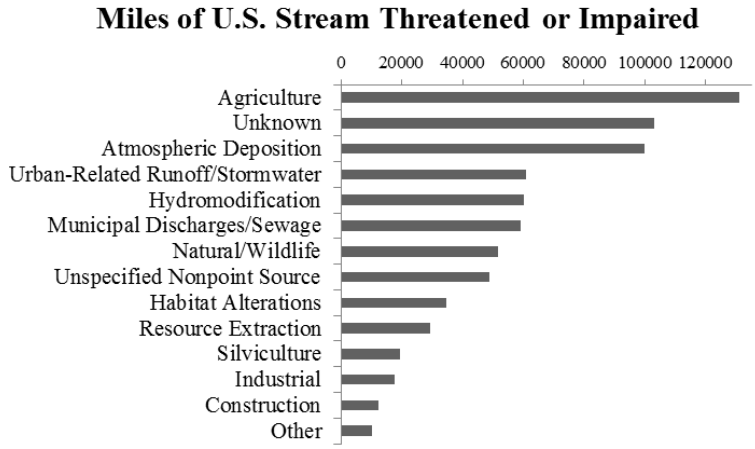

Figure 2. Leading Sources of Pollution in Assessed U.S. Rivers and Streams

Values from: National Summary of Water Quality Attainment in Assessed Rivers and Streams 2015, EPA

The top ten causes of impairment in <u>assessed rivers/streams</u> are:

- Pathogens
- Sediment
- Nutrients
- Mercury
- Organic enrichment/oxygen depletion
- Polychlorinated Biphenyls (PCBs)
- Metals (other than Mercury)
- Temperature
- Habitat alterations
- Flow alterations

  Source: National Summary of Water Quality Attainment in Assessed Rivers and Streams 2015, EPA

Contaminant sources for nonsupported designated uses assigned to <u>Missouri classified</u> streams:

- Nonpoint source, not specified
- Source unknown
- Atmospheric deposition
- Municipal point source
- Urban runoff and construction
- Agriculture
- Habitat modification other than Hydromodification
- Industrial point source
- Recreation pollution source
- Natural conditions

  Source: Missouri Water Quality Report 2014, DNR

Eroded soil is one of the most widespread pollutants affecting streams that have been assessed. Siltation is the process that deposits eroded soil into waterbodies. About 8,000 miles of classified streams in Missouri are affected by sediment deposition and other types of habitat degradation, such as channelization of streams. For more information, visit the EPA website: http://water.epa.gov.

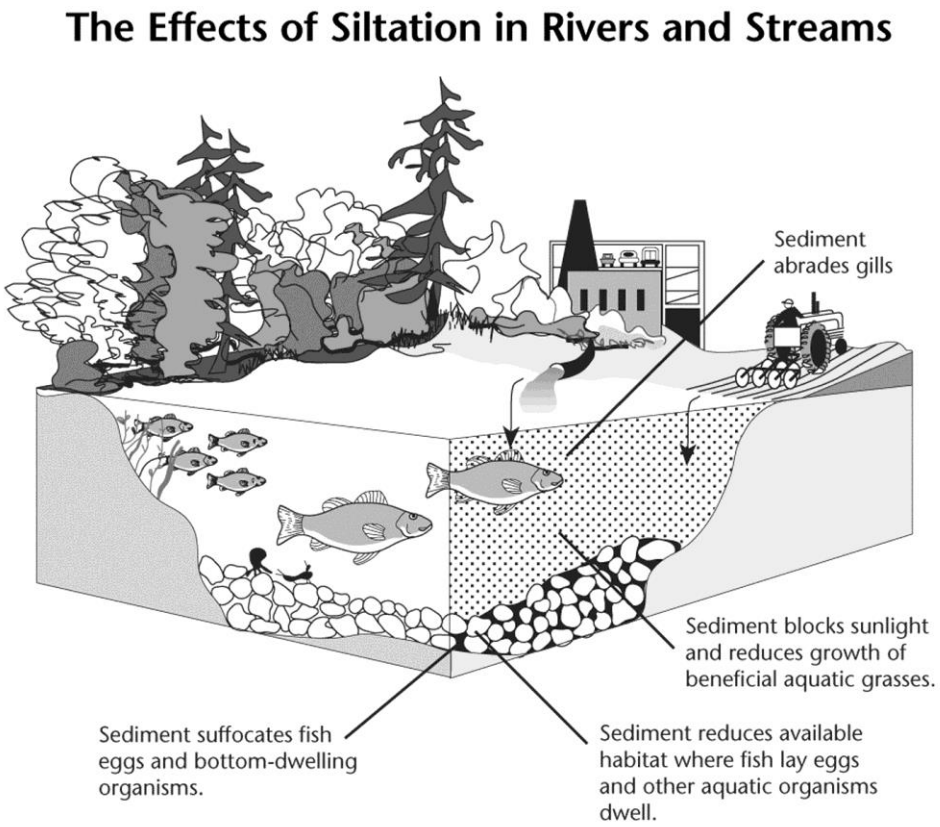

Figure 3. Effects of Siltation on Rivers and Streams

Source: National Water Quality Inventory 2000 Report to Congress, EPA

Mercury is one of the leading causes of pollution in Missouri. This heavy metal bioaccumulates in the tissue of fish, resulting in a high mercury concentration in large predatory species. The Missouri Department of Health and Senior Services recommends pregnant women, women of childbearing age, nursing mothers and children under 13 years of age should limit consumption of bass species greater than 12 inches to one meal per month and all other sport fish to one meal per week. For more information on this advisory, consult the Department of Health and Senior Services website: http://health.mo.gov.

Even though pollutants/stressors are listed separately, in reality, water quality usually suffers from the combined effects of several pollutants and processes. EPA encourages water quality managers and the public to use a holistic approach to managing our integrated water quality problems.

ST VWQM Training Levels

If a volunteer chooses to continue attending the available training, they must attend the following workshops in chronological order. Each level is a prerequisite for the next class, as is submission of appropriate data as listed below.

Introductory

This is the entry level of monitoring, and is a prerequisite for the Level 1 class. The Introduction to Volunteer Water Quality Monitoring workshop includes training for watershed mapping, site selection and biological monitoring (for stream macroinvertebrates). These workshops are usually offered in the spring and early summer each year.

Level 1

Volunteers who have successfully completed the Introductory workshop and have submitted Site data, Stream Discharge and Macroinvertebrate data are eligible to attend a Level 1 workshop. This level of training covers both physical monitoring (i.e., Visual Survey) and chemical monitoring. The workshop includes a mid-day field trip to a nearby stream where techniques of visual survey and water chemistry are practiced. A review of macroinvertebrate identification is also provided. When a volunteer has successfully completed the 8-hour Level 1 workshop, then their data has a quality control designation of Level 1. Volunteers are eligible to receive chemical monitoring equipment upon completion of this workshop. Level 1 workshops are offered in the late summer and fall of each year.

Level 2

Volunteers who have successfully completed the Level 1 workshop and submit two seasons of Biological Monitoring, Stream Discharge, Visual Survey and Water Chemistry data are eligible to attend a Level 2 workshop. Attending a Level 2 workshop allows the volunteer to do the following:

- Check their chemical monitoring equipment to ensure it is functioning properly
- Improve their chemical monitoring techniques
- Improve their ability to correctly identify macroinvertebrates by getting assistance in identifying unknown invertebrates from their streams and confirming identification of invertebrates in their reference collection

Data assigned the quality control designation of Level 2 indicates a volunteer has successfully completed the Level 2 Quality Assurance/Quality Control Workshop. This means they can correctly identify at least 75% of the macroinvertebrates covered in the workshop to order and establish accuracy limits on at least four out of five chemical parameters. Level 2 workshops are usually offered during the winter of each year (January – March).

Level 3

A volunteer who has successfully completed the Level 2 Workshop and submitted data 12 times is eligible for Level 3 evaluation. Those volunteers who regularly submit all four data types may be the most comfortable pursuing a Level 3 audit.

The designation of Level 3 indicates that program personnel have evaluated the volunteer in the field at their monitoring site. In order to pass a Level 3 audit, participants must meet accuracy limits on five out of five chemical parameters and correctly identify 90% of invertebrates and all of the mayflies, stoneflies and caddisflies at their site to order. In addition, they must be able to accurately measure stream discharge, define the terms associated with a visual survey and demonstrate an understanding of proper visual survey assessment.

This evaluation is scheduled through appointment only. *It is strongly recommended that the volunteer request evaluation during a time of year they regularly sample macroinvertebrates*. By doing so, the

volunteer ensures the highest level of familiarity and confidence identifying the types and seasonally changing sizes of invertebrates in their stream.

VWQM Validations

Since data submitted by Level 2 and above Stream Team Volunteers are utilized at a higher level and are often used to supplement agency data, we need to ensure we are providing the highest quality data to the sponsoring agencies and all other data users. *The Program is now requiring individuals to have their equipment checked at least once every three years in order to maintain quality assurance and confidence in data collected by Level 2 and above volunteers.*

Volunteers can either attend one of our regularly scheduled Level 2 trainings, or one of the VWQM Validation Trainings. This training is critical to ensure that the volunteers' equipment is functioning properly and their reagents are viable.

In order to be eligible to attend you must have previously completed at least a Level 2 workshop. The focus of these workshops will be Quality Assurance/Quality Control (QA/QC) procedures to improve the quality of volunteer data.

Uses of Volunteer Data in General:

- Inform and educate people about the condition of our streams
- Establish baseline information since it's sparse or non-existent on many streams
- Locate emerging problems
- Identify long-term trends on the condition of streams
- Supplement agency-collected data

Uses of Level 2 and Level 3 Data:

- Evaluate best management land use practices (BMPs)
- Aids in planning by local agencies, such as for zoning regulations
- Aids in planning and permitting within DNR
- Supplements DNR's Biennial Report to the US Congress 305(b) on the condition of the state's waters, commonly called the Missouri Water Quality Report
- Is used in the development of the 303(d) Report to the EPA. This is a list of the impaired waters of the state.

Today's workshop will prepare you to perform Level 1 Volunteer Water Quality Monitoring. We will provide information about chemical monitoring and physical monitoring (conducting a visual survey) and we will present additional information on macroinvertebrate identification. We will loan you the equipment to conduct Level 1 monitoring. Level 1 volunteer monitors are expected to periodically monitor a stream, submit data in a timely manner and share the knowledge and information gained from this workshop and from your monitoring efforts with others.

For more information on the Stream Team Program, visit our website:
http://www.mostreamteam.org

"And we proceeded on." William Clark 1804