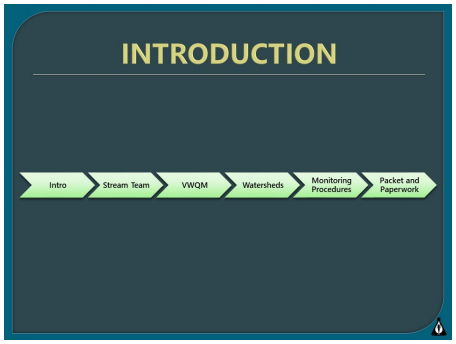
Chapter 1
Welcome & Introduction

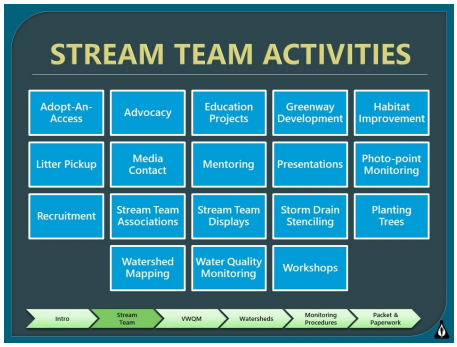
Welcome to Missouri Stream Team! This program is made possible by a strong partnership between the citizens of Missouri and the following organizations:

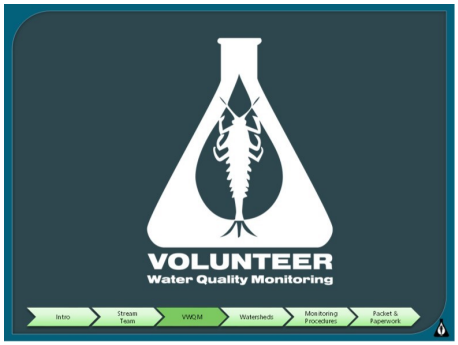
Beginning in 1989, the Missouri Stream Team provides opportunities for all citizens to get involved in river and stream conservation. The program has three main goals:

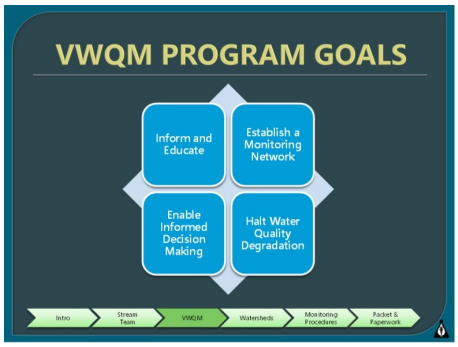
- ***Education:*** Teaching citizens about Missouri's 110,000 miles of flowing water enables people and their communities to better understand our stream systems and the challenges we face in conserving them.
- ***Stewardship:*** Becoming good stewards of our natural resources ensures future generations will enjoy the benefits of Missouri's streams. Whether you assist in litter control, streambank stabilization, streamside tree planting, water quality monitoring, or storm drain stenciling, let the Stream Team Program help you plan and support your next stewardship project.
- ***Advocacy:*** Citizens who have gained firsthand knowledge of stream needs, problems, and solutions are best equipped to speak out on behalf of Missouri's stream resources.

Whatever your talents, the Missouri Stream Team Program has many opportunities for you to get involved. We welcome your volunteer efforts and sincerely appreciate the work you do to protect and conserve Missouri's streams.









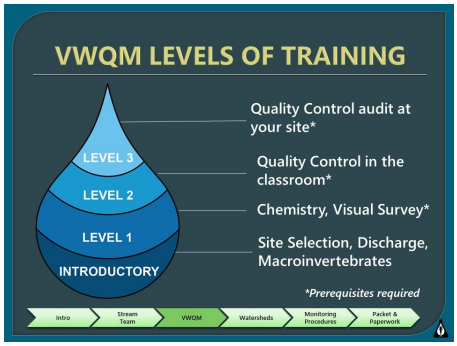
VWQM Program and Goals

One of the most popular Stream Team activities is the Volunteer Water Quality Monitoring (VWQM) Program. This activity was added in 1993 at the request of Stream Team volunteers who wanted to participate in stream monitoring.

The VWQM Program provides volunteers with training and equipment to monitor the quality of Missouri's rivers and streams. The VWQM Program was established to achieve four goals:

- Inform and educate yourself and others about the conditions of Missouri's rivers and streams.
- Establish a network of trained volunteers to monitor the quality of Missouri's rivers and streams.
- Enable citizens to help local, state and federal leaders make informed decisions about Missouri's waterways.
- Halt water quality degradation of Missouri's water resources.

VWQM Levels of Training and Requirements

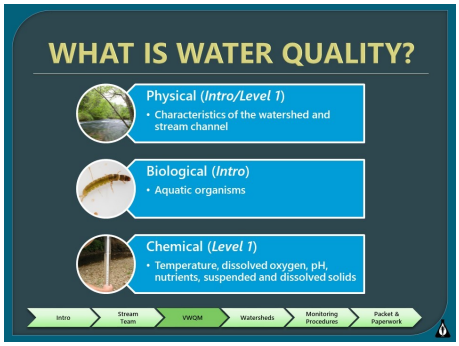


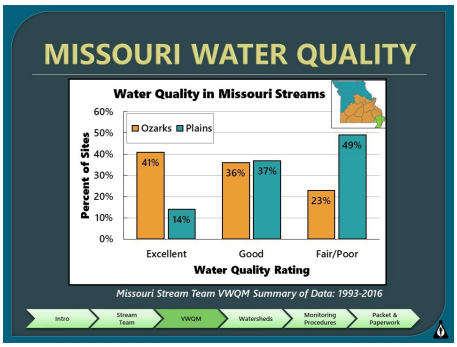
To become a water quality monitor, volunteers engage in training to acquire the knowledge and skills they need to evaluate water quality accurately. Currently, there are four levels of training. Each level of training is a prerequisite for the next. Structuring the training in this way allows volunteers to choose their own level of participation and commitment in monitoring activities.

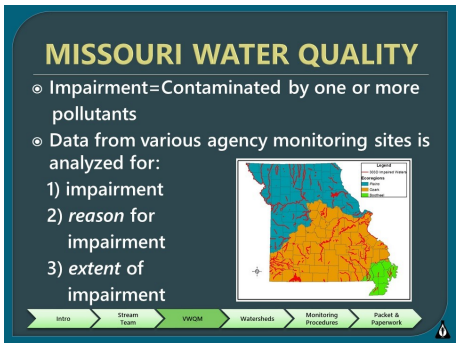
Volunteers who wish to advance from one level to the next must meet certain requirements. The table below describes the content of each training level and the requirements that allow you to advance to the next level.

VWQM Levels of Training and Prerequisites

Intro	Content: Introduction, site selection, stream discharge, biological monitoring *Prerequisite*: None
Level 1	Content: Water chemistry, visual survey, invertebrate review *Prerequisite*: Intro training plus site selection, stream discharge, and biological monitoring data submissions
Level 2	Content: Quality Assurance/Quality Control (QA/QC), chemistry and biological monitoring review *Prerequisite*: Level 1 training plus 2 seasons of stream discharge, biological, visual survey, and chemistry data submissions
Level 3	Content: On-site QA/QC of stream discharge, biological monitoring, visual survey, and water chemistry *Prerequisite*: Level 2 training plus 12 sets of all data collected and submitted

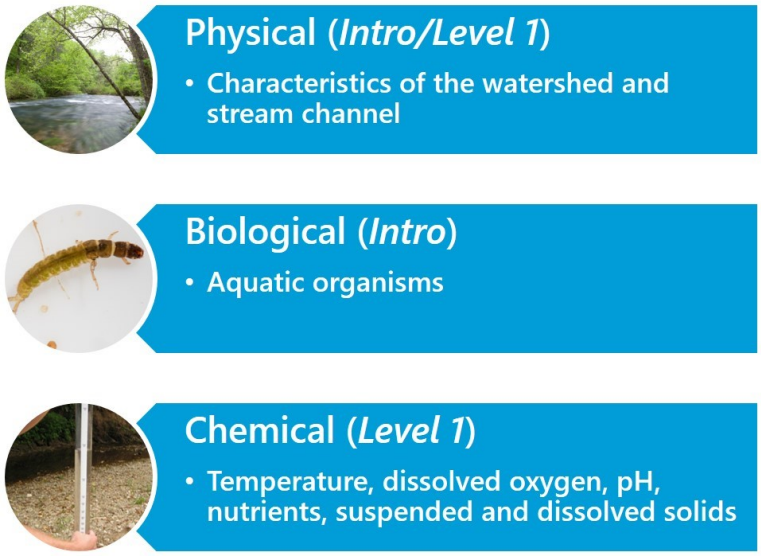






What is Water Quality?

The quality of Missouri's water resources is reflected in the physical, chemical, and biological characteristics of our rivers and streams. Today's training will introduce you to the physical and biological components of a stream. Chemical characteristics will be covered in the VWQM Level 1 training.

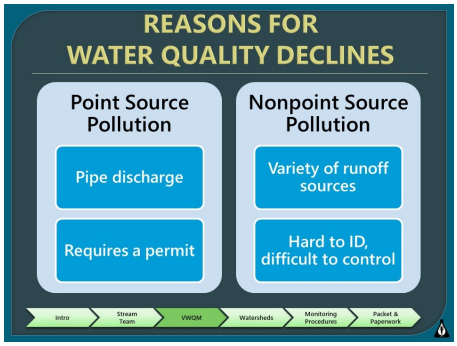


Missouri Water Quality

In order to compare natural properties across the state, Missouri is divided into three broad ecoregions based on topography, soils, geology, etc. The Plains ecoregion lies to the north of the state. The Ozarks ecoregion lies to the south. In Missouri's bootheel is the Mississippi Alluvial Basin ecoregion. Differences in water quality across these regions can be attributed to a combination of actual water quality differences and variations in habitat.

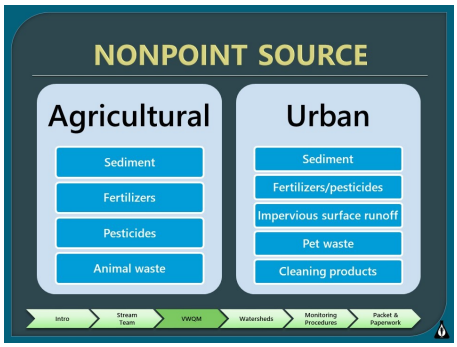
Stream Teams United published a summary of Missouri Stream Team Volunteer Water Quality Monitoring Program data collected from 1993 to 2016. This summary can be found online at www.MSTWC.org.

Reasons for Water Quality Declines



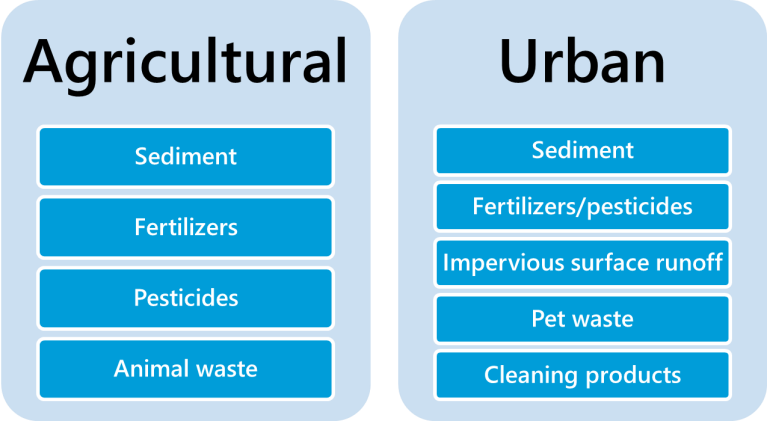
The Clean Water Act mandates how our nation must manage the two major types of water quality pollution:

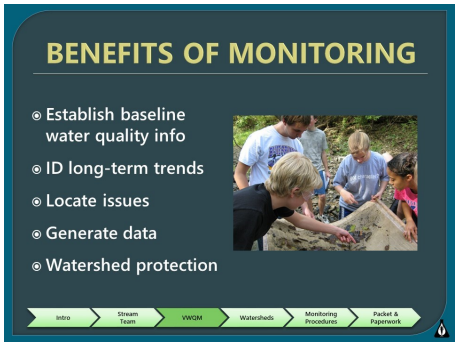
- ***Point Source Pollution*** is characterized by an entry point or source, such as a pipe. This type of pollution requires a permit, so it can usually be identified and regulated through the permitting process.
- ***Nonpoint Source Pollution*** refers to contaminants that do not come from specific conveyances, such as pipes or other permitted sources. It includes contaminants carried in runoff from fields, roads, parking lots, etc., as well as more specific sources such as improperly functioning septic systems. Nonpoint source pollution is much more challenging to identify and control than point source pollution.

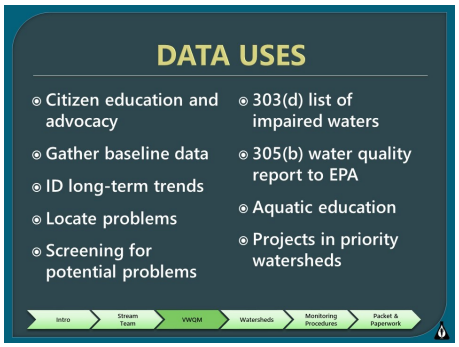


Nonpoint Source Pollution

Nonpoint Source Pollutants can be classified into two groups: Agricultural and Urban. Many of these pollutants are found in both environments, they have a substantial effect on water quality.





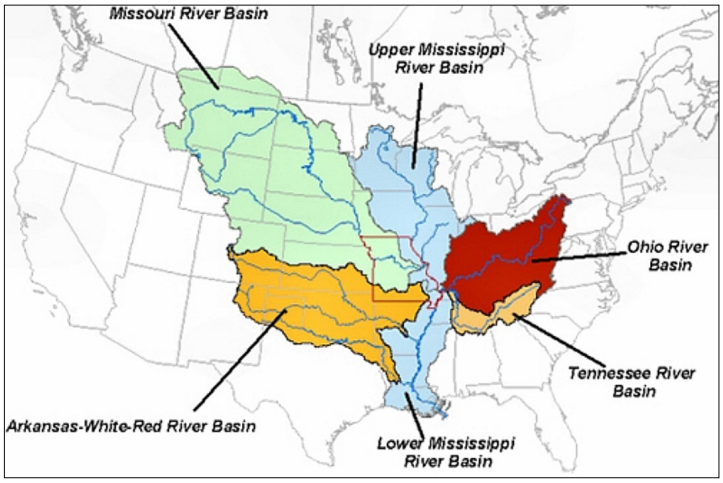


Benefits of Monitoring Water Quality

There are several benefits to monitoring the water quality of our streams:

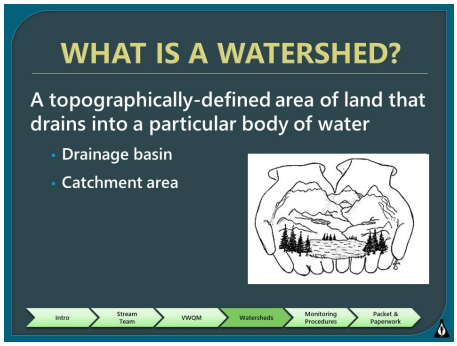
- ***Establish Baseline Water Quality Information:*** Missouri has nearly 110,000 classified streams. Many of these streams have little or no information about water quality. If a pollution event should occur, a baseline of information serves as a comparison to what conditions were like before the incident.
- ***Identify Long-Term Trends:*** Submitting consistent data over a span of many years reveals if the stream conditions are improving, declining, or staying the same.
- ***Locate Issues:*** With over 9,000 trained volunteers, there are numerous examples of volunteers who discover pollution events and alert the appropriate authorities.
- ***Watershed Protection:*** Monitoring your stream gives you a richer understanding and appreciation of our waterways. This allows for better decision making regarding the protection of your local watershed.
- ***Data Uses:*** The data collected by trained monitors is used by many state agencies and local groups to educate citizens, advocate for clean streams, locate sources of pollution, conduct scientific research, and many other applications.

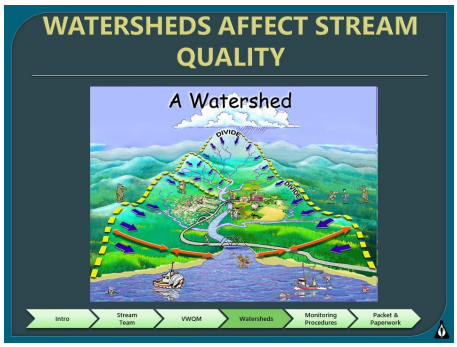
What is a Watershed?

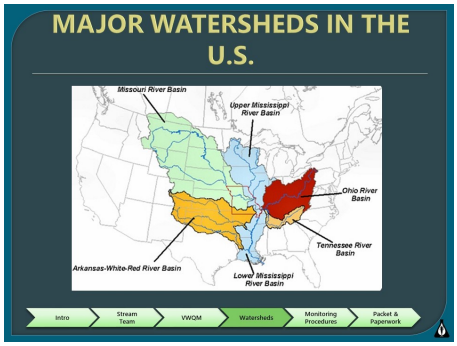


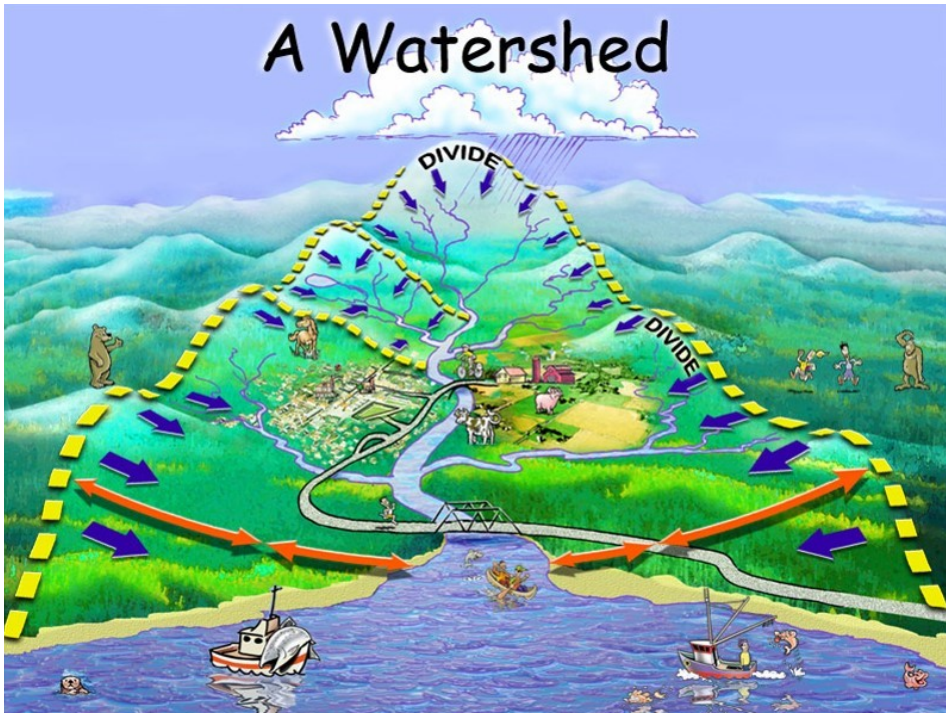
A watershed is a topographically defined area of land that drains into a particular body of water. Watersheds are interconnected. For example, the Mississippi Watershed includes the Missouri, Mississippi, Ohio, Tennessee, Arkansas, White, and Red river basins.

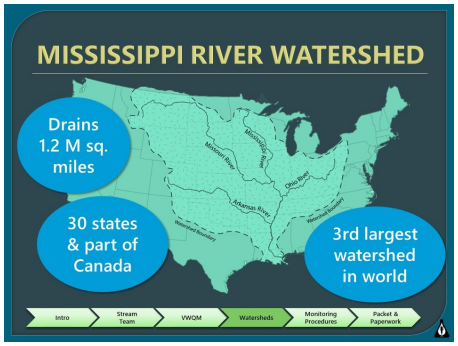
The quality of a stream is a direct reflection of its watershed. Since humans live, work, and play in watersheds, we directly and indirectly alter them and our water resources. As water flows across urban areas or pastures, it picks up sediment, pollutants, and even heat. These contaminants eventually flow into a stream or lake, impacting water quality.

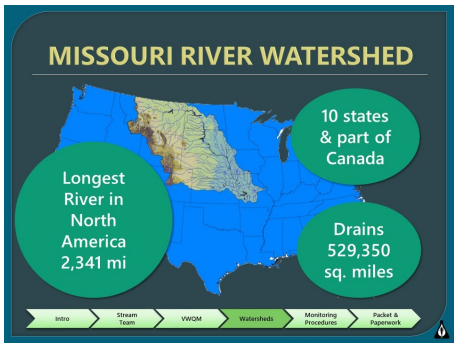












Mississippi River Watershed

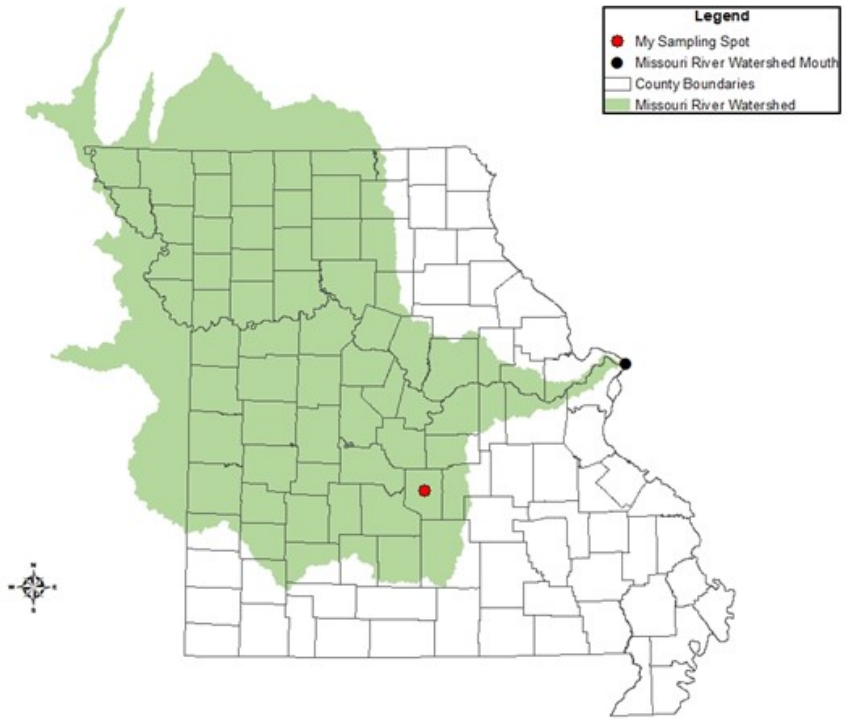
Watersheds range in size from less than an acre to millions of square miles. The Mississippi River watershed is the third largest, covering 1,247,000 square miles. Streams and rivers cross political boundaries, too. For example, the Mississippi River watershed includes portions of 30 states and a small part of Canada.

Missouri River Watershed

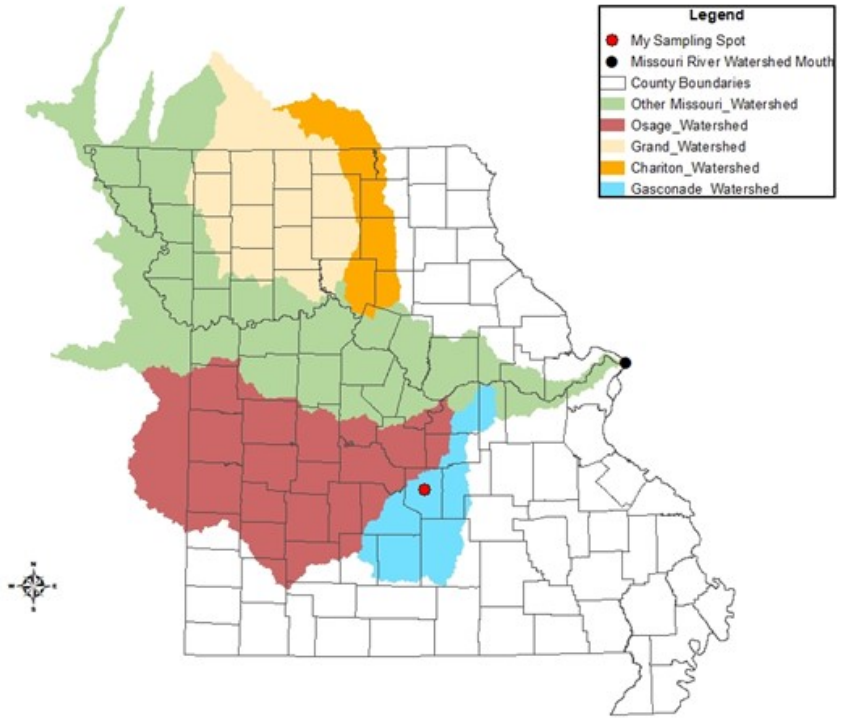
The Missouri River is the longest river in North America, stretching 2,341 miles. As the largest tributary to the Mississippi River, it has the largest reservoir system in North America. At normal water levels, this system stores approximately 55 times the amount of water stored in Truman Reservoir. With its channelization, major reservoirs, and systems of levees, it is also one of the most altered rivers in the world. More than half of Missourians get their drinking water from the river or its underground aquifer. The Missouri River watershed is actually a sub-watershed of the Mississippi. It covers 529,350 square miles, portions of 10 states, and a small part of Canada.

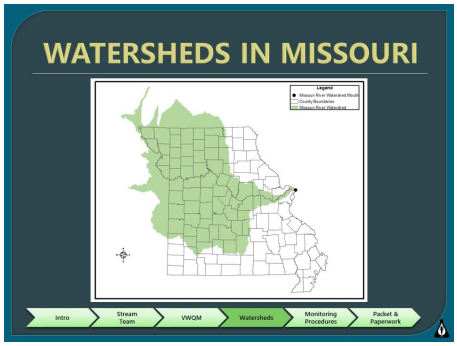
Watersheds in Missouri

The image below depicts the portions of the Missouri River watershed in the State's boundaries. To give a point of reference, a sampling spot is indicated by the red point.

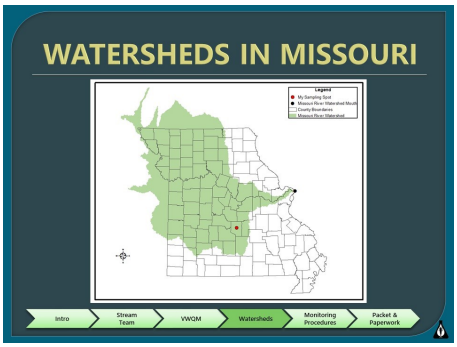


The Missouri River has many tributaries including the Gasconade, Grand, Chariton, and Osage rivers. The image below illustrates these tributaries' watersheds within the Missouri River watershed.

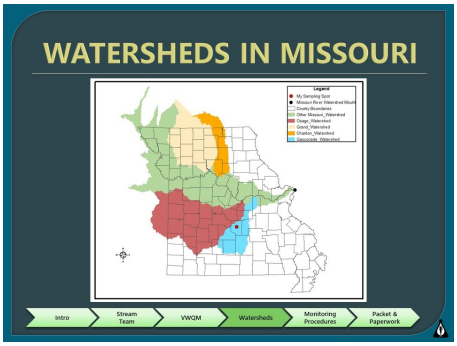




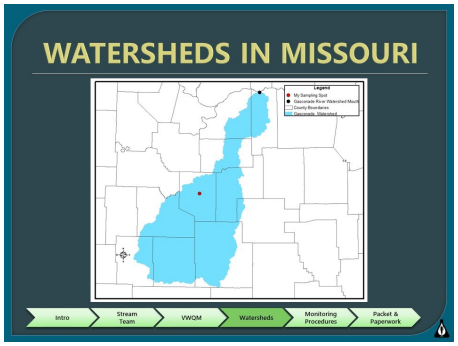
WATERSHEDS IN MISSOURI



WATERSHEDS IN MISSOURI

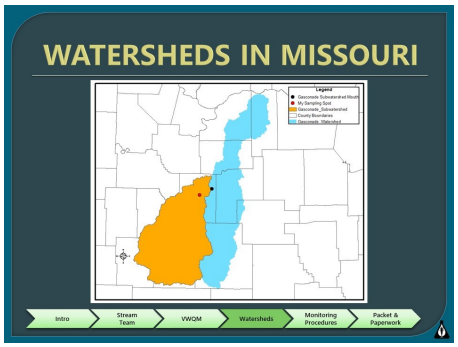


WATERSHEDS IN MISSOURI



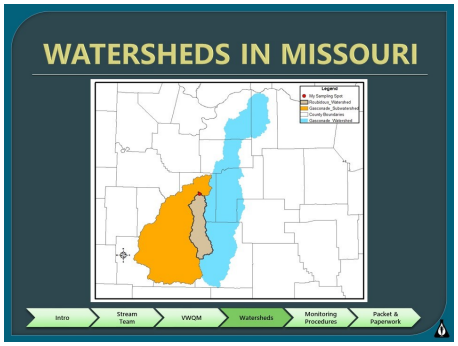
WATERSHEDS IN MISSOURI

Intro · Stream Team · VWQM · Watersheds · Monitoring Procedures · Packet & Paperwork



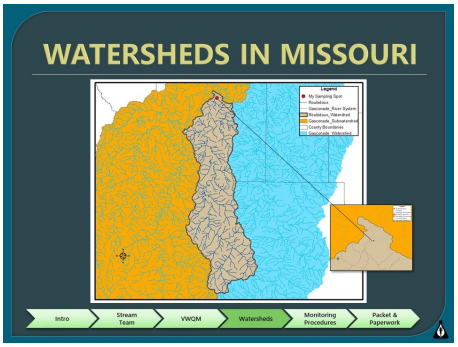
WATERSHEDS IN MISSOURI

Intro · Stream Team · VWQM · Watersheds · Monitoring Procedures · Packet & Paperwork



WATERSHEDS IN MISSOURI

Intro · Stream Team · VWQM · Watersheds · Monitoring Procedures · Packet & Paperwork



WATERSHEDS IN MISSOURI

Intro · Stream Team · VWQM · Watersheds · Monitoring Procedures · Packet & Paperwork

WE ALL LIVE IN A WATERSHED

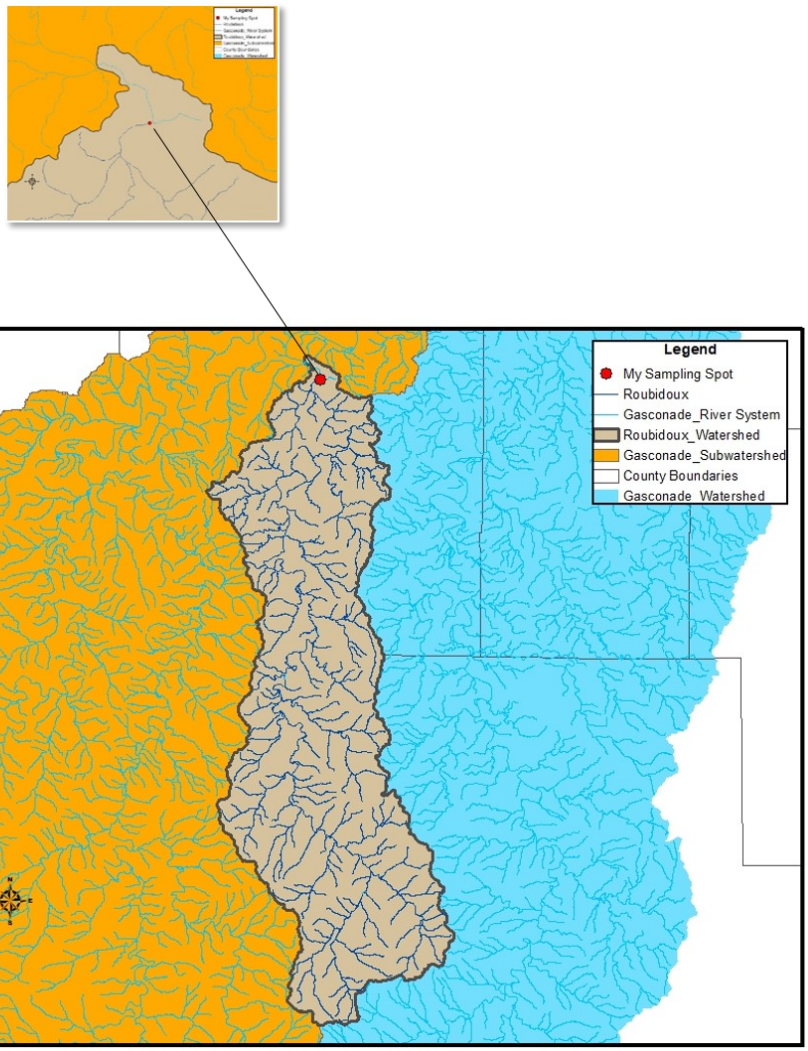
- WQ in a stream is a reflection of its watershed
- Important to look at big picture
- Healthy watersheds have healthy streams

Intro · Stream Team · VWQM · Watersheds · Monitoring Procedures · Packet & Paperwork

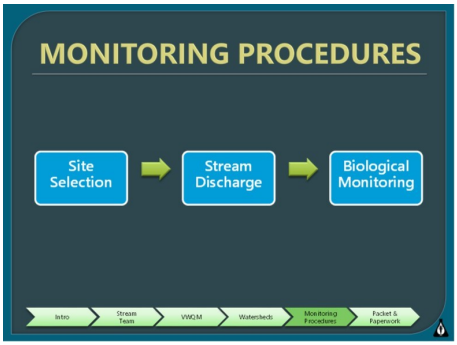
Watersheds in Missouri

The red point indicating a sampling location is along the Roubidoux Creek in Pulaski County. The Roubidoux watershed is a subwatershed of the Gasconade River watershed.

Remember, watersheds range in size from less than an acre to millions of square miles. Additionally, there are watersheds within watersheds that cross political boundaries. The health of these watersheds directly affects the quality of our water resources where we live, work, and play.



Monitoring Procedure



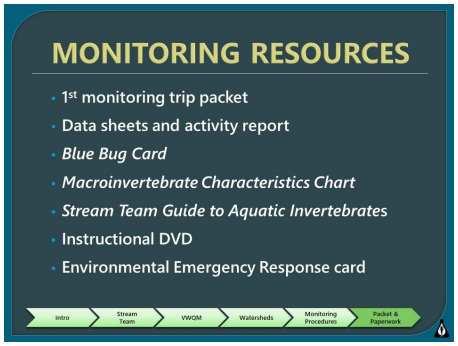
Today's Volunteer Water Quality Monitoring Introductory Level workshop will prepare you to conduct the following monitoring procedures for your chosen stream site:

- ***Site Selection:*** In the next chapter, you will learn about how to choose an appropriate stream site to monitor, factors you should consider when selecting a site, and how to identify your site on the required data sheets and paperwork.
- ***Stream Discharge:*** In chapter 3, you will learn about factors that affect stream discharge, how stream discharge affects water quality, and a process to measure stream discharge at your chosen site.
- ***Biological Monitoring:*** In chapter 4, you will learn about benthic macroinvertebrates, the vital role they play in a stream's ecosystem, and a process to collect and identify them.

Upon leaving the workshop, you will be equipped to conduct site selection and measure stream discharge.

To receive biological monitoring equipment you must submit:

- Initial Green Site Selection form
- Map with monitoring site clearly marked
- Stream Discharge data sheet



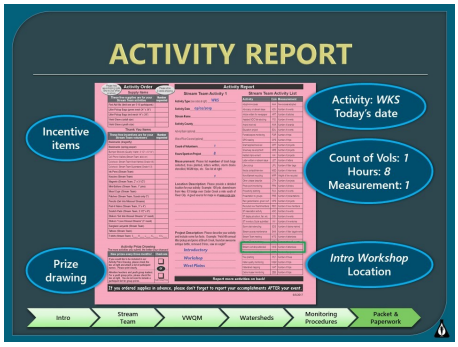
Materials and Resources

Thank you for your willingness to become a Volunteer Water Quality Monitor. The important work you do and the data you submit will help protect and conserve Missouri's water resources for future generations. To assist you in this important work, there are people and resources you can rely upon. Be sure to take a few moments to become acquainted with the many resources in your learning materials. Additionally, the Missouri Stream Team website has a wealth of information and resources for you.

Missouri Stream Team

mostreamteam.org

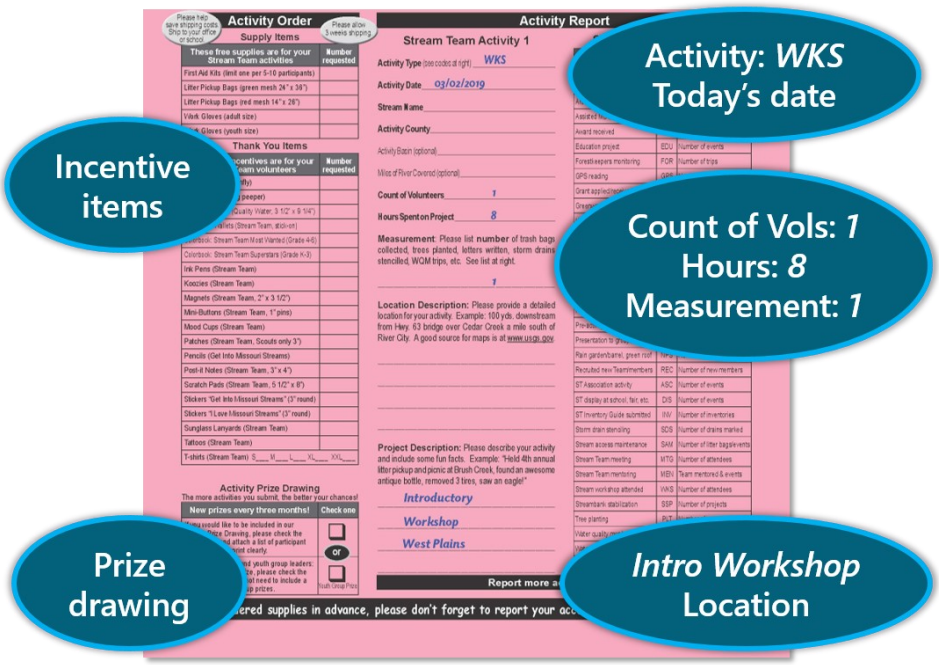
Stream Team Activity Report



Every time you participant in a Stream Team activity, please complete a *Missouri Stream Team Activity Report.* This allows program staff to track the tremendous efforts of our volunteers across the state.

- ***Contact Information:*** Record your Stream Team number and name, your name, shipping address, phone number, and email in the top section of the form.
- ***Activity Order:*** Use this section to order supplies and thank you items.
- ***Prize Drawing:*** The more activities you complete, the better your chances of winning!
- ***Activity Report:*** Use this section to describe the type of Stream Team activity completed.

For today's introductory workshop, your completed activity report should resemble the following example.



Please Complete Activity Reports Every Time You Participant in a Stream Team Activity