Chapter 6
Mapping and Online Tools

The stream site you monitor is just part of a much larger system. When analyzing stream health, it is important to take a holistic view by considering the entire watershed. This chapter will introduce you to:

- The importance of watershed mapping
- How to interpret topographic maps
- Utilizing online tools
Importance of Watersheds

Knowing the boundaries of the watershed in which your stream site is located allows you to see the big picture when analyzing the health or impairment of a stream. Everything that occurs within a watershed affects the water resources in it. A healthy stream is a good indicator of a healthy watershed.

For example, consider the differences between natural and urbanized environments. Natural environments have a slower rate of overland flow due to plants, trees, and vegetation. This allows for the filtering of water before it enters a stream and a greater recharge of groundwater. Urbanized environments with concrete and other infrastructure has rapid overland flow. This results in higher runoff, no filtering and little or no groundwater recharge.

Mapping the watershed of your stream site has many benefits. It can help identify sources of pollution, aid in locating optimal monitoring sites, provide information to educate your local community leaders, and provide a sense of value. If your site is located in a large watershed, you may want to consider mapping a limited portion of it so it is more manageable. Once mapped, you can identify how the land within its boundaries is used and how this will affect your sampling results.
Topographic Maps

Because a watershed is defined by the topography of the land, a topographic map will be your best resource in defining the watershed for your stream site. Topographic maps represent a specific area of land or quadrangle; a four-sided region bounded by a particular latitude and longitude. These maps use contour lines to show the shape of the earth’s surface. The contour lines make it possible to show the elevation and shape of mountains, hills, and the steepness of slopes. Maps are drawn to a scale that represent distance. This is a ratio comparing a measurement on the map to the distance you would find in real life between two points. Topographical maps will also use symbols to show boundaries, surface features, building, roads, railroads, and communication features. The following symbols are often used on a topographical map:
Parts of Topographic Maps

The most striking feature of a topographic map is the contour lines. These lines show the elevation of the earth’s surface. Notice that these lines will never cross on a map. Some contour lines are marked with a specific elevation. You can determine the elevation of the unmarked intermediate contour lines by using the contour interval printed in the margin of a map. When contour lines are close together, it indicates steep terrain. When these lines are drawn further apart, there is a more gentle slope to the terrain.

The Rule of the V: When contour lines cross a river or stream, they form a “V” shape that always points upstream. This helps you determine the direction of flow in a stream. The Rule of the V’s also applies to ridges. The top of a ridge is shown as an enclosed shape, like an irregular oval. As contour lines extend out from the ridge, they often form rows of parallel “V’s” that point downhill towards lower elevations. Other features like forests, water features, town, and roads are depicted on topographic maps.
Translating Topographic Maps

It is sometimes difficult to translate the contour lines on a two dimensional map to what a specific landscape might look like in three dimensions. The illustration below might help. Imagine you are standing where the X is marked on the topographical map on the left and looking north. The picture on the right demonstrates the landscape you would see.

Standing at the "X" on the topo map (above left), someone looking north would see the scene depicted above, right, including the secondary highway, streams, house, unfinished roads, ponds, and mountain ridges.
Watershed Mapping

Steps for delineating a watershed:

1. Mark monitoring site with a star.
2. Trace the stream and tributaries in blue upstream from the monitoring.
3. Mark ridge tops around the stream and tributaries with an X.
4. Connect the Xs following the contour lines.
Online Watershed Mapping Tools

*MU Ag Site Assessment:*
agsite.missouri.edu

The University of Missouri’s Ag Site Assessment tool generates a report for a selected site that includes the following helpful information:

- Soils
- Streams
- Wetlands
- Ponds
- Watersheds
- Floodplains
- Karst geology
- Legal description
- Threatened and endangered species

*EPA How’s My Waterway:*
mywaterway.epa.gov

EPA’s How’s My Waterway is another online tool for mapping watersheds and a good resource to learn about the conditions and uses of water in your area.
Online Tools

There are many resources and tools online to aid you in your monitoring efforts:

**Stream Team Website**

*mostreamteam.org*

The Missouri Stream Team website has many resources available for you. Under the **Forms** tab, you can submit activity reports, request equipment, and add new members to your Stream Team. The **Water Quality** tab has many of the documents and resources you have covered in this workshop, helpful tips for monitoring, and information on future workshops. The **Calendar** keeps you informed of the many events taking place around the state. You can even post your own events to this calendar.

**Stream Team Interactive Map**

*mostreamteam.org/interactive-map.html*

This map can be used to find Stream Team adopted sites and corresponding VWQM data. As you use the map to zoom in to your stream, you will see two logos: the Stream Team logo and the black and white VWQM logo. By clicking on any VWQM logo, you can view details about the site. In the Water Quality Data field, you can click on "More Info" to view the data we have for that site. If you use this map to find a site, note that not all locations are currently adopted or monitored. If you see a VWQM icon at the site you want to monitor, contact Stream Team staff to see if it is currently being monitored.

Adding Your Site

Once you completed the field training and are certified as a Level 1 monitor, the next step is selecting a site. Data cannot be submitted online until this site is created under your user in the database.

To establish your first monitoring site and subsequential sites, you will email a map of your site to **streamteam@dnr.mo.gov**. This map should include your name, stream name, county of the stream, and a verbal site description. If you are adopting an existing site from the Stream Team Interactive Map, also provide the Site IDX from the map information.

Do not submit a map or any data until field training is completed.
Online Tools

*United States Geological Survey Water Data*

[waterdata.usgs.gov/mo/nwis/rt](waterdata.usgs.gov/mo/nwis/rt)

This site offers water data online, including stream discharge and precipitation. This is an excellent tool to evaluate general stream conditions before you monitor your site. For instance, you may want to know if recent flood waters have receded or if stream discharge has increased with a recent snow melt. **Remember, you may only use USGS stream discharge data if the USGS gage station is within one-half mile of your monitoring site and there are no inputs or outputs between the gaging station and your monitoring site.**

![Graph of USGS stream discharge data](image)

Activity Report

*mostreamteam.org*

Please report all Stream Team activities on the Stream Team website. Not only does this allow us to track volunteer hours and accomplishments, but it also helps keep our program running. Volunteers submitting activities are eligible to request free incentive items and to be entered into a prize drawing. Some Stream Team activities include:

- Litter cleanup
- Water quality monitoring
- Tree planting
- Habitat improvement
- Storm drain stenciling
- Advocacy
- Stream Team recruitment

Scan this QR code to submit your Stream Team activities!
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