

Background

FieldScope is an online mapping program students can use to analyze and share environmental data about their school's watershed or an adopted stream.

As a *geographic information system* (GIS), FieldScope lets you view different types of data (such as population density or land cover) at the same time on one map. This enables you to more easily discern relationships among the phenomena.

You will use FieldScope to explore the following features near your school:

- Watersheds
- Rivers and streams
- Land cover
- Impervious surfaces
- Watershed or Stream health

The instructions for this activity are divided into two parts:

Part One: FieldScope Basics

- Learn how to make a map and use the FieldScope tools needed for Part 2.

Part Two: Explore Your Watershed

- Explore and analyze different aspects of your watershed using map data layers.



Part One: FieldScope Basics

1. If you are in Maryland, go to <http://maryland.fieldscope.org/>. If you live in a different jurisdiction in the Chesapeake Bay Watershed, go to <http://chesapeake.fieldscope.org/>.
2. Click on **“Map Data.”**
3. Click on **“Create Your Own Map.”**
4. **Selecting a Base Map**

A *base map* is the bottom layer of your map. (Other map layers with physical, geographic, or observational data are layered onto the base map, giving users the ability to observe possible relationships.) FieldScope offers choices of base maps with different views, place names, color schemes, etc.

- *Suggested choices for your base map: Topographic, National Geographic, or Street Map.*

When done, go to the next step one of these ways:

- Go to the *navigation bar near the top* of the screen titled “Create Map Progress,” and click the next step in the sequence: **“2. Observation Data.”**
- OR, click **“Next”** at the bottom of the screen.

5. Selecting Observation Data

The “Select Observation Data” page offers choices of data to view on your map. For instance, you can view stream data from the U.S. Geological Survey, schools, or citizen organizations.

*In this exercise, we will not use specific stream data, so **deselect** the “Participant Water Quality Data” box.*

Go to the next step by using the map navigator bar (*Step 3*), or by clicking on “Next.”

6. Setting Data Display.

“Select Data Display” enables users to change how observation data is displayed on a map. Take a moment to look at the options.

Make no changes for this exercise.

Click on “4 Map Layers” or “Next.”

7. Selecting Map Layers.

With “Select Map Layers” you can select the type of data layers to view. **Up to 2 layers can be selected at a time.** The layers can be changed easily later.

While learning to use tools, you will use one map layer. Select Watersheds.

Click on “5 View Map” or “Next.”

- A pop-up will appear. For now, click on “**No, Thanks. I want to explore on my own.**”

8. Viewing Your Map.

Now, you will see your map. It might not look as expected, because the Watershed data layer is blocking the view of the base map.

? What watershed is represented by this layer?

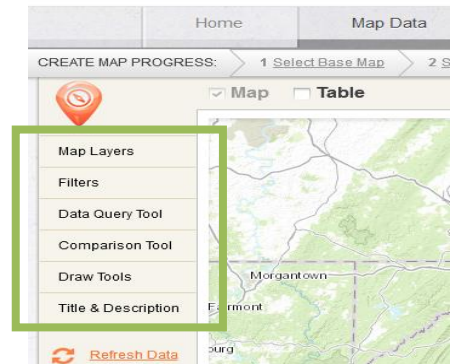
Next, you will learn to use tools that enable you to adjust this view and use the map for research.



9. Using the Map Layer Tool

FieldScope Tools are located on the left side of the computer screen. You will use the Map Layers tool to adjust the visibility of your map layers. The data and base maps also can be changed with this tool.

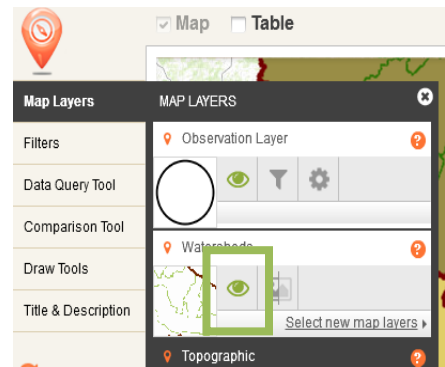
Click on Map Layers



- The top row of the Map Layer inset controls how observational data is viewed. It is inactive, because we did not include observational data.
- The second row shows the watershed map layer.
- The third shows your base map.
- By using the **EYE** and **the slider bar** you can change the **visibility** and **transparency** of each of these layers on your map.

a. Click on **the EYE**, the visibility tool, on the Watersheds layer.
 ? What happens?

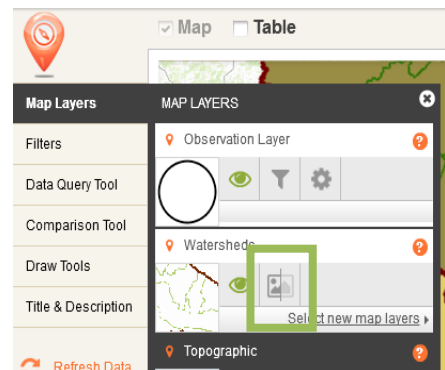
b. Make the watersheds map visible again, using the EYE.



Transparency controls how much you can see through the layer. At 0% transparency, the layer is opaque. When new layers are added to a map, they initially are set to 0% transparency.

? c. What happens when you slide the transparency bar to 100%?

? d. Move the transparency bar until you can see both map layers. What percentage works for you?



The eye in top picture controls visibility.

The slide bar in the bottom picture controls transparency.

10. Using the Draw Tools

The Draw Tool Box allows you to insert text, shapes, and lines on your map and to explore data more closely.

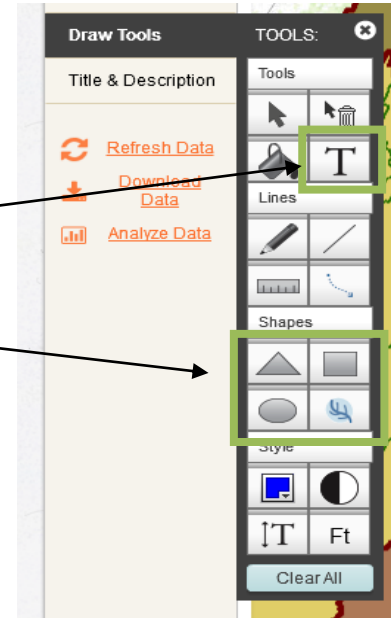
*Click on **Draw Tools**. Hover over each tool with your mouse to see what it does.*

? a. Which tool can be used to measure distances on your map?

You will use more of these tools in Part Two.

Insert text & labels

Insert shapes

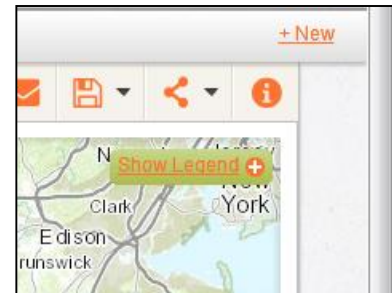


11. Using the Legend

In the top right corner of your map, is a “Show Legend” link. A legend lists what the symbols and colors mean on your map.

*Click on “**Show Legend.**”*

? List the largest subwatersheds in the Chesapeake Bay Watershed:

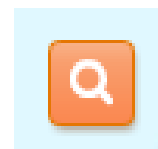


12. Using the Search and Zoom Features

You can search for a location by clicking on the search tool — the magnifying glass — at the bottom right of your screen. The zoom tool (+ and -) is below the search tool.

Click on the search tool and enter the name of the city in which you live.

? a. What happens when you close the search tool?



Part Two: Explore Your Watershed

You are now ready to observe:

- Your school's watershed
- Local rivers & streams
- Land cover
- Impervious surfaces
- Impermeability
- Watershed health

1. Locate Your School

- Use the search button (*magnifying glass*) to locate your school. Put in the address or name of your school. The location will appear as a red dot. Keep the search tool open.
- Zoom all the way into your campus.

2. Creating a Marker and Label for Your School

Remember that when the search tool is closed, the red location marker disappears. You will create a school Place Marker and Label, which will remain in place as the view is changed.

Making the Marker

- Go to the TOOL BOX on the left side of the screen and open DRAW TOOLS.
- Click on the **Circle Tool**.
 - Press down on the map where you want the symbol and gently drag outwards to create a circle. Then LET GO. (If you press down too long without moving the cursor, the tool will automatically create a shape.)
 - If you are unsatisfied with your shape or its location, use:
 - The Select Tool to move it, or
 - The Erase Tool to delete it.

Making the Label

- Click on the **"Add Label"** tool.
- Click where you want to place the text and type it in.

Close the draw and search tools. Zoom out to see the results.

3. Locating Your Local Watershed

The Chesapeake Bay Watershed consists of large and small watersheds. To learn in which large and small watersheds (subwatersheds) the school is located, click on the school's location. A popup will appear.

? a. In what Small Watershed is your school located? _____

? b. What does this tell you about where stormwater runoff from your campus eventually flows?

4. Viewing Nearby Rivers and Streams

To observe small, nearby waterways, you will add the Rivers and Streams layer to your map.

- Click on “4 **Select Map Layers**” on the top bar.
- Check the “**Rivers and Streams**” box to add it to your map.
- Click “**Next**” to view your map.
- Make sure you are zoomed in enough to see what streams are in your watershed and around your school.
- Click on the stream that nearest your school to see more information.
 - ? a. Does the stream have a name? If so, what is it? _____
 - ? b. Use the Measure Tool (in the Map Layers tool box) to measure how far the stream is from your campus. What did you get? _____
 - ? c. One way to tell which direction the stream is flowing, is to find where it joins a larger stream or river. What river does your stream flow into?

5. Land Cover Layer.

Now you will observe Land Cover on your map. This layer will show you the physical material on the surface of the earth, such as grass, asphalt, trees, bare ground, and water.

Click on “4 **Select Map Layers**” on the top bar. Uncheck Watershed Layers. Add the “**Land Cover**” layer. Return to your map.

- Adjust the *transparency* settings (the slide bar) so that you can view land use, as well as the streams and base map.
- Show the legend, if it isn’t showing. Hover over the question mark by Land Cover.
 - ? a. How recent is the data on this map? _____
- Click on any location to see what the land cover type is.
 - ? b. What types of land cover are in the area surrounding the stream nearest your school?

 - ? c. Draw a square mile around the stream nearest your school, including your campus, if possible. (See measuring tool.) Which type of land cover is most common within that area?

 - ? d. Drawing a square around the stream isn’t the correct way to determine a stream’s watershed, but for this exercise we will assume that the area within your square drains to

you local stream. How do you think the stream health is affected by the runoff from the nearby land cover?

6. **Impervious Surfaces Layer.**

Now you will observe the Impervious Surfaces layer on your map. Impervious surfaces are areas cannot absorb or allow water to soak into the ground. This layer shows areas that are completely impervious to water versus those where at least some water soaks in. You will be able to view areas that have been categorized as impervious and pervious.

To add the “**Impervious Surfaces**” layer to your map:

- Click on “**Select Map Layers**”
- Uncheck the “**Rivers and Streams**” layer box to remove it from your map.
- Check the “**Impervious Surfaces**” layer box to add it to your map.
- View your map, and adjust the transparency and zoom, as needed.
- Click on any location to see if the surface is categorized as impervious or pervious. If it is impervious, you will see a number 1 in the bottom right-hand of the information box. If it is pervious, you will see a 0.



a. Generally, where do you find the greatest amount of impervious surfaces?

b. How do you think the stream health is affected by the amount of impervious surfaces in your watershed?

c. What are possible ways your class could verify the impermeability of different areas of your campus (known as, “ground truthing”)?

d. Why might it be necessary to “ground truth” the map data?

7. **Bringing it all together: make a hypothesis about the health of the stream ecosystem nearest your school.**

- Consider your map data and what you have learned about the relationships of different land uses to stream health. Make a hypothesis about the health of your stream, based on the types of land uses and land cover in the area draining to your stream. You could state that the

stream health is good, fair, or poor, based on your reasons. Or you could pick a specific feature, such as the amount of erosion or aquatic life you expect in the stream.

8. Checking Your Hypothesis

If you cannot test your stream quality, you can see if your hypothesis agrees with stream surveys that have been done by government and citizen organizations. If you are in Maryland, check if your hypothesis by doing one or both of the following:

Step 9A: Observe **Watershed Health** on your Field Scope map. This layer incorporates the results of stream and watershed surveys done by the Maryland Department of Natural Resources.

Step 9B: Check the **health of your stream**, by following step 9B. You will need to go to a different website, hosted by the Maryland Department of Natural Resources.

9A. Add the “**Watershed Health**” layer to your map. Click on “**Select Map Layers**”

- Uncheck the “**Impervious Surfaces**” layer box.
- Add the “**Watershed Health**” layer box.
- Click “**Next**” and *adjust the transparency*.

? a. What is the health of your watershed? Is it what you expected? If not, do you have ideas on why it is different?

9B. **Looking Up Stream Data:** The Maryland Stream Health website provides a map with data from thousands of stream surveys. Likely, your local stream or river can be found on this site.

- Go to the Maryland Stream Health interactive map, using this link <https://goo.gl/6KHF3W> or click [here](#).
- Enter the name of your stream or your location in the search box.
- Streams that have been assessed are shown in colors or as triangles. Click on these symbols to learn more.

? A. What is the health of your stream? Is it what you expected? If not, do you have ideas on why it is different?
