

MAPPING OUR PARKS

Lesson 1: What area affects your national park stream site?

Overview

You have conducted a field investigation on a national park stream site. In the *Mapping Our Parks* (MOP) unit, you will expand your investigation to determine how the surrounding landscape might be impacting this site. You will take on the role of a Geographic Information System (GIS) specialist. GIS is a digital mapping and analysis tool. A GIS specialist uses GIS to explore spatial patterns, create maps, and solve problems. You will use an online Geographic Information System (GIS) developed by National Geographic called FieldScope. You will use this to

1. Determine the area that impacts your national park stream site;
2. Determine how land cover in this area impacts your site;
3. Consider who should work with national park rangers to improve your site; and
4. Compare your site to another national park site.

You will summarize your findings in the *MOP Report*.

In this first lesson, you will use FieldScope to identify the area that drains rainwater and snowmelt to your national park stream site. In the next lesson, you will use FieldScope to examine the impacts of different land cover types on your stream site.

Materials

- FieldScope
- Pen or pencil
- Paper
- *MOP Report*

Directions


1. Open the FieldScope software by typing <http://fieldscope.us> in a web browser, and then clicking on *Mapping Our Parks*.
2. You are looking at the terrain of the Mid-Atlantic region on a late afternoon (in others words, sunlight is coming from the west)¹. The western slopes of mountains and hills are sunlit (lighter), and the eastern slopes are shaded (darker). The blue lines are streams and rivers such as the Potomac River. The large blue body of water is the Chesapeake Bay.

¹ This type of model is called a “shade relief map.”

Use the steps below to find your school or house and examine the surrounding landscape.


- Click on the word **Search** at the left of the screen. In the search box, type in your home or school address. Then click the “Search” button. Your address will appear next to a red marker. Double click on this, and FieldScope will zoom to your address.
- Click on the word **Layer** at the left of the screen. Scroll down to *Basemap*. Under *Basemap*, use the pull-down menu to change the layer from *Terrain Map* to *Satellite Imagery*. Pan around and zoom in or out on your map to look for your home or school and other familiar features.
- As a class or in small groups, identify different surfaces that cover the ground based on your bird’s-eye-view (e.g., pavement, bare soil, lawn, forest). Also discuss what happens to rain and snow when it lands on these different surfaces.
- When you are done, change the *Basemap* back to *Terrain Map*.

To hold the **Search** or **Layer** window open, click on the pushpin. Click on it again to close the window.

To pan, click on the Navigator button . Then click on your map, hold your mouse button down and move your map.

To zoom in or out, use the zoom bar to the right of your map. Note that when you zoom in, a more detailed image or map will be provided.

3. Use the steps below to find the national park stream site where you conducted your field investigation.

- Open the **Layers** window.
- Show *Student Observations* layer. You may need to scroll up.
- Click on the pull-down button  next to *Student Observations*. When it appears, click on the **Edit** button to open the **Edit Observation Filter** window. In the box next to *Location(s)*, click on your national park site name. Click **Save** to save your filter.
- You may have to zoom out to see the black dot at your national park stream site. Then pan and zoom in as much as possible to your stream site.
- Place your cursor over your stream site. In the lower right corner of your map are the latitude (first number) and longitude (second number) of your site. Record these on your *MOP Report (1.1)*.



To show a layer, click in the box next to its name. This will add a checkmark.

Student Observations


To hide it, click in the box again.

4. Look at the terrain around your stream site, and predict what area might positively or negatively impact your site. Use the steps below to draw a boundary around this area.

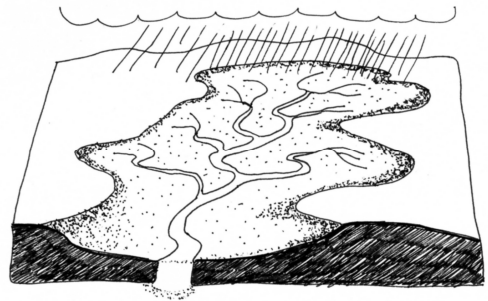
- Zoom or move your map as needed to see the entire area of your prediction.

- Click on the **Draw** button  to open the **Drawing Tools** window (you may have to move your map again to see the entire area of your prediction). Click on the **Freehand Line** button , and then click and hold your mouse button down to draw a boundary around the area you think is impacting your stream site. Close the **Drawing Tools** window when you are done.
- In small groups or as a class, discuss how you selected this area of impact and how your area differed from someone else's.


To erase your line, click on the


Delete button , and then click on the object you wish to delete.

5. The area of land that positively or negatively impacts your stream site is called its watershed. A watershed is all the land that drains water to a point on a stream, lake, ocean, etc. You can draw a watershed for any point on a stream, including your national park stream site. Think of the watershed for your stream site as a bathtub. Your stream site is the lowest point—or the drain. The boundaries of the watershed are the highest points—or the sides of the tub. Any rainwater that falls on your watershed will flow downhill to your stream site.



Use the steps below to redraw the watershed for your stream site and to determine its area.

- Click on the **Compute Watershed** button . Click on your stream site (the point will turn red when you are over it). When FieldScope is done, the watershed boundary will be provided, and the watershed area will appear in the **Watershed** window. Record the area on your *MOP Report (1.2)*.
 - Make your watershed more transparent by using the slide bar in the **Watershed** window. Reduce the opacity to zero. Close the **Watershed** window when you are done.
 - Zoom out if necessary to see the entire actual watershed and the predicted area of impact that you drew in Step 4. Compare the actual watershed (the one FieldScope just computed) with your predicted area of impact.
6. Zoom and pan around the actual watershed, and notice it contains a network of streams that flow down to your stream site. On your *MOP Report (1.3.A)*, draw a simple map that includes your stream site, this stream network and the actual watershed.

7. Determine the flow direction of one of the streams in your site's stream network by clicking the **Compute Flow Path** button  and then clicking somewhere on that stream. FieldScope will mark the path from that point to your stream site and beyond (we will discuss this later). On your *MOP Report* map (1.3.B), draw an arrow on this stream indicating its flow direction. Repeat this for all the streams in your site's stream network.
8. When it rains, water falls on the land as well as onto streams. Pick two sites where raindrops will fall on the land in your watershed. Use the **Compute Flow Path** tool to determine the flow path of these raindrops. Draw the two raindrops and their paths on your *MOP Report* map (1.3.C).
9. The watershed and flow paths computed by FieldScope are estimates of the actual watershed and flow paths. As a class or in small groups, discuss any errors you see in these. Then discuss how you know there are errors. Lastly discuss what determines which way a stream or a raindrop flows across the land.
10. Answer the reflection questions, and then close FieldScope.

Name: _____ Date: _____ Class: _____

Reflection Questions

1. Describe why your initial prediction of the area impacting your stream site (in other words, your predicted area of impact) did not match the actual watershed provided by FieldScope.

2. When it rains on your watershed, does all of the water flow to your stream site? Explain why or why not.

3. Can a stream flow north? Explain why or why not. HINT: you can test this using the **Compute Flow Path** tool.