



Chesapeake Bay FieldScope Activity Teacher Guide

About FieldScope

FieldScope is a National Geographic pilot project, designed to encourage students to learn about water quality issues in their area. The program is designed to deliver Web-based mapping, analysis and collaboration tools to students and teachers. This program is one of the best geospatial tools, ideal for use in the classroom. Using FieldScope, students are able to investigate water quality issues in their local watershed or in the larger Chesapeake Bay watershed. In addition, students are able to view their peer's observations and photos taken in their area. FieldScope is a powerful tool engaging the students while encouraging them to take action.

Purpose of this activity

After students complete this activity, they will understand how their actions can affect the water quality of the Chesapeake Bay. Also, students will gain an appreciation of their local environment.

9th Grade Learning Objectives

- To grasp how large the Chesapeake Bay watershed is
- To be able to locate their school's watershed
- To compute the flow path of water from their school and into the Chesapeake Bay
- To identify land use in their area
- To investigate the major sources of nutrients and sediments in their watershed

12th Grade learning Objectives

- To grasp how large the Chesapeake Bay watershed is
- To be able to locate their school's watershed
- To compute the flow path of water from their school and into the Chesapeake Bay
- To identify land use in their area
- To investigate the major sources of nutrients and sediments in their watershed
- Identify trends between water quality and environmental factors using data from CBIBS
- Gain experience graphing and interpreting data



What the student will need

- Access to the internet
- The Student Worksheet
- About 60 minutes

Procedure

Navigating FieldScope

1. Open a web browser and go to <http://chesapeake.fieldscope.us/>
 - a. You will see a map of the Chesapeake Bay, default layers selected are water depth and terrain map
 - b. Spend a few minutes to take a look at the map, zoom in and out of an area using the slide scale on the right of the map
 - c. Click on the layers tab on the left of the map to see what layers are checked
 - i. *Optional* – play with selecting and deselecting layers to become familiar with the program. However, before beginning the activity, ensure the default layers are selected by un-checking any additional layers

Activity 1 9th & 12th Grade

2. Search for your school
 - a. Click on the search tab on the left of the map
 - b. Type in your school e.g. Patuxent High School
 - i. A red icon  will appear on the map
 - ii. Double click on the search result and the map will zoom into the area
3. Identify your watershed
 - a. Click on the layers tab on the left
 - b. Under the Boundaries menu, check Watershed Boundaries. Notice an information icon appears  Click on the information icon for more information. When finished click the x to close the box
 - c. Click on the query point icon  from the top right menu bar of icons and click on the map near your school (note: the information box will not appear if you try to click on the icon so pick a spot close to it).
 - d. Close the box and zoom out by clicking on the – symbol on the sliding scale on the right. Zoom out all the way to view the red outline of the Chesapeake Bay watershed
 - e. Move the map to center it in your screen: left click, hold and drag to center the map
 - f. Under the base map menu, click on boundaries and places to help answer question 3.



4. Compute Flow Path*

- a. Click on the compute flow path icon  from the top right menu of icons (notice the tab on the left has changed to the flow path tab)
- b. Click a point in New York which is within the Chesapeake Bay watershed
- c. To view the path more clearly, uncheck watershed boundaries and boundaries & places
- d. Zoom in and follow the path the water takes from NY to the Bay. Left click hold and drag to move the map see the beginning of the flow path
- e. Try different base map views to see the rivers and streams. Zoom in and out to see the difference in detail of each base map
- f. Now that you have got the hang of things, try computing a flow path from your school. Zoom out and return to default layers before you begin. To find your school on the map go back to the search and double click on the search result.

*The flow path computed may not necessarily follow the waterways perfectly. Once the water enters a stream it will remain there. It won't jump out of the stream or river as depicted in FieldScope!

5. Nutrient Sources

- a. Under the layers tab, return the base map to terrain
- b. In the layers tab select nutrients and sediments from the Human Geography menu
- c. The map will change color depending on the nitrogen yield. Click on the information icon  next to nutrients and sediments to view the nitrogen yield in your area. If you are unsure which color your area corresponds to, you can move the information box by left click holding and dragging the box to the right – it may help compare the map to the key. To close the information box click the x
- d. Select the query point icon 
- e. Click on the map near your school to retrieve information about your area

Activity 2 12th Grade

6. Retrieving Data

- a. Under the layers tab check the CBIBS (Chesapeake Bay Interpretive Buoy System)
- b. Locate the nearest buoy  to your school, zoom out if necessary. Close the box by clicking the x



- c. Click on the query point icon  and click on the buoy to retrieve information

7. Graphing Data

- a. Select the Time Series Plot tab from the top of the map
- b. Click on the CBIBS menu
- c. Select the station closest to your school e.g. Potomac
- d. Select Chlorophyll A from the variable list
- e. Select the date range for the last 30 days
- f. Click on add to graph (the graph may take some time to appear)
- g. Select water temperature from the variable list and click on add to graph
- h. Select dissolved oxygen from the variable list and click on add to graph

DRAFT



Student Worksheet 9th Grade

Name: _____

FieldScope is a great web-based tool, which allows you to investigate your local watershed and the larger Chesapeake Bay watersheds. While working on the FieldScope Activity, answer the following questions.

1. Approximately how many rivers and streams transport water to the Chesapeake Bay estuary?
2. What is the: Subregion, Subbasin and Local Watershed of your school?
3. What states are within the Chesapeake Bay Watershed?
4. How far does water that falls on land in NY have to travel to enter the Chesapeake Bay?
5. What major river(s) does water that falls in NY travel down to enter the Chesapeake Bay?
6. When it rains near your school, what distance is the flow path to the Chesapeake Bay?
7. What is the first waterway the rainwater will drain into?



8. What is the first major river the rainwater will drain into?

9. What is the nitrogen yield near your school?

10. What are the 2 major sources of phosphate, nitrate and sediment near your school?

DRAFT



Student Worksheet 12th Grade

Name: _____

FieldScope is a great web-based tool, which allows you to investigate your local watershed and the larger Chesapeake Bay watersheds. While working on the FieldScope Activity, answer the following questions.

1. Approximately how many rivers and streams transport water to the Chesapeake Bay estuary?
2. What is the: Subregion, Subbasin and Local Watershed of your school?
3. What states are within the Chesapeake Bay Watershed?
4. How far does water that falls on land in NY have to travel to enter the Chesapeake Bay?
5. What major river(s) does water that falls in NY travel down to enter the Chesapeake Bay?
6. When it rains near your school, what distance is the flow path to the Chesapeake Bay?
7. What is the first water way the rainwater will drain into?



Student Worksheet With Answers

FieldScope is a great web-based tool, which allows you to investigate your local watershed and the larger Chesapeake Bay watersheds. While working on the FieldScope Activity, answer the following questions.

14. Approximately how many rivers and streams transport water to the Chesapeake Bay estuary?
Answer: 100,000
15. What is the Subregion, Subbasin and Local Watershed of your school?
Answer: e.g. Subregion: Upper Chesapeake, Subbasin: Patuxent, Local Watershed: Patuxent River – Lower
16. What states are within the Chesapeake Bay Watershed?
Answer: NY, PA, DE, MD & VA
17. How far does water that falls on land in NY have to travel to enter the Chesapeake Bay?
Answer: E.g. 580 km
18. What major river(s) does water that falls in NY travel down to enter the Chesapeake Bay?
Answer: Susquehanna
19. When it rains near your school, what distance is the flow path to the Chesapeake Bay?
Answer: E.g. 10.4 km
20. What is the first water way the rain water will drain into?
Answer: E.g. St John Creek
21. What is the first major river the rain water will drain into?
Answer: E.g. Patuxent River
22. What is the nitrogen yield near your school?
Answer: E.g. 7.5-10 tons/acre/year
23. What are the 2 major sources of phosphate, nitrate and sediment near your school?
Answer: E.g. Phosphate: urban & point source. Nitrate: urban & agriculture. Sediment: agriculture & urban.
24. What is the current Chlorophyll A reading?
Answer: E.g. 8.49 µg/l



25. What trend, if any, is present between chlorophyll A and water temperature?
Give reasons for trends observed.

Answer: e.g. there is a positive correlation between water temperature and chlorophyll a concentration. As temperatures increase the chlorophyll a concentration increases. Chlorophyll A is an indication of phytoplankton density. Therefore, as the water warms up productivity will increase allowing the phytoplankton multiply.

26. What trend, if any, is present between chlorophyll A and dissolved oxygen?
Give reasons for trends observed.

Answer: e.g. as the population of phytoplankton increases (extrapolated from chlorophyll A concentrations) initially, the dissolved oxygen concentration will increase due to the increase in photosynthesis and thus oxygen. Once the population of phytoplankton drops, gross photosynthesis decreases, and as a result the concentration of dissolved oxygen will decline.

DRAFT