

Name _____

Date _____

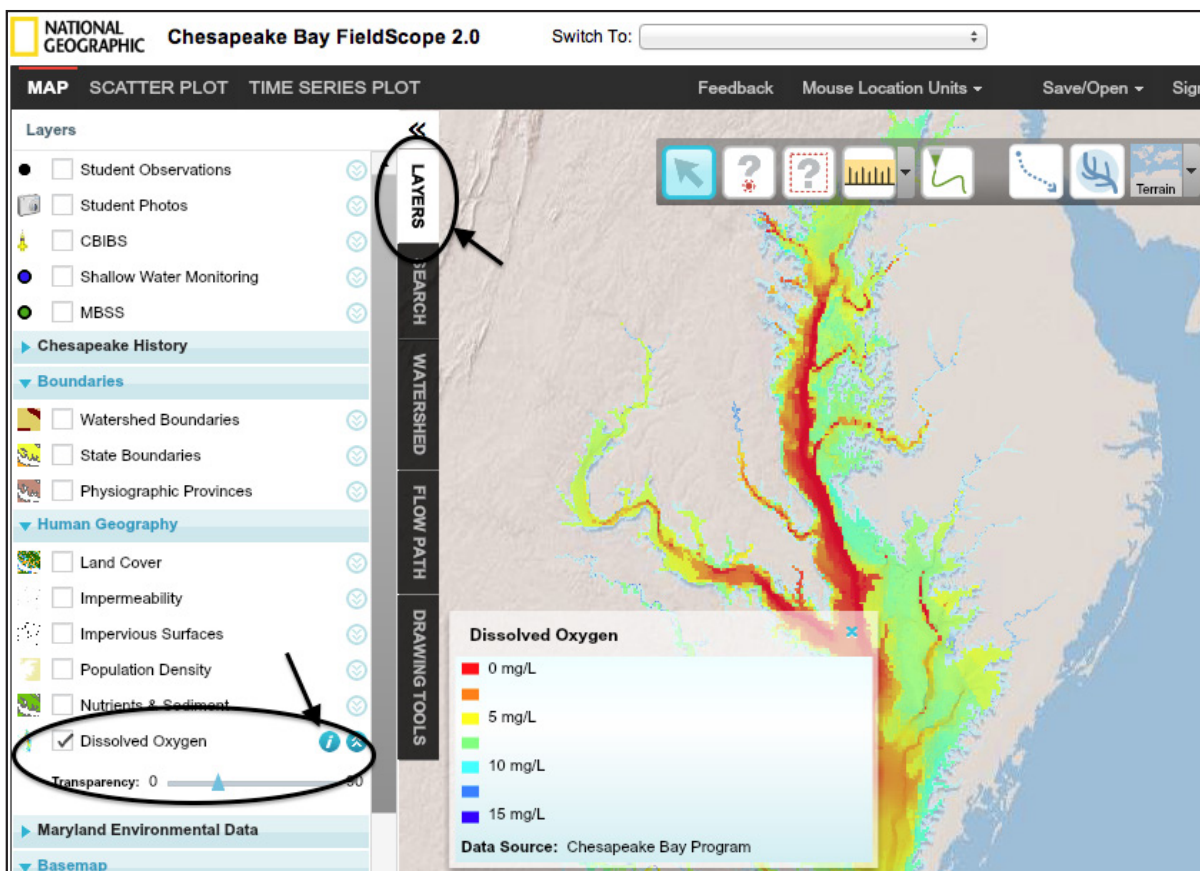
Analyzing Watershed Health: Dissolved Oxygen Answer Key

Follow the steps below using Chesapeake Bay FieldScope to examine the health of areas of the Chesapeake Bay watershed.

Part 1. Analyze dissolved oxygen levels over 12 months.

Scientists monitor the health of the Chesapeake Bay watershed by measuring levels of dissolved oxygen in the water. Dissolved oxygen levels of 6.0 mg/L or higher are considered healthy for the Chesapeake Bay. Levels below 5.0 mg/L can create stress on the ecosystems.

You can use the FieldScope mapping tool to view and examine data provided by the Chesapeake Bay Program for dissolved oxygen in different areas of the Chesapeake Bay and in its main tributaries. This data has been loaded into the map by National Geographic.



1. In the Layer tab, turn on Dissolved Oxygen. Click the “i” next to Dissolved Oxygen to view the legend.

Analyzing Watershed Health: Dissolved Oxygen Answer Key, continued

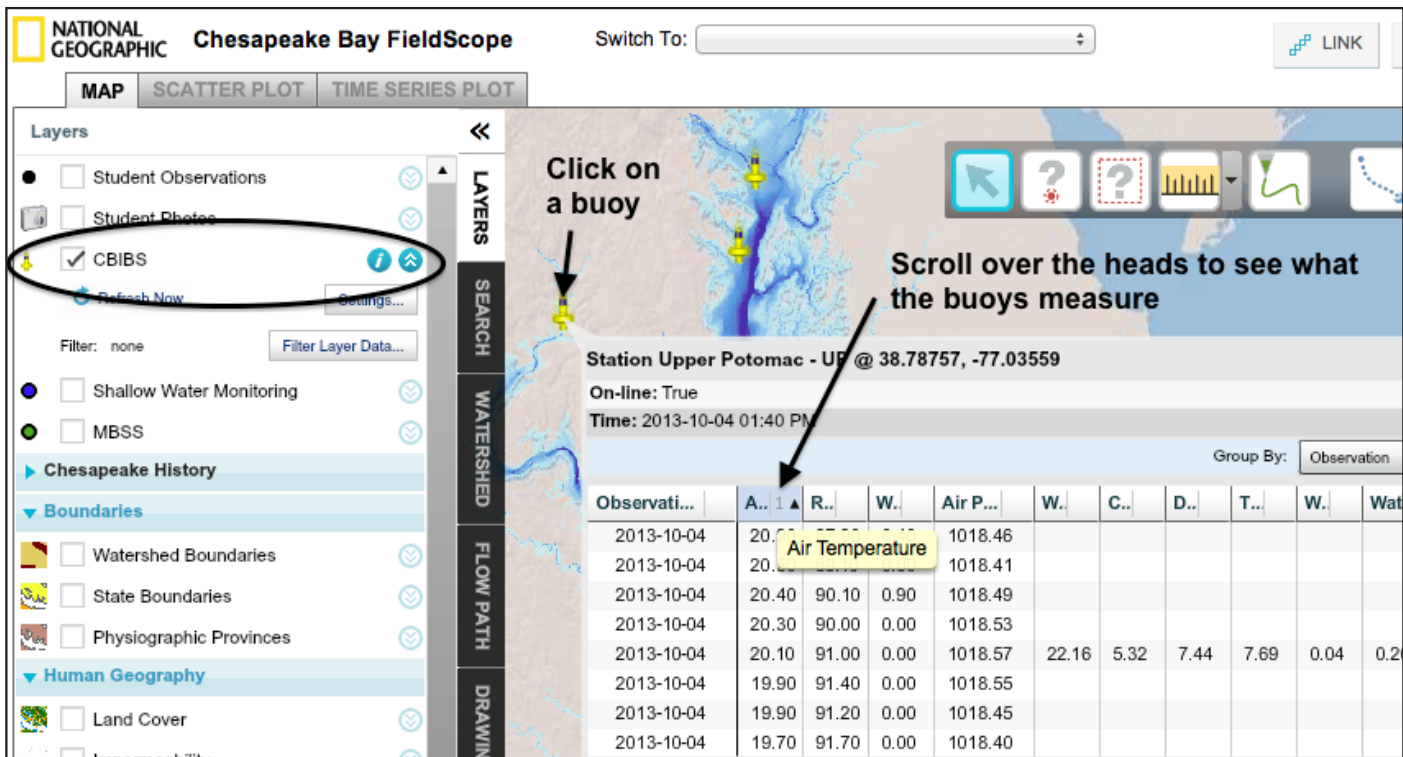
- a. Which colors represent low dissolved oxygen? red and orange
- b. Which colors represent high dissolved oxygen? blue and light blue
2. Look at the bottom of the window, and find the timeline. Scroll through the timeline to view the data through a 12-month period.
- a. In which months do you observe the lowest dissolved oxygen levels? Why might this happen? June, July, August. During summer months, warm water temperatures naturally lead to lower dissolved oxygen levels than in colder months. Spring rains can carry a lot of nutrient pollution into the bay. This causes more algae to grow than usual, which affects the amount of dissolved oxygen in the water.
- b. In which months do you observe the highest dissolved oxygen levels? Why might this happen? January and February. Cooler water temperatures and less runoff from agriculture at this time of year enable dissolved oxygen levels to go back to a healthy level.
- c. How do dissolved oxygen levels in the Chesapeake Bay change over the course of a year? What is the range? Dissolved oxygen levels are near 0 mg/L in many areas in the summer months, then are as high as 10-15 mg/L in the winter months.
- d. Are there areas where dissolved oxygen is very low? If so, describe the geographic setting of those areas. (Hint: Use other base map layers to see the types of land surrounding the bay.) Downstream from Baltimore and Washington DC, the heavily urban areas
- e. When dissolved oxygen is low, how do you think aquatic life is affected? Where there is little or no oxygen for them, aquatic animals cannot survive.

Analyzing Watershed Health: Dissolved Oxygen Answer Key, continued

Part 2. Examine NOAA data for dissolved oxygen

- 1. Continue to use your current location. In the Layers tab, turn off Dissolved Oxygen. Turn on CBIBS. Click the “i” for information.

What does the acronym “CBIBS” mean? Chesapeake Bay Interpretive Buoy System



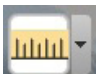
These buoys, developed by the U.S. National Oceanographic and Atmospheric Administration (NOAA), are set throughout the bay and its main tributaries. Each buoy has sensors that collect information about the water at that location. This data is transmitted to NOAA using cellular communications. It is then shared with a variety of people and organizations.

- 2. On the map, zoom in to find the buoy icon nearest your location. Click to find the name for this location. The nearest CBIBS buoy to my location is Answers will vary.

- 3. Roll over the column heads to see the different data that the buoy monitors.

Analyzing Watershed Health: Dissolved Oxygen Answer Key, continued

a. List three types of observations made by this buoy: Answers may include: air temperature, relative humidity, wind speed, air pressure, water temperature, chlorophyll A, dissolved oxygen, turbidity, water conductivity, water salinity

b. What is the distance in miles and kilometers to this buoy from your location? Use the measure tool for this.  Answers will vary.

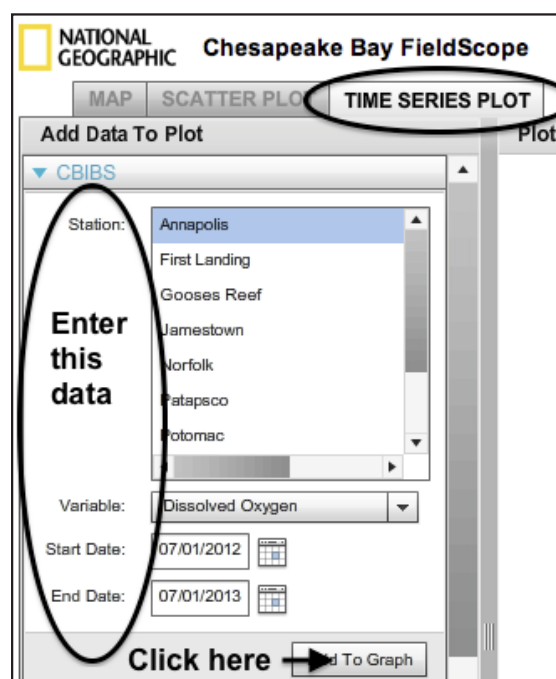
c. How many CBIBS buoys are present in the bay, according to this FieldScope map? 10

4. Next, you will use the CBIBS data to create a graph to see the dissolved oxygen levels measured at this location.

At the top left of the FieldScope map, click on the Time Series Plot tab. Under Add Data to Plot, choose CBIBS. Enter each of the following:

- Station—your nearest CBIBS buoy
- Variable—dissolved oxygen
- Start Date and End Date—July 1 for the two previous years, e.g. July 1, 2012 to July 1, 2013

Click Add to Graph. Be patient; you may need to wait while the data loads.



a. What general range does this buoy show for dissolved oxygen in a year's time?

Answers will vary.

b. During which months are dissolved oxygen levels the highest? Answers will vary.

c. In which months are they lowest? Answers will vary.

Analyzing Watershed Health: Dissolved Oxygen Answer Key, continued

Part 3. Zoom in to examine dissolved oxygen at the local scale.

1. Now go back to the FieldScope map and zoom in to the area of your selected buoy. Select again the Dissolved Oxygen layer. View the area near the buoy from July 2006-07 using the timeline scroll.
 - a. What range does the Dissolved Oxygen layer data show for the area near your buoy?
Answers will vary.

 - b. How does this compare with the more recent CBIBS data you saw graphed? _____
Answers will vary.

 - c. Which visualization of the dissolved oxygen data do you like best, the map or the time series plot graph? Why? Answers will vary.

 - d. Are the dissolved oxygen levels near this buoy healthy or unhealthy? How do the levels look farther downstream? Answers will vary.

 - e. What human actions can help to keep dissolved oxygen levels healthy in your local area?
Answers will vary.
