

## Track the Recovery in Blackwater River State Forest Using Google Earth Pro

In addition to allowing you to view the world through its own satellite imagery, Google earth lets you import data layers (other satellite images, historic maps, demographic information, etc.) into Google earth. (After you open Google earth, have a look at the Layers section on the left to see the data layers already included.)

Google earth takes a flat satellite image (or a flat map) and georectifies it -- i.e., when importing the image, it takes into consideration the curve of the earth and matches key coordinates in Google earth to those in the image, and bends the image to fit.

You will be using Google Earth to estimate the of Blackwater River State Forest. You will be exploring how SkyTruth does this type of analysis in its work.

There are 4 steps to estimating the change in size:

1. Open Google earth pro and familiarize yourself with Blackwater River State Forest as it appears in Google's most recent imagery.
2. Open the KMZ file that includes satellite imagery of Blackwater River State Forest, and save it, if you wish.
3. Draw a polygon around the burned area in each satellite image, and get perimeter and area measurements.
4. Compare the visibly burned area over the several months and analyze your findings.

### ① Open Google earth pro and familiarize yourself with Blackwater River State Forest as it appears in Google's most recent imagery.

1. Open Google earth pro.
2. You will see a search bar at the top left of your screen. Type in **Blackwater Forestry Center** and click or tap Search.

#### Google Earth Pro Tips:

Click + R - Re-ori-ents your view to looking straight down with North at the top.

The Exit ground-level view button (top right) will get you back to viewing the world from above.

Drawing polygons - the dialog box must stay open in order to draw. Don't click OK until you are finished and ready to save your work.

The New Polygon dialog box will almost always cover up your work area

3. Take a minute to zoom in and really look at the area near the Forestry Center. You can see buildings, waves, and even some cars. The resolution of the imagery in Google Earth Pro is very high, much higher than what you will see in the satellite imagery used in this lesson.

## ② Open the KMZ file and save it

To open and view satellite images of Blackwater River State Forest in Google Earth:


1. Click on the link to the Prescribed Fire KMZ file in the left column of the SkyTruthing for Schools website. (<http://skytruth.org/schools/prescribed-fires/>)
2. Save the file to your desktop or another area that has been specified by your teacher. (Your teacher or school's tech support person may have already done this step.)
3. Double-click the saved KMZ file to open it in Google Earth.
4. The KMZ file will automatically take you to a section of Blackwater River State Forest, if you are not already there. The area you will be looking at in this exercise is just north of the Forestry Center; there is a polygon in the exercise labeled Study Area which is where the fire took place.
5. Before you begin working with the satellite image, move the KMZ file from Temporary Places to My Places. If you don't do this, any changes you make to the KMZ file will be lost if Google Earth unexpectedly closes for some reason. To do this:
  - a. Right-click on the KMZ file in Places >> Temporary Places on the left side of Google Earth. Select Save to My Places. This moves the KMZ file from Temporary Places to My Places.
  - b. If multiple people will be using the computer you're working on, you may want to save your KMZ file by a different name. To do that, right-click on the KMZ file and select Rename.

## ② Draw a polygon around the burned location to measure its perimeter and area

It's easiest to draw a polygon around the burned area if you are looking straight down on the map with North at the top. To adjust the map, click on the satellite image, then type R. (You can do this any time the map orientation needs adjusting, as long as no dialog boxes are open.)

Before you start to draw your polygon, make sure that you have the burned area sized large enough to be able to draw a polygon around it, and that you are looking at imagery titled NBR (which stands for Normalized Burn Ratio). Also make sure that the entire burned area is visible on the screen. While you are drawing a polygon, you can't move or resize the map.

To draw a polygon around the burned area:

1. Choose a month to start with and click the radio button next to that month. The satellite imagery for that year will appear as an overlay. Be sure to turn off the True-Color and False-Color imagery before you start drawing.
2. Click the polygon icon in the top menu:  (If you hover your mouse over the icons, you'll see a tooltip that describes what each tool does.)

3. A "New Polygon" dialog box opens. This box must be open while you are drawing your polygon. (It may open on top of your map; if this is the case, you can drag it out of the way so you can see the burned area.)
4. Give your polygon a name, then click the Style, Color tab to select colors for the fill and outline of your polygon. Try setting your Polygon Area opacity to 0% so you can see the burned area while you draw it. You can change the outline and fill settings after you've drawn your polygon.
5. Use your mouse to draw a line around the burned area. You can draw freehand or use your mouse to click points and these will stitch themselves together into a polygon. If you want to adjust your points, you can tap and move them. You can also delete a point by selecting it (click on it) and then right-clicking.
6. When you are finished, click the OK button at the bottom of the New Polygon dialog box. (This saves your work.)
7. Do this for each year in the set.

### ③ Get the perimeter and area measurement measurements for each year

1. Right click the polygon layer that you just created and select Properties.
2. Click the Measurement tab. Write down the perimeter and area measurements in kilometers and square kilometers.
3. You can print out the worksheet (this is the same as the Calculations Worksheet) in this Guide to write down measurements and then use them to evaluate the change in the burned area's size.

You can see a lot of strange and wonderful things using satellites. Plug these coordinates into the Search box (top left of Google earth) to see a few. Some are pretty small, you may have to zoom in to see them.

19°56'56.96"S 69°38'1.83"W  
 38°29'0.16"N 109°40'52.80"W  
 -25.344375, 131.034401  
 51.848637, -0.55462  
 35.027185, -111.022388  
 44.525049, -110.83819  
 -33.350534, -71.653268  
 -33.867886, -63.987  
 26.357896, 127.783809

Name: \_\_\_\_\_ Date: \_\_\_\_\_

## Prescribed Burn Calculations Worksheet

Directions: Discover how long the effects of a forest fire are visible, and calculate the rate of recovery by following these steps:

1. 1. Use Google Earth Pro to measure the perimeter (P) and area (A) of burned land that can be seen from space.
  2. 2. Calculate the rate of recovery by dividing the amount of visibly burned land by the amount of time since the fire occurred.
  3. 3. Use your calculations to create an estimate of how long it will take for the forest to recover from the fire.
- ① Using the steps outlined in the Guide to Using Google Earth Pro, draw a polygon around the burned land seen in the NBR (Normalized Burn Ratio) imagery and find the perimeter, P, in kilometers (km) and the area, A, in square kilometers (km<sup>2</sup>) from Google Earth. Record your measurements in Perimeter and Area columns of the Burned Area Chart on page 2.
- ② Calculate the rate of recovery, in days. To do this use the following equation:

$$\% \text{ Recovery} = \left( \frac{\text{Area}(\text{km}^2) \text{ Early Date} - \text{Area}(\text{km}^2) \text{ Later Date}}{\text{Area}(\text{km}^2) \text{ Early Date}} \right) * 100$$

### BURNED AREA

Date	Perimeter (km)	Area (km <sup>2</sup> )
December 07, 2014		
January 01, 2015		
March 29, 2015		
April 30, 2015		

③ What is the percentage of change in the area of burned land for the following:

From Dec 07, 2014 to Jan. 01, 2015:

From Jan. 01, 2015 to Mar. 29, 2015:

From Mar. 29, 2015 to Apr. 30, 2015:

From Dec 07, 2014 to Apr. 30, 2015:

④ Do your measurements show that the rate of change is increasing or decreasing? Other than changes in size, what other changes do you see in the area where the fire took place?

⑤ Using the average rate of change in size of the burned area between Dec. 7, 2014 to Apr. 30 2015, in how many months do you expect the burn scar to disappear? Check your estimate by looking at the image in Google Earth from January 11, 2016. Was your estimate right?