

## Lesson Plan "Geocaching With Google Earth"

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Audubon at the Francis Beidler Forest

Overview: This activity allows students to explore the geography around a selected geocache, whether or not the geocache will actually be visited. Although a only one geocache is used as an example in this activity, the process can be repeated for any geocache on the planet.

### Connection to the Curriculum:

#### *Literacy Elements*

- F. Ask geographic questions: Where is it located? Why is it there? What is significant about its location? How is its location related to that of other people, places, and environments?
- G. Make and record observations about the physical and human characteristics of places
- P. Locate, gather, and process information from a variety of primary and secondary sources including maps
- Q. Interpret information obtained from maps, aerial photographs, satellite-produced images, and geographic information systems

Suggested Grade Range: 8th

Time: 60 minutes

### Materials Needed:

1. Internet connection
2. Google Earth software (free)
3. Geocaching.com account (free)

### Objectives:

1. Student will be able to answer geographic questions regarding the area with 10 miles of a designated geocache.
2. Student will be able to interpret information obtained satellite-produced images and geographic information systems.

### Procedures:

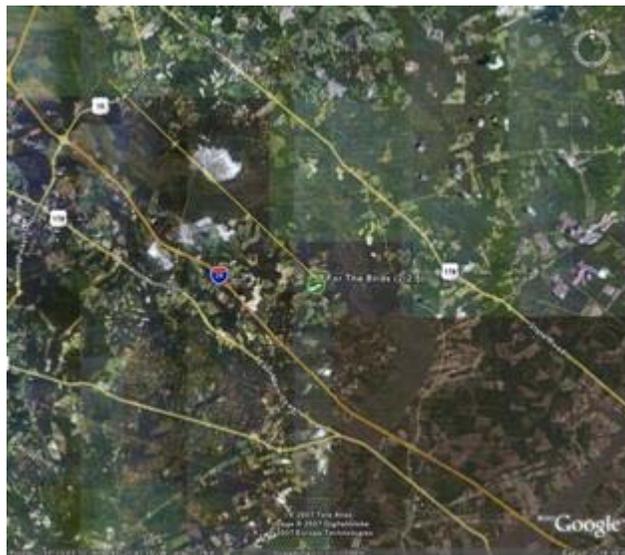
1. Prior to the activity, create a Geocaching.com account and download the Google Earth software. A Geocaching.com account can be created using a free and disposable email account (yahoo, gmail, hotmail, etc.). Creating an account is necessary to view the coordinates for geocaches and for downloading the Google Earth geocaching file. To create an account, go to <http://www.geocaching.com/>. The Google Earth software can be downloaded at <http://earth.google.com/>.
2. Log onto the geocaching.com account and go to the "my account" page (left menu). On the "my account" page, click on the "Download Geocache browser in Google Earth" under the Google Mapping Features in the right menu. Save this (kml) file in a Google Earth folder on your computer desktop or in a location where it can be easily accessed.
3. Students can launch Google Earth and load the geocache browser by simply opening the downloaded kml file.
4. Students can be directed to any geocache. For example, the "For the Birds" (GC4460) geocache hidden near the Audubon Center at the Francis Beidler Forest.

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5. Students can be directed to the location by typing "N 33° 12.954 W 080° 21.946" into the "fly to" box at the upper left of the Google Earth screen. The coordinates can be found on the "For the Birds" geocache page.
6. Have students create a 10-mile radius from the geocache's location. This can be done by using the ruler feature in the menu bar across the top of the Google Earth screen.



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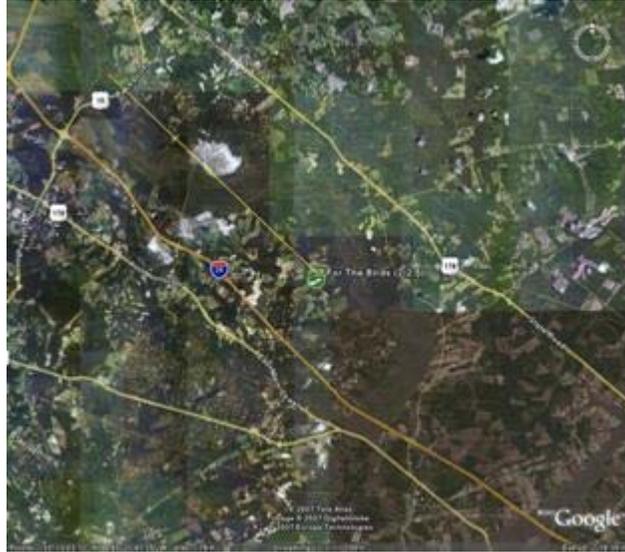
7. Have students describe the geography within the circle around the geocache created by the 10-mile radius. For example, what is the human activity occurring in the white areas 5 miles to the northwest of the geocache? (Mining for marl by Holsim Cement north of the swamp and Giant Cement south of the swamp)
- a. Students can zoom in and out for a better perspective of the area. Additionally, the bar above the compass rose tilts the image from directly overhead ( $90^\circ$ ) to horizontal ( $0^\circ$ ). Tilting the image to  $45^\circ$  provides a hint of relief, especially if there are strong shadows. For example, zooming in on the Giant Cement plant, tilting the view  $45^\circ$  and rotating the compass rose for a view from the west, produces the image below. Note that the buildings at the cement facility appear three-dimensional along with the numerous railcars in the foreground. Moving east, the active mine can be seen.



- b. What is the straight-line feature (west to east) less than 0.5 miles north of the geocache? (Zooming in reveals that it is a powerline)
- c. What appears to be the main land use within the circle around the geocache? (agriculture, including silviculture [mainly pine plantations])
- d. What is the function of the long buildings just over 0.5 miles north of the geocache? (chicken production)
- e. What natural feature moves west-east north of the geocache but moves north-south east of the geocache. (Four Holes Swamp)
- f. What is the land use for the area approximately 6 miles southwest of the geocache? What are all of the small clearings cut throughout the forested area? (The land is owned by Norfolk-Southern Railroad and is used as a retreat and recreation area. The creek is dammed to provide fishing and other water-related recreation, a small golf course and tennis courts can be seen north of the pond, cabins are set along the north side of the pond, a skeet range can be seen near the northeast end of the pond, and all of the small clearings [too small to farm] are feed plots for wildlife that can be hunted by guests.)

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8. Additional kml files can be provided to the students or they can locate appropriate files via research on the Internet or Google Earth site. The following image shows the Francis Beidler Forest boundaries along with the boardwalk and canoe trails. The kml files are posted in the educators' section of the Beidler Forest webpage. Simply opening the files loads them to Google Earth where they can be saved.
  - a. Pose the question, "If you were the land manager of the Francis Beidler Forest, what land might you be looking to acquire next?" (Answer will vary, but should include the gap near the cement companies, which would make the property more contiguous. Gaps between properties at the south end of the sanctuary might also be targeted. Additionally, land in the upstream portion of the swamp along with land that buffers the swamp should be included to help ensure that activities in those areas do not cause negative effects, such as water, soil or noise pollution, in the current holdings.)

#### Suggested Evaluation:

1. Student work can be evaluated with the following rubric:
  - a. 5 = described 4 or more human/environmental interactions, including roads, buildings, and land use plus described 2 or more physical features
  - b. 4 = described 3 or more human/environmental interactions, including roads, buildings, and land use plus described 2 or more physical features
  - c. 3 = described 2 or more human/environmental interactions, including roads and land use plus listed 1 or more physical features
  - d. 2 = listed 3 or more human/environmental interactions, including roads, buildings, and land use plus listed 1 or more physical features
  - e. 1 = listed 2 or more human/environmental interactions, including roads and buildings plus listed 1 or more physical features

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### Extending the Lesson:

1. Global Positioning System (GPS) units can be borrowed from the South Carolina Geographic Alliance (SCGA) along with a PowerPoint presentation on GPS and geocaching basics. Select a geocache or geocaches nearby (often state, county or city parks will have more than one geocache located within the park) and have students navigate to the geocache.
2. If the students will be visiting the geocache, have each student determine a route to be taken from the school to the geocache. Using the ruler feature, students can determine the total distance between the two points. Using the current cost of fuel and the fuel efficiency of the vehicle to be used, students can determine the amount and cost of the fuel required to make the round-trip.
3. Create a GPS navigation course on the school campus. The SCGA has a PowerPoint presentation describing how this can be done.

### Resources:

1. Geocaching at <http://www.geocaching.com/>.
2. Google Earth at <http://earth.google.com/>.
3. Audubon Center at the Francis Beidler Forest at [www.beidlerforest.com](http://www.beidlerforest.com).
4. South Carolina Geographic Alliance at <http://www.cas.sc.edu/cege/>.