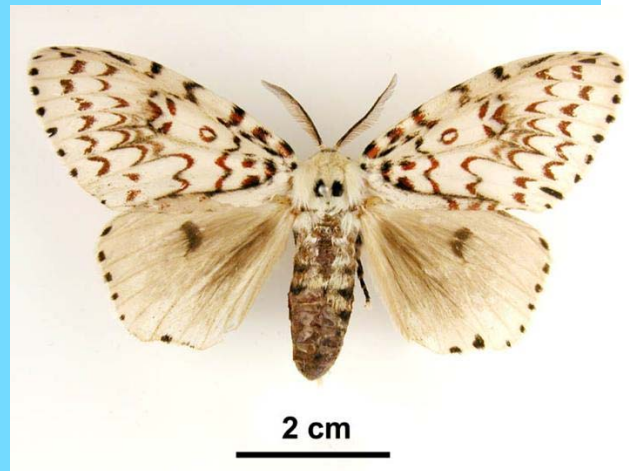


Gypsy Moth GeoCoins: Virginia Geocoin Adventure Activity Guide and Project Reflections

In this activity, your group will explore:

- **Geography and geography terms**
- **Invasive species ecology**
- **Environmental management**



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Gypsy Moth Activity Overview

Gypsy moths are on the move! These destructive pests have hitched an egg mass to the backpack of an unsuspecting hiker (a.k.a. your Trackable Geocoin!) and are traveling all over Virginia and beyond, hatching, multiplying, and leaving forests stripped bare of their leaves. It's up to you to track the gypsy moth movements and determine the possible impacts of this pest. You'll also discuss ways to manage the movement of real gypsy moths.

Gypsy Moth Background Information

Gypsy moths are a species of moth that are native to Europe and Asia. These moths were introduced to the United States in 1869 and have damaged millions of acres of forests in Virginia and beyond.

Life Cycle

Invasive Species: An insect, plant, or animal that is not native (indigenous) to an area that also causes harm to the new environment to which it is introduced.

To answer the following, use information from the Slow The Spread (STS) program at https://www.gmsts.org/fdocs/STS_Brochure.pdf and the Gypsy moth spreadsheet from the Purdue (<https://extension.entm.purdue.edu/GM/PDF/SlowSpreadProg.pdf>)

How does Slow the Spread work? _____

Can all Gypsy moths fly? _____

When do gypsy moth caterpillars hatch ?

How are caterpillars transported? _____

How long do the caterpillars (larvae) feed before the pupae stage? _____

Which part of the gypsy moth life cycle is responsible for the destruction of tree foliage? (caterpillar, pupae, adult, egg mass) _____

What does an egg mass look like? _____



gypsy moth male (l) and female (r)
J.H. Ghent, USDA Forest Service, Bugwood.org

Feeding preferences

Gypsy moth caterpillars love to eat leaves! However, they prefer some species of leaves more than other species. What are the some of the most preferred species of leaves that gypsy moths like to eat?

1. _____
2. _____
3. _____

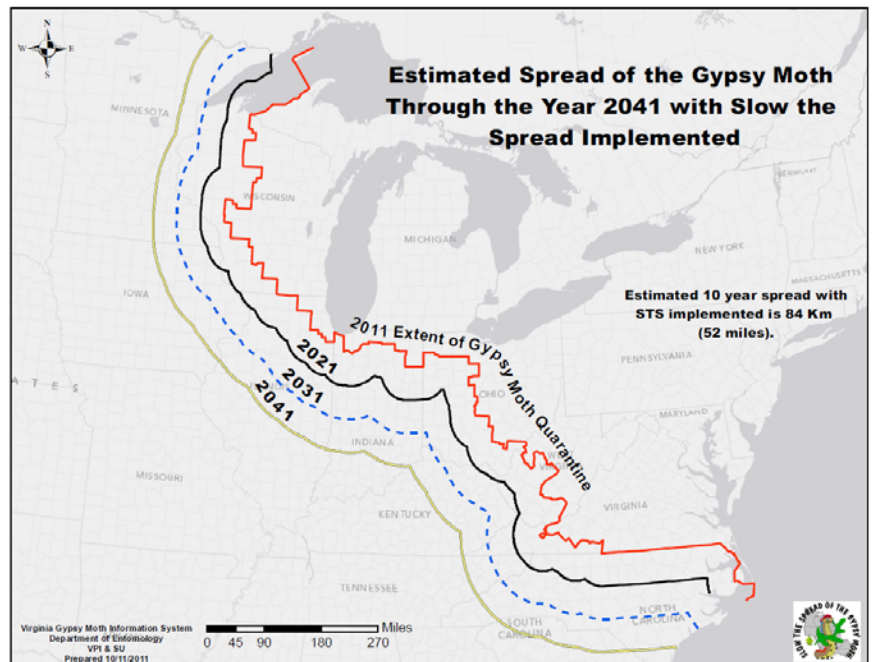
The Spread of Gypsy Moth Eggs

Gypsy moths don't always lay their eggs on tree trunks or branches—sometimes they lay eggs on items that are then transported by humans! A human can introduce gypsy moths to a new area without even suspecting it.

Read the lists (you can skim the rest of the document) in the USDA Publication, "Don't Move Gypsy Moth." http://www.aphis.usda.gov/lpa/pubs/pub_phgmth.pdf

Name 6 common items around your home that may spread gypsy moth eggs:

- | | |
|----------|----------|
| 1. _____ | 4. _____ |
| 2. _____ | 5. _____ |
| 3. _____ | 6. _____ |



In our exercise, we'll be imagining that a Trackable Geocoin (the VirginiaView Geocoin, the Virginia 4H Geocoin, the NGTEN Geocoin, etc.) is a mass of gypsy moth eggs attached to an unsuspecting hiker's backpacks. We'll track the egg mass to see where it goes and what impacts it might have as it travels!

Gypsy Moth Data Collection

You or someone else in your group should have dropped off a Geocoin in a Geocache a while ago (See Virginia Geocoin Adventure: Getting Started Manual if these terms sound unfamiliar). Now, we can use your Geocoin's log information to explore gypsy moth infestations. We will be imagining that your Virginia Geocoin is a mass of gypsy moth eggs. We will track the location of the gypsy moth egg mass as it moves from place to place (via geocaches), and get an idea of how the spread of the Gypsy moth could impact that particular environment.

Note to Leaders: You'll want to make sure that your Geocoin has traveled to at least 3 (hopefully more) different places before starting this activity. If it has not, then you can always select a different geocoin to complete this exercise. You can conduct a search for Trackable Geocoins on www.geocaching.com, and under the 'Play' menu, select 'Find Trackables'. You can search for a "Trackable by name", and enter VirginiaView (for a listing of all VirginiaView Geocoins), Map@syst (for a listing of all Map@syst Geocoins), 4H (for a listing of all 4H geocoins), or any other geocoin name that you might be familiar with! You can sort these lists by distance traveled (number of miles)! **If you have not dropped off trackable Geocoin, then you can use an existing trackable item that is already in circulation.**

1. Log in to www.geocaching.com with the login you used when you dropped off the geocoin.
2. Go to the tracking log page for your geocoin.
- Go to the Play -> Find Trackables menu item to go to the Trackables page. Enter the Tracking Code (from the coin itself) or the Trackable name (from the coin package, for example, VirginiaView Geocoin-79). Click on the geocoin name to view the log page.

Tracking History (5287.5mi) [View Map](#)

01-10 of 47 records · [01](#) [02](#) [03](#) [04](#) [05](#) [next >](#) [last >>](#)

01/19/2010 kayl retrieved it from Need-electronics?	Georgia	Visit Log
Retrieved from Need Electronics- I'll drop this one off somewhere in Wisconsin.		
01/19/2010 brydawg placed it in Need-electronics?	Georgia - 66.06 miles	Visit Log
01/01/2010 brydawg retrieved it from Homers Toolshed	Georgia	Visit Log
Found in Homer's Toolshed (GCT5G3). Great looking coin! Will move along on it's way to another cache.		
12/27/2009 Flagq2007 placed it in Homers Toolshed	Georgia - 55.58 miles	Visit Log
10/26/2009 Flagq2007 retrieved it from Left Hanging	Georgia	Visit Log
This one was so cool we had to grab it and move it along.		
10/03/2009 terry-ga placed it in Left Hanging	Georgia - 75.47 miles	Visit Log
09/11/2009 terry-ga retrieved it from Fencing on the backside BHSC	Tennessee	Visit Log
ver nice coin, i see it hasn't been to Georgia yet so i'll release it there soon.		
09/07/2009 CaverScott placed it in Fencing on the backside BHSC	Tennessee - 125.18 miles	Visit Log
09/05/2009 CaverScott retrieved it from Golden-Palace-Travel-Bug-&-Coin Motel-II	Alabama	Visit Log
Moving to Chattanooga		

Figure 1. Tracking History for a Geocoin. Each line represents a log entry. We'll be using the log entries where the coin actually moved—those that have a distance traveled shown in the third column.

3. Scroll down to the bottom of the log page to see the Tracking History. Each entry in the log (Figure 1) represents one move of a gypsy moth egg mass by an unsuspecting hiker. Complete columns A, B, and C in the chart listed in Appendix A (attached) by using the information on your geocoin's log.

Note to Leaders: Be sure that Google Earth is already installed on your computer(s) – visit <http://www.google.com/earth/index.html> for the download and basic information. For a primer on how to navigate in Google Earth, download the GoogleEarth tutorial from <https://virginiaview.cnre.vt.edu/tutorials/>.

- Now we'll explore a bit more about the gypsy moth movements by using Google Earth. We want to hypothesize what types of effects our moth egg mass might have at each stop. From your geocoin's log page, click on "View in Google Earth" under the Trackable Options menu. (You may need to scroll up to the top of the log page to see this, and if the "View in GoogleEarth" option does not appear on your webpage, then you need to make sure that you are logged in to geocaching.com). This will launch Google Earth if it is not already open, and the tracks for your geocoin will now be listed on the left-hand menu, and should show up as a yellow track on the map.
- Be sure that the "Borders and Labels" base data is turned on in Google Earth. For each stop on the geocoin's journey, zoom in and explore the immediate area .

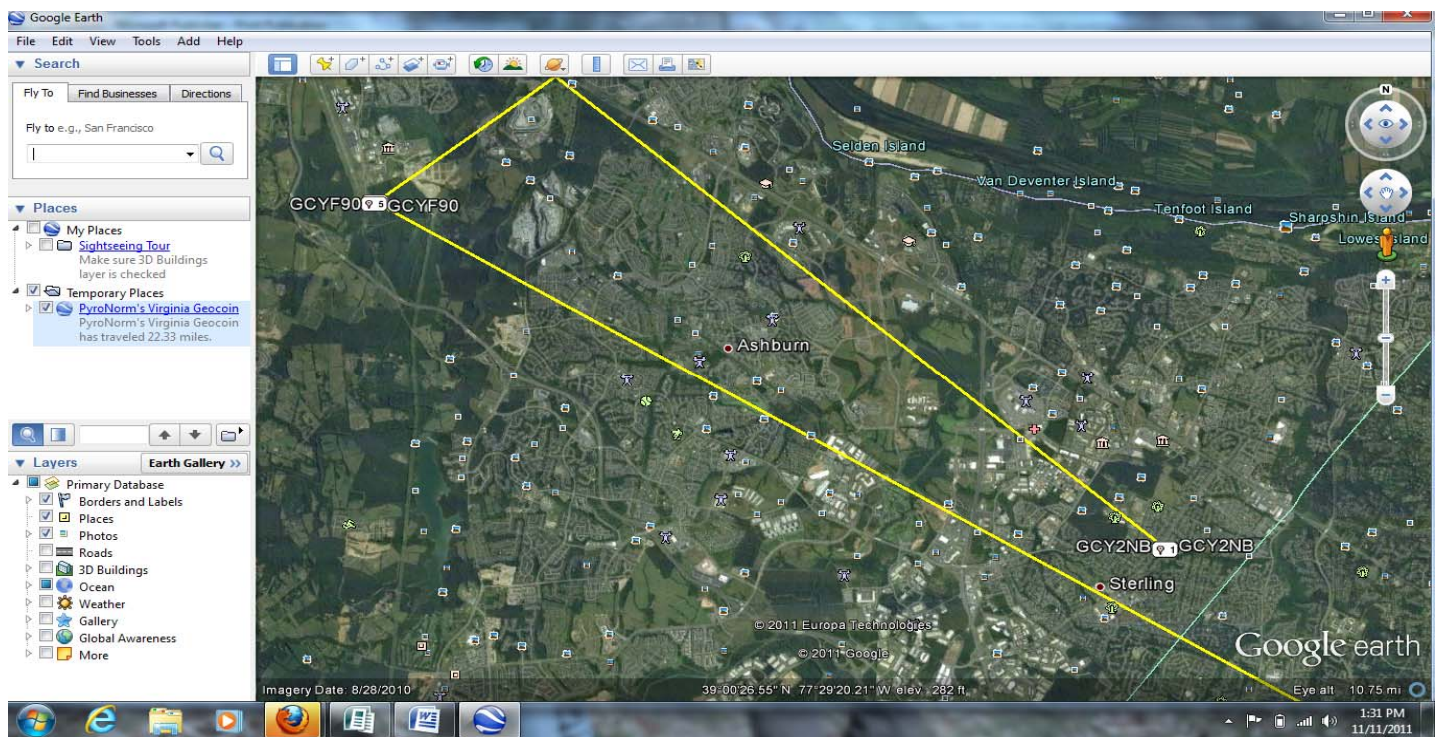


Figure 2. Points and yellow tracks between the geocoin stops in Google Earth.

Land Use: The human use of land. Some examples of different human land uses would be industrial, commercial, agricultural, and residential.

Land Cover: The physical features that cover land. Some examples would be forested, grassland, agricultural, urban, water, and others.

- By viewing the aerial photography, we will estimate the major land use or land cover in the area. Some areas may be more difficult than others, depending on the information available in Google Earth. Explore other menu options and additions in Google Earth to help you come up with your best estimate of the major land use and land cover for each geocoin stop.

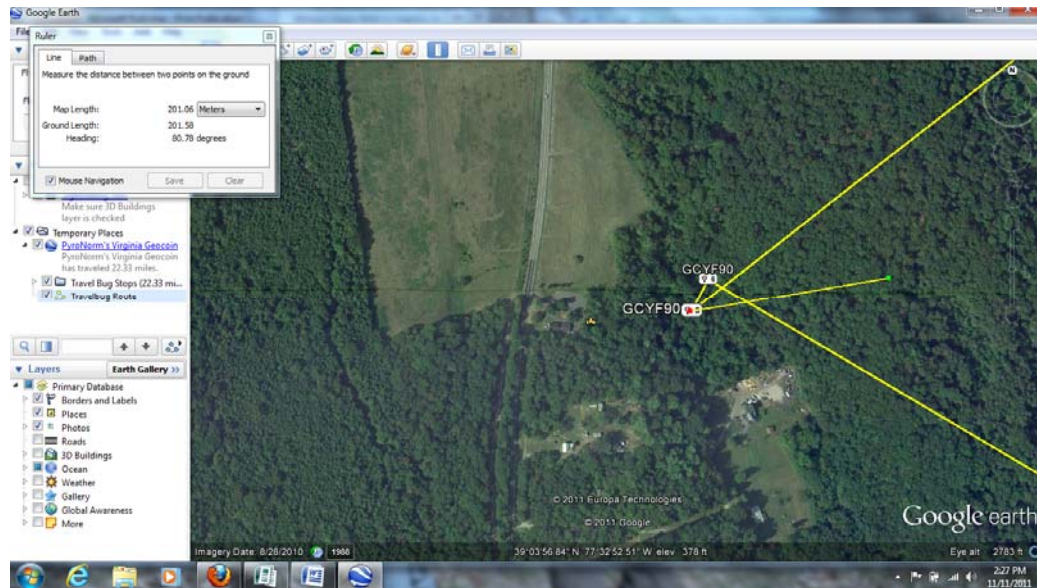


Figure 3. Using the ruler tool to estimate a 200-meter radius from point 5. The land cover in this area is mostly forested.

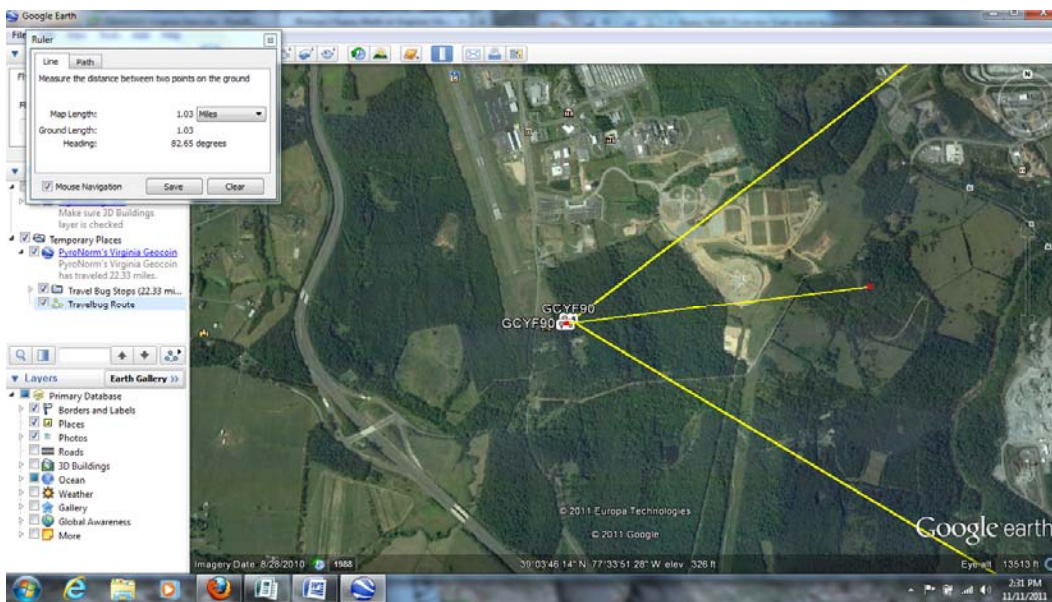


Figure 4. The same point as figure 3 with a 1-mile length ruler to estimate a 1-mile radius. Land cover is still mostly forested, but also contains about 30% commercial and industrial land use.

- We know that most of the moth larvae only spread about 200 meters from the nest site, but some travel up to a mile by wind currents. Use the ruler tool from the top menu bar, and set the units to miles or meters to help you estimate a 200-meter and 1-mile radius.

Record your findings in column D and E on the chart in Appendix A. See Figures 3 and 4 for an example of estimating radius and land cover.

- Optional:* For each stop your geocoin made, try to determine how it got there from the previous stop. There may be more than one mode of travel (for example: plane, car, train, hiker, biker, grills or patio furniture moved

from place to place, etc...). Use the details on the geocoin log as well as Google Earth to figure out how the coin traveled between places. Record your answer in column F on the chart in Appendix A.

6. Using the information you learned about gypsy moths in the background information, and the data you just collected on land use and land cover in Google Earth, decide, for each geocoin stop, if the area would be susceptible to a gypsy moth outbreak from the egg mass that moved there. Record your answer in column G on the chart in Appendix A.

Gypsy Moth Reflection Questions

1. What was the total distance traveled by your gypsy moth eggs (geocoin) so far? (Hint: this is shown on your geocoin's log page on geocaching.com).

2. What was the farthest the egg mass traveled between two points?

3. What factors did you consider when deciding if an area was likely to have a gypsy moth infestation from the eggs?

4. How might topography impact the spread of the Gypsy moth?

5. How would the land use / land cover affect the susceptibility of an area?

6. How do the travel patterns of humans affect the spread of the gypsy moth (and other invasive species)?

7. Suppose you live in an area that does not currently have a gypsy moth infestation problem, but has tree species that are susceptible. How could you stop or slow the spread of gypsy moths to your area?

Resources

Land Use and Land Cover with Aerial Photography:

United States. Department of the Interior. Geological Survey. *A Land Use And Land Cover Classification System For Use With Remote Sensor Data*. By James R. Anderson, Ernest E. Hardy, John T. Roach, and Richard E. Wimter. Washington: United States Government Printing Office, 1976. USGS. Web. <<http://landcover.usgs.gov/pdf/anderson.pdf>>.

Information on Gypsy Moths and their spread:

"Gypsy Moth in Virginia | Virginia Tech." *Fubyss.ento.vt.edu* - /. Web. 11 Nov. 2011. <<http://fubyss.ento.vt.edu/vagm/index.html>>.

United States. Department of Agriculture. Animal and Plant Health Inspection Service. *Don't Move Gypsy Moth. Program Aid No. 1329. USDA*. Web. <http://www.aphis.usda.gov/lpa/pubs/pub_phgmoth.pdf>.