An Introduction to Google Earth Pro

By:

Katherine Britt
Ph.D. Candidate
Virginia Tech
Department of Forest Resources and Environmental Conservation

John McGee
Geospatial Extension Specialist
Department of Forest Resources and Environmental Conservation

Jim Campbell
Professor
Virginia Tech
Department of Geography

Opening Google Earth Pro and Configuring the Program Window

Being by opening Google Earth Pro. Select the Google Earth Pro icon "   ," or search in the start

menu for "Google Earth Pro." When Google Earth Pro has been opened, you will get this screen.
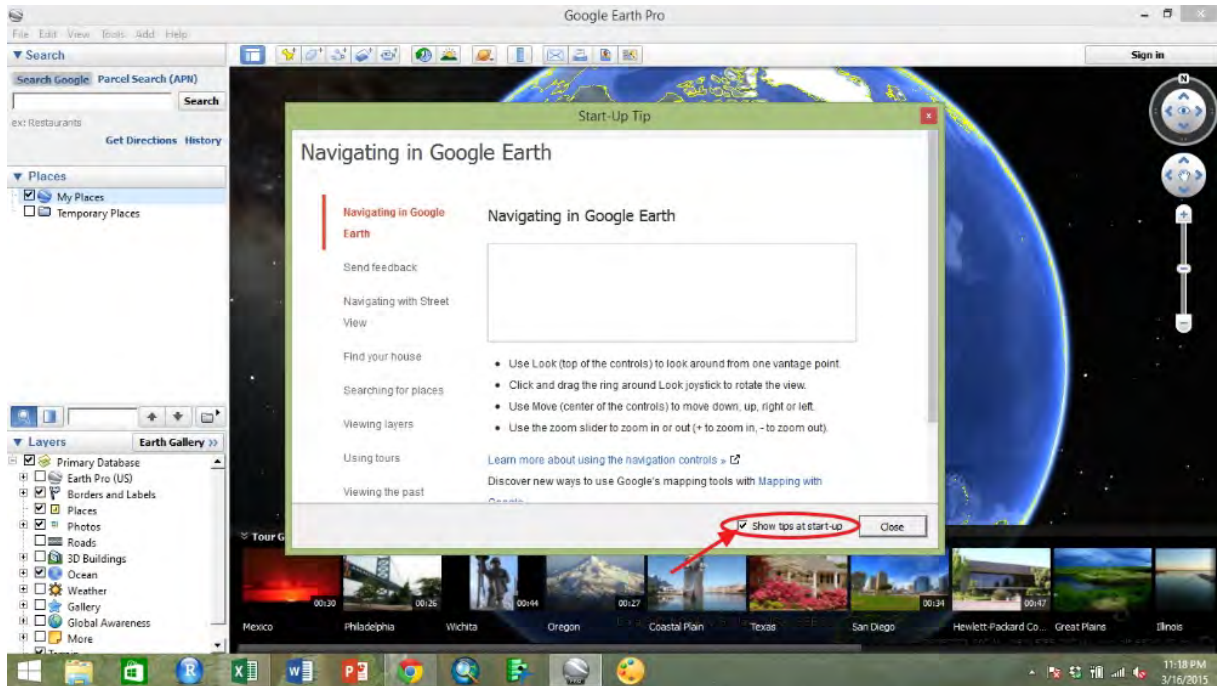

A "Start-Up Tip" window will automatically open when Google Earth Pro starts. These include hints and

instructions about many popular features in the program. If you do not want to see this window each

time you start the program, you can uncheck the "Show tips at start-up" box and then either click

"close" or click the red "X" at the top right of the window (see above). After the "Start-Up Tip" window

is closed, you will see a view of the earth, with a "Tour Guide" ribbon at the bottom of the main, map

area of the screen. The "Tour Guide" will show you photos that may be of interest in the region you are

viewing. You can scroll through them to explore the feature or the surrounding area of what you are

interested in. These are often used when creating customized tours or videos in Google Earth Pro.

Google Earth Pro

You may instead wish to maximize your viewing area in the map window. To do this, collapse the "Tour Guide" and associated photos by clicking the double, downward pointing arrows by the title of the ribbon (see below). This will collapse the ribbon, expanding the viewing area for the map.
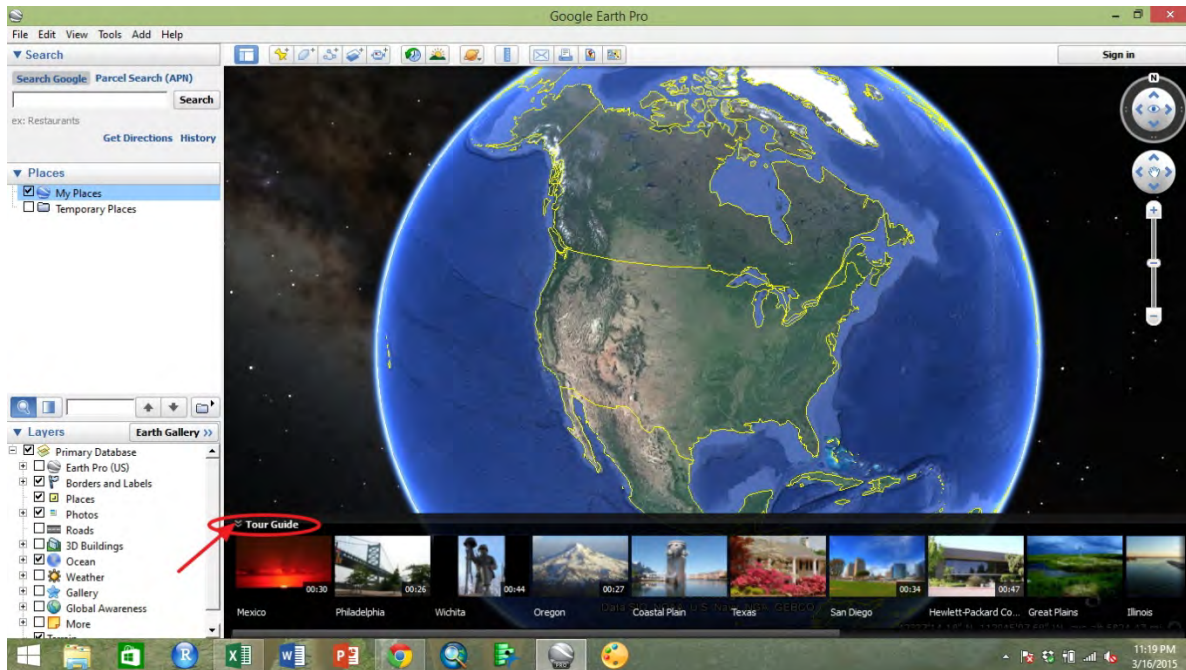
Your Google Earth Pro window will now have the full area available for the map (see below).
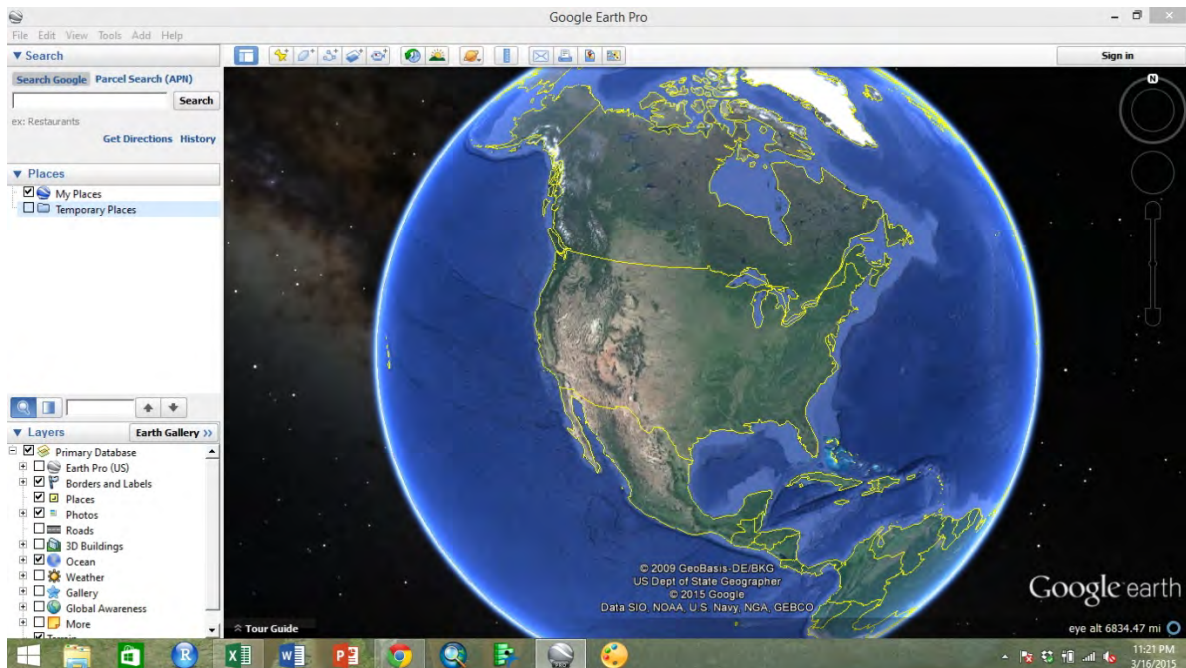
Navigating in the Map Window

To move around the map and focus on areas and datasets that are of specific interest, there are a few key tools. Hover the mouse over the upper right corner of the map where there are two light, circular outlines. The main navigation tools will disappear when the mouse is not directly over then to allow for a better view of the map. The tools will appear when the mouse is over them (see below).
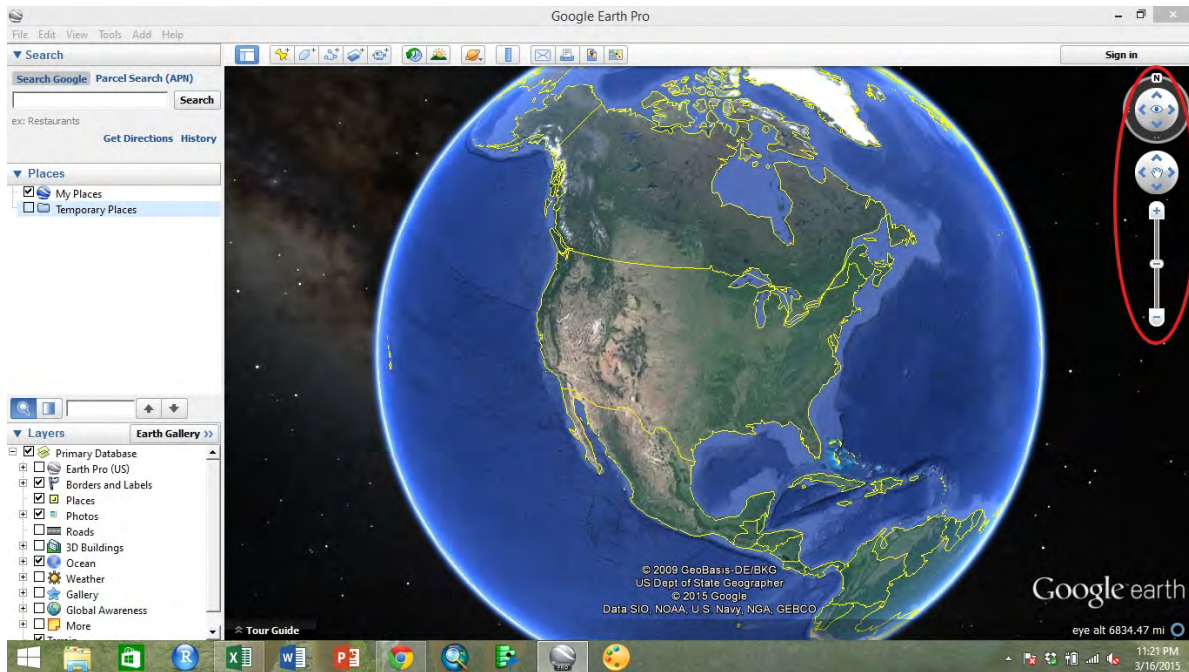
To the left, you can see each of the navigation tools, which are (1) the direction of North, (2) the tilt of the camera towards the landscape, (3) the movement buttons, and (4) the zoom slide bar. By either dragging the "N" icon around the circle or clicking around the circle, you can change the orientation of North on the map. To return the direction of North to at the top of the screen, double click the "N" symbol. By clicking the arrow around the eye symbol or holding down the left mouse button in the interior circle, you can change the direction of the camera from straight down to an oblique angle. To change the tilt to directly downward, double click the eye symbol. To move the map contents around the map window, you can click the arrows in the lower circle.

You can also use the mouse to pan across the map by clicking a point on the map in the map window and dragging it elsewhere in the window. The zoom slide bar can be operated by pressing the "+" or "-" to zoom in or out respectively. You can also drag the marker along the slide bar. Additionally, you can zoom in or out by using the scroll wheel on the mouse within the map window. By double clicking a

point on the map, you will zoom in and re-center the map with that point in the middle of the map window.

At the top of the side bar on the left edge of the Google Earth Pro window, there is a box labeled "Search" (see left). This box can be used to search for places by their name, address or geographic coordinates. Google Earth Pro also allows for searches for parcels using the Assessor Parcel Number. When you type an address into the circled field, Google will try to predict and auto-complete the address. Either hit the enter button or click the "Search" button to search for the location in the map window.
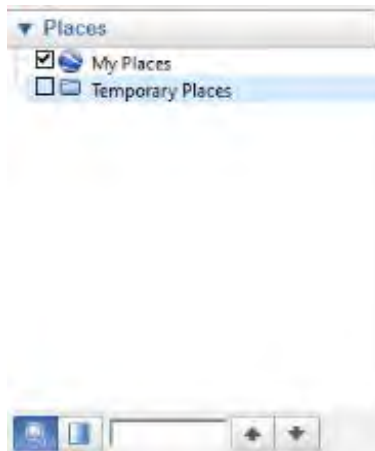
When you search for and find a place, load an existing place, or create a place, it will appear in the middle section of the left side bar labeled "Places" (see left). There are two automatic folders, "My Places" and "Temporary Places." You can organize these and create sub-folders as we will see later.

The final section of the left side bar appears at the bottom left corner of the screen and is labeled "Layers" (see left). This section contains checkable layers that contain different types of information that will appear on the map. Each layer has its own set of symbols. These symbols will appear on the map and can be selected to show an information box about each symbol.

Google Earth Pro

To expand layer sets, click the small boxes with a "+" symbol in them (see left). Already expanded sets can be collapsed by clicking the boxes with a "-" symbol in them. By checking or unchecking the boxes by each layer, the associated symbol will be added to or removed from the map. Google Earth Pro contains the same layers as Google Earth, but adds the layers found by expanding "Earth Pro (US)," which are US demographic layers, US Parcel Data, and US Daily Traffic Counts.

For all sections in the side bar, you can select the "▼" symbol by the section name to collapse the section and leave more room to view other sections. If you wish to reopen a section, the labels of the collapsed sections will still be in the side bar. You can expand collapsed sections by clicking the "▶" symbol by the section label.

Common and Useful Tools in Google Earth Pro

There are quite a few frequently used tools in Google Earth Pro. Some have buttons with icons for easy access along the top of the screen while others are found in drop down menus from the top of the window.
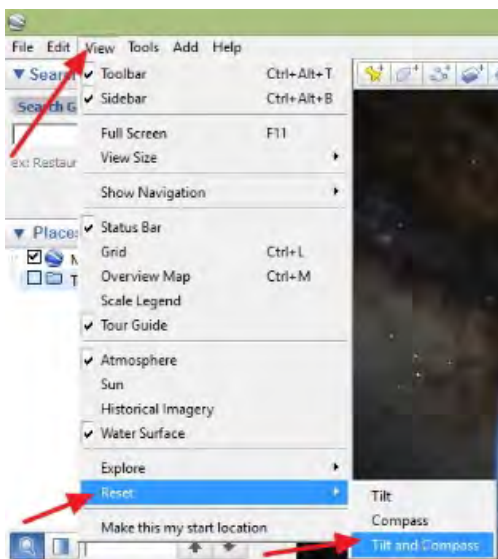

Occasionally, settings at a zoom level or embedded in a specific place will change the compass direction and imagery tilt angle away from the default. To reset either or both of these options, go to "View" in the top menu list, then select "Reset," followed by "Tilt and Compass" or either option individually (see left). This will return the view to directly above, and North to the top of the screen.

Google Earth Pro
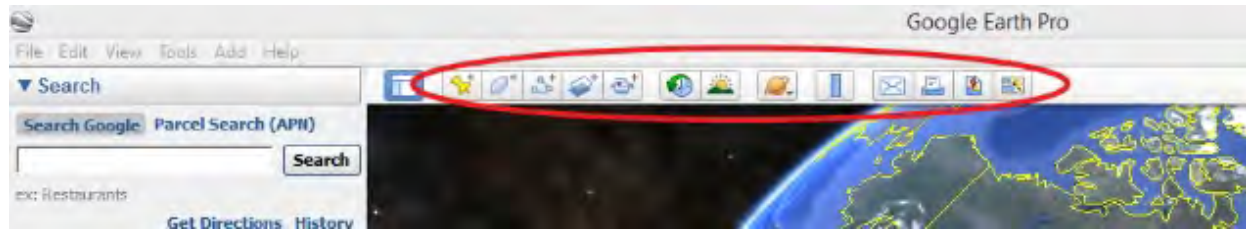
Other useful tools are located along the top of the map window (see above). The tools covered here are for creation and editing of places, changing imagery dates, measuring features, and printing and sharing maps. Additional tools include overlaying imagery, creating tours, changing the solar angle for different times of day, and touring the sky or other planets.

The tools in the first section, , are used to add content to the map such as places and additional imagery, or to create a tour. The pushpin icon creates a point, the irregular hexagon creates a polygon, and the three connected vertices create a path. These all will show up in the "Places" in the left side bar. The tools in the next section, , allow for additional imagery dates to be viewed or to change the sun angle for different times of day. The sky and its constellations, the Moon, and Mars can be explored, similarly to the way Earth is explored in this manual, by using the tool's drop down menu and selecting a different location. The tool allows for measurements to be made of features on the map. The tools in the last section, , allow maps to be created and shared with other users.
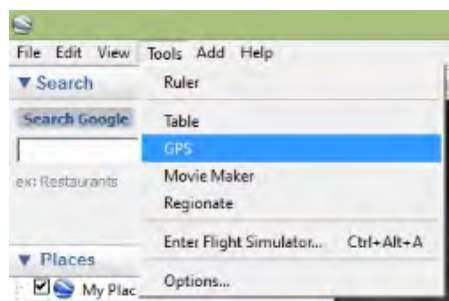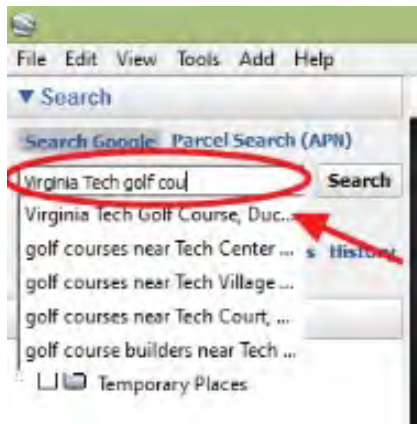
Additional tools can be found in the drop down "Tools" menu (see left). The GPS tool is useful for importing points from a GPS unit directly into Google Earth Pro. The tools is compatible with multiple brands of units, which interface with the tool when the user selects the unit from the GPS import wizard (see below).

Google Earth Pro


Exploring Places in the Map

Go to the "Search" section of the left side bar. Search for the "Virginia Tech Golf Course" (see left). Notice that Google attempts to predict and auto-complete likely places. Select the location on Duck Pond Drive and either hit enter or click "Search." The map will automatically zoom to the selected area.

Sometimes there are multiple locations that could have been intended in the search. In this situation, Google Earth Pro will list all options under the "Search" field (see below). You can view the address and some information about each to choose the best option. Notice that here, Google found both the golf course on campus, and the golf course at which the Virginia Tech Golf Team plays.
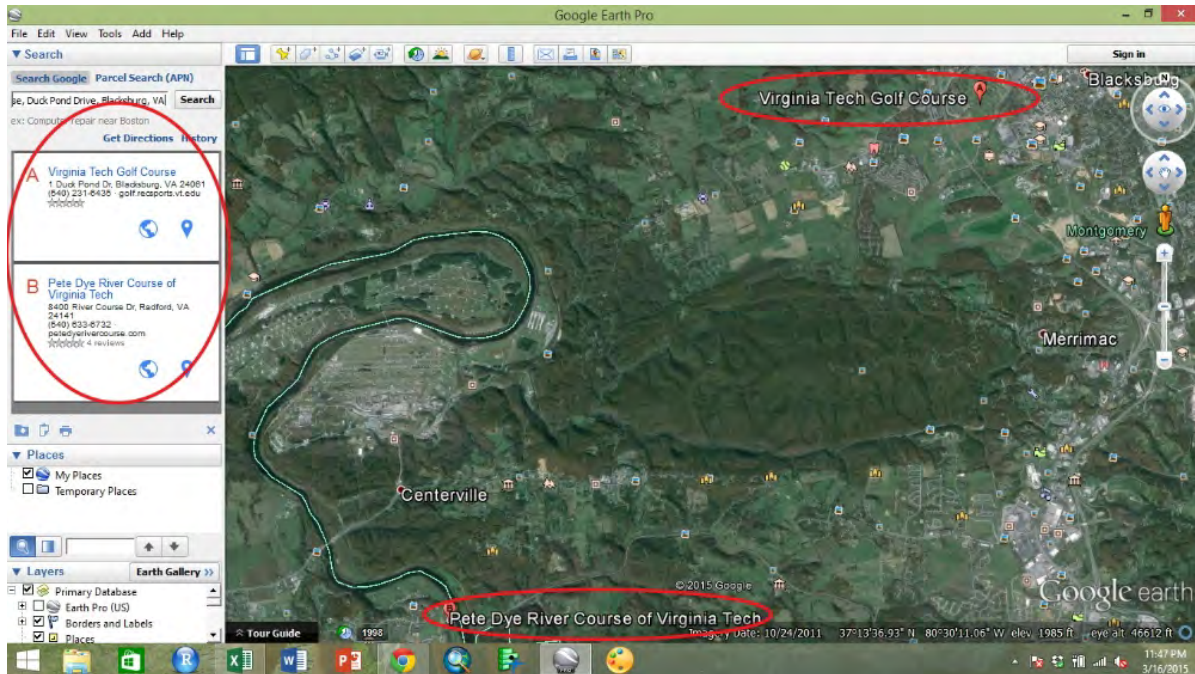
Double click on option "A," the course on campus to zoom in and center the map over that location (see below). You will see a red marker on the map at the golf course. There are also other symbols located across the map. The symbols correspond to layers that are turned on in the "Layers" section of the side bar. Clicking on these symbols will provide additional information.
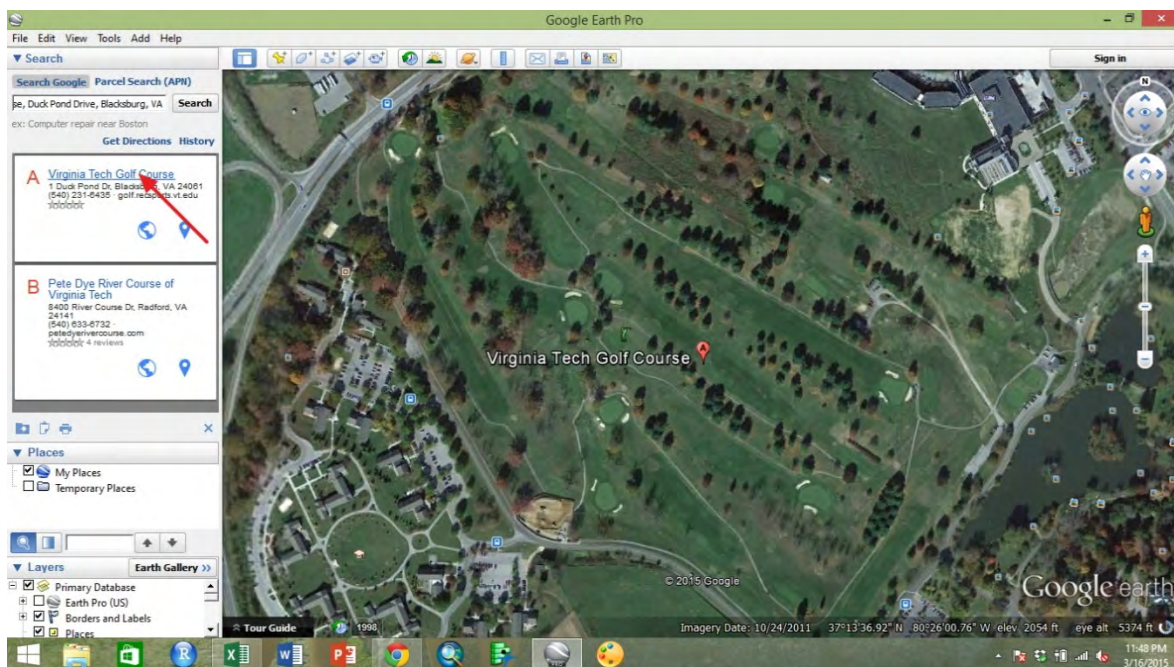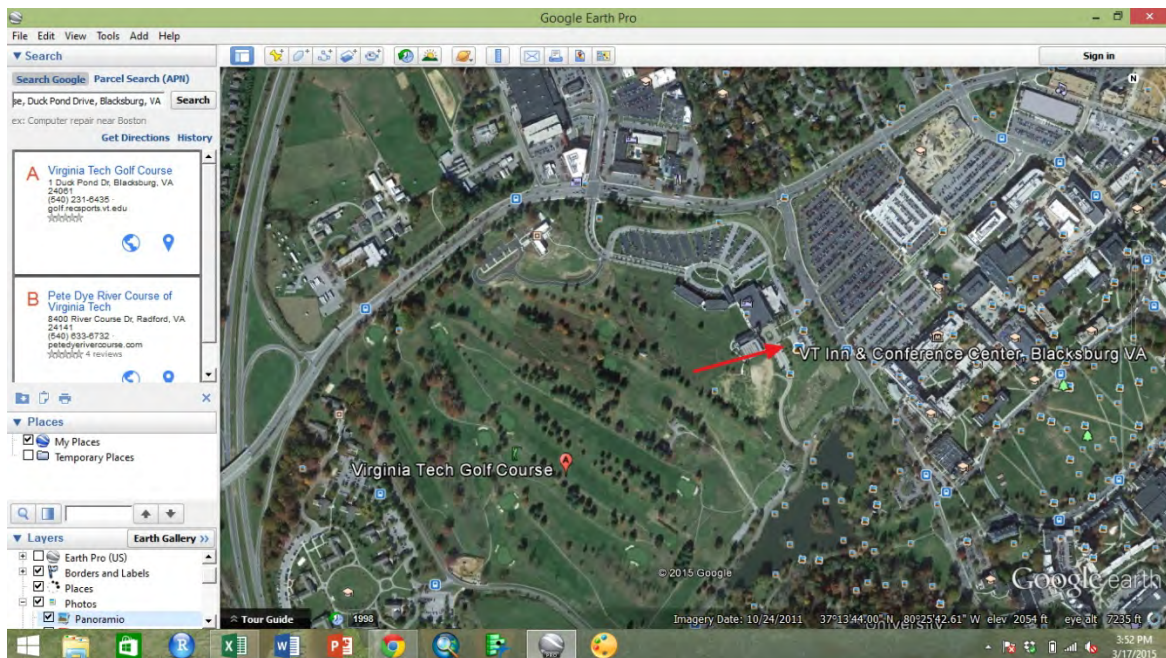
Google Earth Pro

Click square symbol indicated with the left arrow (below). A white box containing information about

that location will appear. The content can vary to include descriptions, addresses, place name, or links to

websites. Close the window by clicking the "X" in the top right corner of the white information window.
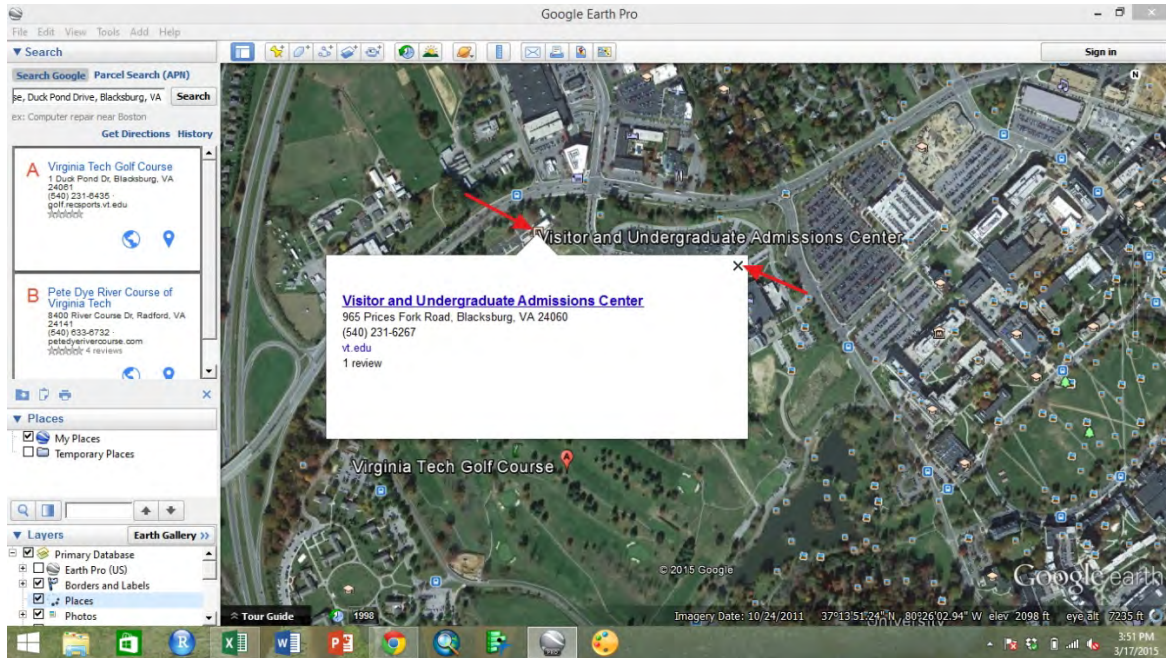
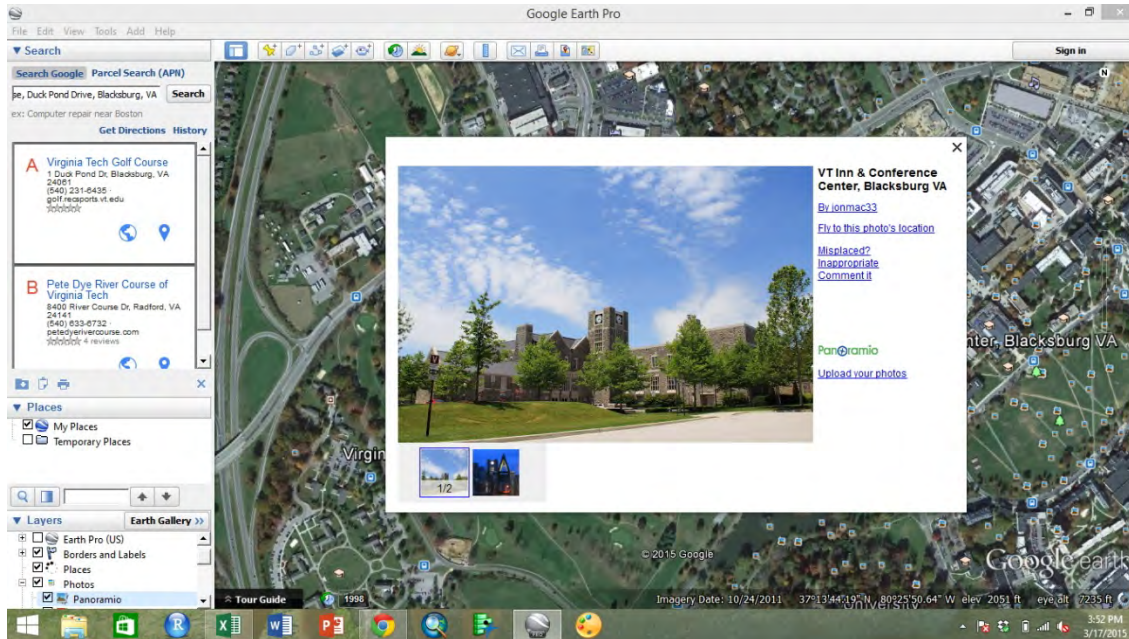

Next click on the photo symbol (see below).

Google Earth Pro

An information window similar to the previous one will appear, but this time with a photo associated

with the location (see below). Additional information or more photos may be available in the window.
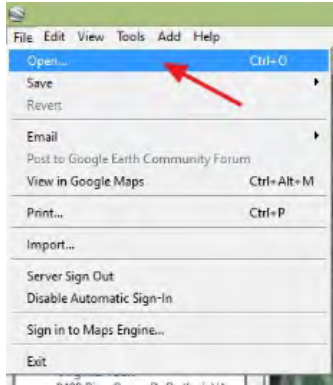
The photo window can be closed by clicking the "X" in the top right corner of the window.

Depending on which layers are turned on, additional information will be spread across the map. Here,

information about transportation, such as bus stops, is available by clicking symbols (see below).
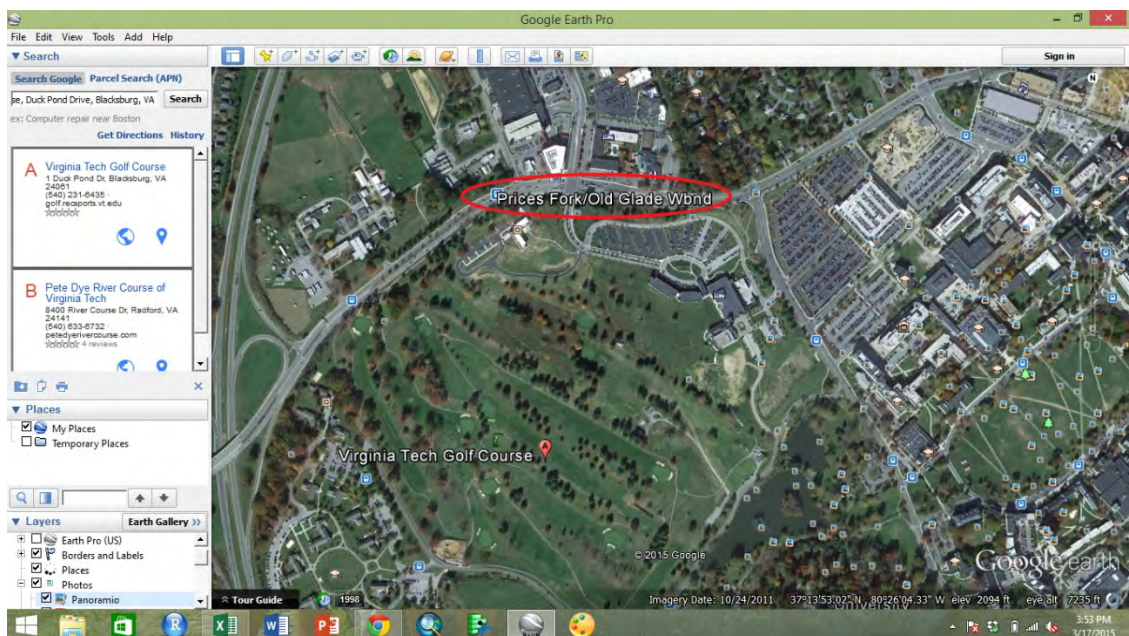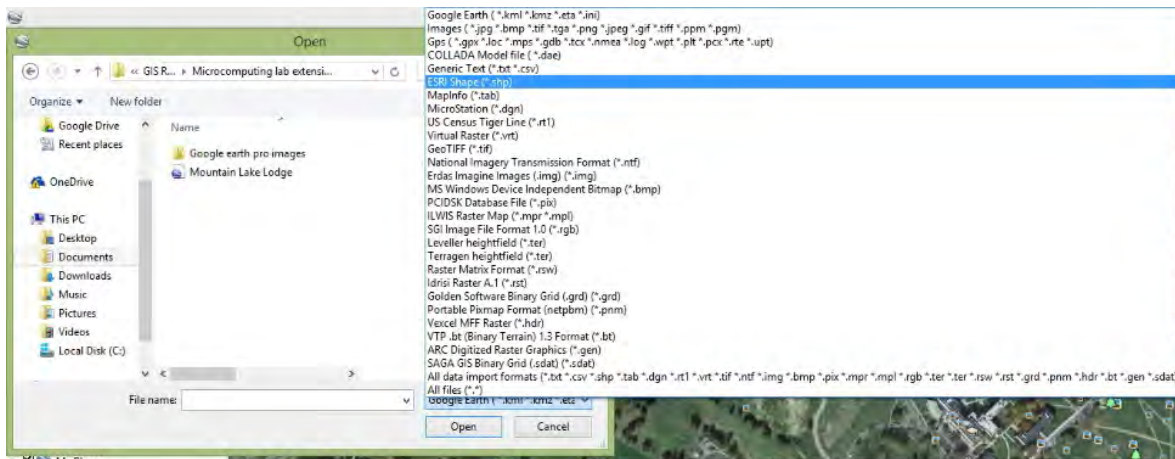
Google Earth Pro

Other place files can be opened and viewed in the map. Google primarily employs KML and KMZ files (keyhole markup language and keyhole markup language zipped files) in Google Earth. These files can be easily shared and viewed in Google Earth Pro. To open an existing file, select "File" from the menu at the top of the screen, then select "Open" (see left). Other types of files can also be opened here, including ESRI shapefiles (.shp), an additional format available to Google Earth Pro users (see below).
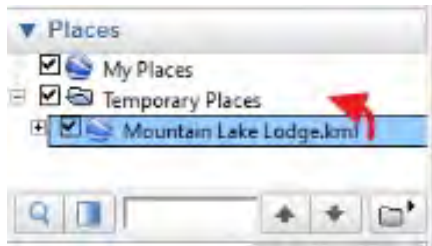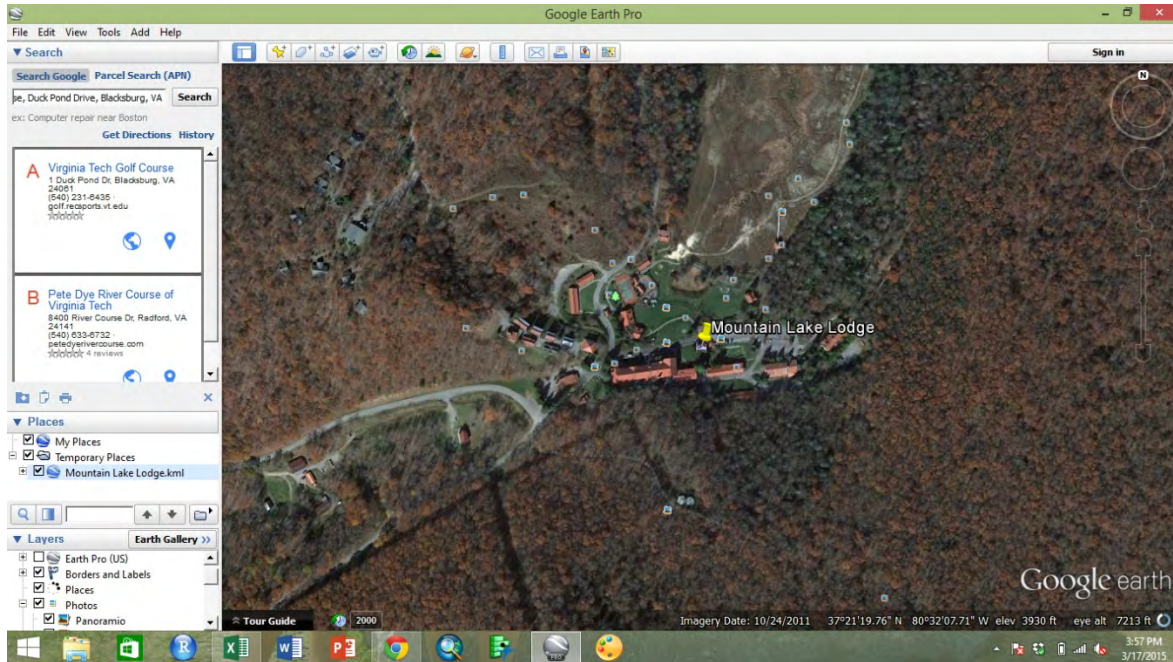

Here, after navigating to the correct folder, select the "Google Earth (*.kml, *.kmz, etc)" file type from the drop down menu and select the "Mountain Lake Lodge" KML and then click "Open" (see below).

The KML will open and zoom to a newly created placemark in the map (see below).

Notice where the KML is located in the "Places" section of the sidebar (see left). The file will appear in the folder that was already highlighted. Here, "Temporary Places" was highlighted, so the file is now stored in a temporary location. To make this file permanent, left click and drag the KML to "My Places."
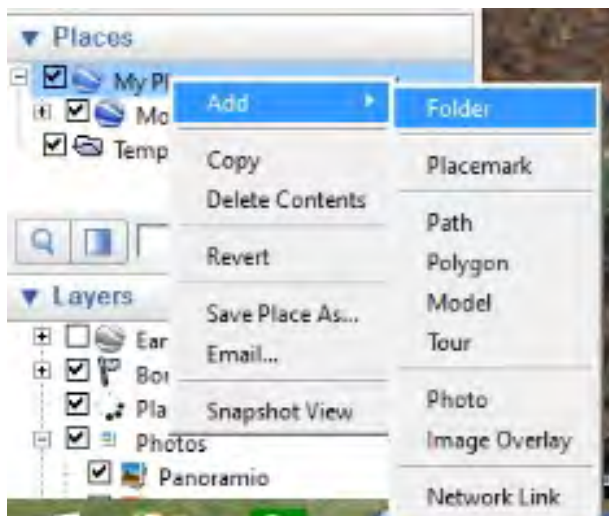
To organize "My Places," you can create folders (see left). Right click on "My Places" and then go to "Add" and "Folder." Once you start organizing your places with multiple folders, you can selectively turn on or off individual places or entire folders at a time by checking the associated box. This allows for reduction of map clutter while working on individual projects.

When you have clicked "Folder," the "New Folder" window will appear (see left). Name the folder by filling in the field for "Name." You can select the option of allowing the folder to be expanded, which can be useful if you want the option of turning only some of the contained places on or off at one time. You can also allow for a radio button to be used if you will only want one file from a folder to be turned on at a time.

Add a description about the contents of the file if desired, and click "OK" to create the new folder. Here, for now, leave the settings at their default, and name the folder "Workshop." Once the folder is created, you can move it or put it into an already existing folder by dragging it in the "Places" section.

Creating and Editing Places

Highlight your new "Workshop" folder in "My Places." Select the "Add Placemark" tools, or the pushpin
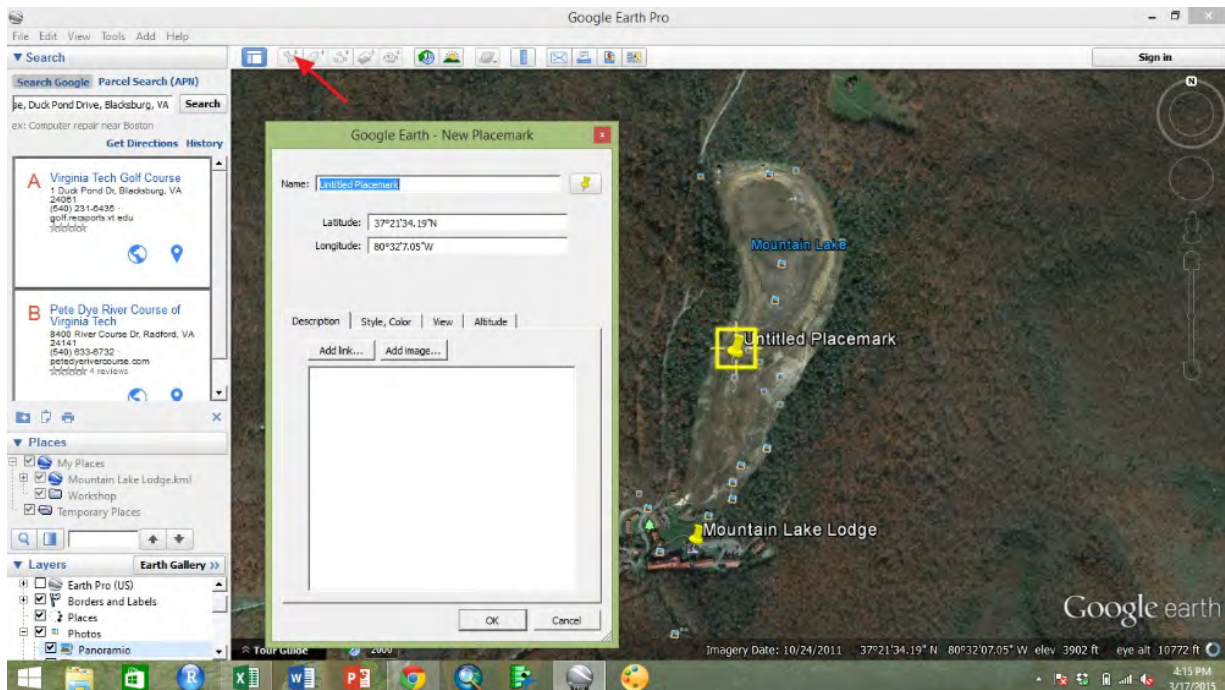
button (see above). A yellow pushpin will automatically appear in the middle of the screen. Move the

pushpin to the desired location by clicking and dragging it to the middle of the lake bed (see below).

Rename the placemark "Mountain Lake" in the "Name" field. Do not click the red "X" in the top right of

the window or click "Cancel" unless you do not want to save the place and place information you

created. When you are finished adjusting the location, information, and style of the placemark, be sure

to select "OK."
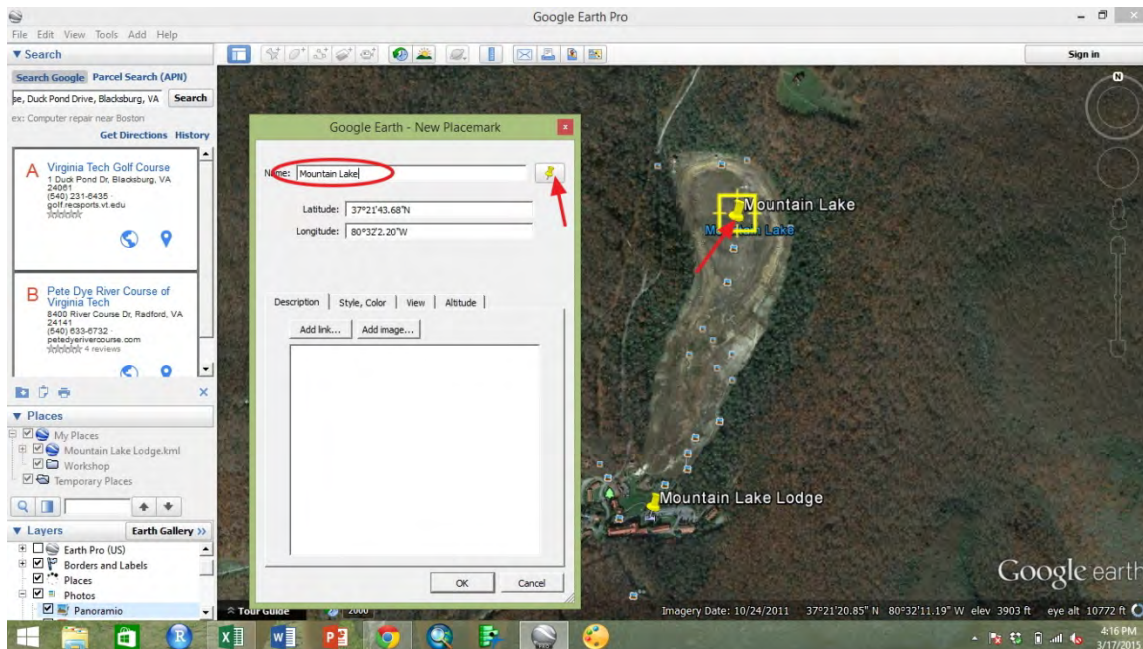
You can click the pushpin symbol in the "New Placemark" window to change the symbol of the placemark. A variety of symbols are available (see left). You can also edit the color and size of the label that goes with the marker. You can also select "No Icon" or create a custom icon symbol using the bottons at the bottom of the "Icon" window.
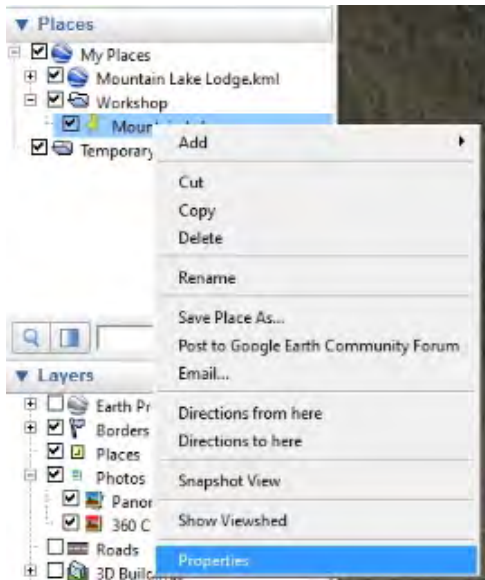
After a place has been created and is listed in the "Places" section, you can always go back and edit it. Right click the place, and then select "Properties" (see left).

A window will appear to allow the place to be edited (see left). You can change the symbol or name. While this window is open, you can move the placemark to a different location by dragging it across the map. You can also add website links or photos. Remember to click "OK" to save any changes made to the place.

Another benefit of the properties tab for points is that the latitude and longitude are saved with the place, and can be accessed at any time through the properties menu.

This method of editing places or accessing measurements works for points, polygons, and paths. The measurements available for each will vary.

Next, adjust the zoom level of the map so the map window contains the entire map bed and the resort.

To create a polygon, select the "Add Polygon" tool (see below). A "New Polygon" window will appear. If

the window covers an area you are interested in, simply click the top of the window where the title is,

and drag it out of the way. Edit the "Name" field to title the new polygon "Lake." You can add a

description or add photos and website links at this point. Next, select the "Style, Color" tab. Select a line

color that is easy to see on aerial imagery, like yellow or magenta. Adjust the line width to make it easy

to see on the map with a value like "2.0." Then, adjust the area by selecting "Outlined" from the drop

down menu. This will make the polygon you create have no fill so you can see the imagery beneath it.

Alternatively, you could leave the polygon filled, but adjust the opacity level to make the fill fairly

transparent.
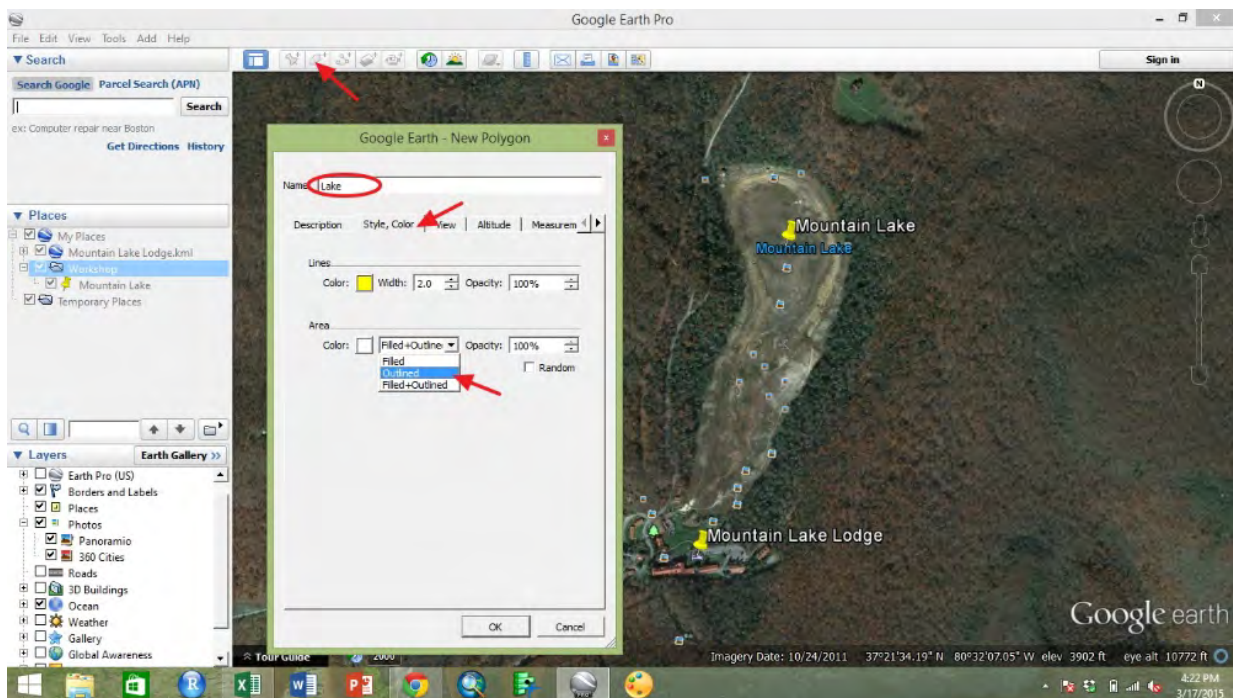
Next, you will begin to outline the polygon on the map. Google Earth Pro will attempt to "close" the

polygon as you add vertices. Be sure to follow the edge of the feature you are tracing all the way around

either clock-wise or counter-clock-wise in a consistent direction. Click to add vertices as you go around

the outside edge of the lake bed. Place vertices close together to create short, straight segments that
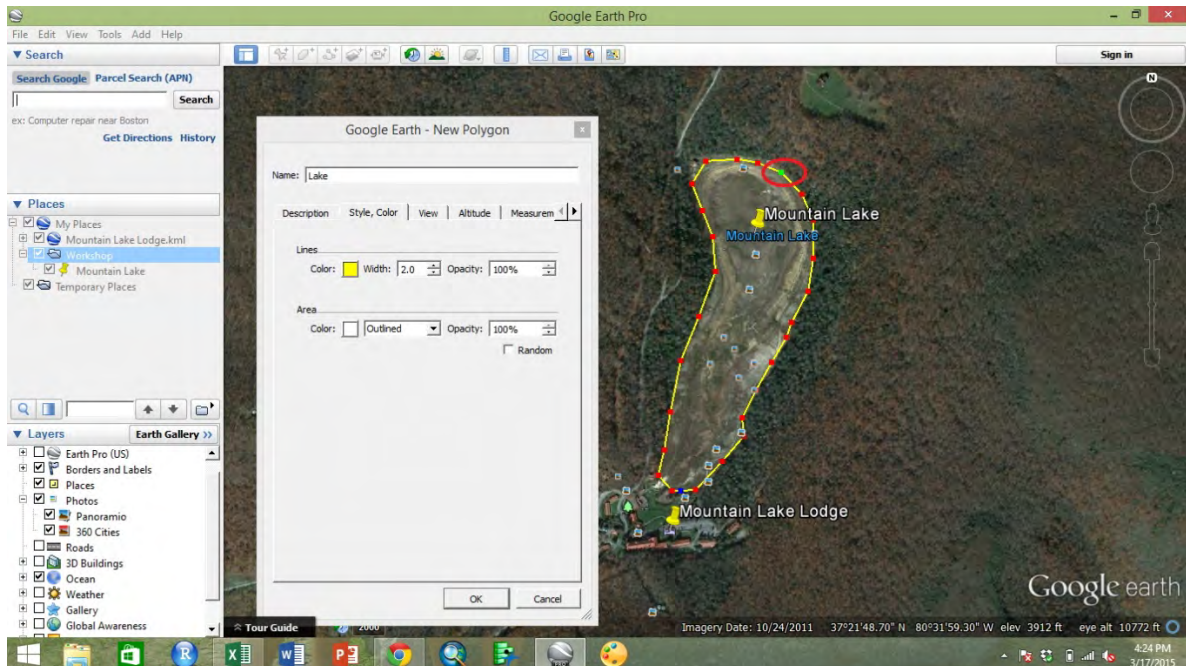
resemble a curve. As you add vertices, the most recent one will show up highlighted in a different color

(see below). The cross hairs will show where the next vertex will be.
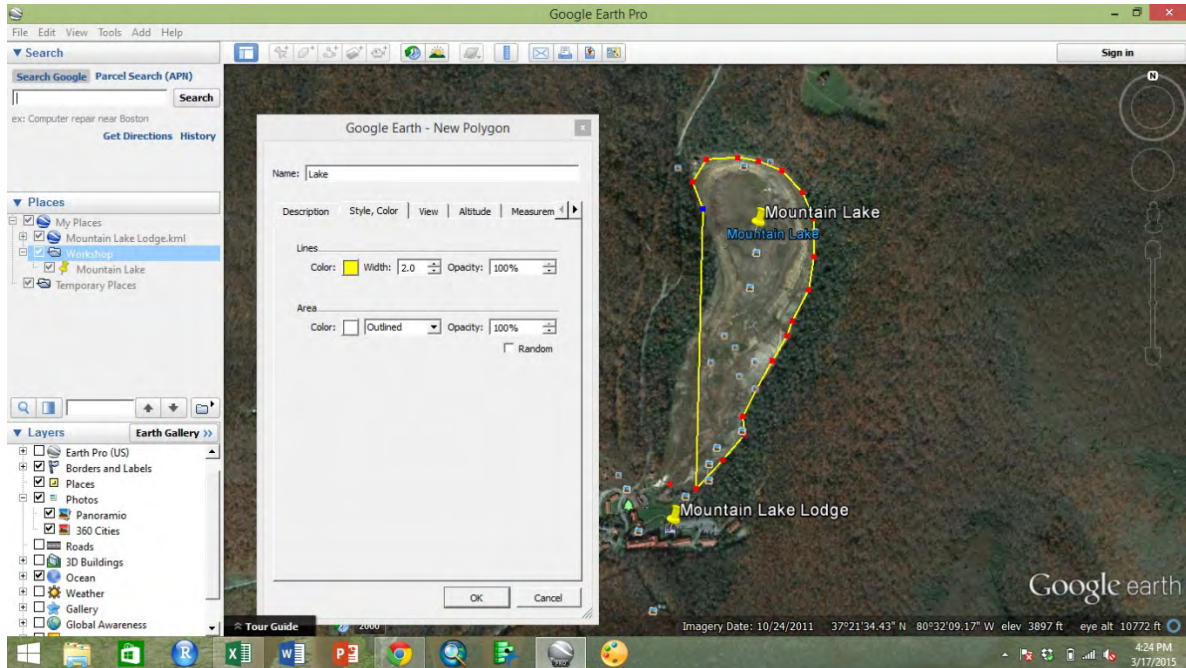
To edit a polygon, hover the mouse with the cross hairs over the vertex you wish to edit until the cross

hairs disappear. Then click the vertex to select it (see below). It will change colors when selected.

When you have highlighted a vertex, you can drag it to a different location. If you wish to add additional

vertices, they will be added after the highlighted vertex by clicking either clock-wise or counter-clock-

wise after the highlighted vertex in the direction the polygon was created. If you create a vertex you

wish to delete either while creating or editing a polygon, either click the right mouse button or hit the

delete button while the vertex you with to remove is highlighted. Remember to click "OK" to save

changes.
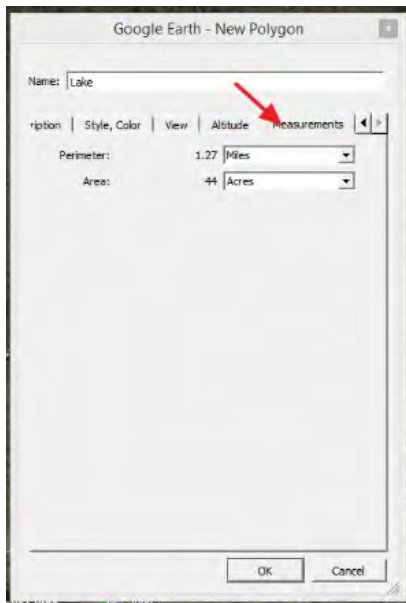
In Google Earth Pro, measurements of polygons are available. Either while creating a polygon or while editing it, select the "Measurements" tab (see left). Perimeter and area are available measurements. You can use the drop down menus to change the units of measure. Occasionally, a measurement will show up as zero when it should not. To fix this, switch between units of measure until the measurement refreshes.

To create the final shape, select the "Add Path" tool (see below). A "New Path" window will appear.

Write "Road" in the "Name" field. You can add additional information about the place or add a photo or

website link under the "Description" tab. Click the "Style, Color" tab, and adjust the color and linewidth

to something that is easy to see. Click where the cross hairs are to add vertices along the desired path in

the map window. To undo a vertex, hit delete or click the right mouse button. Edit the middle of the

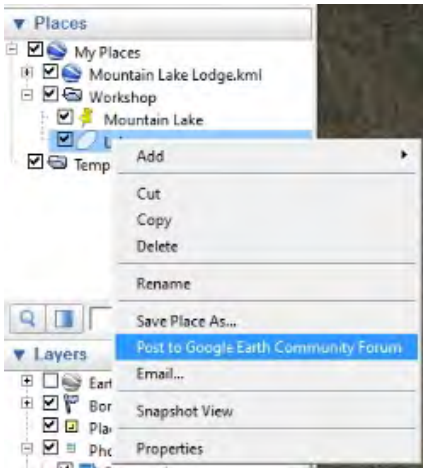path by highlighting a vertex and moving it or adding additional vertices after it by clicking along the

path.
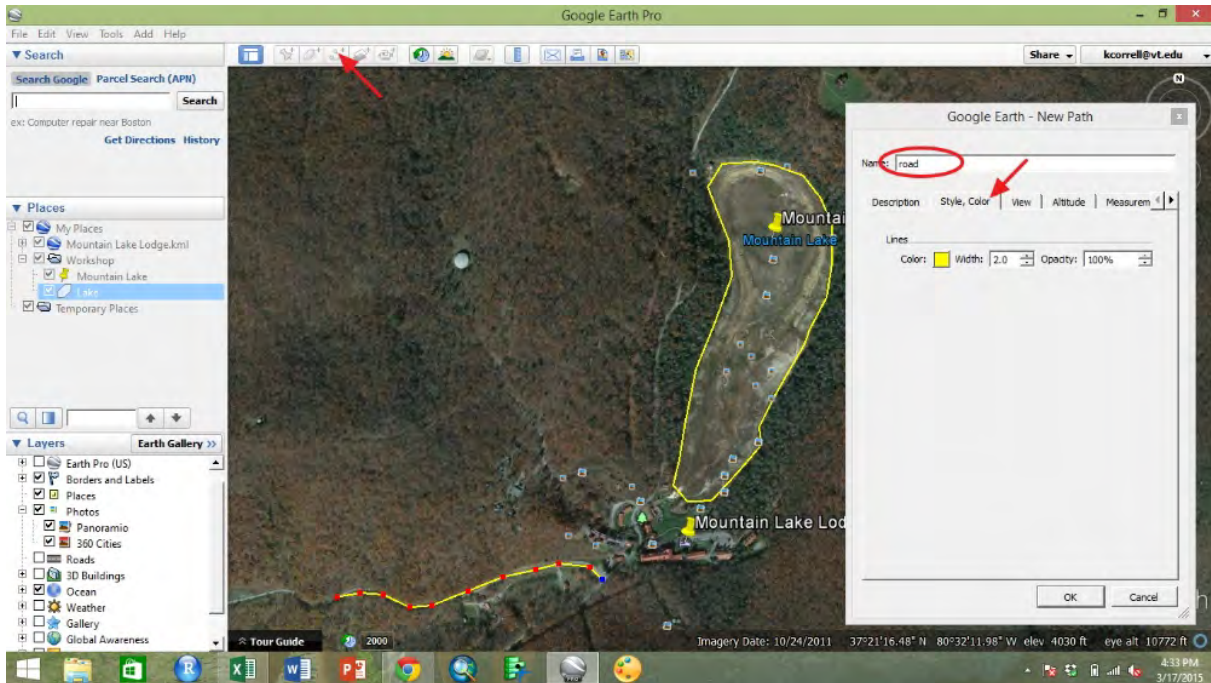
Click the "Measurement" tab to view the path length (see below). Change the units by selecting other units of measure from the drop down menu. Click "OK" to save the created or edited path. Remember to add points that are close together to approximate a curve.

When you add places to the map, this information will only be available to you and those with whom you share place files. If you add places or photos to the map, your data will not be shared with other Google Earth Pro users unless you intentionally do so. This option can be found by right clicking on an item in "Places" and selecting "Post to Google Earth Community Forum" (see left).
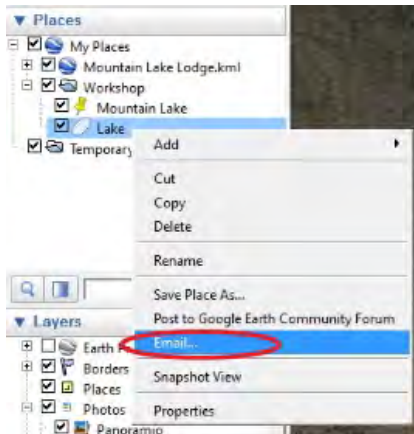
An easier way to share places with others is to email them a KML. To do this, right click an item in "Places" and select "Email" (see left). This allows the option of sending a small file that they can open independently in Google Earth or Google Earth Pro. If you wish to share large assortments of places and photos, consider creating a tour and sharing that instead.
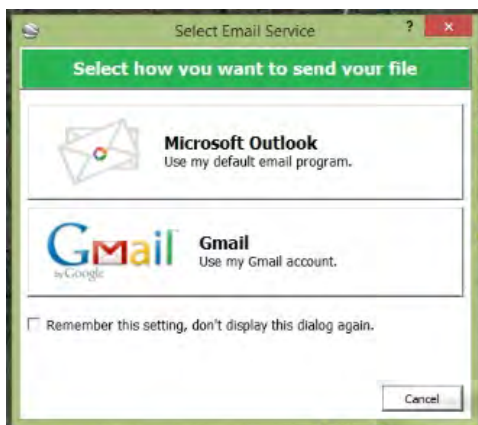
If you select the "Email" option, the "Select Email Service" window will appear (see left). You can select between Microsoft Outlook or Gmail. You can allow Google Earth Pro to remember this selection so you will not have to choose this option every time you share a file by email. When you select your email service and login, you may need to right click your place and select "Email" again to bring up the message options.
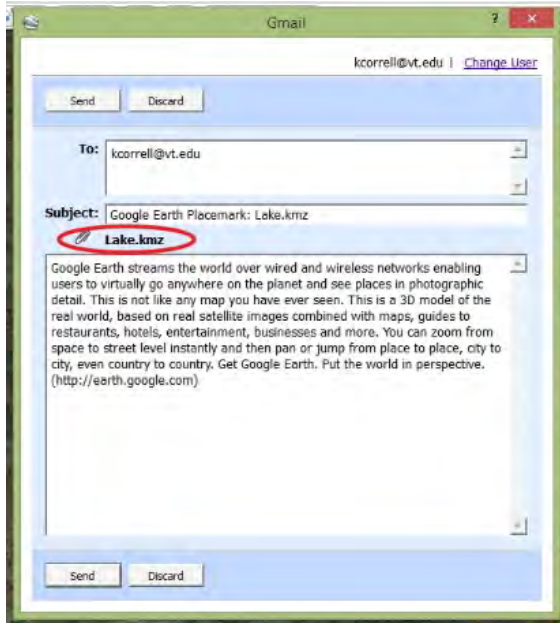
A preformatted email will appear (see left for Gmail as selected email service). Enter the email address you wish to share your file with in the "To" field. Notice that Google Earth Pro defaults to sharing a KMZ file. This is the compressed version to save space. You can edit the message or leave as is. Press send to share the file.
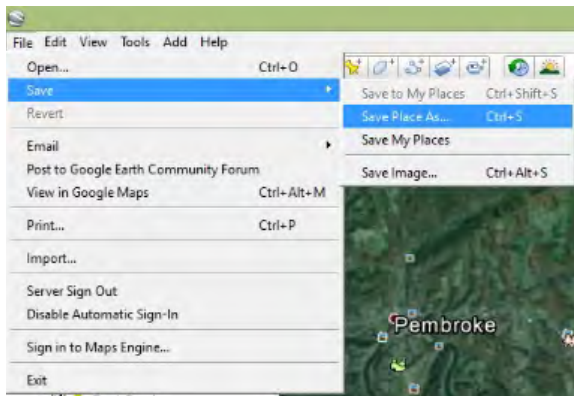
Be sure the file you wish to save or share is highlighted.To save a place as a KML, select "File" from the menu at the top of the screen, then select "Save" and "Save Place As…" (see left). When the "Save" window opens, navigate to the folder you wish to save in, name the file, and click save. You can use this file as an email attachment if you do not use either email service option given in Google Earth Pro.

Now, search for "Duck Pond" in Blacksburg, VA (see left). Search for this location, and select the pond near the golf course from earlier.

Add a placemark in the pond on campus (see below).
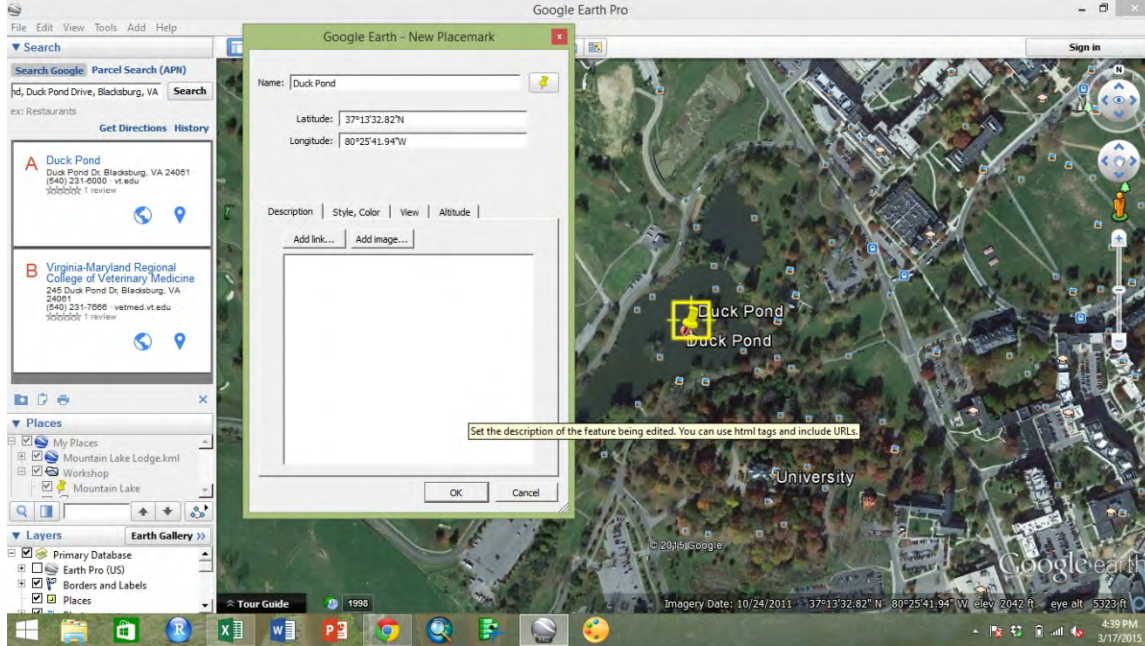
Ruler Tool

Zoom out so that the pin for Mountain Lake and for the Duck Pond are visible in the screen (see below).
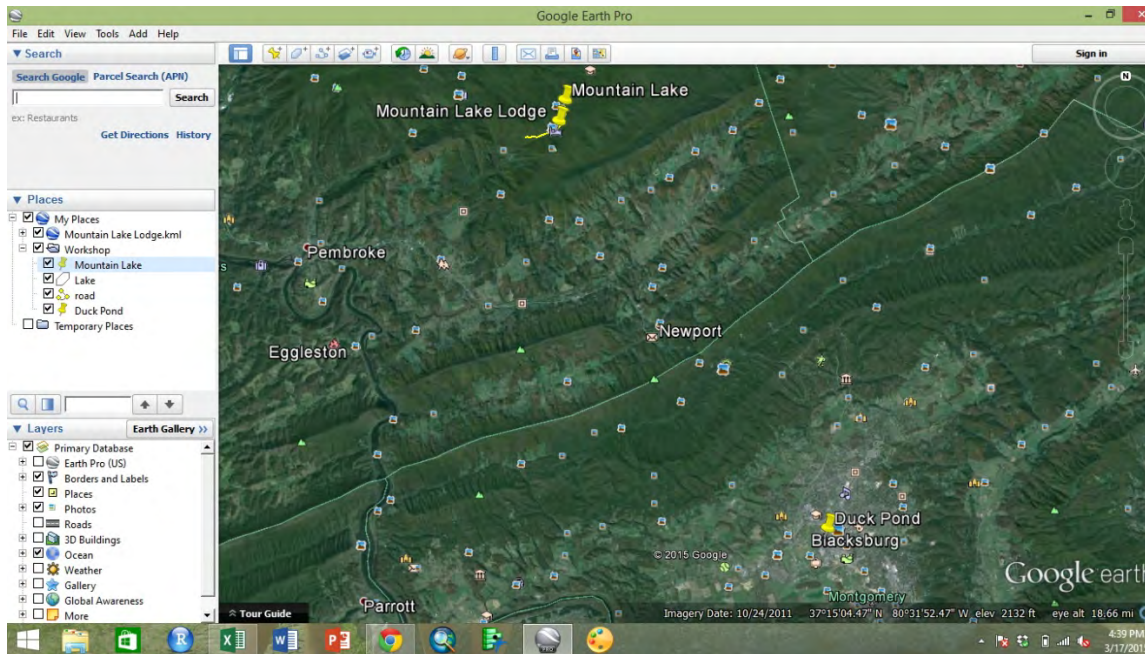
Select the "Ruler" tool from the tool icons (see below). Be sure the "Line" tab is selected and click the

Mountain Lake placemark.
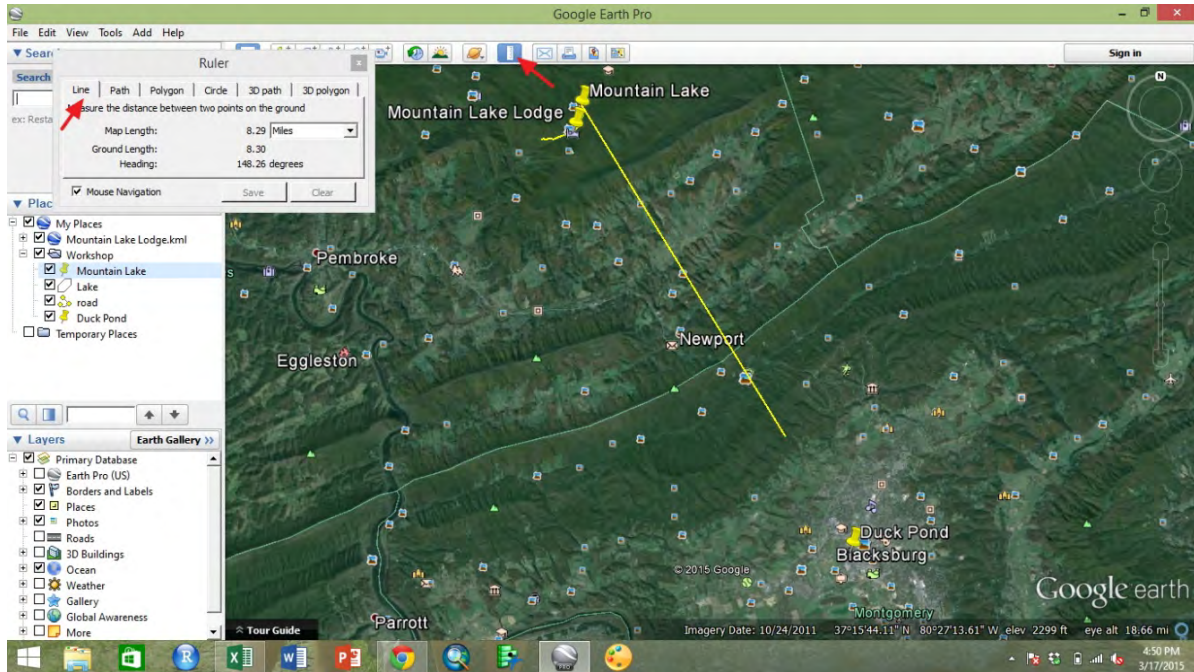
As you move the mouse across the screen, a line will appear between your mouse location and

Mountain Lake. As you move the mouse, notice that the map length in the "Ruler" window updates.

Click on the Duck Pond placemark to finalize the line between the two placemarks (see below). Use the

drop down menu in the "Ruler" window to choose the units of measure that you are interested in.
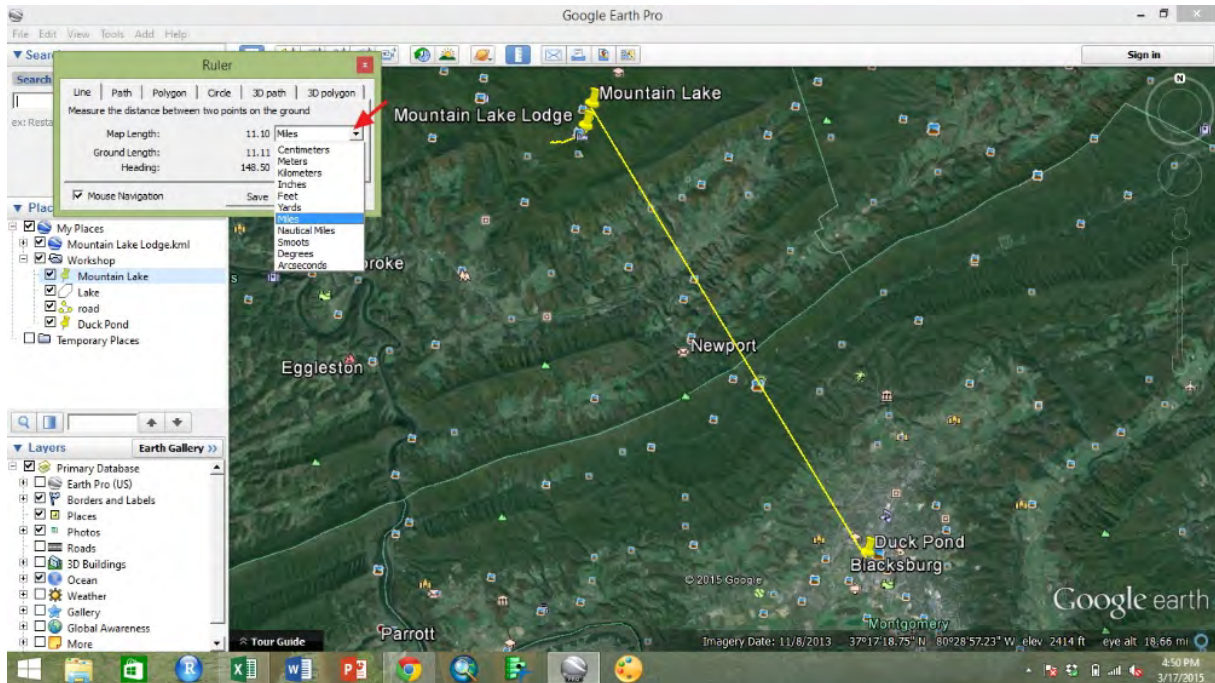
While places have measurements associated with them in their properties, the ruler tool is useful for measuring things for which you do not wish to create an object. If you decide after using the ruler tool that you would like to save your measurement as a place, click "Save" to open the menu from creating a place, and edit the properties such as name and style as you see fit. If you do not wish to save your measurement as a place, click "Clear" to begin a new measurement.

The "Ruler" tool can measure lines, paths, polygons, circles, 3D paths, and 3D polygons. Each type of measurement has its own tab in the "Ruler" tool. "Line" measures a straight line distance between two points. "Path" allows for distance to be measured over multi-segment paths to capture more complex shapes than "Line" does. Polygon allows for area and perimeter to be measured. For "Circle," select the center of the circle and then a point on the outside edge, or on the circumference. The returned measurements are area, radius, and circumference. Both 3D options take topography into consideration and can be used with vertices that have a height component.

Historical Imagery Tool

Select the "Historical Imagery" tool (see below). A tool will appear in the top left of the map window.

The tools includes a timeline with a slider that has markings when each date of imagery is available. You

can drag the marker along the slide bar or you can use the fast forward or rewind buttons to click

through the available imagery. Notice that along with a date marking in the tool, the date is also listed at

the bottom of the map window. In the default imagery, notice the water level in Mountain Lake. The

lake bed is entirely dry.
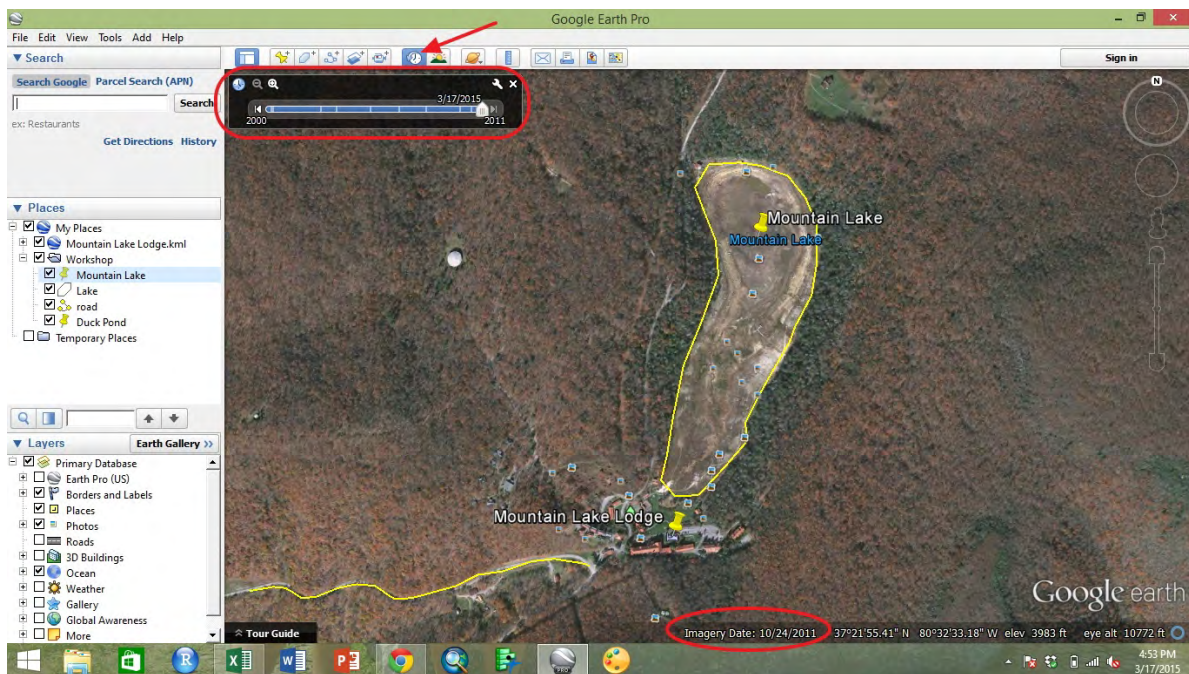
Press rewind until you reach the imagery from September 9, 2010 (see below). Notice where the water

level in the lake is in this imagery. There is only a small amount of water in the deepest part of the lake.

The "Historical Imagery" tool can be very useful for discovering land cover and land use change. While

imagery dates are not always close enough together to pinpoint dates of change, this tool can be useful

for identifying these trends. Remember that different imagery is available at different scales, so

sometimes zooming in or out some will make different imagery dates available.
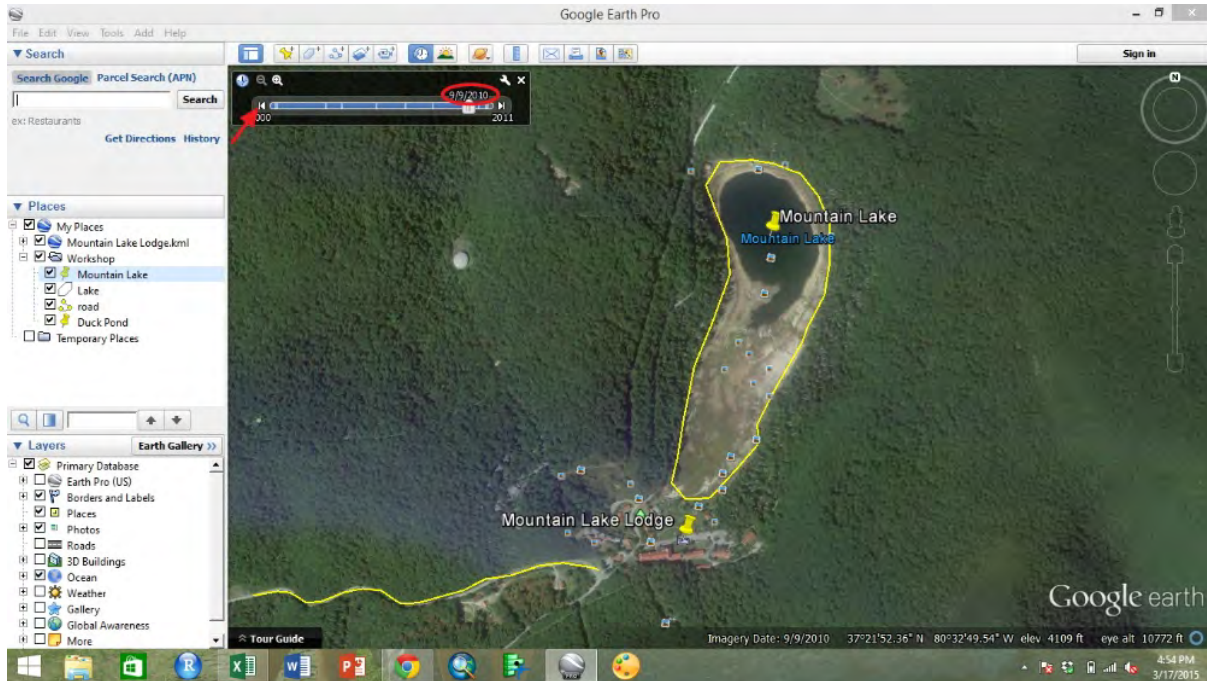
Go back to September 22, 2005 (see below). Notice that the lake is full. Also notice the difference in the date listed at the bottom of the map window and in the tool bar. These differences can occur from imagery acquisition and processing dates or for other reasons.
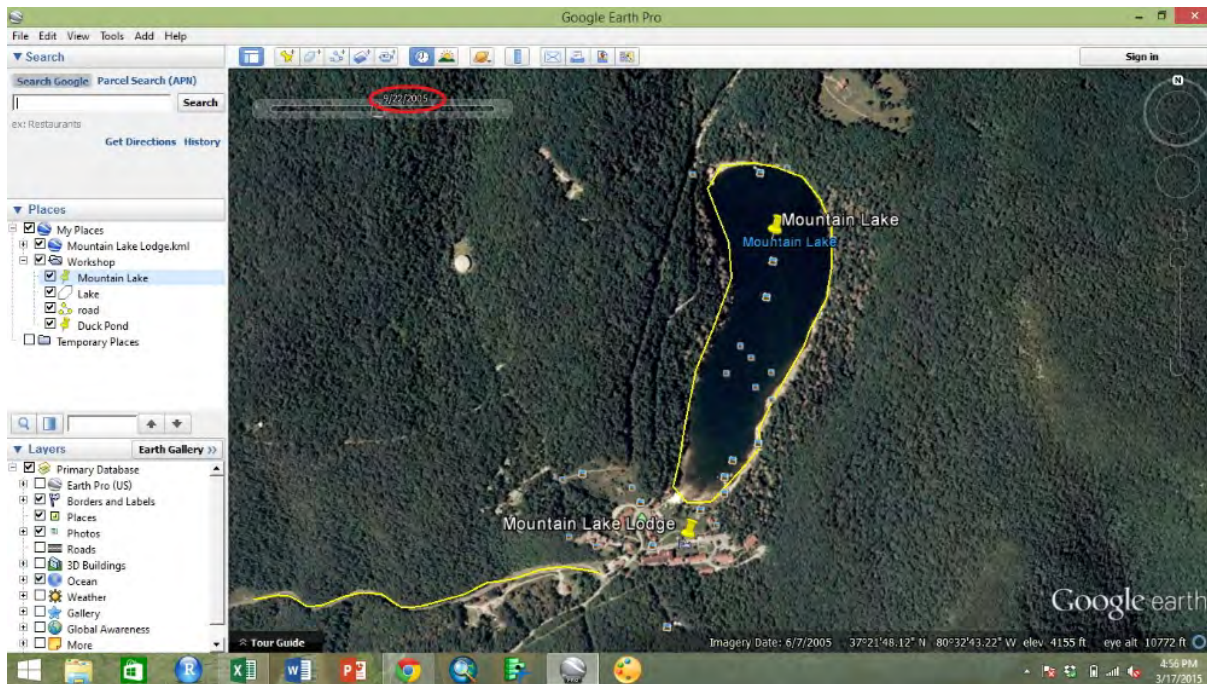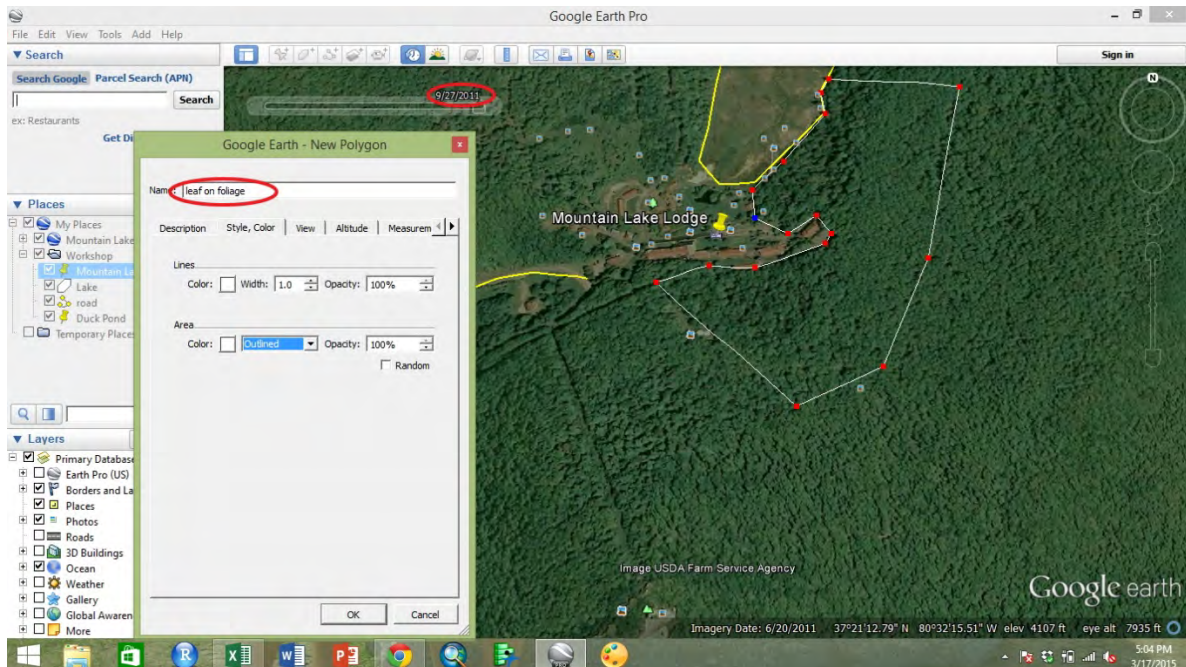
Google Earth Pro

Zoom in slightly and adjust the center of the map (see below). Pay attention to the area in the red box.

This imagery is from October of 2011, and the deciduous trees have clearly changed color or lost their

leaves.
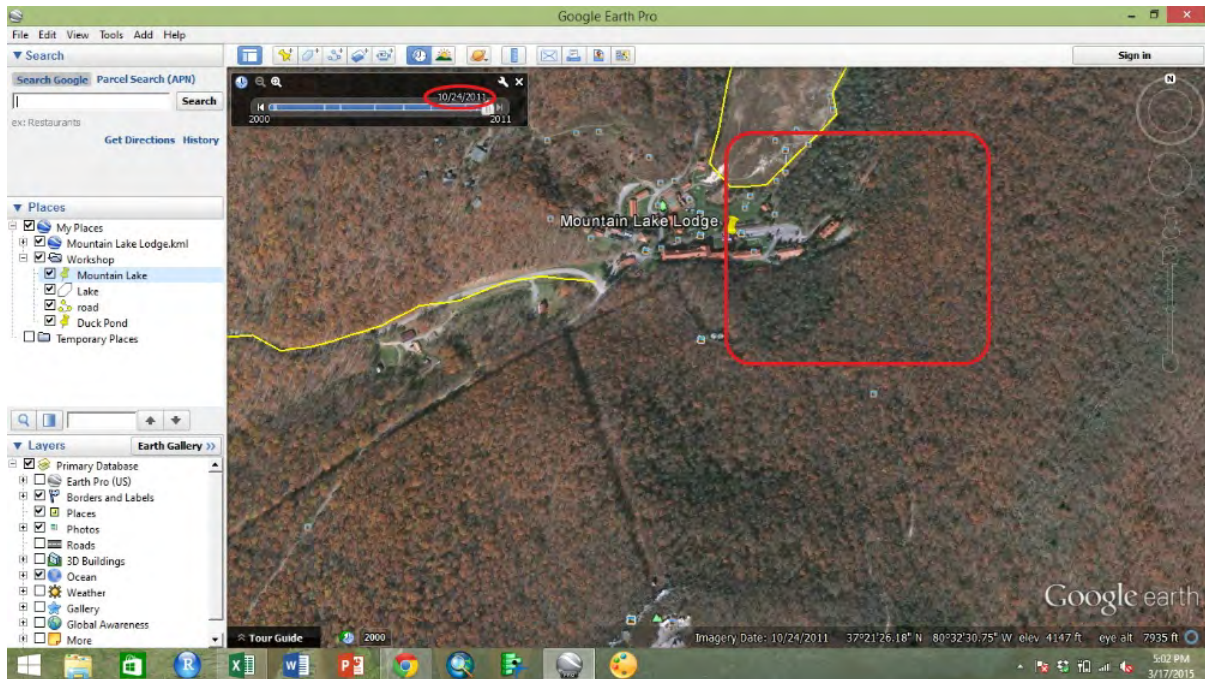
Change the imagery date to September of 2011 (see below). Add a polygon around some of the trees

near the lake and resort to show an area or trees with summer foliage. Once a "leaf on" area is traced,

change the imagery back to the October of 2011 imagery (see below). Now trace "leaf off" polygons

around the areas that still have foliage after the deciduous leaves begin to change.
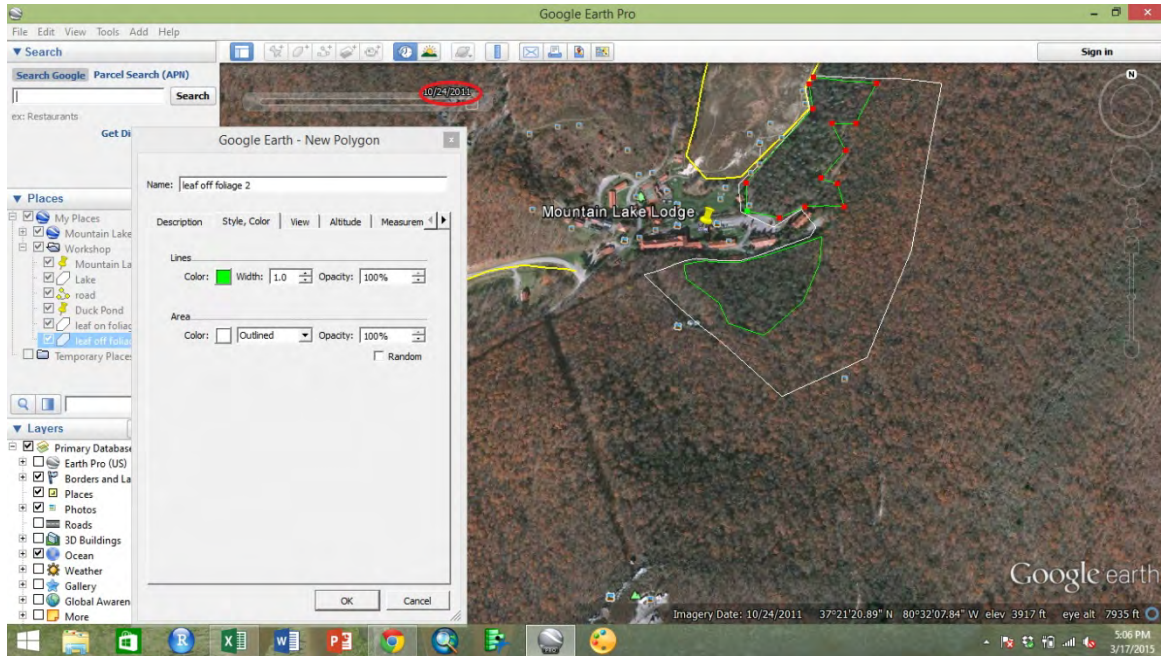
Compare the areas from the "leaf on" and "leaf off" polygons (see below). Mapping areas that retain
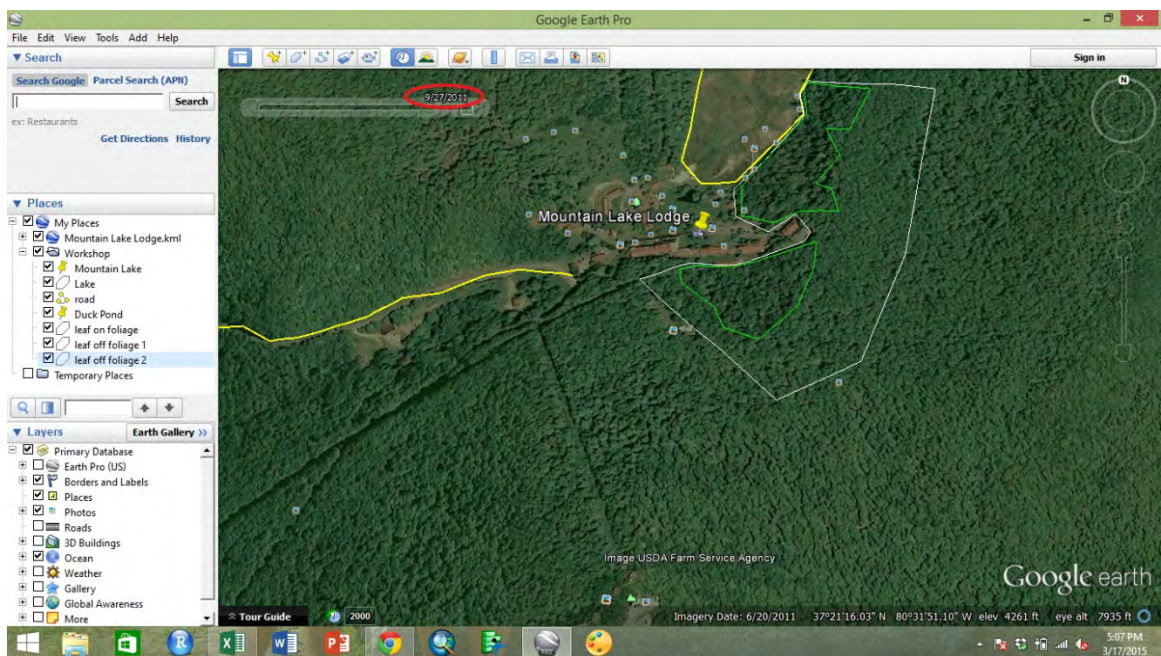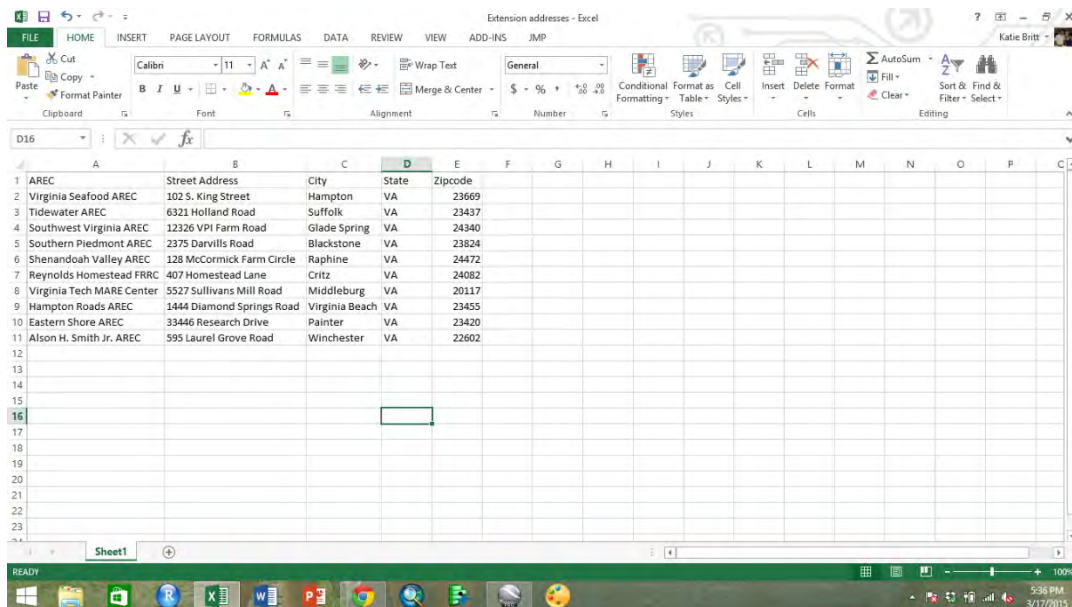
foliage during the winter, or in "leaf off" imagery can allow for differentiation of deciduous and evergreen forested areas. While winter imagery may not always be available in the "Historical Imagery" tool, it may be helpful to check different scales of imagery, as some satellite data that is available at a coarser resolution is available more frequently. Be careful of differentiating these forest cover types from imagery that was taken years apart. Other land cover changes may have occurred in that time frame that could be misinterpreted as foliar differences.

Geocoding an Address File

Google Earth Pro has a tool for importing and adding files of locations to the map as individual placemarks. Open the provided file of address of Agricultural Research and Extension Centers (see below). Be sure the file is saved as a .csv.

Select "File" from the menus at the top of the screen, then select "Import" (see left). The "Open" window will appear (see below). Navigate to the folder where the file is saved. Select "Generic Text (*.txt, *.csv)" from the drop down list of file types. Select the "Extension addresses" file and click "Open."
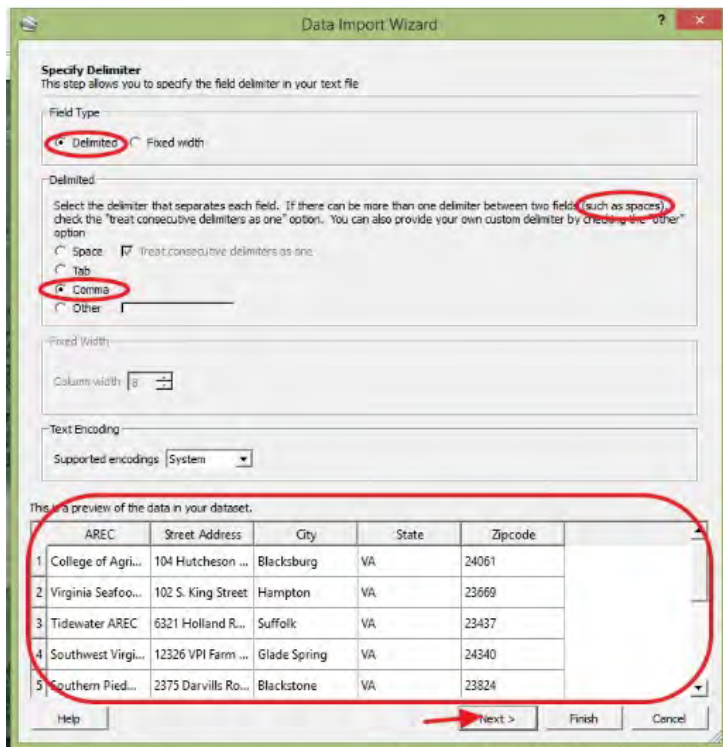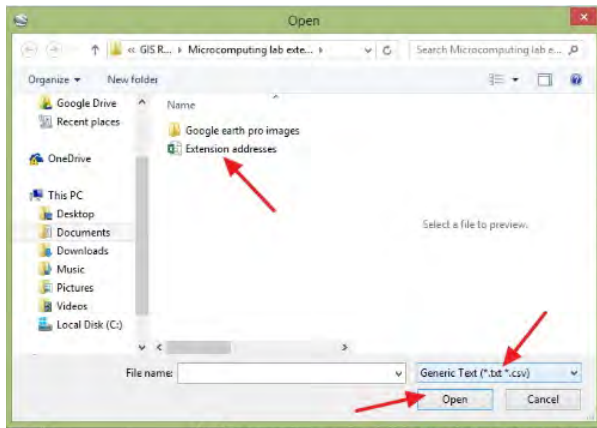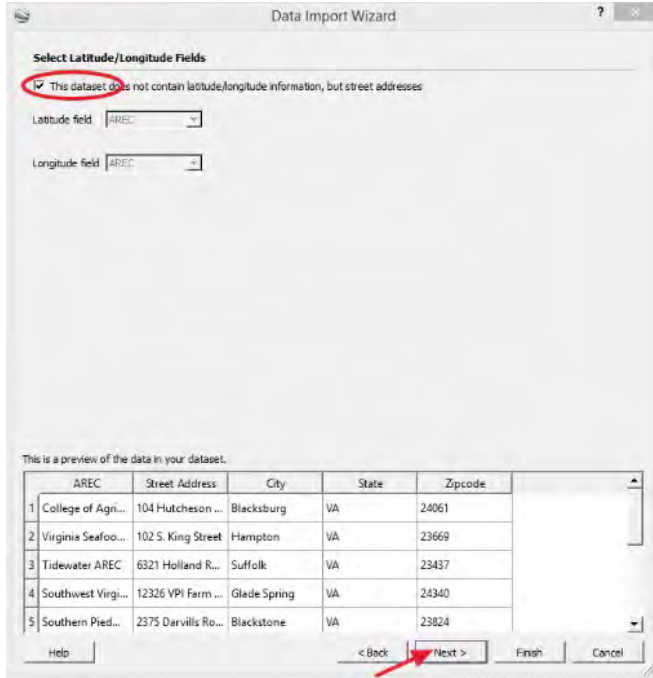

A "Data Import Wizard" window will open (see left). Select "Delimited" and "Comma." If addresses are not formatted consistently (some with street addresses requiring two columns), we would select space and check the box.
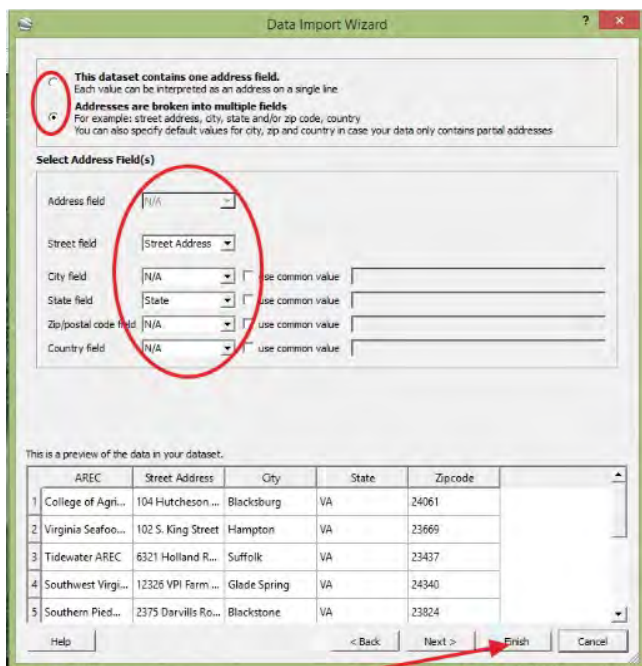
Check the preview area to make sure the addresses are formatted consistently, and click "Next."

In the next screen, check the box saying that the dataset do not contain latitude or longitude (see left). This type of data is supported by the wizard, but our dataset does not include it. Click "Next."
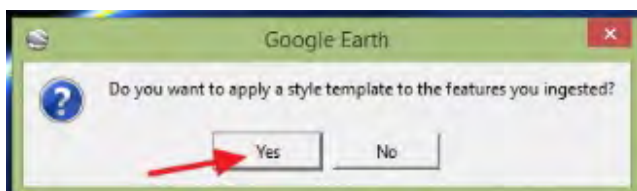

In the next screen, be sure that the radio button is selected for addresses broken into multiple fields (see left).

Next, check that the header of each column matches the field it is being read to.

Click "Finish."

When asked if you would like to apply a style template the imported features (see below). Select "Yes."

A "Style Template Settings" window will appear (see below). Under the "Name" tab, use the drop down menu to select the field containing the name of each feature. For this dataset, select the "AREC" field. Click "OK."
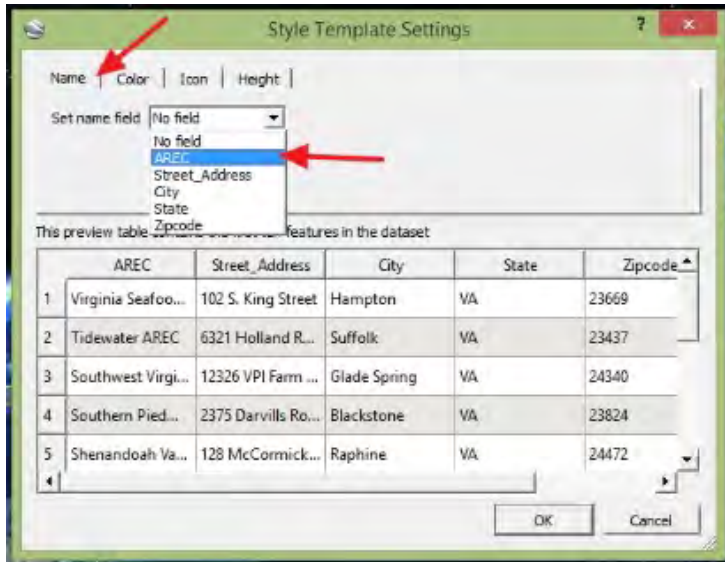

Next select the "Icon" tab (see below). Use the drop down menu to select an icon for each AREC placemarker. Then click "OK." If you are asked if you wish to save your template, you can select no since the template here is only lightly customized and probably will not be used again.
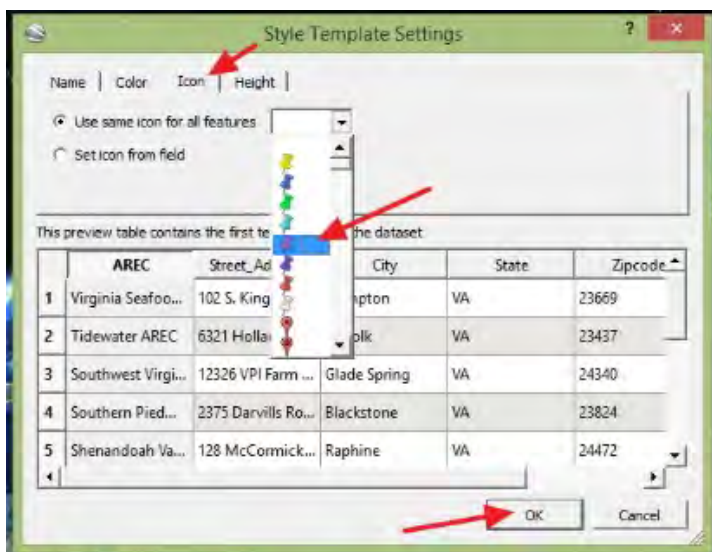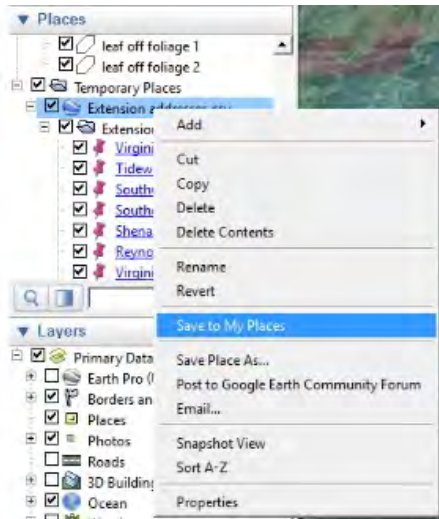
The addresses will be geocoded and added to the map as points using the icon style you selected (see

below).
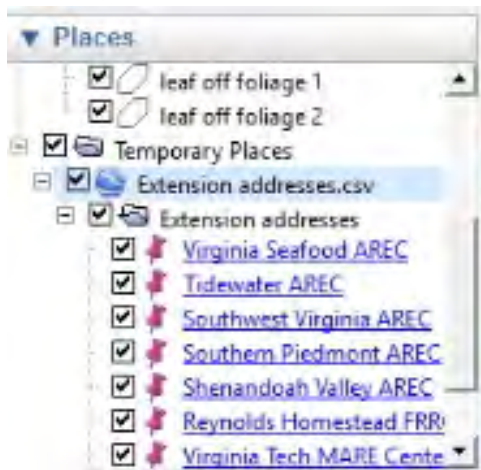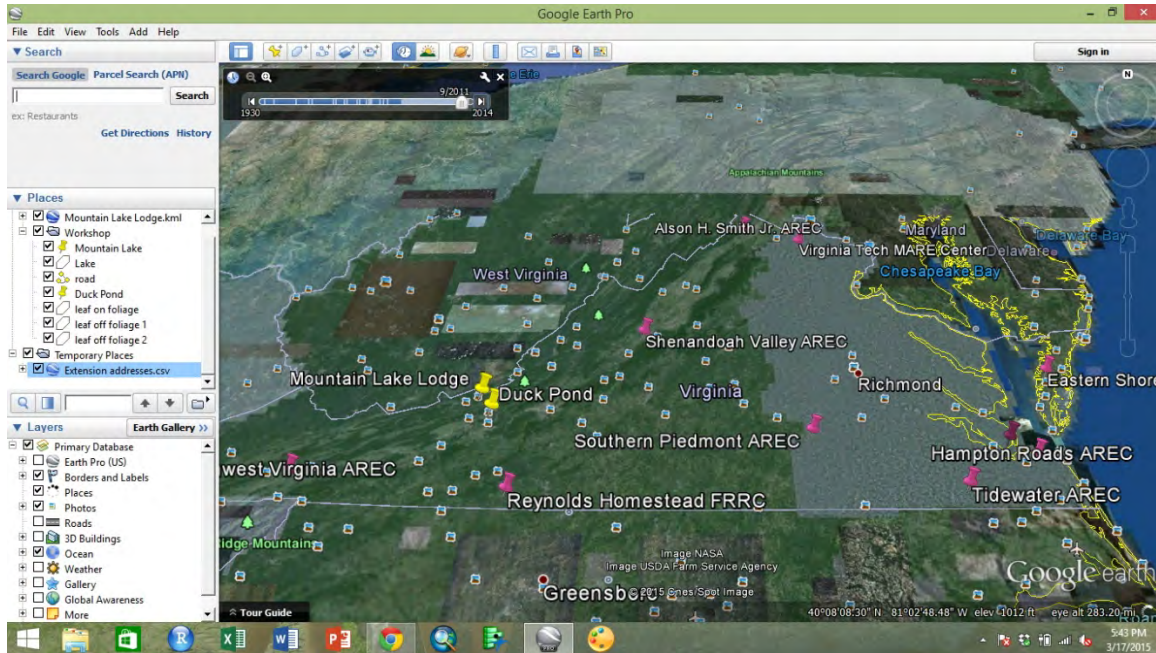
The geocoded places have been added to "Temporary Places"
in the "Places" section of the left side bar (see left). Expand
the file "Extension addresses.csv" and the "Extension
addresses" folder to see individual placemarks.

With the expanded placemarks in "Temporary Places," highlight the "Extension addresses" folder (see left). Right click the folder and select "Save to My Places." The places will automatically move to "My Places" where they are permanent. You can adjust which folder than are in as needed.

Producing and Sharing Maps

There are many options for producing and sharing maps through Google Earth Pro. Use the

 tools to produce maps and share them in multiple ways, such as email, printing, saving images, and opening in Google Maps. Sharing using email will open the "Email" window (see below). This window gives three sharing options. The first option shares an image file of the current Google Earth Pro map window view. The second shares a KML file which will open the current view in Google Earth, but will not share places created by you and stored in "Places." The third option shares a KML of the currently highlighted place or folder of places. In the second and third case, the recipient will need to download the file and open it in Google Earth.
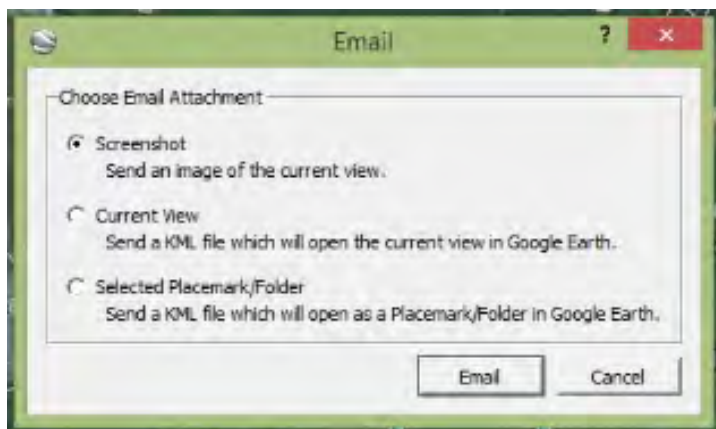
In the case of sharing a screen shot, the recipient will not need to have Google Earth, but will also not be able to interact with the map, instead simply viewing an image of the map. Selecting the first option of sharing a screenshot of the current view will open an email message if you are already logged in using your email service (see left). The attachment is a .jpg. Enter the recipient's email address and click "Send."

Once you have hit "Send," the message will be passed along to the recipient. An email that is received like this will contain the specified text and have a .jpg attached (see below). The map will show the placemarks, but the recipient will not be able to click them to receive more information.
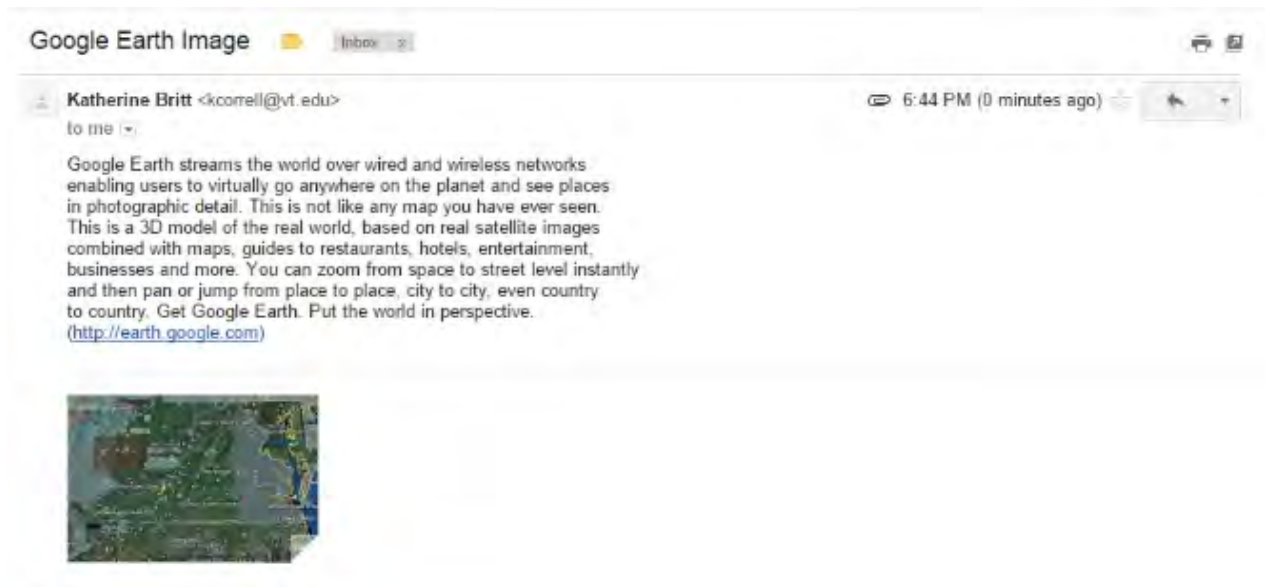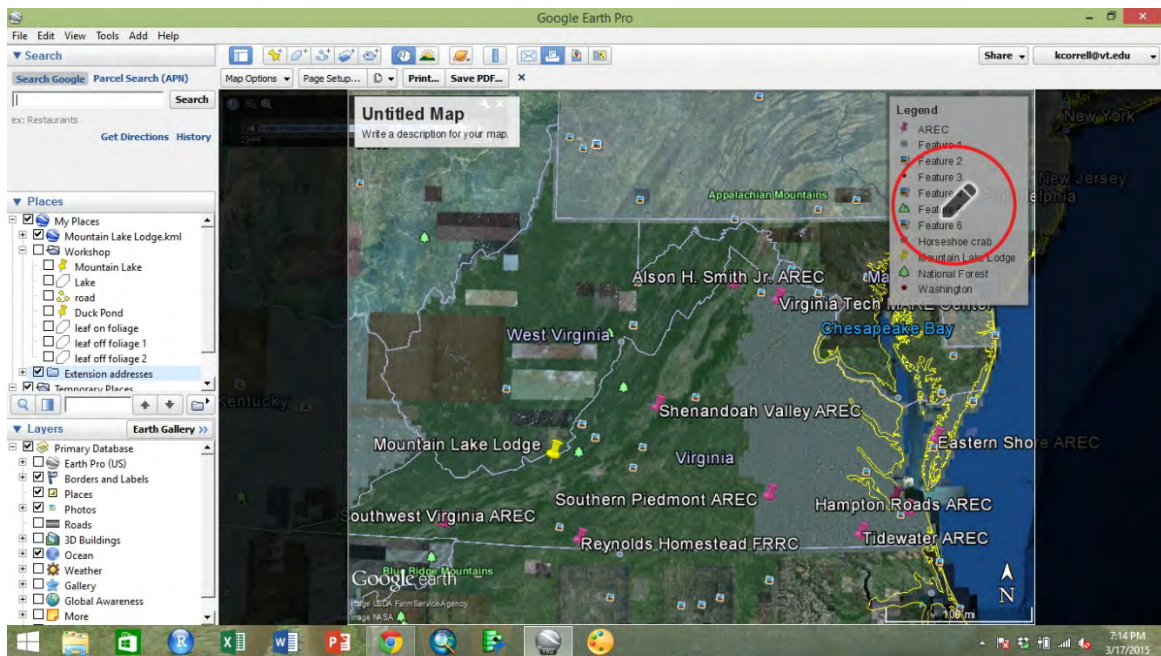
Google Earth Pro

Choosing to print a map will overlay an interactive map template over the map window (see below). The

map contents can be dragged to fit the region of the window that is not darkened. You can double click

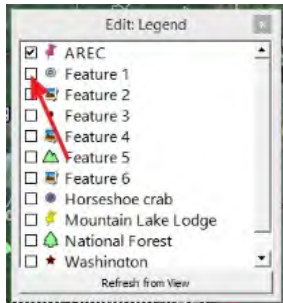to zoom in and re-center, and you can use the mouse scroll wheel to zoom in or out.
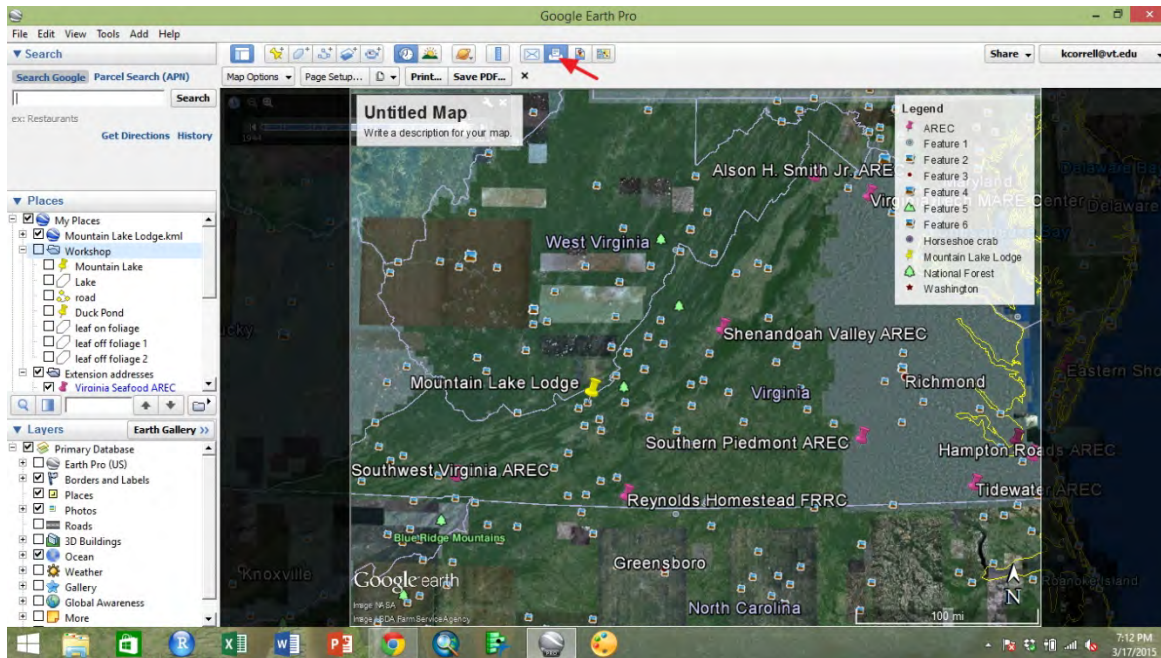
The map interface allows for easy editing (see below).

Hover the mouse over the title box or over the legend. A pencil icon will occur. Click the pencil icon over the legend.


An "Edit Legend" window will appear (see left). Uncheck any items you do not want to have appear in the legend. These items will still show up in the map unless you uncheck the associated layers in the "Layers" side bar. Click the "X" in the top right of the window to close.

Hover over the title and click when the pencil icon appears (see below). An "Edit Title and Description" window will appear. Edit the larger font to change the title. Add a subtitle or more information about the map in the description section. As you change the text, the title box on the map will update.
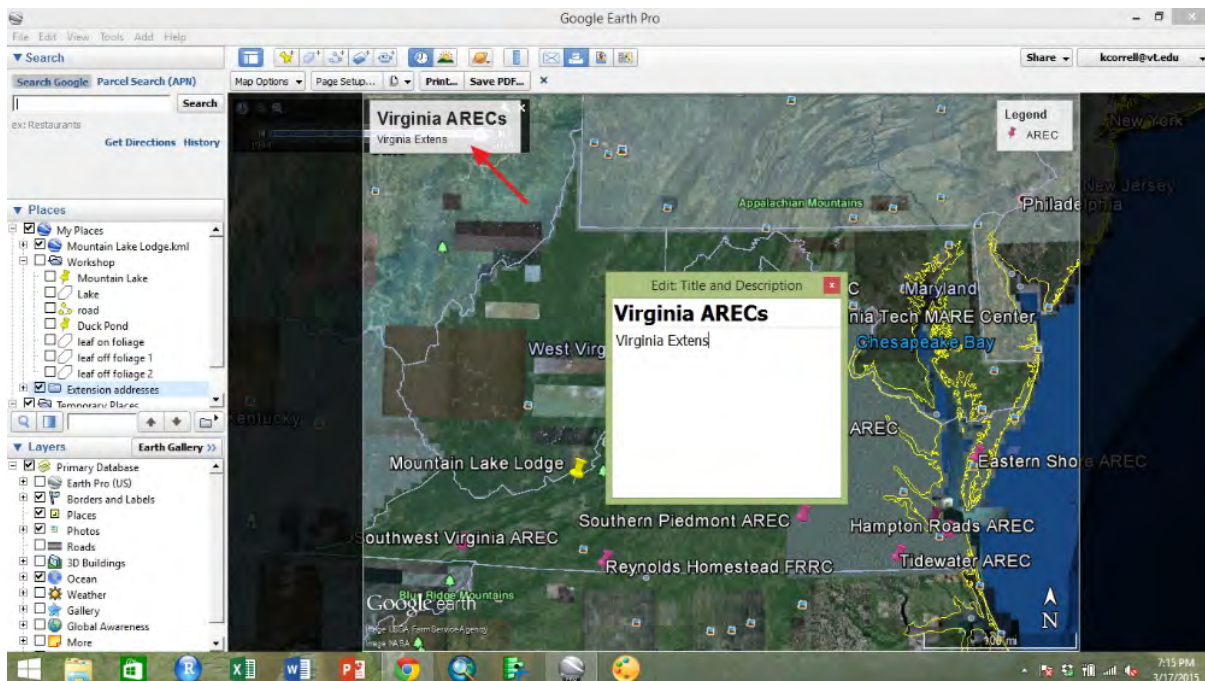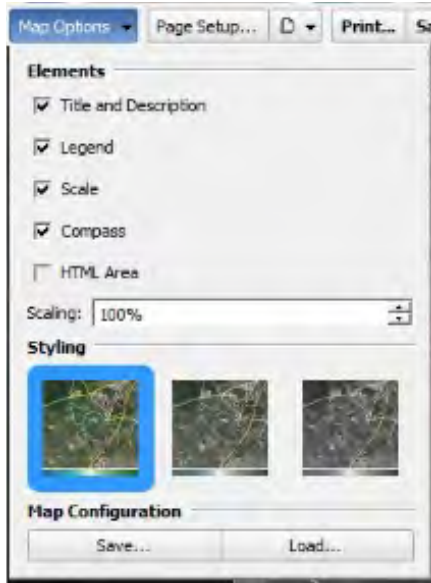
Use the drop down "Map Options" menu at the top of the map window to choose which map elements to include (see left). Check the boxes beside any elements you wish to include, such as scale bars, legends, or a compass, and select "Save" at the bottom of the menu.

Select the "Page Setup" or page icon buttons to change paper size, orientation, margins, or print quality (see below). Select "Print" to print a hard copy by sending the map to a printer, or select "Save PDF" to save a digital copy to your computer. Close the "Print Map" editor by clicking the "X" just above the map title.
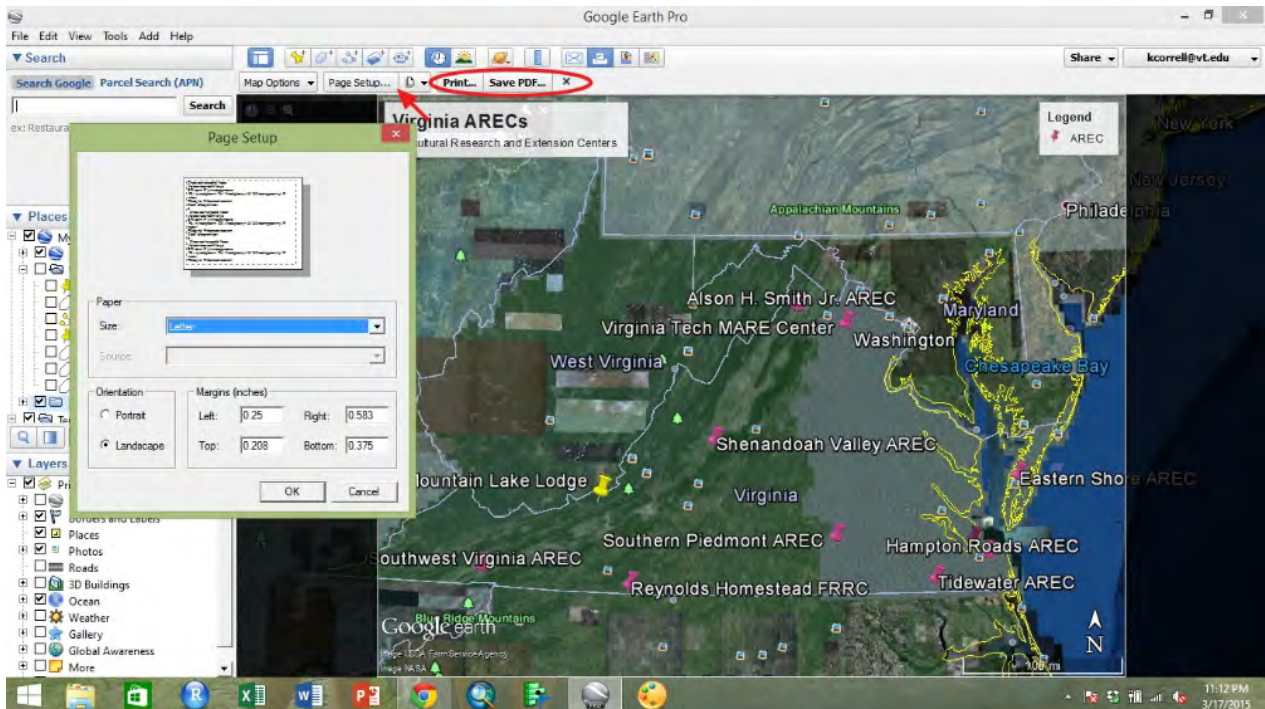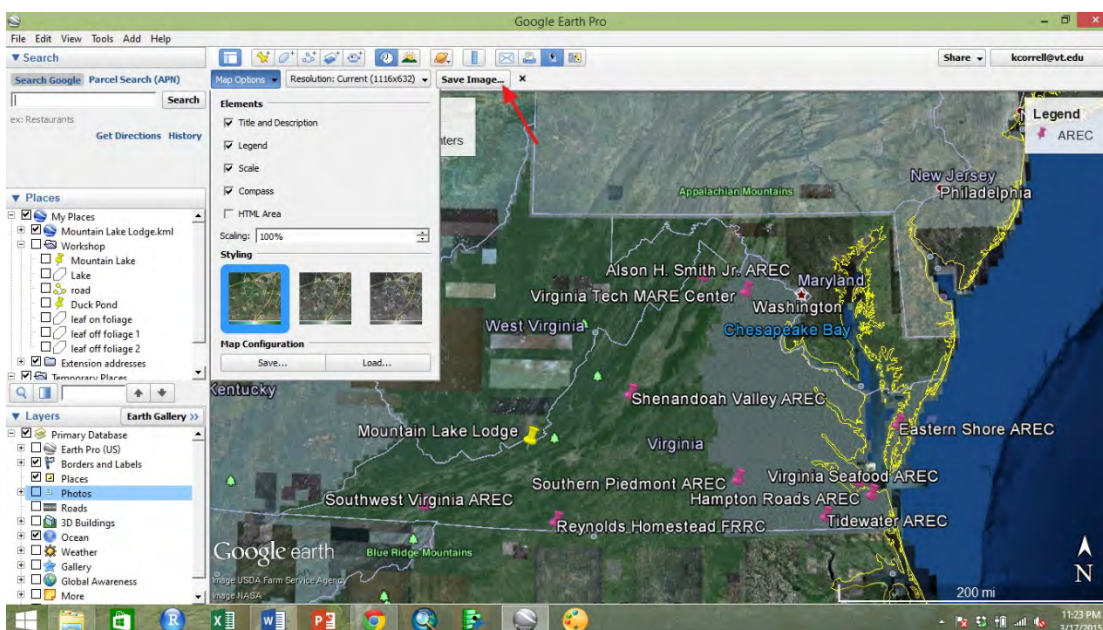
Printing a map to a printer or to a PDF will produce a document with a white border like a piece of paper (see below).

Using the "Save Image" tool will produce a similar map editing interface (see below).

Select map elements and edit legends, layers, and the title the same way as when printing a map. Click "Save Image" to select a file destination, file name, and file type.

While formatting the printed map and saved image are very similar, there are some differences between the outputs (see below). Notice that the saved image does not have a white border around it. Other differences here between the printed map and saved image are the result of unchecking some "Layers" from the side bar.
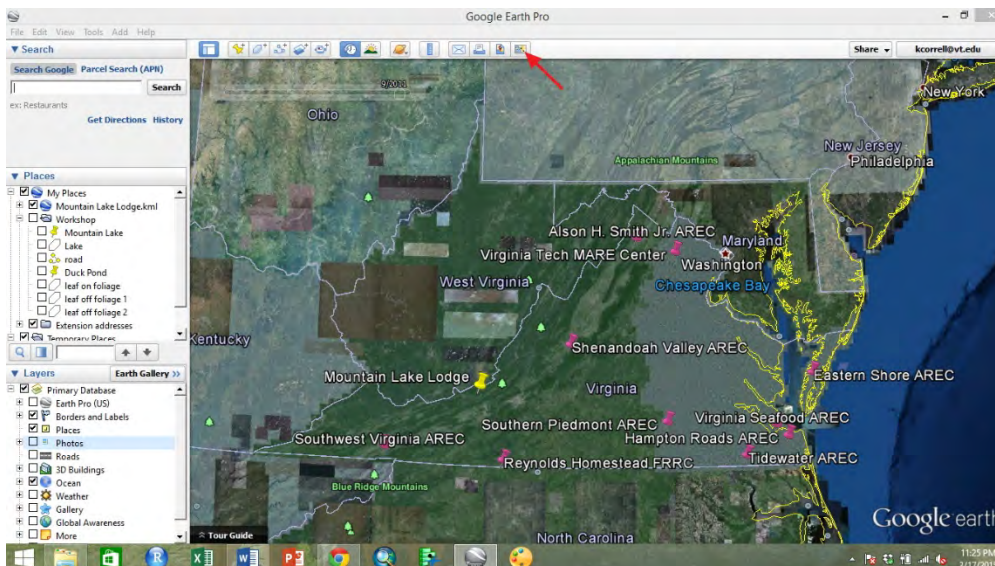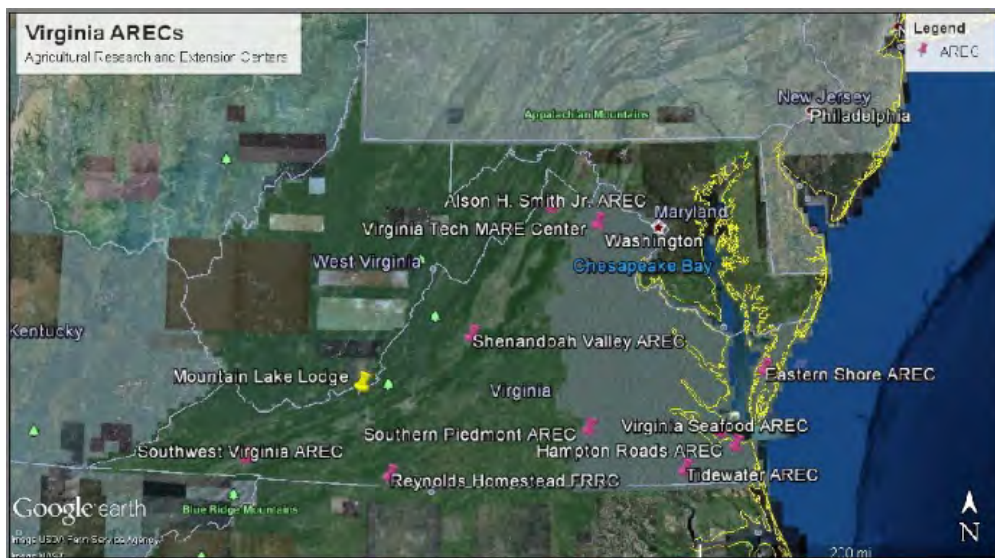
The final tool for sharing map data is to open the map in Google Maps. Selecting "View in Google Maps" will allow for the link to the map to be shared with others (see above). The current view of the map including zoom level will be shared in a browser window.

Notice that the same area of the map is visible, but that none of the places created are visible in the browser window (see below).
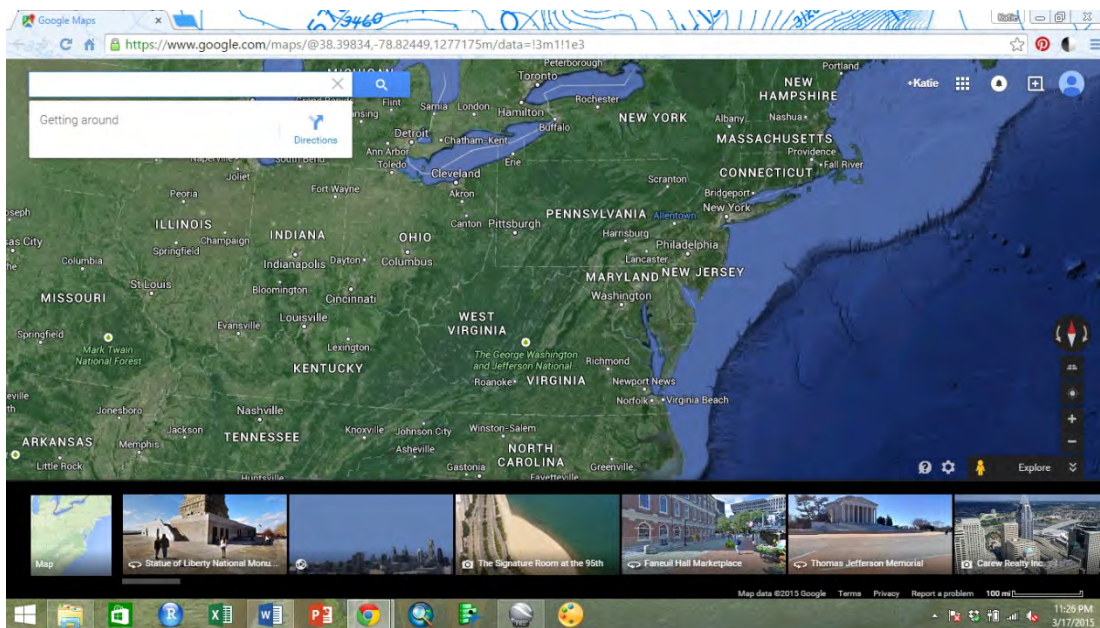
When closing Google Earth Pro, use the red "X" in the top right corner of the program. If you have any places stored in "Temporary Places," Google Earth Pro will prompt you, reminding you to save them (see below). If all of your work is already stored in "My Places" and is already permanent, you will not see this window. Decide if you want your "Temporary Places" and click "Save" or "Discard." Google Earth Pro will close, but places stored in "My Places" will be available when you restart the program later.
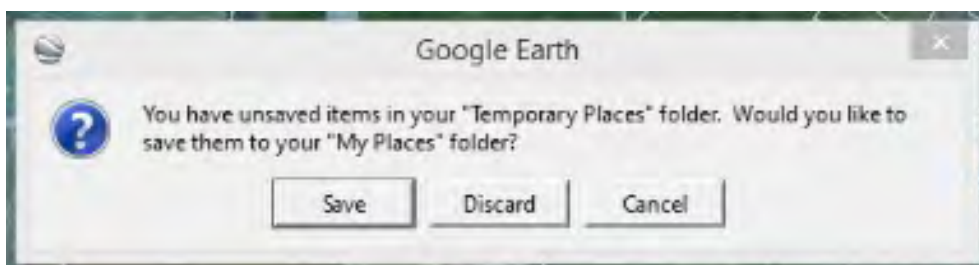
Additional Resources

The Official GoogleEarth Pro User Guide:
http://static.googleusercontent.com/media/earth.google.com/en/us/userguide/v4/google_earth_user_guide.pdf

GoogleEarth Support
https://support.google.com/earth/?hl=en#

GoogleEarth Tutorials
https://support.google.com/earth/answer/176576?hl=en

Making Movies with GoogleEarth
https://www.youtube.com/watch?v=2BudEtIz84A

..and tons of additional tutorials on YouTube (just search!)