GEO STAC Student Lesson

Lesson Title: Lewis and Clark

Lessons Summary: This will be the first in several lessons integrating web based GIS maps and Pacific Northwest history, particularly surrounding the Lewis and Clark trails.
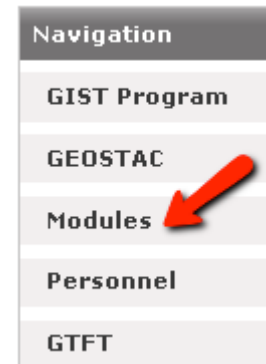
Lesson Objective: The student will learn to use spatial tools to identify, query, and measure information on a web-based GIS. Students will discuss pattern, location, and correlation.

Before you begin using this module, you will need to know about using the ArcGIS Server Web-based GIS viewer. You can do this by watching the server tutorial video or working through the tutorial. The tutorial video, student activity, and Web-based GIS Tutorial Viewer can be found at http://gis.lanecc.edu. Go to the "Modules" tab and click the Tutorial link. You will need a high speed Internet connection and a current version of Adobe Flash Player.

Prior Skills: You will need to know how to turn layers on and off, use the ID tool and, zoom in and out of the map, toggle from layers to the legend, and perform a search (Boolean) query.

Remember: Computer steps are indicated by a ▶ symbol and questions you need to answer are numbered.
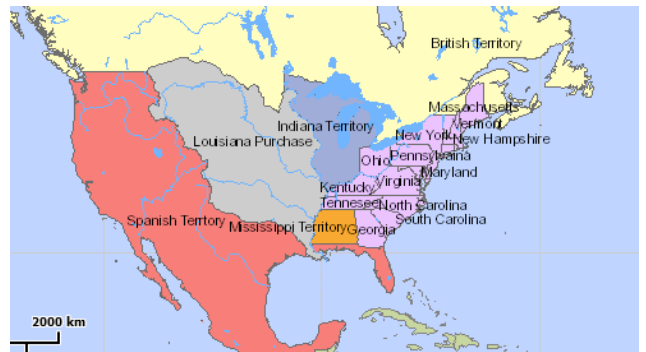
▶ Got to http://gis.lanecc.edu

▶ Click **Modules** Link.

▶ Click Lewis and Clark.

▶ Then Link to the web-based GIS map.

Navigation

GIST Program

GEOSTAC

Modules

Personnel

GTFT

The page will take a minute or two to load. The base map will load first then the other data layers. If it stalls at 55%, just click the **refresh** button on your browser.

C

► Use the Zoom tool to focus on the United States.

On the right side of the screen there are layers of information. This is data for the map. These can be either visible on not visible. To make a data layer visible, the box needs to be checked.

1) Which layers are visible on the current map?

► Click "Refresh Map" to activate any new layer.

► Make the River, Lakes, City 1803, Land Ownership (for 1803) visible. Turn off all other data layers.

2) Describe the pattern of land ownership in North America in 1803. Are the land areas evenly divided or are some larger? If there are differences, where are they? Use location terms like north, south, east and west to describe the land ownership patterns.

3) Which country owned the largest land area in 1803?

The Louisiana Purchase was an important land purchase for the United States. Use the measure tool to determine how many square miles of land was purchased from France.

Zoom in so the Louisiana Purchase is as big as you can make it and still see all the edges.

First measure the length and wide of the Louisiana Purchase.

► Click the measure tool ⬚ .

► Choose Line

► Click in the north and drag the mouse to the southern part of the area.

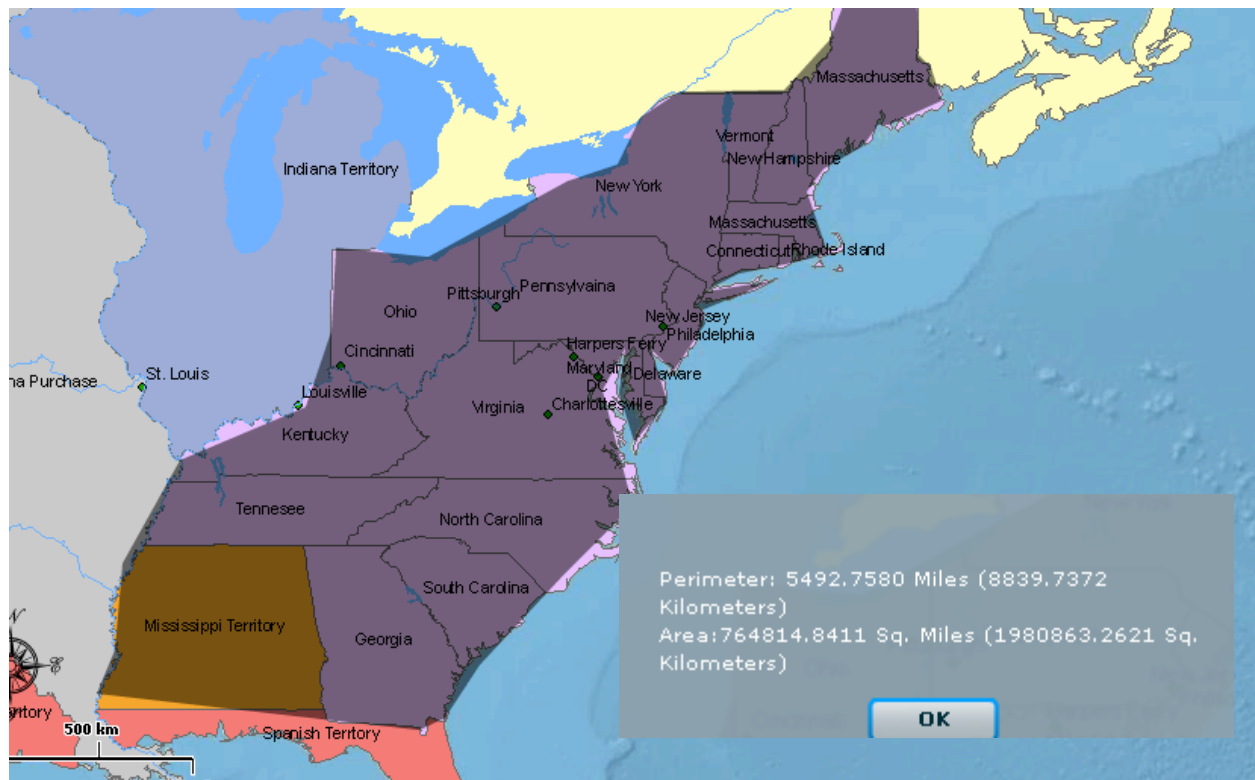► Record the length in miles to the nearest tenth. (My example returned a value of 1997.1 miles)

4) What is the length of the Louisiana Purchase?

▶ To delete the line click the pencil

▶ Now measure the width.

5) What is the width of the Louisiana Purchase**?**

▶ Clear your measurement line.

The Louisiana Purchase increased the size of the United States by a dramatic amount.

The polygon tool can be used to measure the area and the perimeter of a polygon - a polygon is a closed shape.   The area of the 1803 States was roughly 764,814.8 square miles.

Use the polygon tool to measure the area of the Louisiana Purchase.

▶ Clear any measurements.

▶ Click the ruler and choose polygon from the menu.
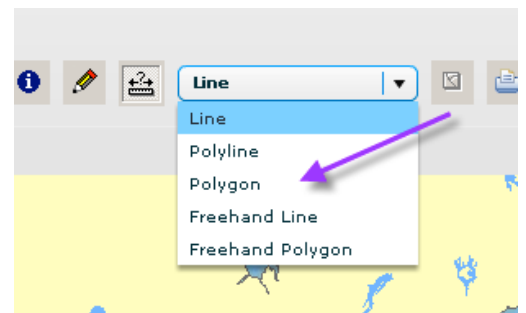
▶ Start clicking around the outer edge of the Louisiana Purchase. A shadow drawing will follow your clicks. When you get around the entire polygon double click to end your sketch. The calculations will be displayed.

☑ Lewis and Clark Trail
— East
— West
— West and East
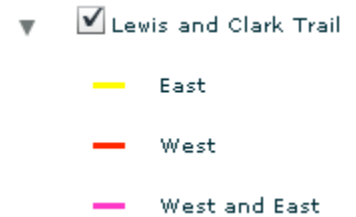
6) What is the area in square miles of the Louisiana Purchase?

▶ Turn off the Land Ownership, River, and Lake layers

▶ Turn on World and the Lewis and Clark Trail layers.

▶ Use the Polyline tool to measure the West and the West and East (red and purple) trail. To use the Polyline tool click at the beginning of the trail and then click along the trail as various points. Double Click at the end of the trail. The distance in miles will be shown in the dialogue box.

7) What is the length of the trail in miles?

Today a car can travel, on average, 60 miles an hour. If you drove for 8 hours a day, you could travel 480 miles a day. [60 miles times 8 hours]   Divide the length of the trail by 480 to find out how many days it would take to drive across the US using the Lewis and Clark trail.

8) How many days would it take to drive across the county?

9) Is the trail or the line you drew a straight line?

10) Did Lewis and Clark walk the distance you measured or did they walk further?

▶ Turn off the World Layer. The base map for these data is a relief map. It shows elevation by color and by shading.

▶ Turn on the Divide Layer. This layer is the Continental Divide. The continental divide is an area of the country with very high mountain ranges. Turn off the Divide layer.

 11) Why do you think the trail they took was not a straight line?

▶ Turn the World layer on.

A correlation is a relationship between two or more variables (layers of data). Some correlations are positive and some are negative. For example a positive correlation would be that the location of the trail is related to the height of the divide. A negative correlation would be is the divide and the routes do not match. It is difficult to see a correlation between the divide and the trail.

► Turn on the River and Lake layers

11) Is there any correlation between their route and the river and lake systems on the map? Describe the relationship that you see.

You can use a Query Builder to find specific information about the data layers. There is a pass called Lemhi Pass. To understand the geography that influenced the location of the trail, you need to zoom into that pass. You can use the selection query to find the pass.

Turn on Key Passes and go to Selection link about the

map title.
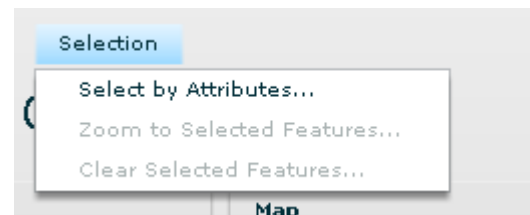
► Choose Select by Attributes. Attributes are columns of information about the data layer.

When the Query Builder window opens, you will need to follow 6 steps to find the pass.

1. In the Layer menu, choose Key Passes
2. Double Click the Name field
3. Choose Equal
4. Click Get Unique Values
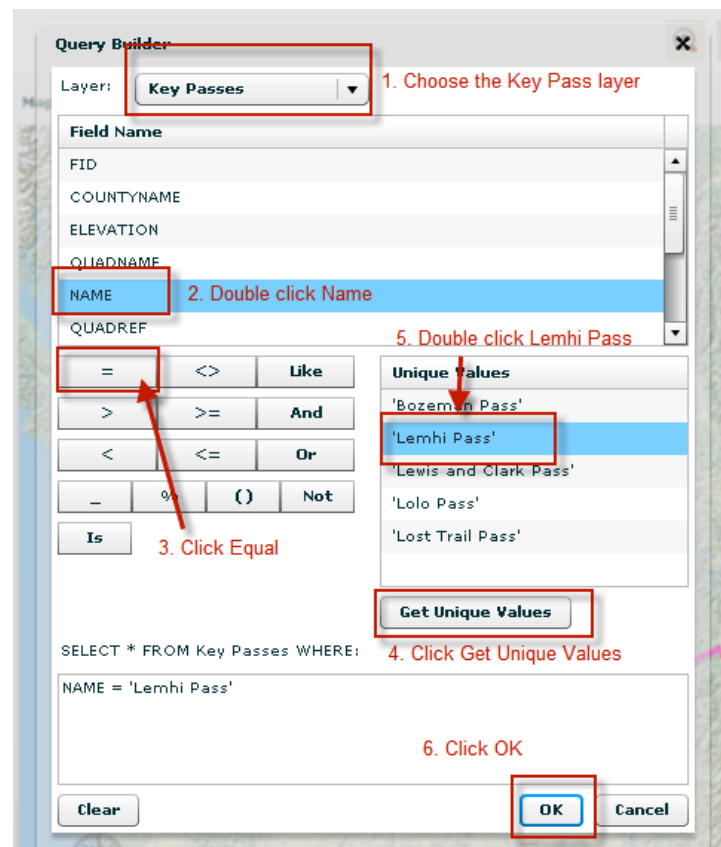5. Double click the name of the pass you are looking for (Lemhi Pass)
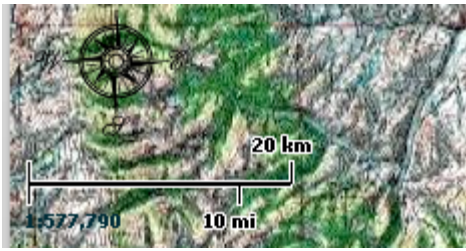
Your query will be entered in the lower window.
6. Choose OK

Your query should look like the one in the image.

The selected feature (Lemhi Pass) is highlight in Blue

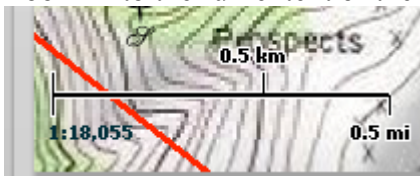► Use the zoom tool to center on the location. Zoom in to a scale of about 1:577,790

This map shows relief or elevation in two ways. The maps is shaded to show mountainous and flat areas at this map scale.

12) Why did the trail go through Lemhi Pass and not to the north or south?

▶ Zoom in to the full extent of the map. It will be about 1:18,055.

Using contour or elevation lines is another way of showing elevation. The arrow is pointing to an elevation line of 7,400 feet above sea level. The elevation of the pass is written just above the highlighted Key Pass point.

13) What is the elevation of Lemhi Pass?
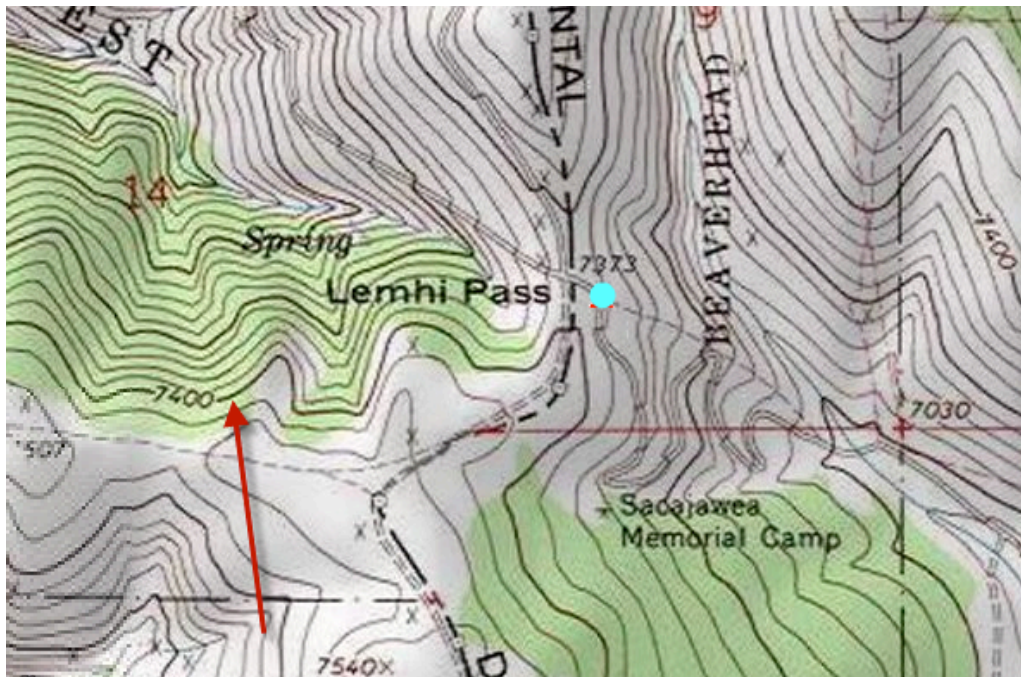
▶ Use the Selection Query Builder to find LoLo Pass.
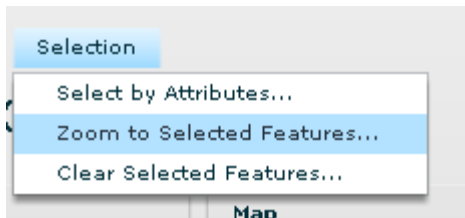
Select by Attribute

1 - Layer Key Pass

2 - Name

3 - =

4 - Unique value

5 –LoLo

6 - OK

▶ Go Back to Select and Choose Zoom to Selected Feature

There is an elevation mark near the pass it is labeled as BM or Bench Mark

14) What is the general elevation of LoLo Pass?

Exploration

You will need to develop two queries to explore passes ore events along the Lewis and Clark trail. Record the query statement you used.

Career Extension

▶ Go to the website http://esri.com/industries.html

▶ Find a career from the list that is of interest to you. For example: In the Natural Resources list, there is a link to forestry. In the forestry link, there are several job descriptions.

▶ List four ways GIS is used in the career you choose.

▶ Conduct an internet search to find information about salary ranges and possible job locations.