Introduction to GIS: Symbolizing Features

The Map Document	• Map Documents, Layers, and Features
Feature Manipulation	• Shapes, Location, and Attribute Data • Symbology
Navigating ArcMap	• Zoom, Pan and Map Scale • Finding, Identifying, and Labelling Features

This tutorial will build on your ArcMap skills and teach you how to edit the symbols used to represent features on the map. In order to make better sense of the data you have in the map you created, it will help to symbolize the layers differently. Your aim, for the purposes of this tutorial, is to create a symbology that is easy to interpret. We will investigate some of the ways ArcMap allows us to symbolize and display data.

Data for this tutorial are stored in the Data subfolder of the IntroToGIS folder, which you should have saved on your local machine. The file path referenced in this tutorial is assumed to be D:\IntroToGIS\Data.

Use the map you created in the second tutorial (Creating a Map from Scratch) if you are continuing directly, or open the IntroToGIS_Map2.mxd document.

Change Point Feature Symbology

To begin learning how to change the symbology of a feature layer, we change the symbols for the point data in the Bridges_SC layer.

1. In the TOC, under the South Carolina data frame, expand each layer using the plus box to see the symbol currently used, if necessary.

2. In the TOC, click on the symbol (i.e. the colored diamond) under the word Bridges_SC to open the Symbol Selector. Change the color to yellow and the size to 2.00. Click OK and notice the changes.
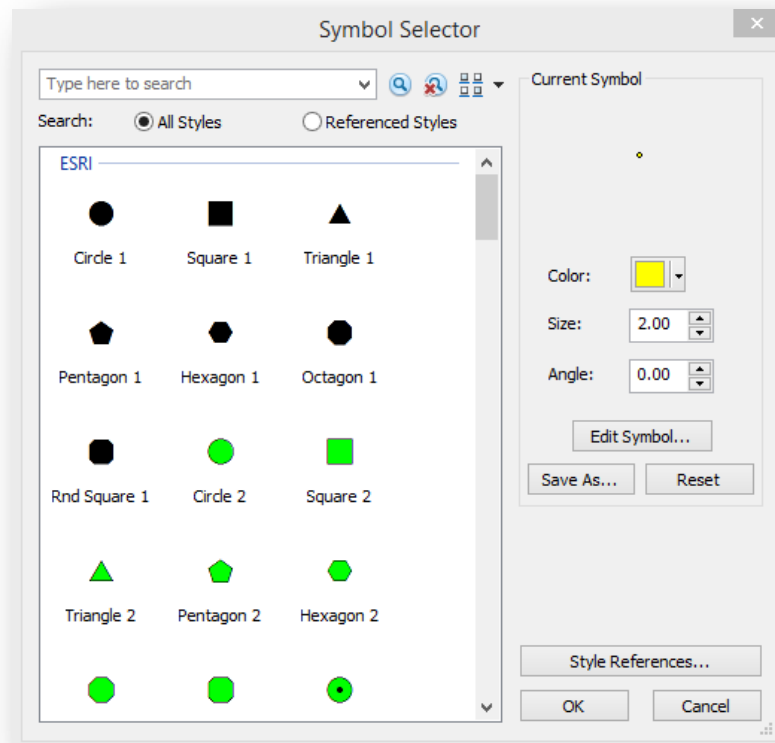
Figure 1. The Symbol Selector window allows the symbol shape, color, and size to be quickly changed.

TIP: Notice that you can select from a set of predefined symbology types. You can also do a search on a specific type, such "roads" or "streets."

1. Click on the symbol in the TOC again to open the Symbol Selector. In the search bar on the top, type in Bridge and hit enter. Scroll down to the Civic-Bridge symbol and click on it. Change the size to 10.00. Click OK and view the changes.

2. Notice the size of each positions symbol. Its size is relative to the map document, not the size of any particular bridge. Navigate to the Clemson bookmark and see how the bridge symbols appear at this scale.
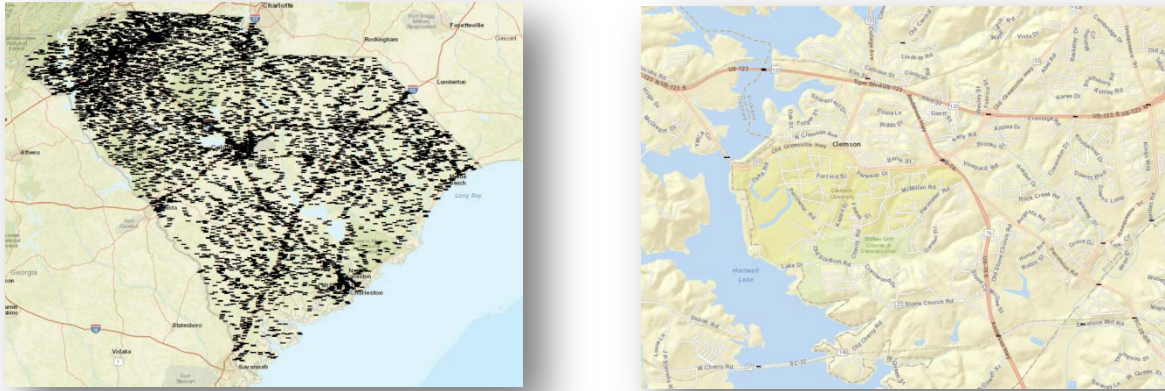
Change the symbology of a line feature layer

The attributes of a feature can be used to create different symbols within the same layer, and this works for points, lines, and polygons. Let's make our symbology more complex by using the attributes of our highways to create customized symbols for the highways.

1. Navigate to the South Carolina extent bookmark. Turn off Bridges_SC and Counties_SC layers and turn on Highways_SC.

2. Experiment with using the Symbol Selector to change the color and weight of the symbol used.

3. Open the Highways_SC attribute table. The Route_Type field has several categories of roads, and using the tools in the Symbology tab of the Layer Properties dialog, we can assign a unique symbol for each category of road. Let's try it!

4. Close the attribute table.

5. Open the Layer Properties for Highways_SC (right-click on the layer in the TOC, click Properties).
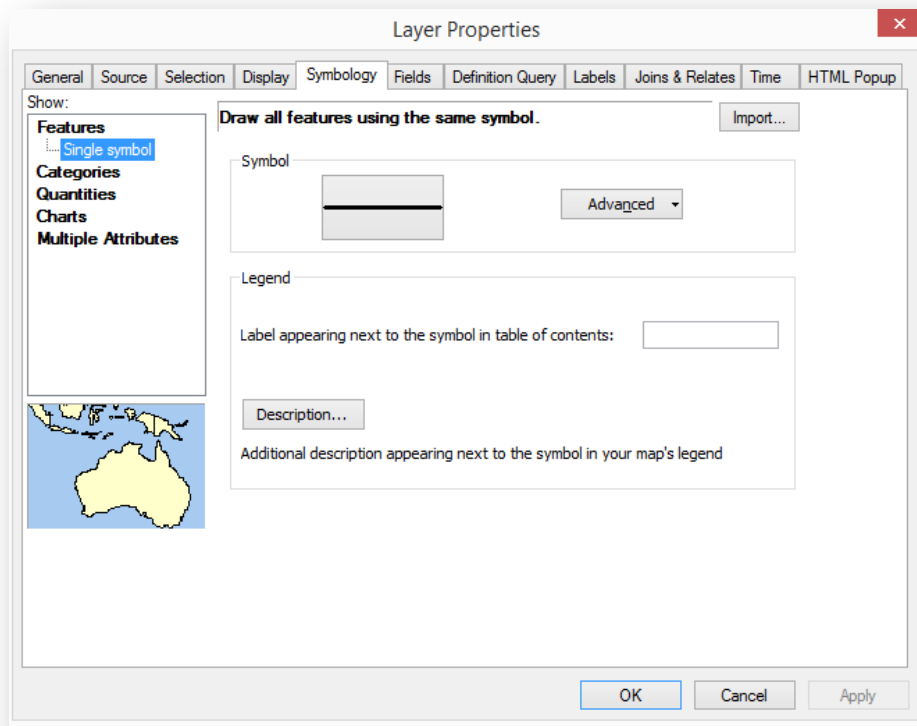
6. Navigate to the Symbology tab.

Figure 3. The Symbology tab in the Layer Properties enables advanced and powerful methods for symbolizing data.

At the left of this window, ArcMap provides us with a few symbology options. In the **Show** box you have the options to symbolize Features, Categories, Quantities, Charts, and Multiple Attributes. The default (Single Symbol) is currently selected.

7. Click **Categories** since we are going to use the type of road as the basis for our symbols.

8. Now choose **Route_Type** from the **Value Field** drop down menu. This is where you set the field containing the attribute you wish to symbolize. Then, click the Add All Values button to list all the available values of the Route_Type field.
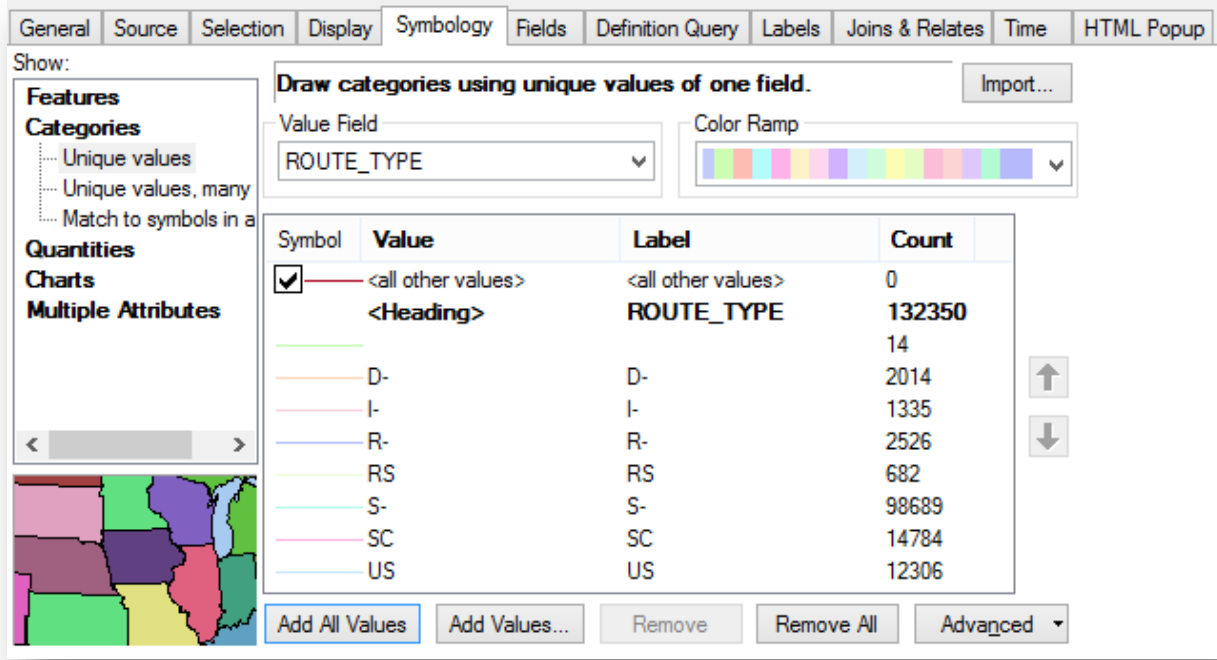
Figure 4. The Unique Values option of Categories used to assign unique symbols to each Route Type.

9. Double click the line to the left of the letters "US" to open the Symbol Selector for those highways. Set it to the Expressway style and click OK.

10. Repeat the process for SC, setting the symbol to Highway but reducing the thickness to 2 points.

11. Repeat the process for S-, setting the symbol to Major Road but reducing the thickness to 1 point.

12. We'll leave the other highways with their default symbol. Click Apply and OK in the Layer Properties to see the changes.
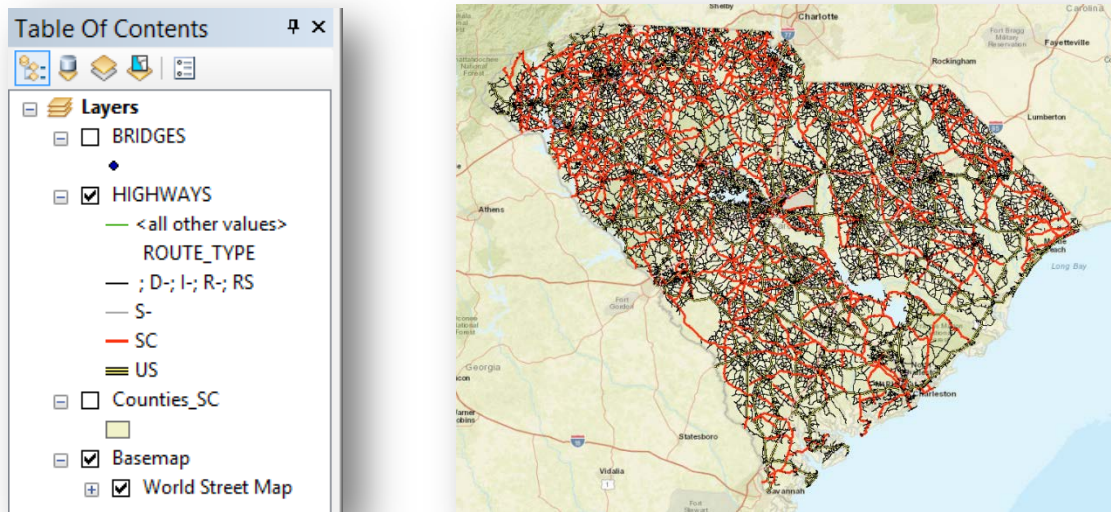
Figure 5. The appearance of Highways_SC using different symbols for each Road Type.

Symbolize a Polygon Feature Using Attributes

Let's now turn to our polygon feature, Counties_SC, and use it to create a map of the population density in each county, i.e. the number of people per square mile.

1. Turn off Bridges_SC and Highways_SC in the TOC and turn Counties_SC back on.

2. Open the **Counties_SC** attribute table (right click on the layer in the TOC and select "Open Attribute Table") and notice that each county has some associated demographic information. You decide to create a map to visualize and compare the populations of each county. To do this, you will change the display of the county layer to symbolize population values. Close the table.

3. Open the Layer Properties window for Counties (right click on the layer in the TOC. And click on "Properties"). Select the Symbology tab.

4. At the left of this window, ArcMap provides us with a couple symbology options. In the Show box you have the options to symbolize Features, Categories, Quantities, Charts, and Multiple Attributes. Select Quantities since you are symbolizing population values and leave the option of "Graduated colors".
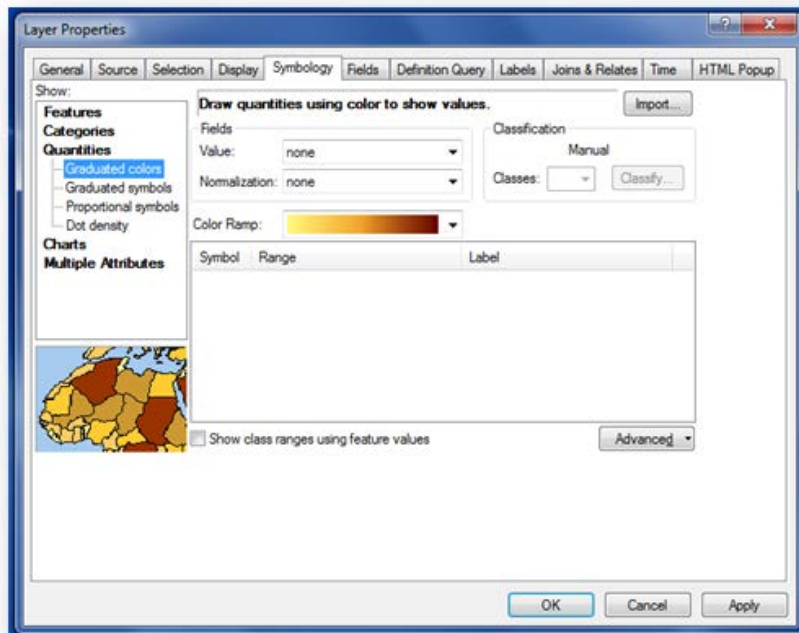
5. Now choose **POP2010** from the **Value Field** drop down menu. This is where you set the field containing the quantitative data you wish to symbolize
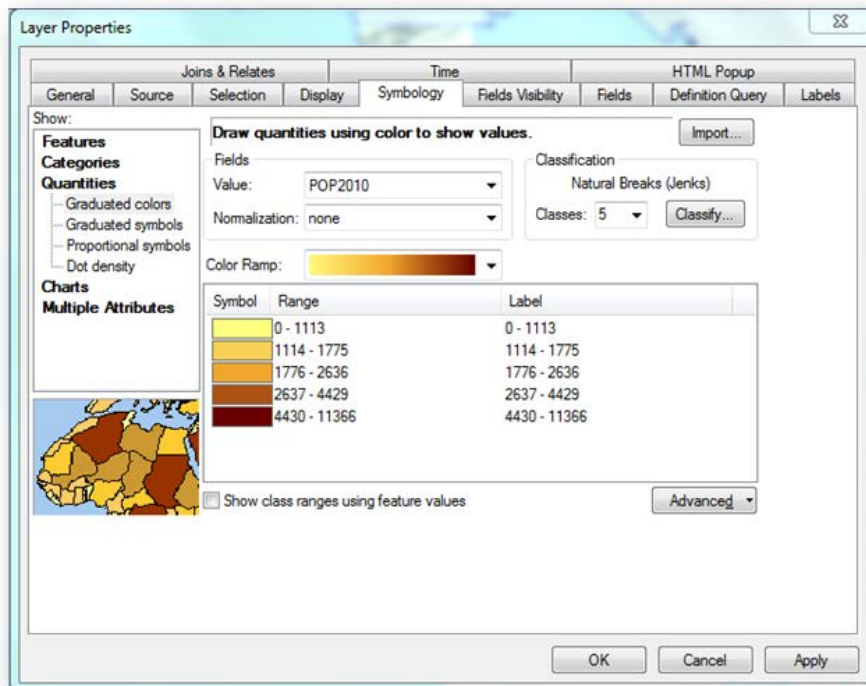
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6. When you symbolize quantities, such as the population of a county, you want to see where attribute values lie in relation to one another on a continuous scale. For this reason, the values must be divided into groups to make the symbology more manageable. By default, ArcMap will classify your data into 5 classes based on clusters or natural breaks within the data.

7. In the classification box, change the number of **classes** to **4**.

8. You may also want to normalize your data according to another variable, like area.

9. In the Fields box, select **SQMI** from the Normalization drop-down menu.

10. It may be useful to think of normalization as a ratio; in this very simple case, you are dividing total population by block group area which reveals population density.

11. You can also set the color scheme to best reflect the nature of your data. ArcMap automatically assigns each quantity range a distinct color symbol, but you can change this using the Color Ramp.

12. Take a look at your options in the **Color Ramp** dropdown menu. Also try right-clicking on the Color Ramp and unselect Graphic View; this provides an alternative text view of your color options. Select a new color scheme from the Color Ramp and hit Apply.
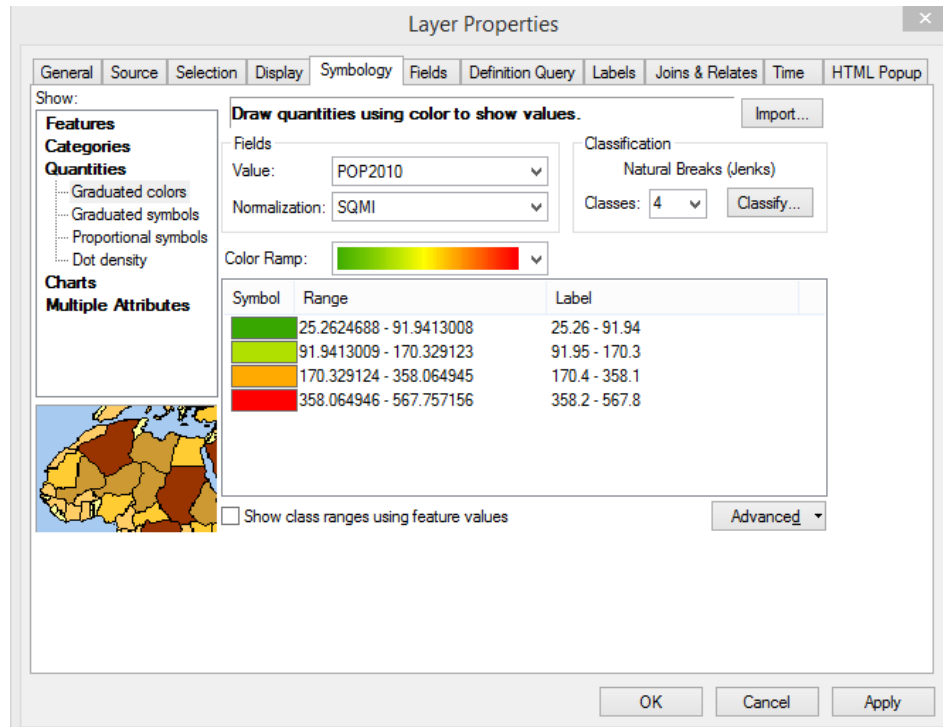

Figure 8. Colors and ranges used to map the population density (person/sq. mi.) map.

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13. When you are done, select OK to exit the Layer Properties dialog. The counties layer is now displayed according to the attributes you have chosen.
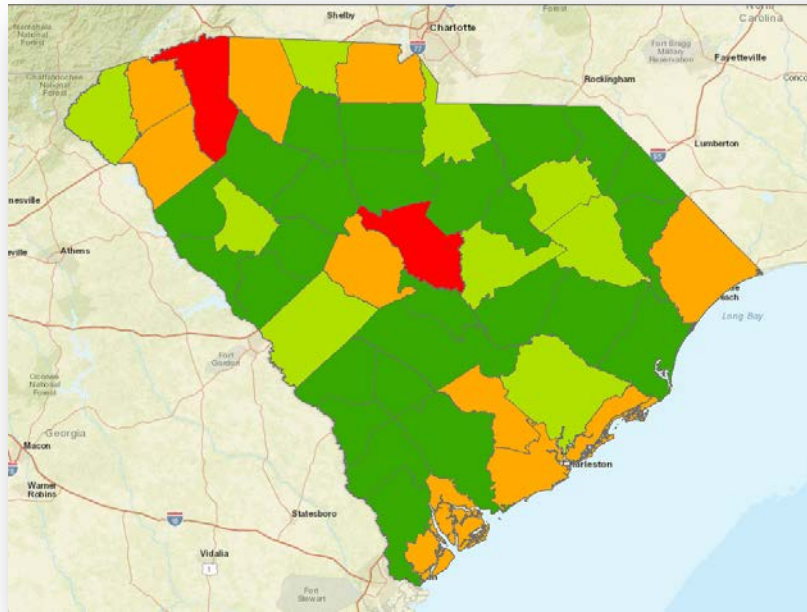

Figure 9. The Counties_SC polygon feature symbolized to show population density using 4 classes.

Identifying Features, the Find Tool, and Feature Labels

By looking at the map, you can see that there are two counties which fall into our highest population density class. Assume you don't know the names of any counties in SC -- how can you determine which counties these are using ArcMap? Using the Identify tool, you can click any feature in the map to see a summary of its attributes.

1. Click the Identify tool button (ⓘ), then click on the county in the center of the state with a high population density. Which county is it? What other information can you see in the window?
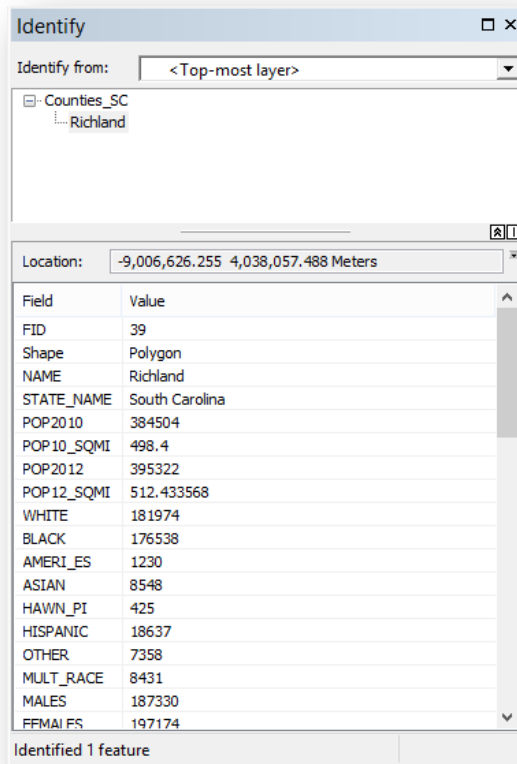
Figure 10

2. Move the Identify window to the side of the screen and try clicking on other counties. Notice that I can't identify any Highways_SC or Bridges_SC features because they are turned off at the moment. Turn on Highways_SC and try identifying some roads. Then turn Highways_SC off again.

Now let's suppose you want to find a particular county, for instance Aiken County, but you're not sure which one it is.

3. Click the Find ( ) tool.   The Find dialog box opens. In the Find field, type **Aiken**. Click the drop-down arrow next to "In" and choose Counties_SC. Click Find.

4. Move the Find dialog box so you can see both the map and the box. In the Find dialog box, right-click Aiken to open a context menu

5. Choose **Flash** from this menu. The county will flash on the map (If you don't see the flash, move the Find dialog and try it again).
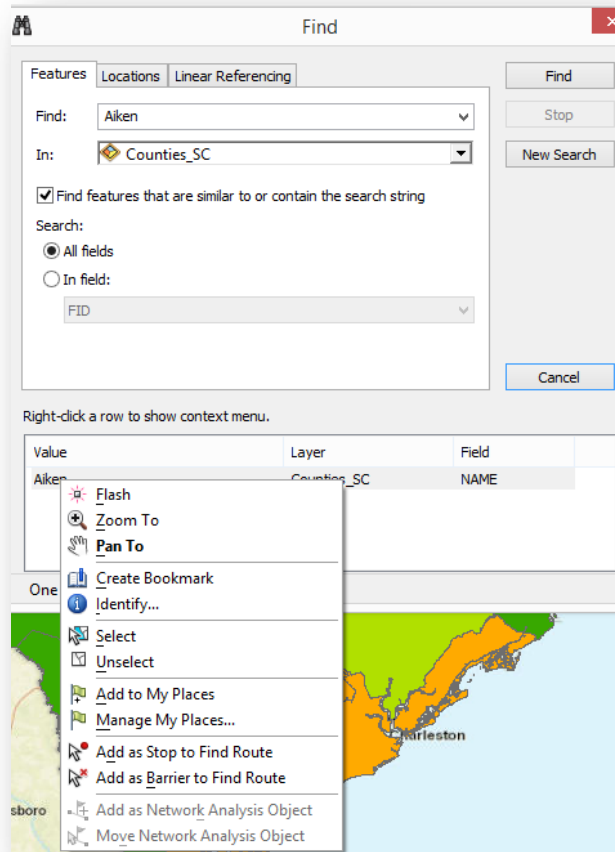
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Figure 11. The Find tool dialog.

Notice the other options, such as Zoom To, Create Bookmark, and Select. Selections are very powerful for GIS processing and you will teach more about it in future workshops. For now, close the Find tool.

Finally, we want to label the counties with their names.

6. To see the names of each county on your map, you will turn on their labels. Right-click Counties_SC in the table of contents and choose **Label Features**.
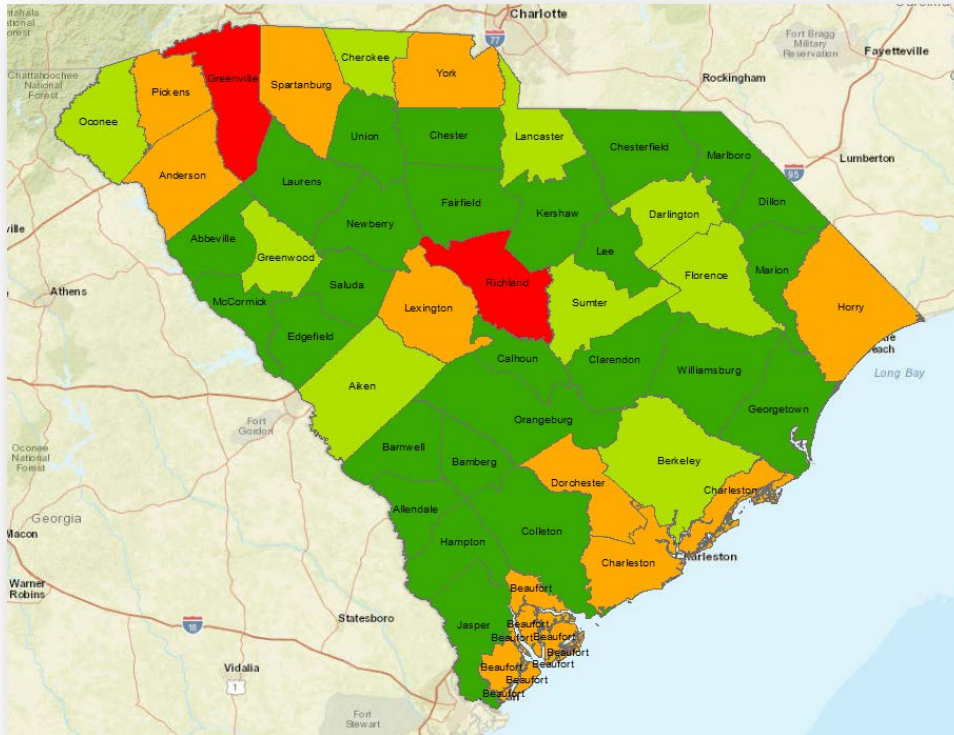
Figure 12. The names of each polygon in the Counties_SC labeled on the map.

7. Right click on Counties_SC and uncheck the Label Features option to turn the labels back off.

8. Save the map document as IntroToGIS_Map2_**.mxd in LOCATION, using your initials in place of the stars.