Symbolizing Features

In this Chapter you will learn

- How to symbolize point, line and polygon features
- How to symbolize quantities using colors, symbol sizes and other methods such as charts and graphs

1. Symbolizing Points

VIDEO

3.1 Symbolizing Points

Exercise 1: Symbolizing points

1. Start ArcMap and open a new map document.

2. Add the "lights" and "trees" shapefiles from the Topic3_1 folder to your map.

3. Add the Topographic base map (if you have internet connectivity). This map shows you the University of Idaho campus in Moscow, Idaho. During this exercise you will symbolize the trees and lights.

4. Turn the lights layer off since we will symbolize the trees first. There are two ways to open the symbol selector:

    a. Single-click or double-click on the symbol in the table of contents as shown on the right.

    b. Right click on the layer name "Trees" and then click on "Properties". Go to the symbology tab and click on the symbol as shown below.

Click on the symbol itself to open the symbol selector dialog box

Click here to open the symbol selector dialog box
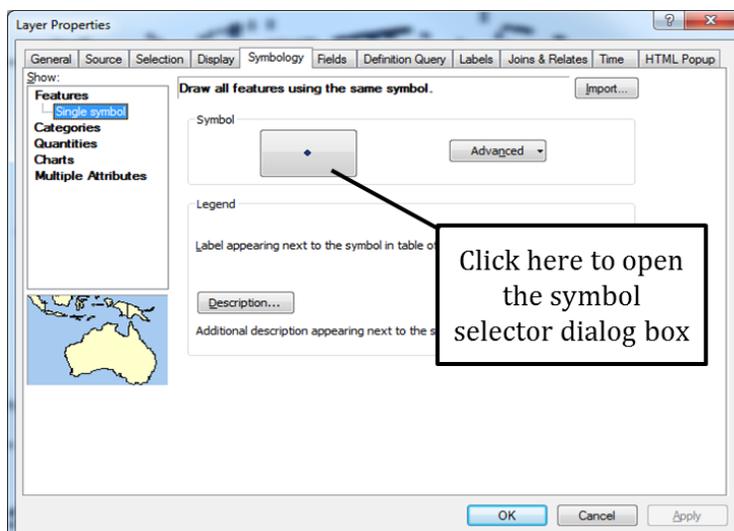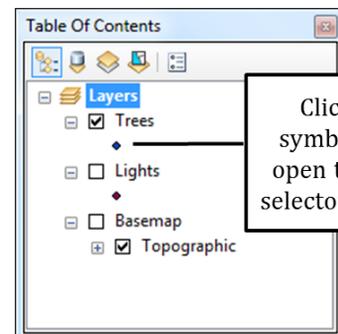
In the next exercises we will symbolize categories and quantities. In those cases you always need to start by going to the Symbology tab in the Layer Properties.

5. Follow the directions on the right-hand side to symbolize your trees as green triangles. When selecting a color you can hoover your mouse over the colors to read the names of the colors.

6. Next we will symbolize the lights, and take advantage of the extensive symbol libraries available to you in ArcGIS.

7. Turn on the Lights layer and open the Symbol Selector dialog box.

8. Follow the instructions below to add a new style reference to your symbol selector and pick a symbol for your lights.
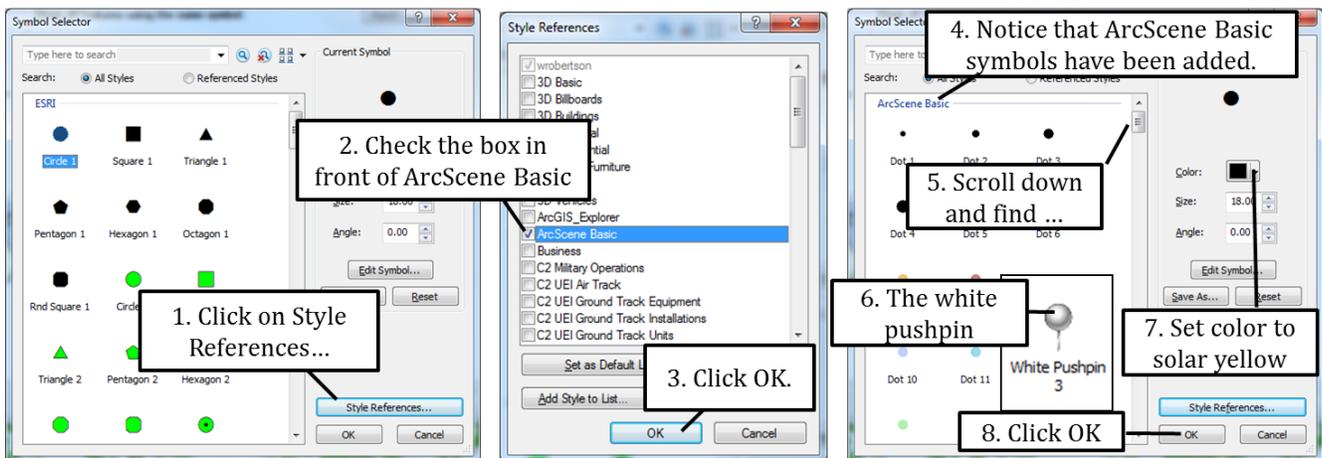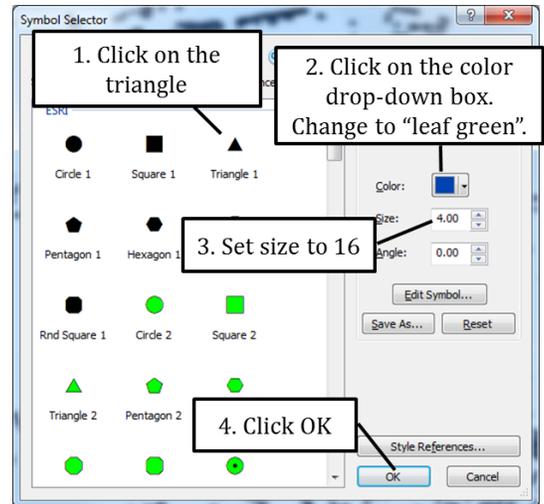
9. Finally, change the trees symbol again. Add the Civic style reference to your Symbol selector, scroll down the list of symbols and symbolize the trees with the "Tree 3" symbol.

10. Save your map in the Topic3_1 folder with any name you wish.

VIDEO

3.1 Symbolizing Points

Exercise 2: Symbolizing categories for a points layer (NHD in Caribou)

1. Start ArcMap and open a new map document. Add the Caribou_County and Waterpoint_Caribou shapefiles from the topic3_1 folder.

2. Open the Waterpoints_Caribou attribute table and notice the "FTYPE" attribute near the right-hand side of the table. Each code corresponds to a specific type of water feature as you can see in the table on the right.

Ftype	Feature Type
367	Gaging Station
450	SinkRise
458	SpringSeep
487	Waterfall
488	Well

3. We want to show each different FTYPE with a different symbol on the map. To do this, we need to symbolize by category. Open up the properties dialog box for the Waterpoints_Caribou layer and go to the Symbology tab.

2. Set Value Field to FType

1. Click on Categories > Unique values

3. Click "Add All Values"

4. Uncheck this box so that "other value" do not appear in table of context or legend

5. Click on each of the Ftypes and change to the corresponding Feature Type text.
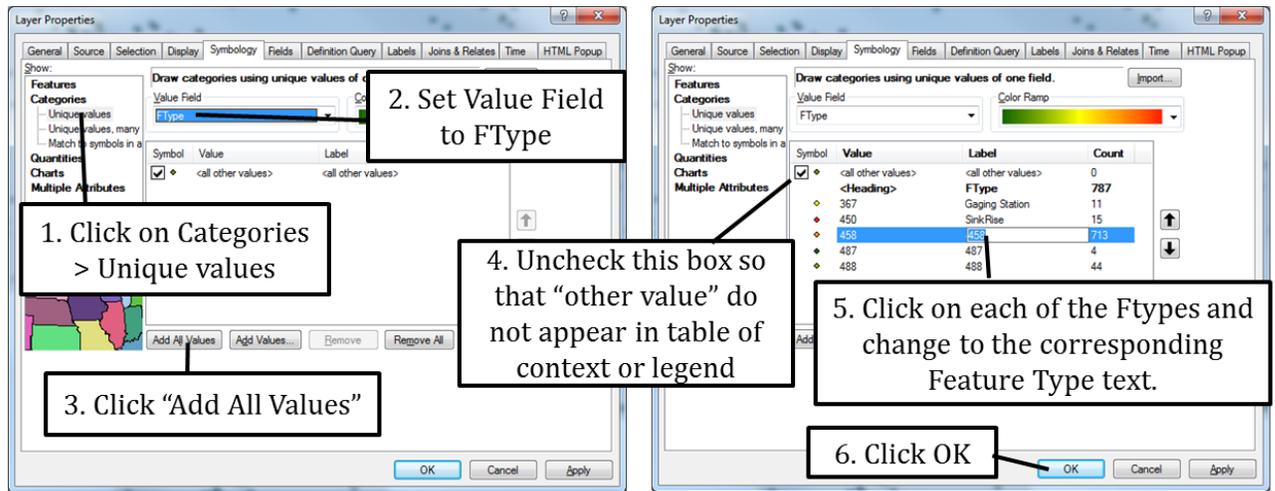
6. Click OK

4. You can now change the symbol for each of the categories separately in the same way as was illustrated in Exercise 1. For example, in the table of context click on the symbol just in front of the word "Gaging Station". This opens up the Symbol selector. Experiment with the search feature in the Symbol selector as shown on the right to find symbols for each FType.

5. Save your map in the final folder with any name you wish.

6. Note: anytime you have cryptic attributes like "FTYPE" you should look in the metadata by right-clicking on the layer that contains the attribute and clicking Data > View Item Description. Even if you cannot find the description of each code, at least you can find out about the organization that produced the data.

1. Type in a keyword. E.g. "waterfall"

2. Click to Search

VIDEO

3.1 Symbolizing Points
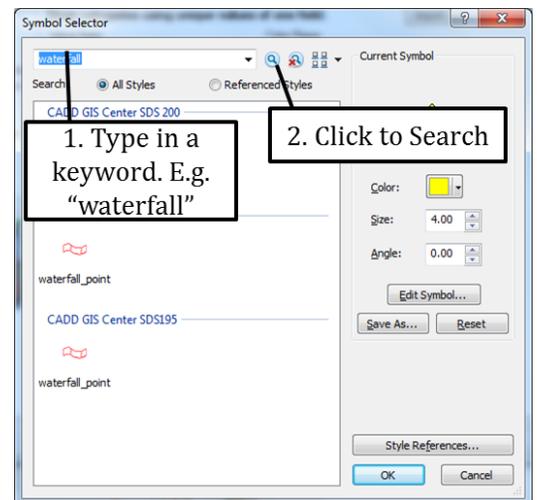
Exercise 3: Symbolizing quantities for a points layer (Earthquakes and Cities)

1. Start ArcMap and open a new map document.

2. Add the Idaho_Historical_Earthquakes.shp and Idaho.shp from the Topic3_1 folder to your map.

3. Open the attribute table to explore the different attributes. You will find information about the year, month and time of the earthquakes, as well as the magnitude ("MAG") of each earthquake. We will make a map that symbolizes stronger earthquakes that have a larger magnitude with a larger circle.

3

4. While still in the attribute table notice that some earthquakes have a magnitude of -999. Since this makes no sense we should exclude those points from the map. Open the properties for the Idaho_Historical_Earthquakes.shp shapefile and go to the Definition Query tab.

1. Make sure you are on the Definition Query tab

2. Click on Query Builder..

3. Build the query. Click OK
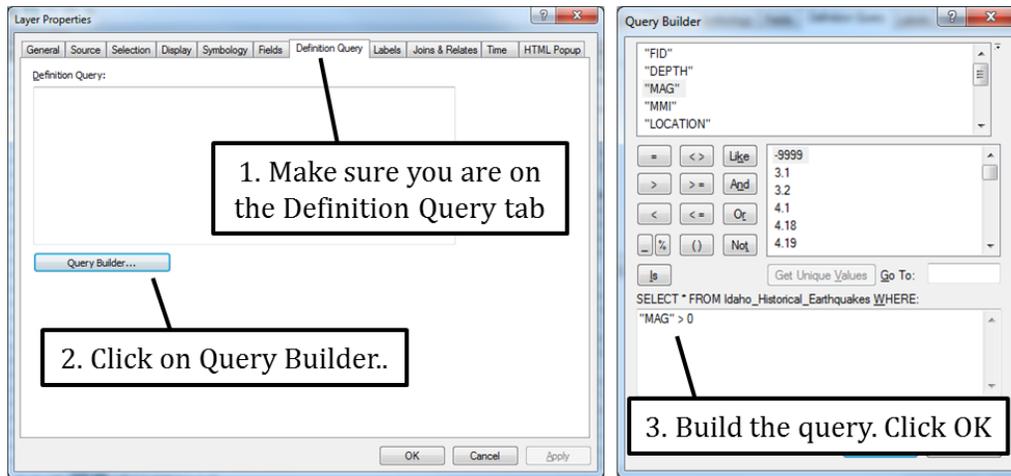
5. Set up the query "MAG > 0" as shown above. Instead of typing the word "MAG" yourself it is safer to double-click on the word "MAG" in the top window of the Query Builder dialog box. Click OK on the Layer Properties to apply the query and close the properties dialog box.

6. Open your attribute table and notice that all the earthquakes with a magnitude of -999 have been removed. Note that this data is not deleted – you are simply not able to view it. If you were to remove the query we just build, then those earthquakes would reappear in your attribute table.

7. Open the properties dialog box again for the earthquakes layer. This time go to the Symbology tab. Follow the instructions below to set up graduated symbols showing the magnitude of the earthquakes.

1. Click on Quantities > Graduated Symbols

2. Set Value to "MAG"

3. Set to 4 classes

4. Click Classify

5. Set method to Manual

6. Starting at the bottom type "7"

7. Work towards the top and change numbers as shown in this inset
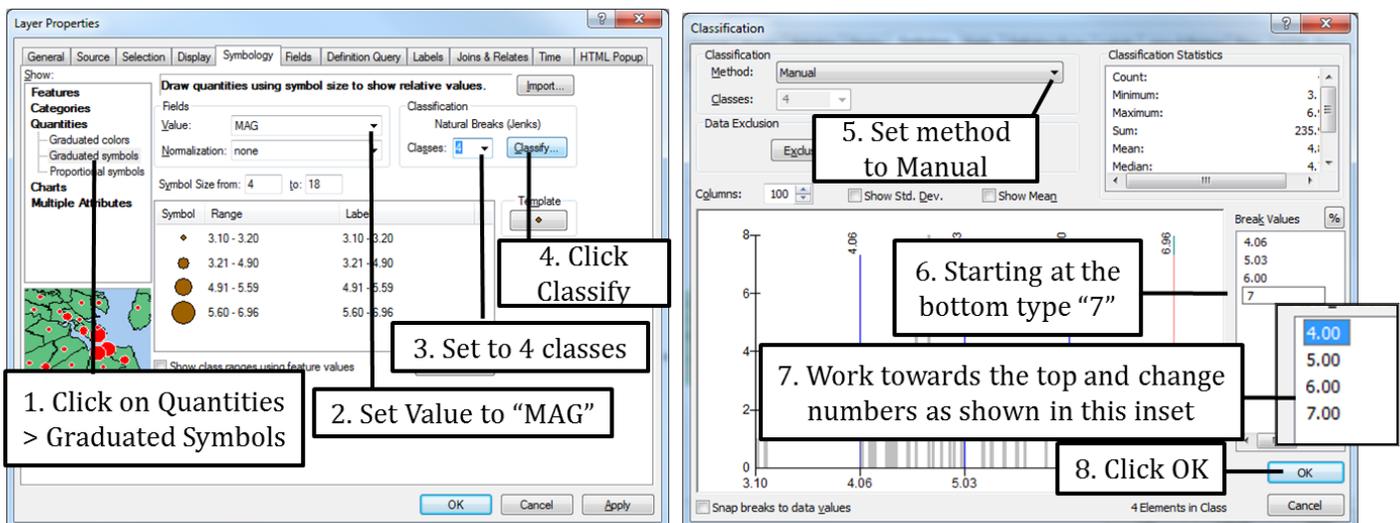
8. Click OK

9. Click on "Symbol". Play around with Flip Symbols and Properties for all Symbols. Make sure small earthquakes have a smaller symbol.

10. Click on "Template"

11. Pick Circle 3 Symbol
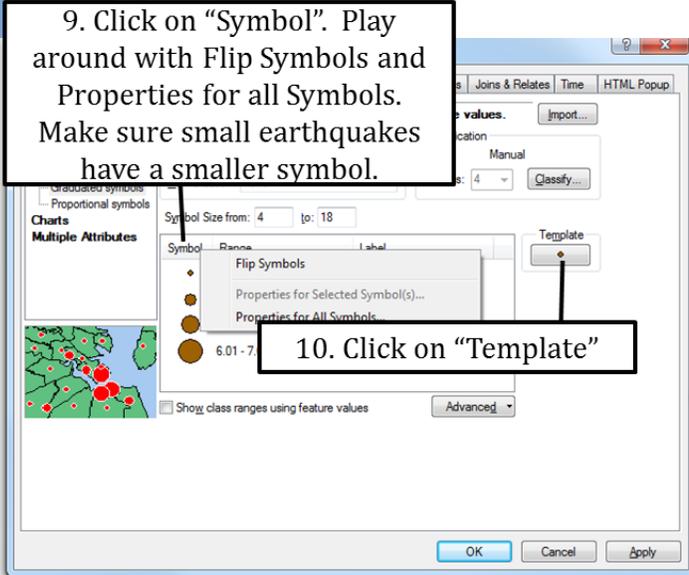
12. Pick any color you like

13. Click OK. Then click OK again to close the Layer Properties dialog box
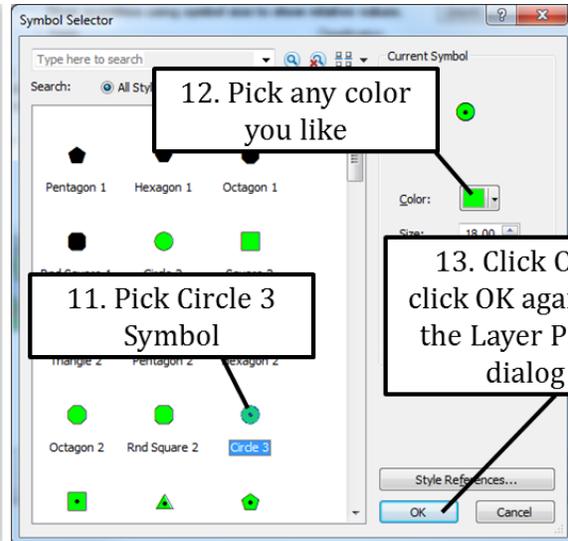
8. Save your map.

9. Challenge (optional): Use graduated colors, 6 classes and a symbol size of 18 to display the year of the Earthquakes, for example in a white-to-black color ramp shown in the map on the right. Hint: to change the symbol size click on "Symbol" as shown in the step 9 of the figure above and then click Properties for all Symbols.

10. Save your map when you are done.

1916 - 1928
1929 - 1947
1948 - 1969
1970 - 1979
1980 - 1988
1989 - 2001
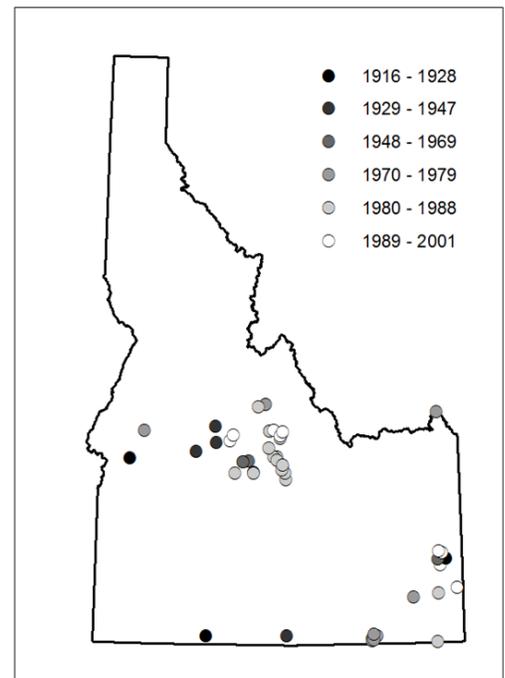
2. Symbolizing Lines

Exercise 4: Symbolizing Line Features

1. Start ArcMap and open a new map document. Add the Stream_Orders shapefile from the Topic3_1 folder.

2. Open the Symbol Selector for the Stream_Orders shapefile by clicking on the line symbol in your Table of Contents (or you can go to the Symbology tab in the Layer Properties).

3. Inside the Symbol Selector dialog box do a search on "River" and pick a line symbol you like.

4. Click OK. This is how you set up a simple symbology that shows all lines in the same color and line thickness. Next we will symbolize based on quantity.

5. Open up the attribute table and notice the Strahler attribute. Larger numbers reflect streams that have more tributaries flowing into them. Close the attribute table. We will first symbolize the stream order using graduated colors, and then by graduated symbols. The symbol for the highest stream orders should be the darkest or the thickest.

6. Go to the symbology tab in the Properties dialog box. Fill out as shown on the right.

7. Click OK to close the Layer Properties and view your symbols on the map.
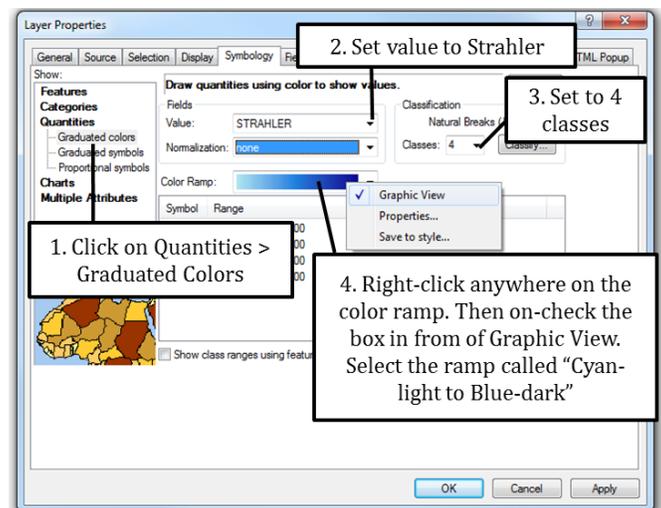
8. Take a look at the class ranges in your table of contents which ranges from "0.000000-1.000000". Go to the Symbology tab in the Layer Properties dialog box and use the instructions below to change the number of decimal places in the label.
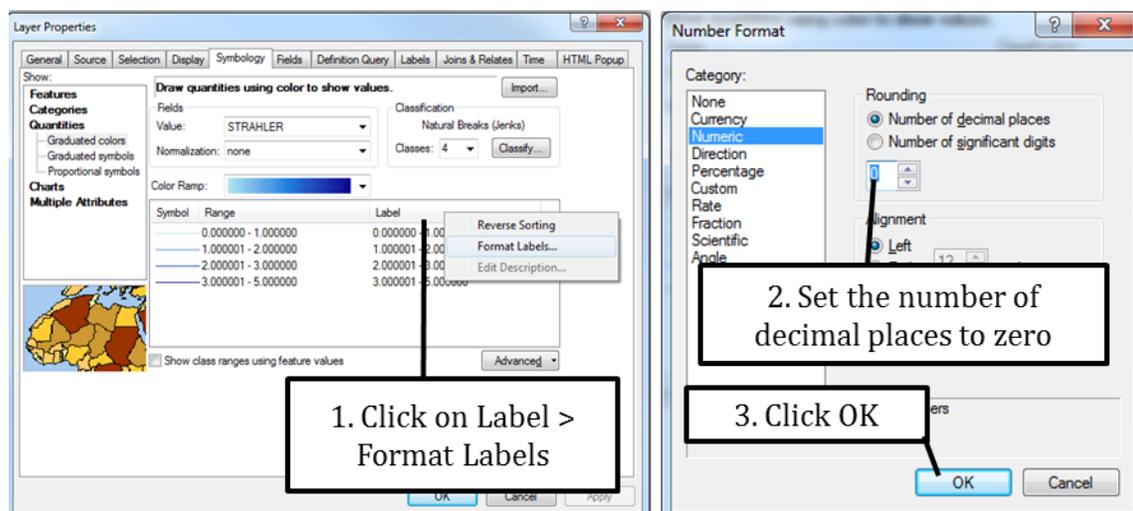
9. Click OK to close the Properties dialog box and notice the updated ranges for the stream orders in your table of contents.

10. Next we will use graduated symbols. Go to the symbology tab in the Layer properties dialog box. Set up the symbols as illustrated on the right.

11. Challenge (optional). Continuing from the symbolization you just set up, change the colors for each of the stream orders in the table of contents so that stream order "0" is the lightest blue, and stream order 5 the darkest. (Hint: click on the line symbol for each stream order in the table of contents to open its symbol selector where you can change the color. This challenge is also demonstrated in the video for this exercise). Save your map.

2. Set value to STRAHLER

3. Use 6 classes

4. Click on Template and make lines blue

1. Click on graduated symbols

5. Click OK
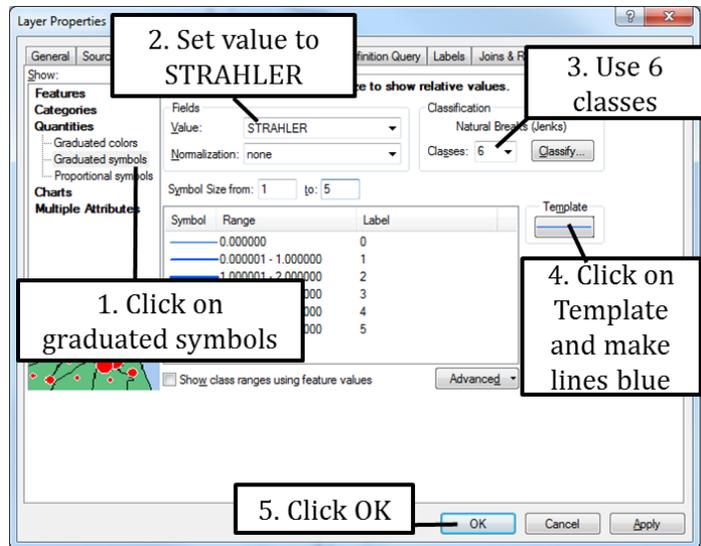
3. Symbolizing Polygons

Exercise 5: Symbolizing features and categories

VIDEO

3.1 Symbolizing Polygons

1. Start ArcMap and open a new map document. Add the Counties_2008_Pop_Founded shapefile from the Topic3_1 folder.

2. First we will symbolize all features in Idaho the same way. Click on the symbol for this shapefile showing the counties to open the symbol selector.

3. Add the Forestry Style Reference and symbolize all of Idaho as "Pine Tree 1". Change the color to leaf green and click OK.

4. Open the attribute table for the Counties_2008_Pop_Founded shapefile. You will see some different pieces of information for each county: the name of the county, when the county was founded and the population residing in each county in 2008. We will use the "NAME" attribute to display each county in a different color.

5. Go to the symbology tab in the layer properties and follow the directions in the

2. Set value field to "NAME"

3. Pick a Color Ramp you like

1. Click on Categories > Unique Values

4. Unclick check-box.

5. Click Add All Value
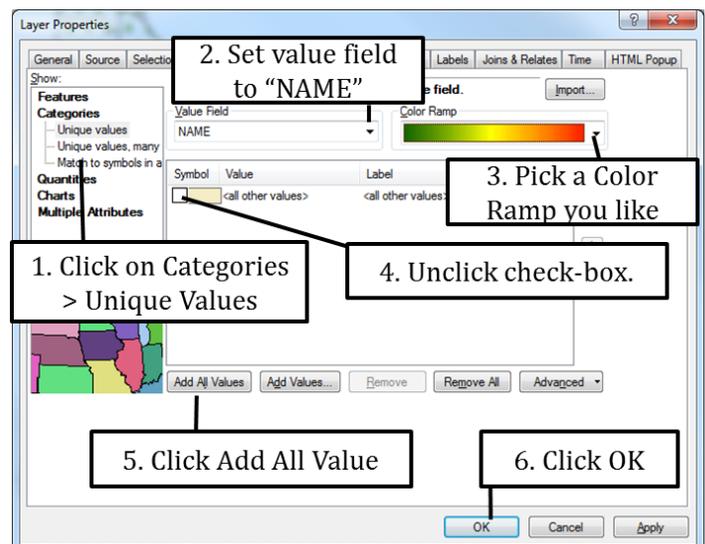
6. Click OK

figure on the right.

6. If you wish you can go back to the symbology tab and change the ramp colors or you can click on a symbol for one county to change its color.

7. Save your map and leave it open if you are moving on to the next exercise.

VIDEO

3.1 Symbolizing Polygons

Exercise 6: Symbolizing quantities

1. If you are not continuing from the previous exercise you should start ArcMap and open a new map document. Add the Counties_2008_Pop_Founded shapefile from the Topic3_1 folder.

2. Open the symbology tab of the Layer Properties.

3. Symbolize your map based on the "FOUNDED" attribute which contains the year each county was founded. Use the figure on the right to help you set up the symbology.

4. Feel free to experiment with the number of classes and different color ramps to see which combination yields the most informative map.

5. Pick a Color Ramp you like

2. Symbolize based on "FOUNDED" attribute

1. Click on graduated colors

3. Use 10 classes

6. Click label and set decimal places to zero

4. Click Symbol > Flip Symbol to make sure that oldest counties have the darkest color

7. Click OK
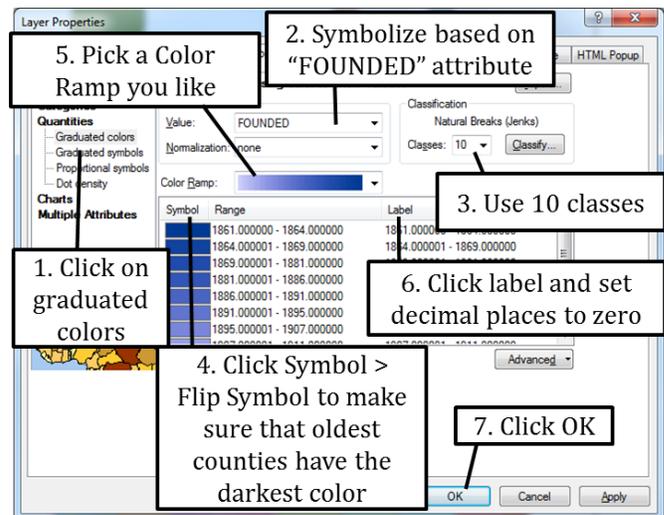
5. Using the same steps as before, create a map with graduated colors showing the 2008_POP attribute which is a count of the number of people that lived in each county in 2008. Use a color ramp that has more than one color, for example the color ramp that goes from green to red. Make sure to use 7 classes, clean up the labels so they do not include any decimal points and – if needed – use the flip symbol so that the counties with the largest population have the most intense, or darkest, color.

6. Perhaps a better way to compare the population in different counties is by comparing the number of people per square mile instead of the total number of people. We can do this by including normalization in our symbology. To do this open the symbology tab and set the normalization to "SQR_MILES" as shown on the right.

1. Click on Graduated colors

2. Set normalization to SQR_MILES

3. Note that the classification method is set to 7 classes using Natural Breaks

4. Click OK

7. Examine your map. Next we will see how the classification method influences the colors on your map. The map you have already made used the "Natural Breaks" method. See ISTC

8
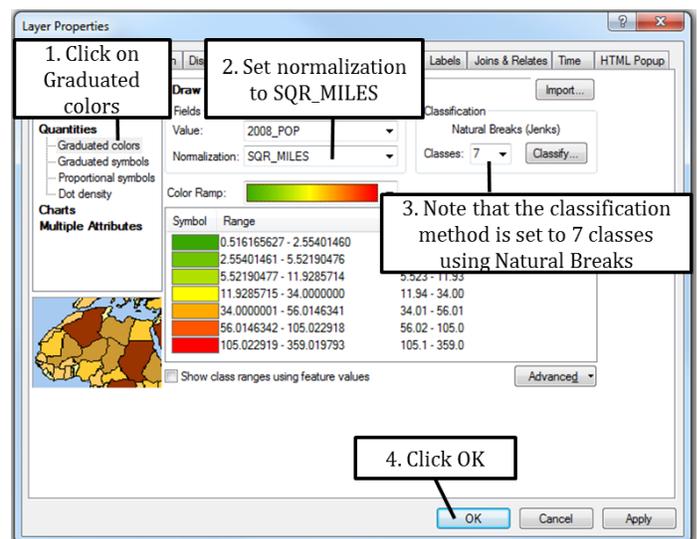
topic 3.9 for more information about classification methods.

8. Use the "Add Data" button to add another copy of the Counties_2008_Pop_Founded shapefile. Repeat one more time until you have a total of three copies of this shapefile in your table of contents.

9. Open the Layer Properties for the shapefile you symbolized in step 6 and go to the general tab. Change the Layer Name to "Natural Breaks" as shown on the right.
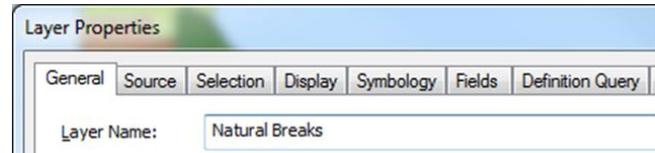
10. Repeat step 9 for the other two layers. Change the layer name to "Quantile" and "Equal Interval" respectively.

11. Open the Layer Properties for the "Quantile" layer and go to the symbology tab. Use the same color ramp and number of classes (7) as you used for the Natural Breaks layer. Click on the Classify button and change the classification method to Quantile as shown below.
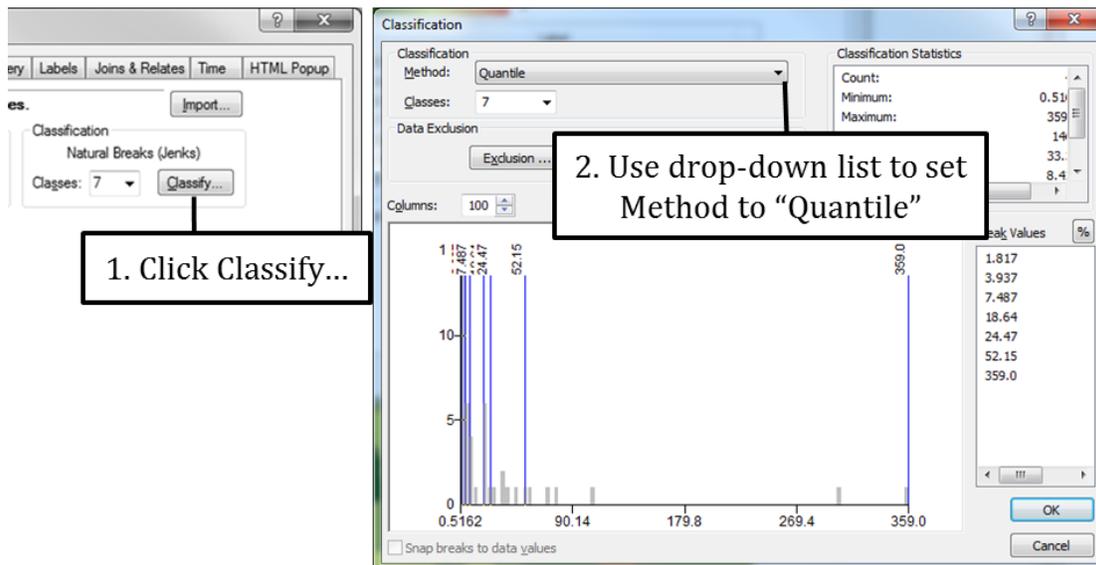
12. Symbolize the Equal Interval layer with the same colors and number of classes, but set the classification method to "Equal Interval".

13. Turn the different layers on and off in your table of content to compare the maps produced using the three different classification methods. Which map do you like the best? Why?

14. Save your map.

Exercise 7: Symbolizing your data using Charts

1. Start ArcMap and open a new map document. Add the shapefile called Canyon_County_Election_Results. This data shows a subset of data obtained from the Harvard Election Data Archive. For more information about this dataset go to the Additional Resources at the end of this chapter. Shown are the results for the 2008 presidential election in Canyon County.

2. Open the attribute table. For each of the precincts you will see the total number of people who voted (USPTOT_08) and of those people how many voted Other (UPS_O_08), Republican (USP_R_08) and Democrat (USP_D_08). In this exercise we will symbolize this data using pie charts and bar graphs.

3. Open the Layer Properties and go to the Symbology tab. Follow the instructions on the right to create pie charts showing how the vote was divided between Republican, Democrat and Other.

4. Click OK and view your map.

5. Open the Symbology tab and click on "Bar/Column" instead of "Pie". Click OK and view your map.

6. Finally symbolize the election results as "Stacked".

7. Save your map.

2. Use this button to add USP_O_08, USP_R_08 and USP_D_08

1. Click on Charts > Pie

4. Double click on each symbol to change the color. Set "Other" to green, "Republican" to red and "Democrat" to blue.

3. Set background to a grey color
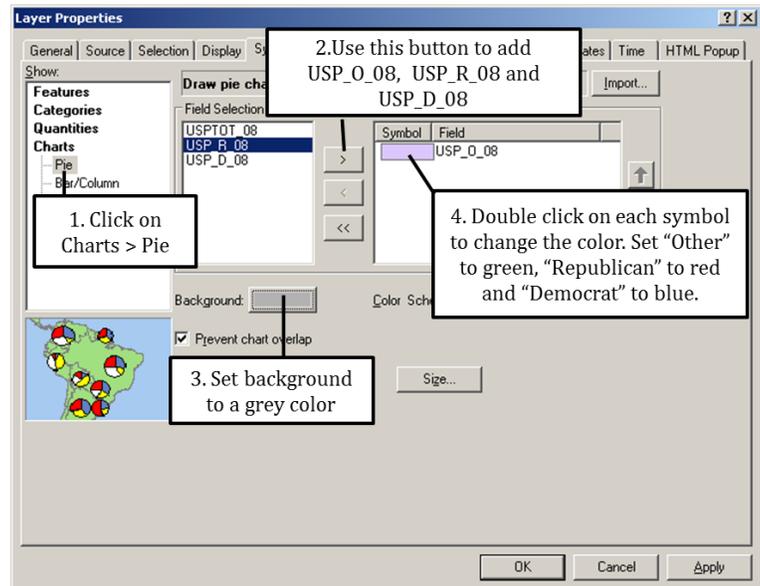
4. Importing Symbology and working with Layer Files

Exercise 8: Working with Layer Files and importing Symbology

1. Start ArcMap and open a new map document. Add the Waterpoints_Caribou.lyr from the Topic3_1 folder. Notice that this brings in the Waterpoint_Caribou layer, as well as symbology for this layer.

2. Add the Waterpoints_BearLake shapefile to your map. Open the Layer Properties for the Waterpoints_BearLake shapefile and go to the Symbology tab. We want to symbolize the water points in Bear Lake the same way as those in Caribou. Follow the instructions below to import the symbology.
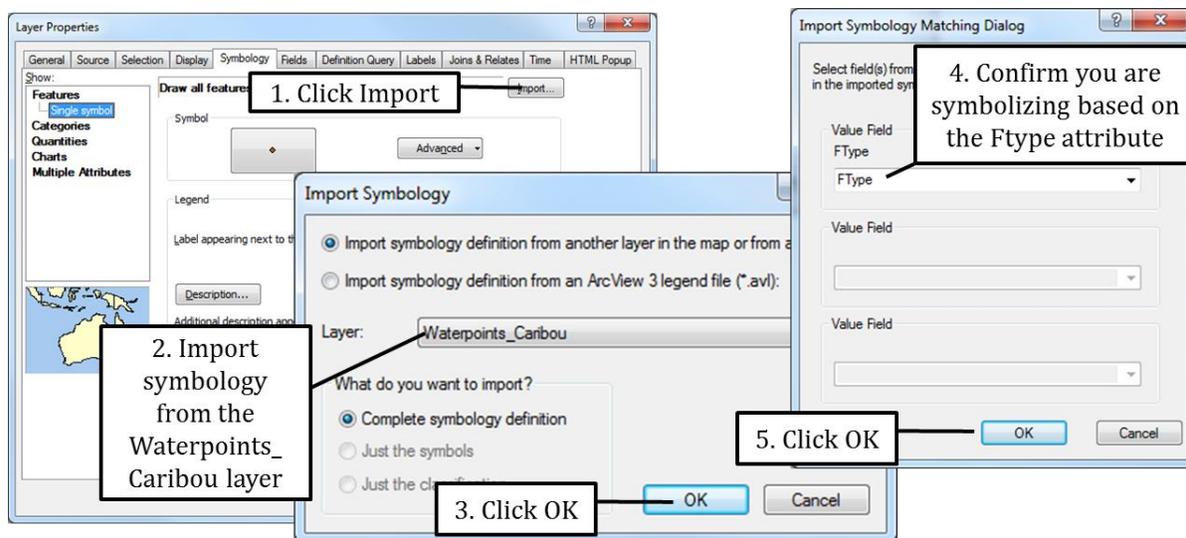
3. Click OK to close the Layer Properties dialog box and note the symbology for the Waterpoints_BearLake layer.

4. Any time you symbolize a layer you can preserve this symbology by exporting it as a layer file. Right-click on the Waterpoints_BearLake shapefile in the table of contents and click "Save As Layer File…". Accept the default name and store this layer in your Topic3_1 folder.

Additional Resources

- The Harvard Election Data Archive contains a wealth of geographic data files detailing election results. Find more information here: http://projects.iq.harvard.edu/eda/pages/about.