Challenge 5: Population Density Map of Lexington and Shared Use Paths

What you'll Learn: More fun with layer symbology and Summary Statistics

Data: Kentucky census blocks and Trails and Paths. Data is on X:/409/L2

What You'll Produce and Deliver: You'll make a map as PDF that shows Fayette County population density and the shared use paths. You'll post this on your journal as "Challenge 4"

Background: As we have seen in Lab 1, pedestrians would do well to find alternatives to walking near roads. Lexington has a network of off-road trails called "shared use paths" but do they connect parts of town with the most people? This is preparation for Lab 2: Connecting City and County, Lexington's Pedshed. Challenge 6 will be an extension of this challenge whereby you will automate the calculation of population density.
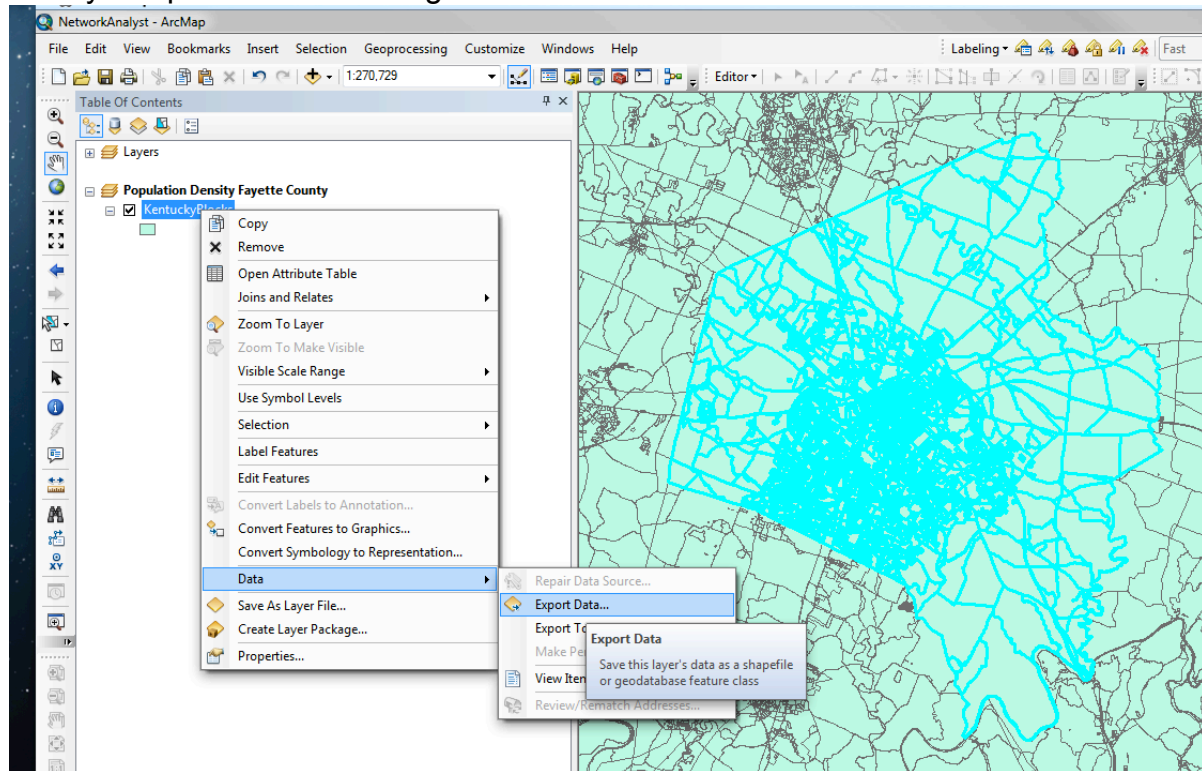
Step 1: Extract Fayette County census blocks

Use **Select By Attributes** to query out Fayette County and export into a new geodatabase.

If you don't know what FIELD to

query, then use the [image] to indentify a unique value for Fayette County. When you have it successfully queried,
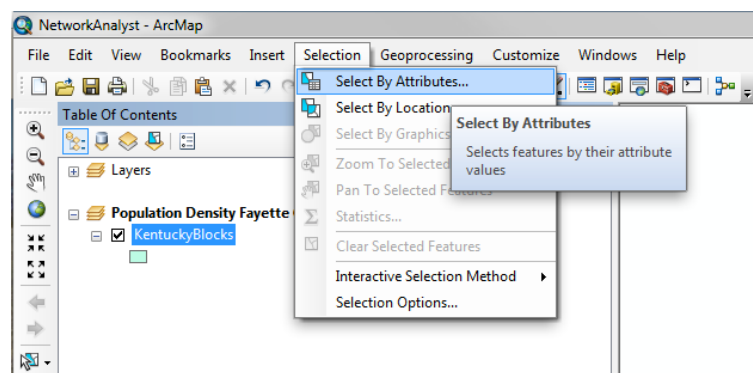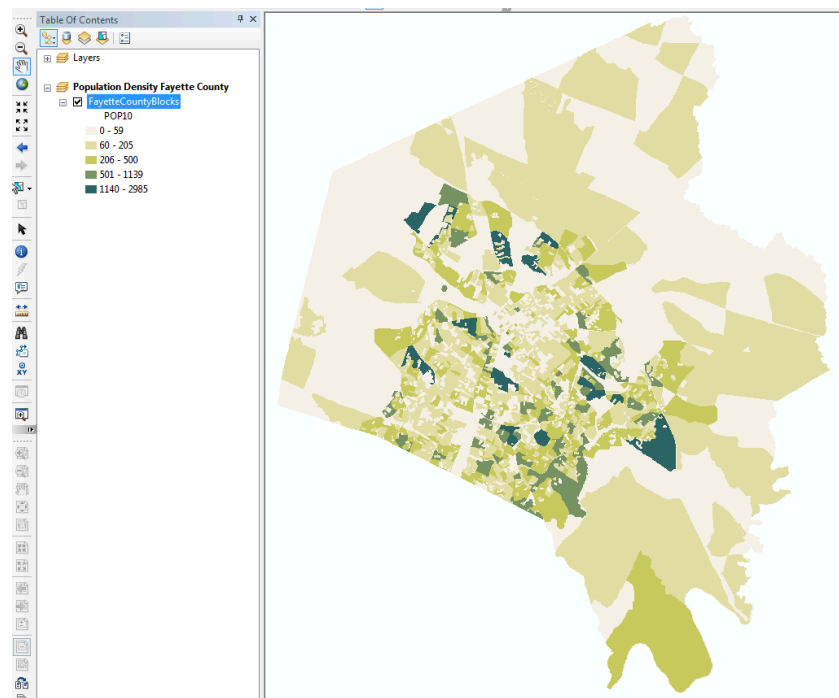
save your queries for Challenge 6

To automate this process, you'll need the **Select** geoprocessing tool. It selects and exports to a geodatabase in one step!
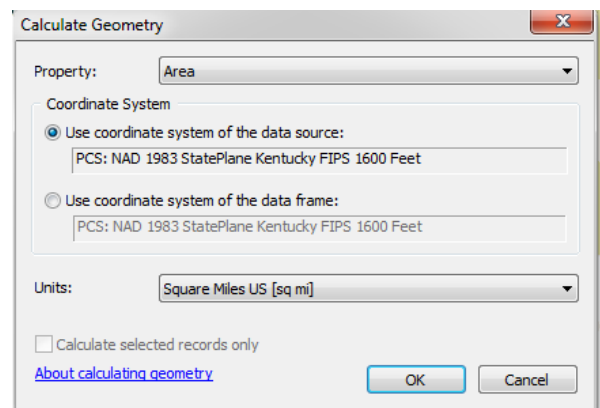
The map to the right is not a population density map. It is a raw count of population and not suitable for cartographic representation, because the area of the blocks have been normalized.

Step 2: Calculate area of blocks in square miles

Open the attribute table and add a new field called, "Sq_mi" with the proper numeric data type (not integer!). The calculate geometry for square miles.
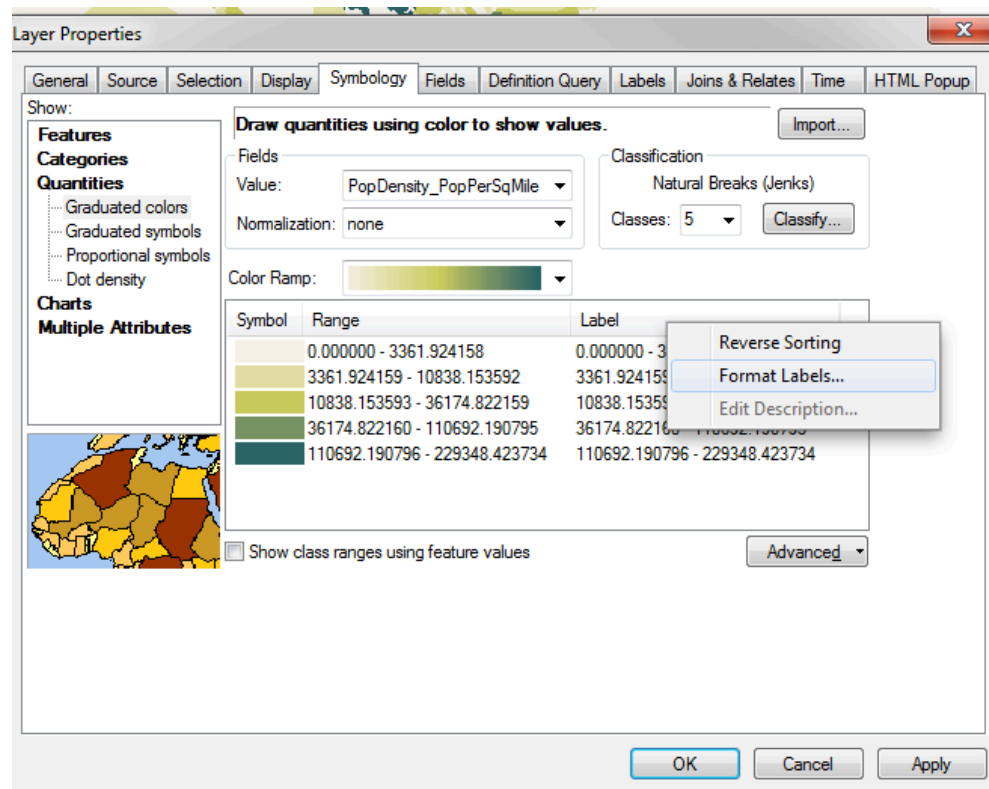
Create another field and calculate the POP10 per square mile by dividing Population by block area. That is "normalization."

Calculate Geometry

Property: Area

Coordinate System
- Use coordinate system of the data source:
  PCS: NAD 1983 StatePlane Kentucky FIPS 1600 Feet
- Use coordinate system of the data frame:
  PCS: NAD 1983 StatePlane Kentucky FIPS 1600 Feet

Units: Square Miles US [sq mi]

☐ Calculate selected records only

About calculating geometry   OK   Cancel

FayetteCountyBlocks

OBJECTID *	Shape *	STATEFP10	COUNTYFP10	TRACTCE10	BLOCKCE	BLOCKID10	PARTFLG	HOUSING10	POP10	Shape_Length	Shape_Area	Sq_Mi	PopDensity_PopPerSqMile
3589	Polygon	21	067	003300	2014	210670033002014	N	8	16	2296.946068	240837.078834	0.008639	1852.092784
1081	Polygon	21	067	002200	2002	210670022002002	N	129	230	11886.666153	3495735.369315	0.125393	1834.23677
3482	Polygon	21	067	003600	2002	210670036002002	N	23	43	3578.765957	653725.573516	0.023449	1833.745616

Geoprocessing tools required to automate this step is **Add Field (Data Management)** and **Calculate Field (Data Management).**

Step 3: Symbolize population density

Layer Properties

Tabs: General | Source | Selection | Display | Symbology | Fields | Definition Query | Labels | Joins & Relates | Time | HTML Popup

Show:
- Features
- Categories
- **Quantities**
  - Graduated colors
  - Graduated symbols
  - Proportional symbols
  - Dot density
- Charts
- Multiple Attributes

Draw quantities using color to show values.   Import...

Fields
Value: PopDensity_PopPerSqMile
Normalization: none

Classification
Natural Breaks (Jenks)
Classes: 5   Classify...

Color Ramp:

Symbol	Range	Label	
	0.000000 - 3361.924158	0.000000 - 3	Reverse Sorting
	3361.924159 - 10838.153592	3361.92415	Format Labels...
	10838.153593 - 36174.822159	10838.1535	Edit Description...
	36174.822160 - 110692.190795	36174.8221	
	110692.190796 - 229348.423734	110692.190796 - 229348.423734	

☐ Show class ranges using feature values   Advanced ▾
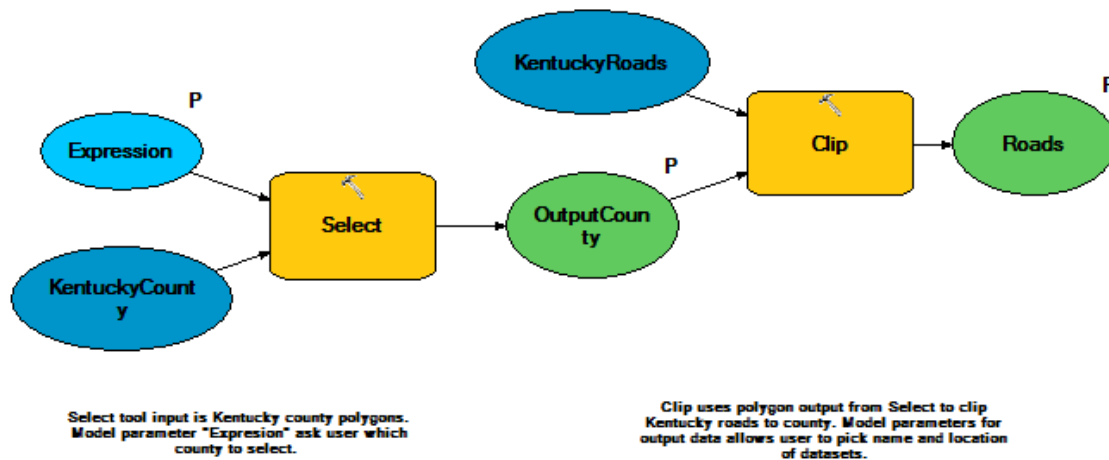
OK   Cancel   Apply

Add up to 7 classes and **Format Labels** to remove decimals.

Right+click a graphic depiction of your under the Symbol column to Change **Properties of All Symbols.**

Explore the **Classify** button to find different methods of classification.

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Step 4: Add roads and county outline

Use you Add County tool from Lab 1 to add and symbolize your roads and county outline.

Select tool input is Kentucky county polygons. Model parameter "Expresion" ask user which county to select.

Clip uses polygon output from Select to clip Kentucky roads to county. Model parameters for output data allows user to pick name and location of datasets.

Step 5: Add streams and waterbodies

Add the National Hydrological Datasets (NHD) flowline (streams and canals), waterbodies (lakes, ponds, and reservoirs), and areas (larger streams). Symbolize the flowlines by "FType".
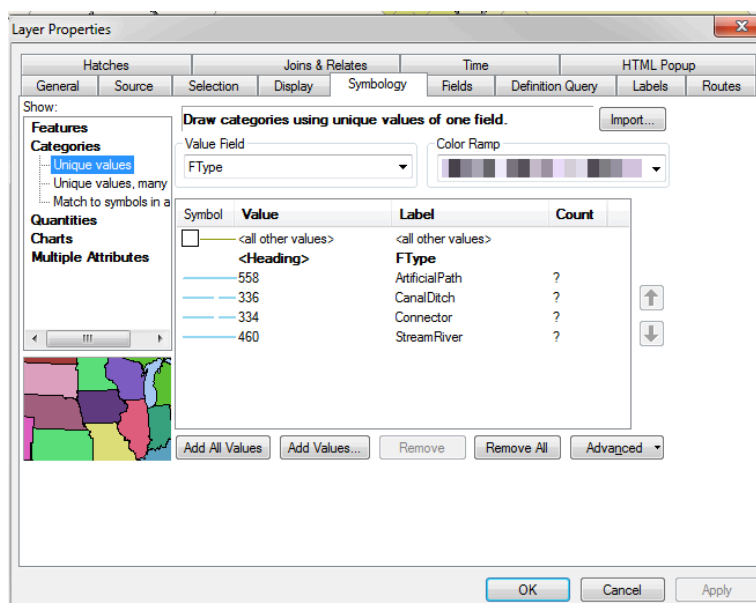
First, a good color to use for symbolizing streams is
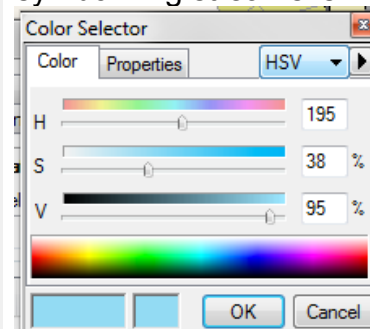
which you find by double clicking a symbol and changing **Color Selector** from RGB to HSV.

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Next, double click on "CanalDitch" and in it's **Symbol Selector** click on **Edit Symbol…**
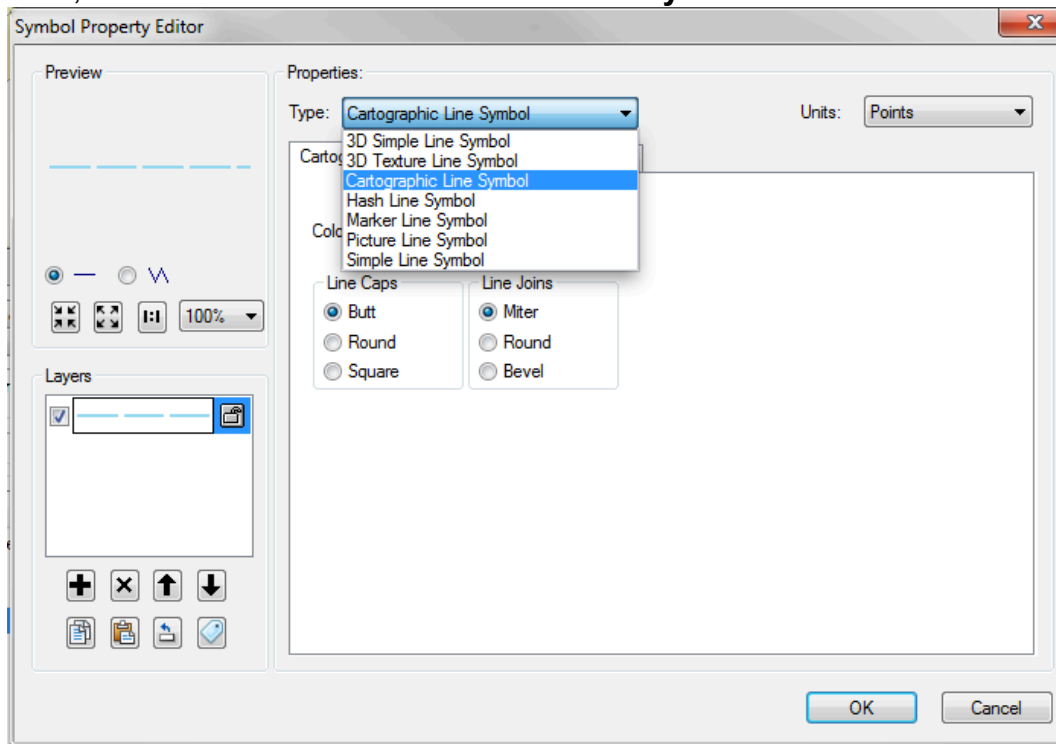
and then select **Cartographic Line Symbol**. This line style can make dashed lines.
Next select the tab **Template** and make a patterned line.
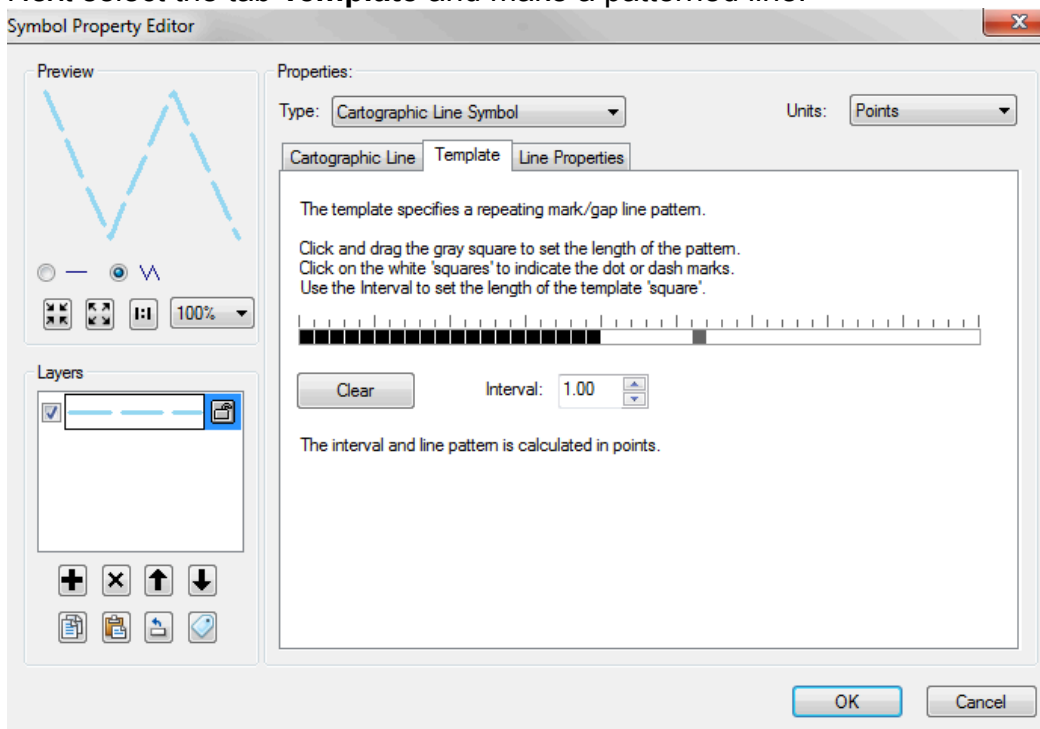
Step 6: Add Existing Shared Use Trails

Select By Attribute the feature class *TrailsPlusBikes* for all existing "Shared Use" trails in the field "FACILITY_S".
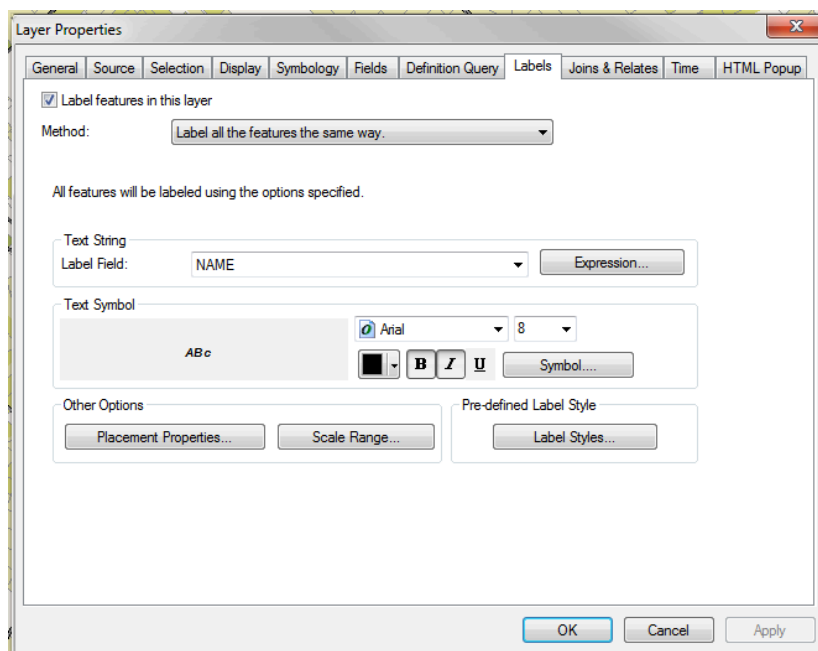
And export to a new feature class and add to your Table of Contents.

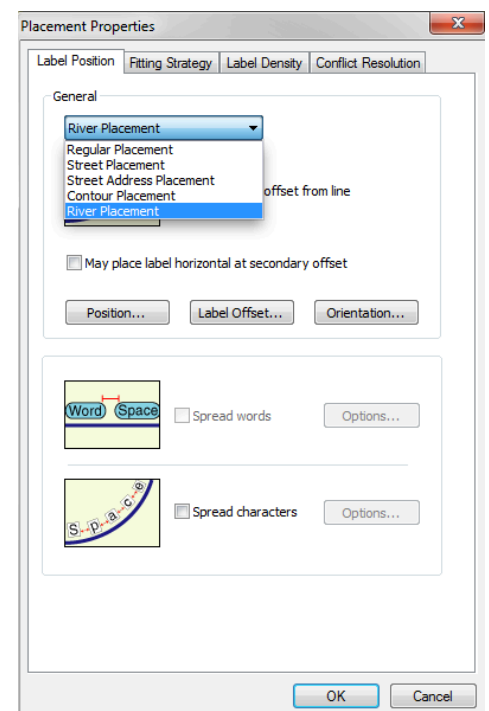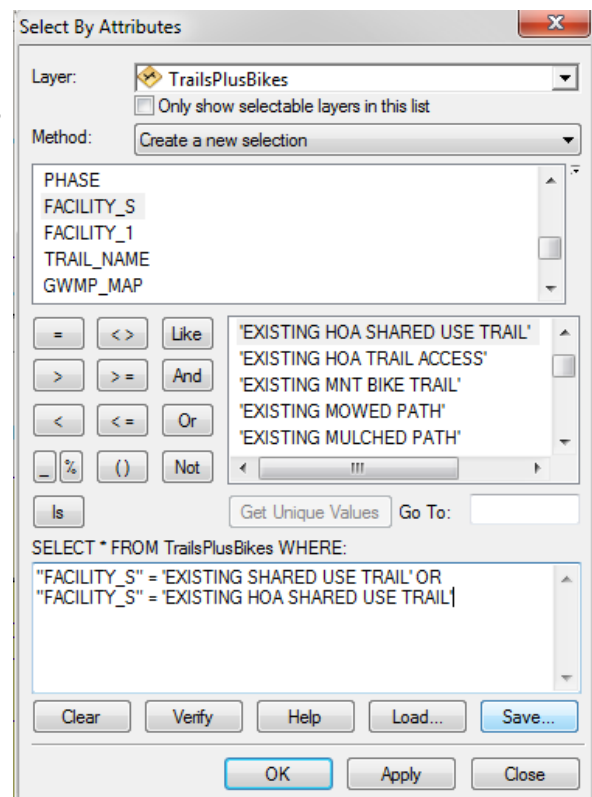Symbolize so they can be clearly seen against the background.

Next, label the shared use trails. Make sure your **Label Manger** is enabled
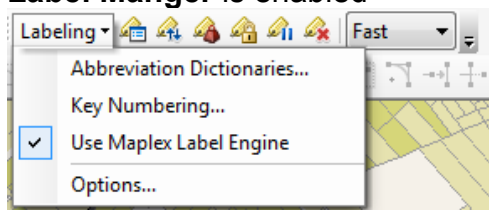
which can be found in the Customize > Toolbars > Labeling. Access the layer's **Labels** Tab. Click on **Placement Properties** and select River Placement.

Finally, enable the checkbox, **Label features in this layer**.

Step 7: Prepare the map for a poster-sized layout

After you have your map symbolized properly, remember to **Save As Layer File** for each layer! Then, change your Page and Print Setup and go big, like ANSI E. We'll come back to this in Lab 2 and use it as a base map. Just set these parameters and your done! Note, if you enable Scale Map Elements proportionally to changes in page size will scale everything up to match new page size. Good setting in the beginning of a project.
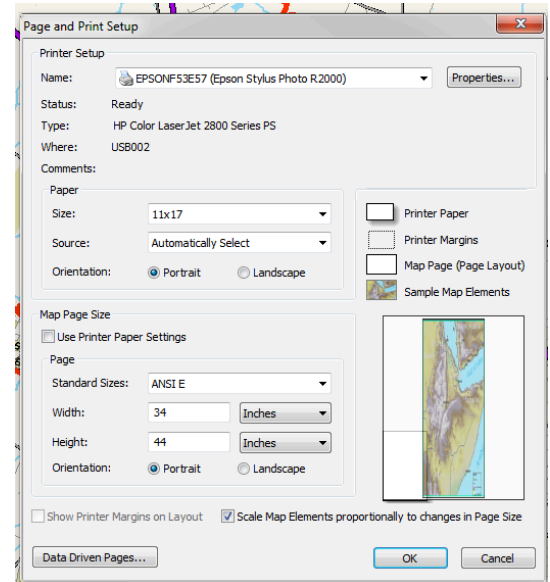
Step 8: Post a screen capture to your journal

Pick an area that you find interesting and capture it!