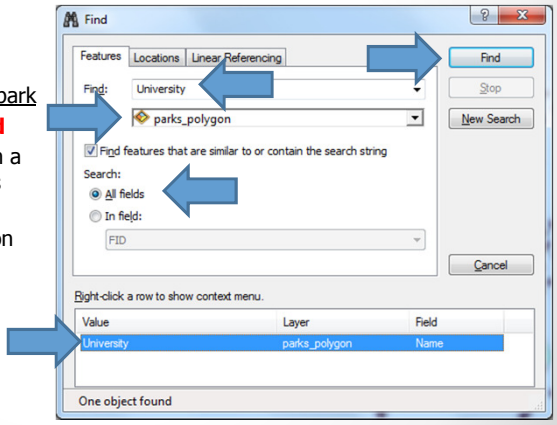
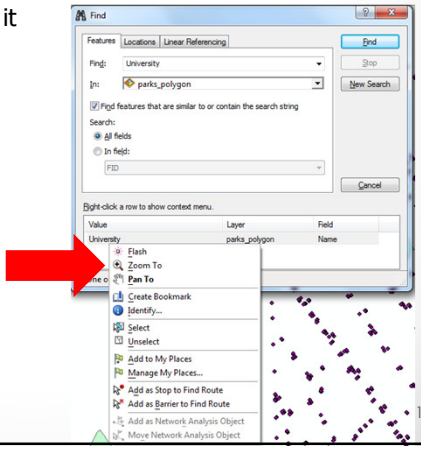
ArcMap: Finding a Feature

- The **Find** button lets you search a map for features that match your search criteria
  1. Click the **Find** button 
  2. Find dialog box appears
  3. Let us search for the University park
  4. Type University in the **Find field**
  5. You can search for features from a particular layer or from all layers on the map
  6. Here let us choose parks_polygon
  7. Click **Find**
  8. Lower box shows all matches
  9. Select from the list
  10. It will highlight it on the map



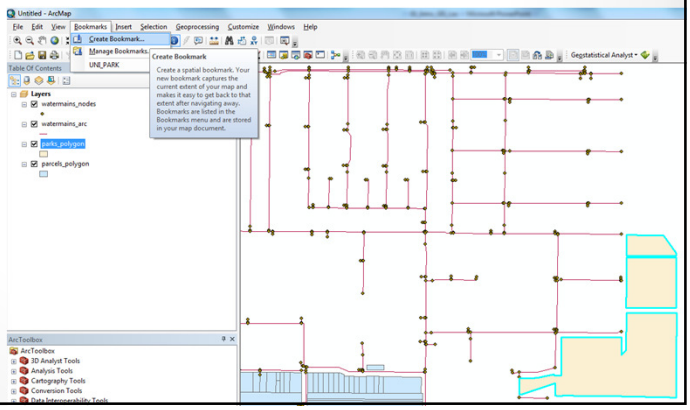
ArcMap: Finding a Feature

- Right-click on the University park and choose:
  - **"Zoom To"**: to go to the site
  - **"Flash to"**: just show you where without changing your map
  - **"Pan to"**: to center the map on it
- Try them all



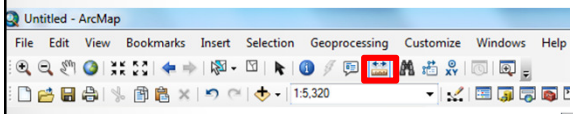
Bookmarking

- You can create a spatial bookmark in ArcGIS
- Let us zoom to University Park (Parks Polygon layer)
- Now go to Menu and click on Bookmarks
- Choose Create Bookmark
- Type the name of your bookmark (e.g. UNI_PARK) and then click OK
- Zoom to full extent now
- Go to Bookmarks and now choose UNI_PARK What happens?

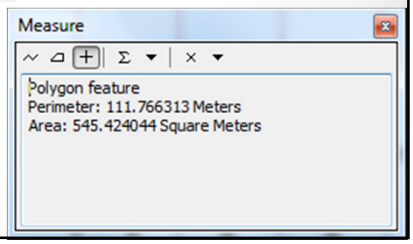


The Measuring Tool

- ArcGIS like Google Maps has a tool to measure distance
- The tool looks like a ruler and it is found under the Tools toolbar
- Powerful as it can be used to measure distance, perimeter, and area
- You can also sum distances and areas

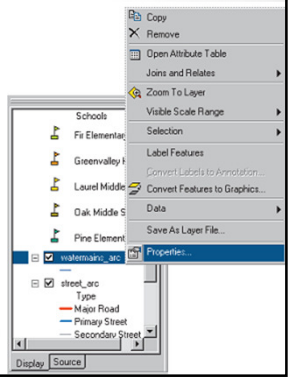


- It knows the geometry of each layer



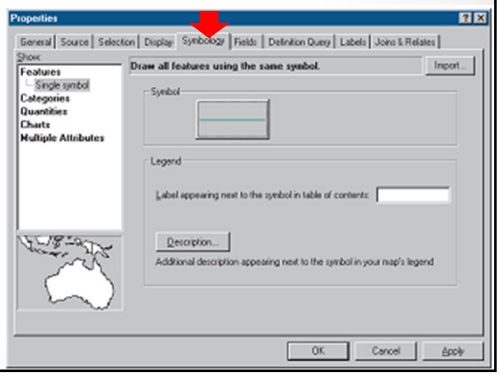
Symbology

- Often you need to change the way the objects are shown on your map ➔ Change **Symbology**
- Right click on the feature you want to change its symbol within the Table of Contents
  - Let us change the symbology of the water main nodes ➔ Right-click watermains_arc in the ArcMap table of contents and click **Properties**



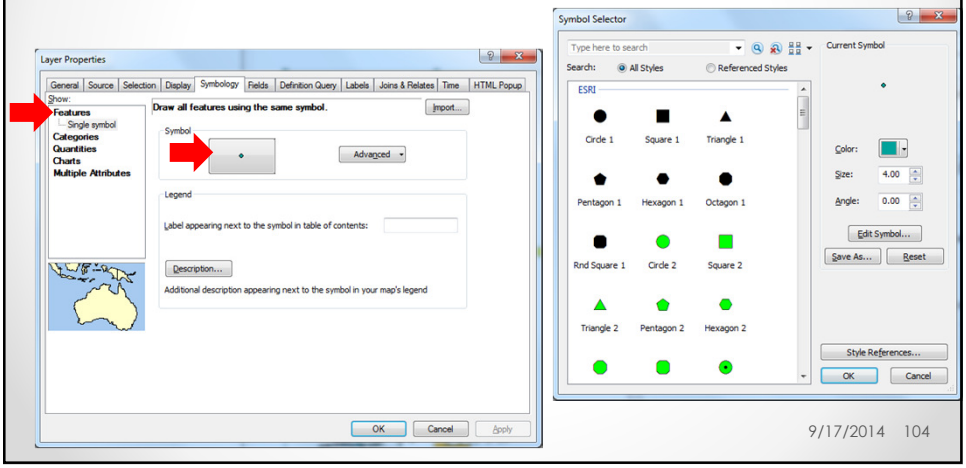
Symbology

- The layer Properties dialog box appears
- Go to Symbology
- You can change the symbol scheme for the layer, as well as its appearance in the table of contents, from this tab



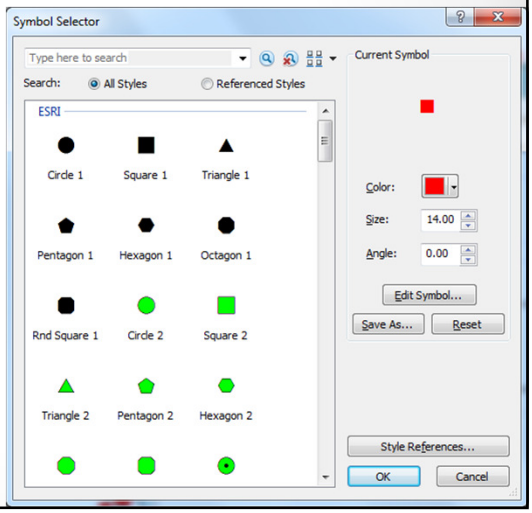
Basic Symbology

- Choose **Single Symbol** and then under **Symbol** click on the button to change the style, color, and size of the symbol to be used



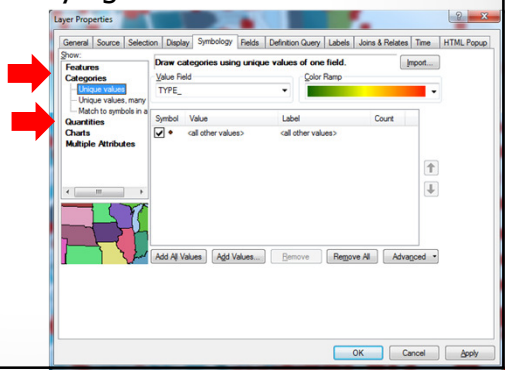
Basic Symbology

- Choose Single Symbol and then under Symbol click on the button to change the style, color, and size of the symbol to be used
- Choose:
  - **A filled square**
  - **Red color**
  - **Size 14**
- Click OK
- Click Apply
- The changes are now reflected on your map



Mapping of Attribute Data

- In GIS, each feature can have a number of attributes attached to it (e.g. land parcel, assessed value, square footage, land use)
- We can map out these attribute values by their corresponding geography on your map
- Two basic approaches for classifying the data:
  - **Category approach**
  - **Quantities approach**

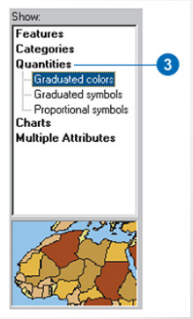


Symbology in ArcGIS

- **Quantity approach:**
  - Applies to ***numeric*** attributes that are ordinal (have order to them)
  - This means one values is greater than or less than another
  - Good for continuous data
- **Category approach:**
  - Applies to categorical data, where the categories can have, but don't need to have an order
  - If they do have order, the category approach ignore that order
  - Good for discrete classes
- Note that the same map can have different layers with different symbologies:
  - Some simple, some quantitative and some categorical attributes
  - But 1 layer should be of 1 type

Symbology in ArcGIS

- Try to change the symbology of the water main nodes to **quantiles**
- Click Quantities ➔ the panel changes to give you controls for drawing with 3 options
- Choose **Graduated Symbols**
- Choose the field you want to use
- Click the Value dropdown arrow and click Outlet_Siz for the watermain_nodes
- You can choose to normalize your value by another attribute (not done here)
- Choose the symbol size range **(5-20)**
- Choose your symbol **(Blue Circle)**
- **Click OK**



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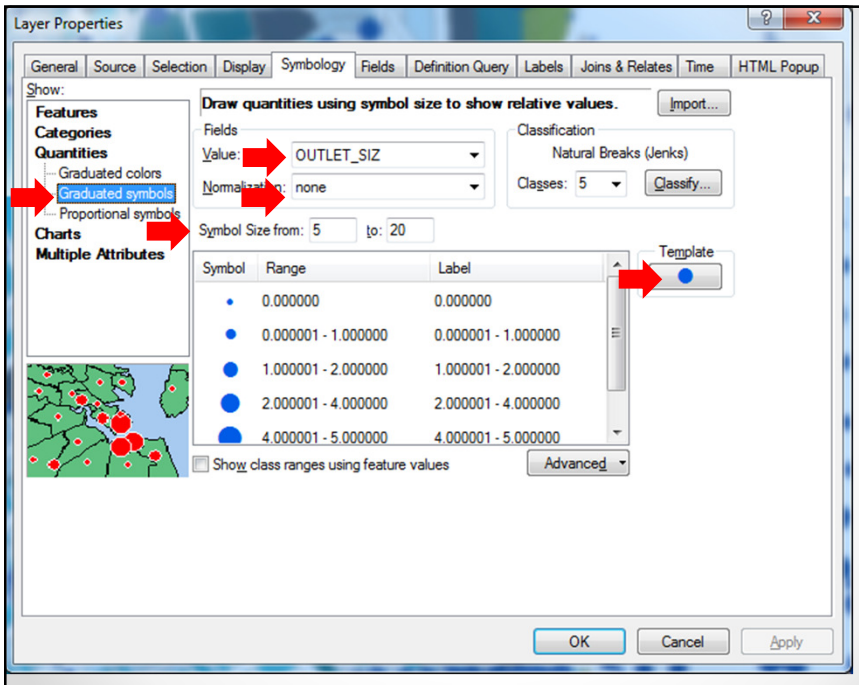

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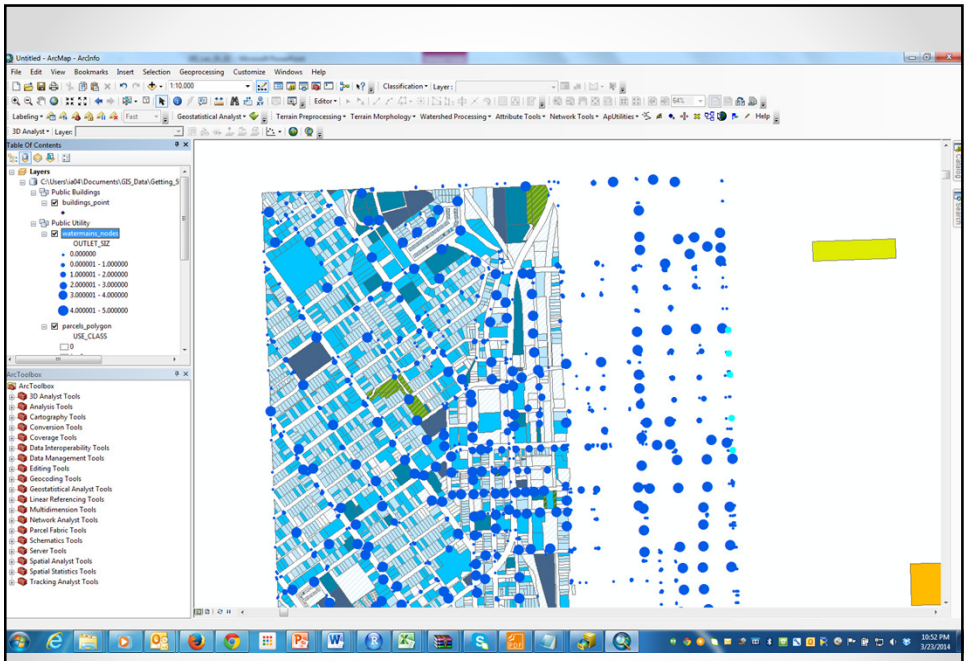
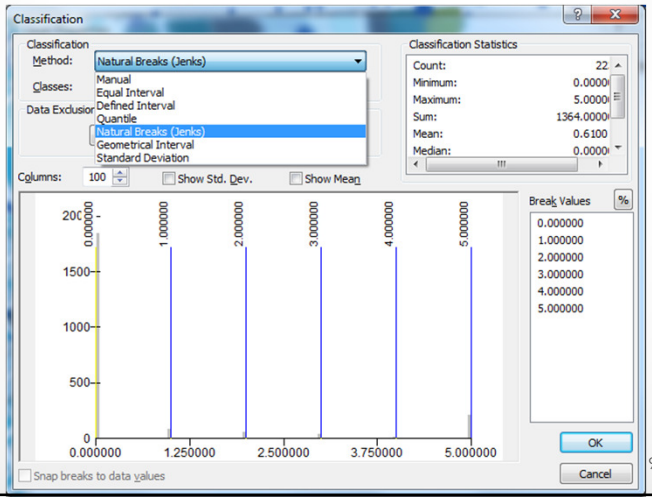


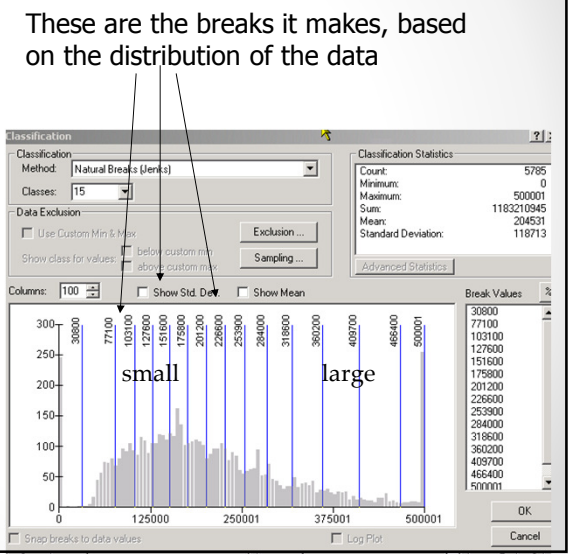
Quantiles

- Here we only have 5 values but what if we have many numbers?
- Not practical to assign a symbol for each number
- I need to classify my divisions: Many options are available



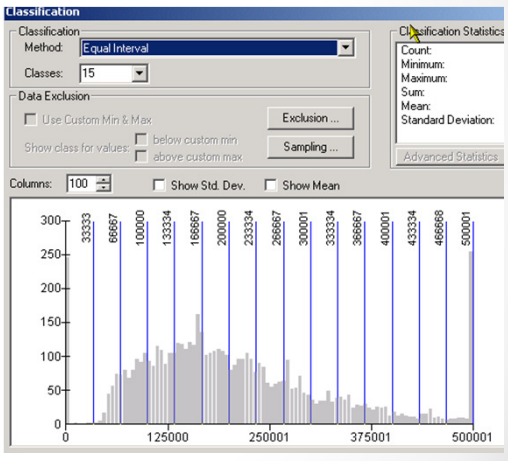
Classification

- The **Classification Method** affects how the mapped attributes will look
- ArcGIS normally defaults to the **Jenks**, or **natural breaks**, method



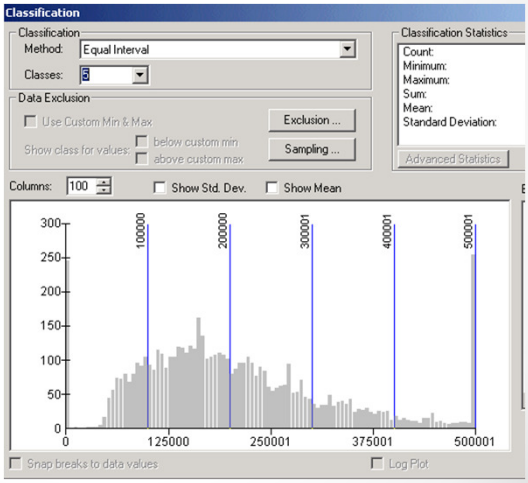
Classification

- If we select the **equal interval** approach
- Notice how all the breaks are evenly spaced
- With a fairly normal distribution of data, this is usually OK



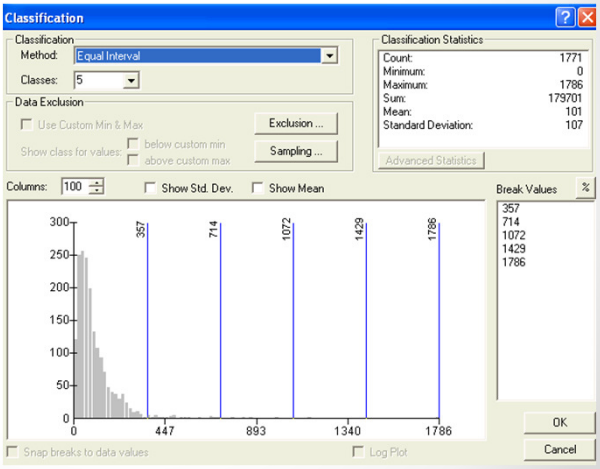
Classifcation

- You can change how many classes you want
- Here's what the same distribution looks like with only 5 equal intervals



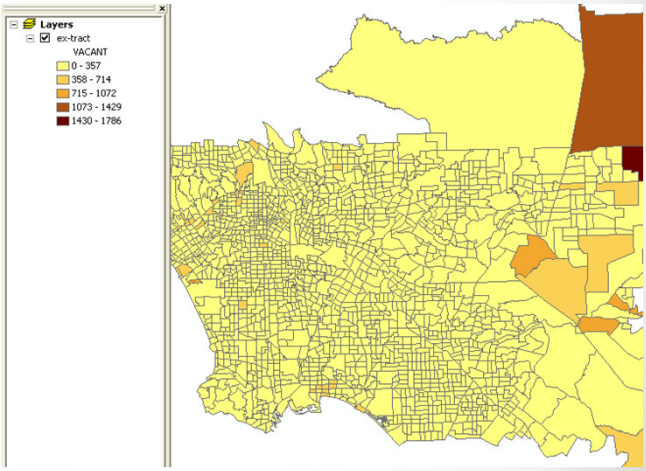
Classification

- When the distribution is skewed, or there are significant outliers ➔ **equal interval is problematic**
- Why?
- Most intervals have no data in them



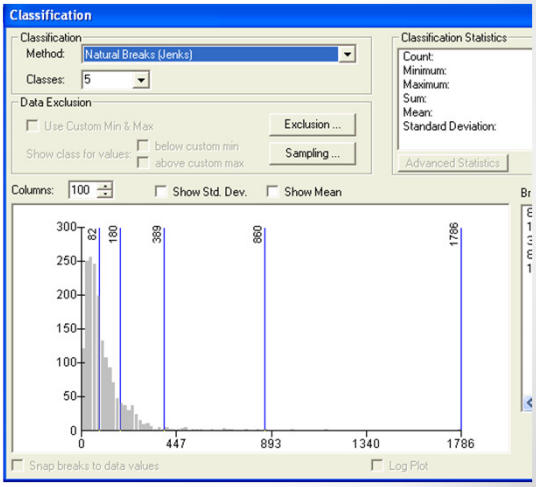
Classification

- This map tells us almost nothing
- Why?
- Because almost all the records fall into the first class



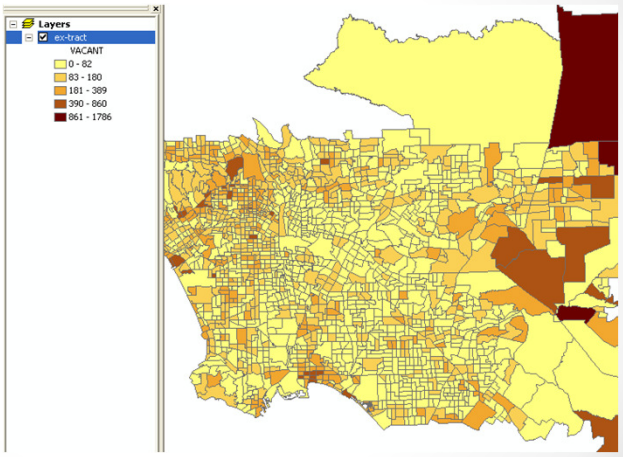
Classification

- Notice how with natural breaks there are now more classes on the left side, where most of the data are



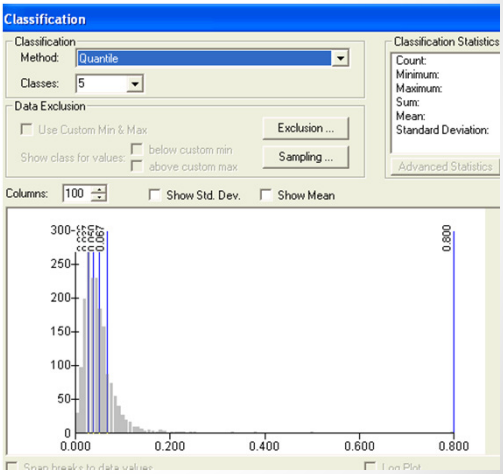
Classification

- **This map, made with Natural Breaks, is more intelligible**



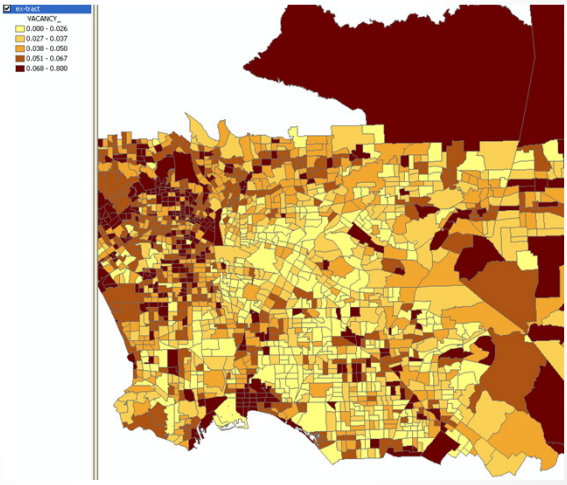
Classification

- There is a similar approach to Natural Breaks called **Quantile**
- This method sets class boundaries so each class has **equal numbers** of observations in it



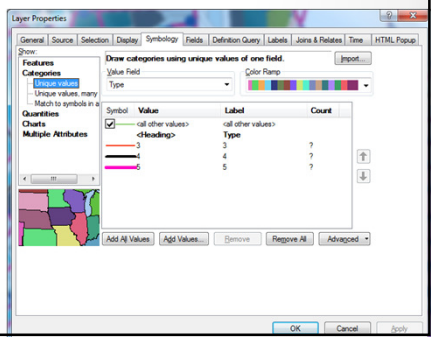
Classification

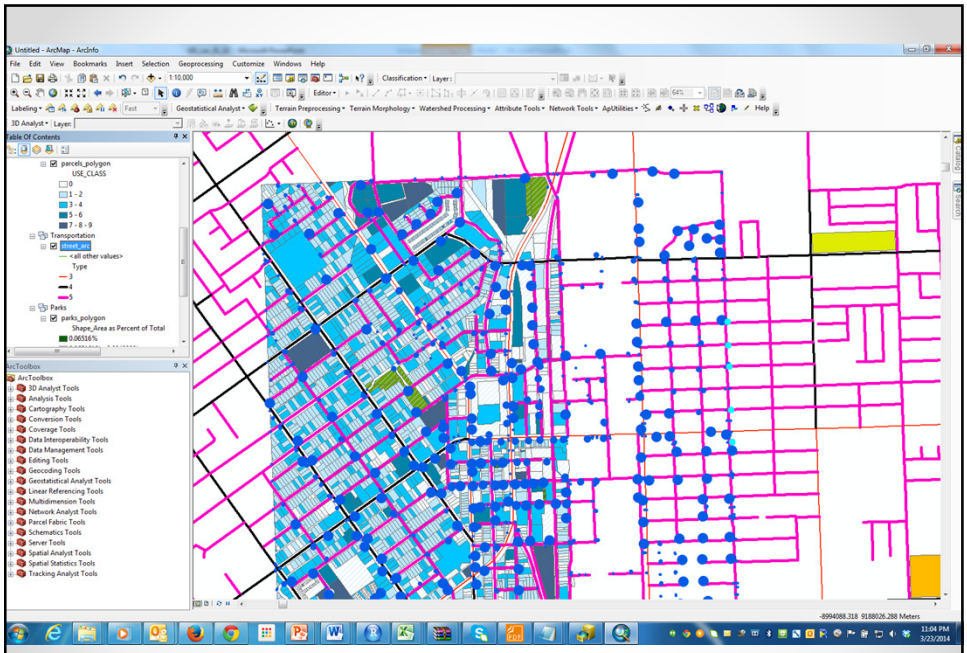
Quantiles



Categories

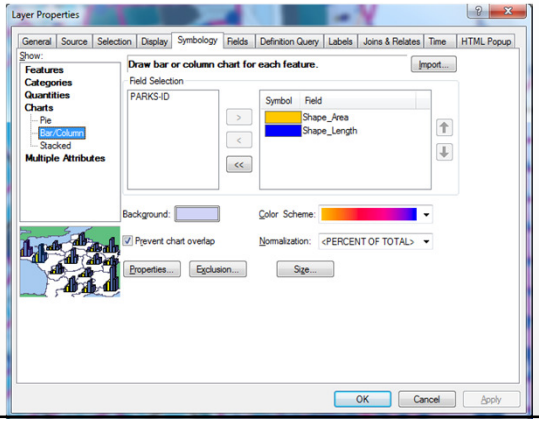
- This is the simplest type of symbology: we are simply assigning a different color or symbol to each feature with a given categorical value
- Try to change the symbology of the street_arc to reflect the type of the road
- Generally, we will choose "Categories>> Unique values"
- Choose your values field that contains the attribute and then click the "Add all values" button
- Change the symbology of each road type accordingly:
  - Type 3: Red Width 2
  - Type 4: Black Width 3
  - Type 5 Pink Width 4
- Click OK ➔ Apply ➔ OK





Symbology by Charts

- Attributes for point, line or polygon features can also be displayed as charts on the map
- Try that with the Parks:
  - Show the park area and park length as bars that are normalized by: Percent of Total

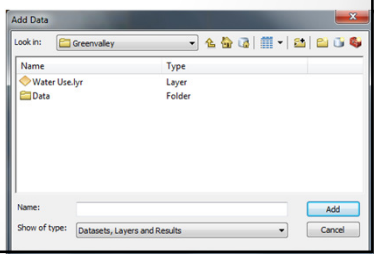


Saving Symbology

- What happens to all your hard work on customizing the symbology for a giver shapefile when you exit GIS?
  - It is not saved (unless you save the map)
- If you want to save your symbology for that shapefile for future use in other maps ➔ save it as a layer file
- Right click on the shapefile in the TOC and click "**Save As Layer File**"
- This will create a **LAYER** file with the same name as our shapefile but with the .lyr extension

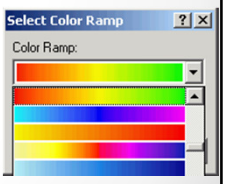
.shp VS .lyr

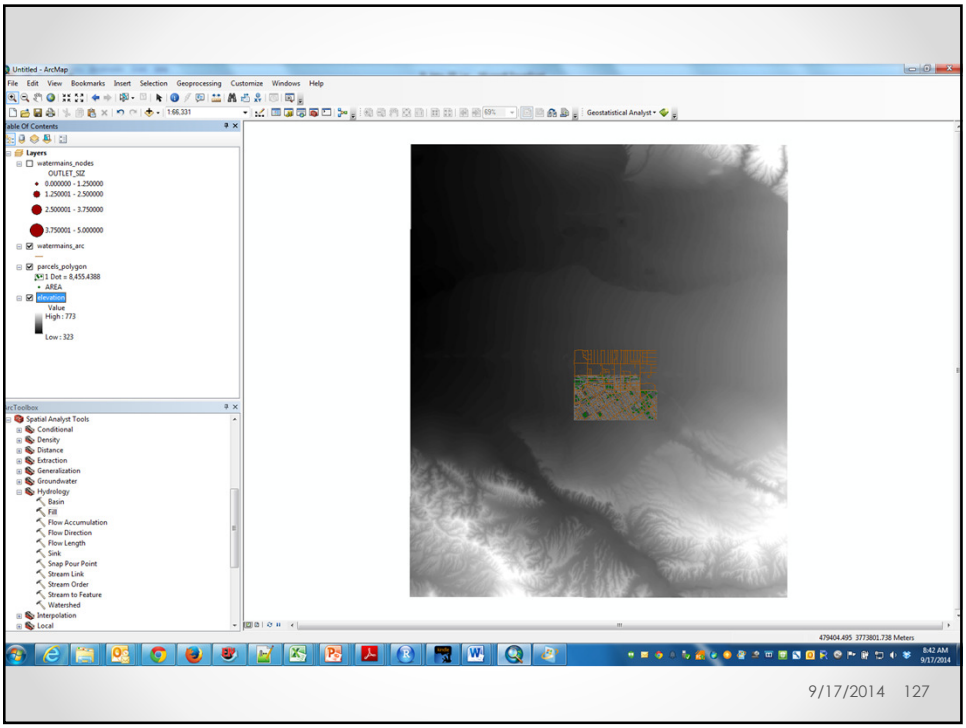
- A layer file primarily stores the symbology for a given feature
- A layer file is a just a link to the actual data
  - It does not store the data's attributes or geometry
  - The .lyr file **needs the .shp** file to display
  - If you email the .lyr file need to provide the .shp file along with it
  - Check the Water Use.lyr file in Greenvalley

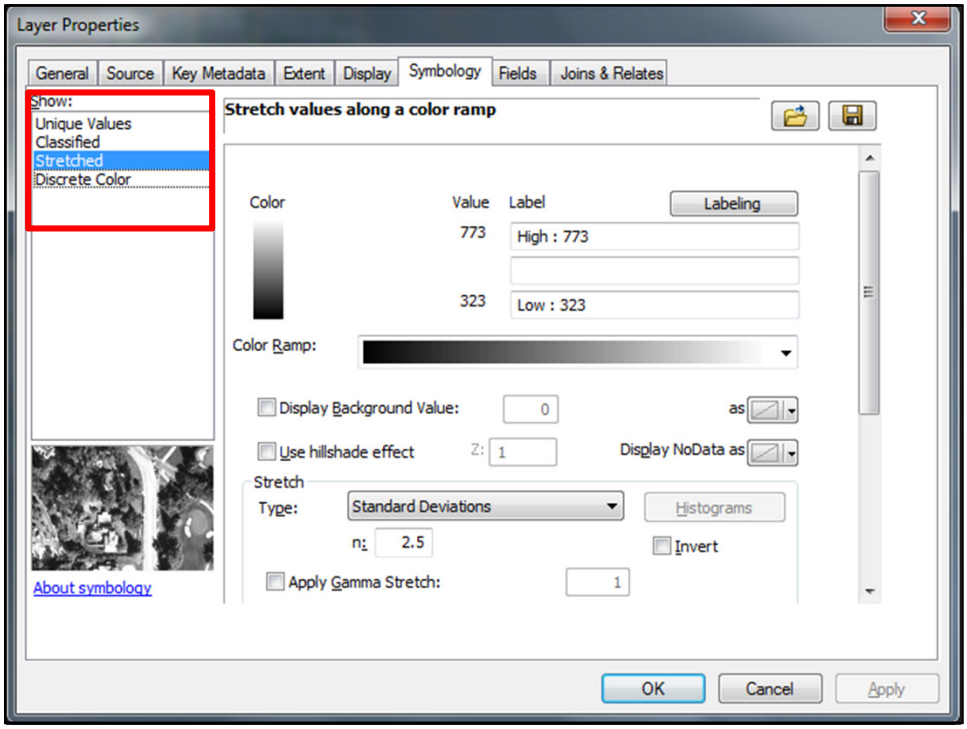


Symbolizing Rasters

- Raster grids have a different type of symbology window than the one you see with vector data
- If raster data is continuous ➔ defaults to the use a color ramp
- To change right click on the layer in the TOC
  - Choose symbology
  - 4 symbology methods
    - Defaults to stretched
- Add the Raster Elevation Raster: Getting_Started\project\State_share\elevation

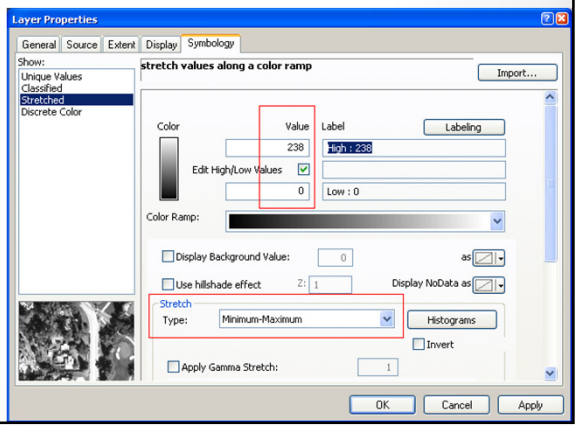




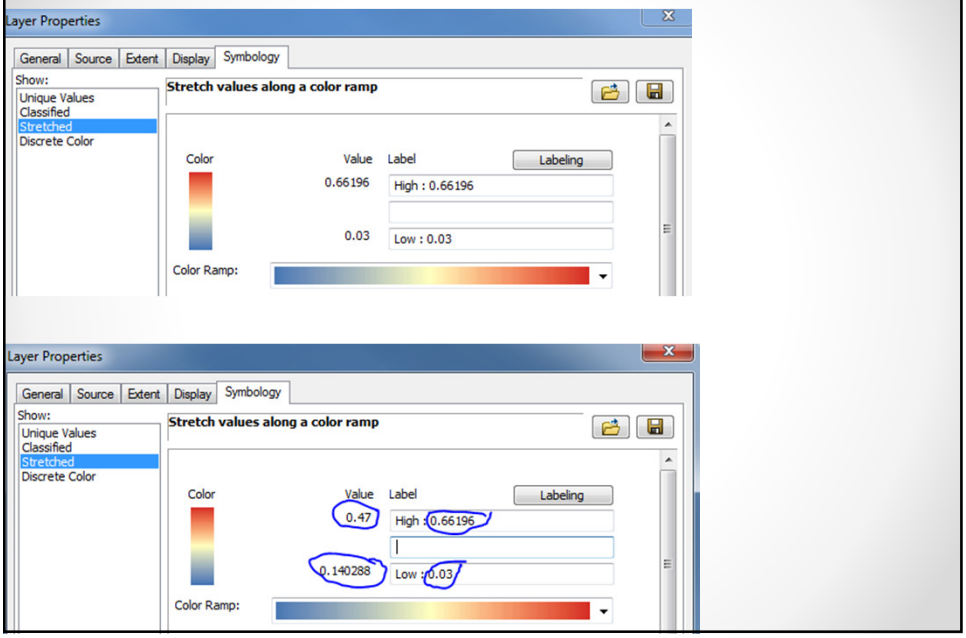


Symbolizing Rasters

- To change right click on the layer in the TOC
  - Choose symbology
  - Default is **Stretched**
  - No information on data values associated with shades of color
  - Stretching colors from min to max
  - Often the the actual **min/max values** are **not the same** across rasters…

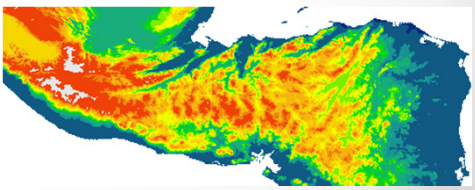


Raster: Symbology



Symbolizing Rasters: Classified

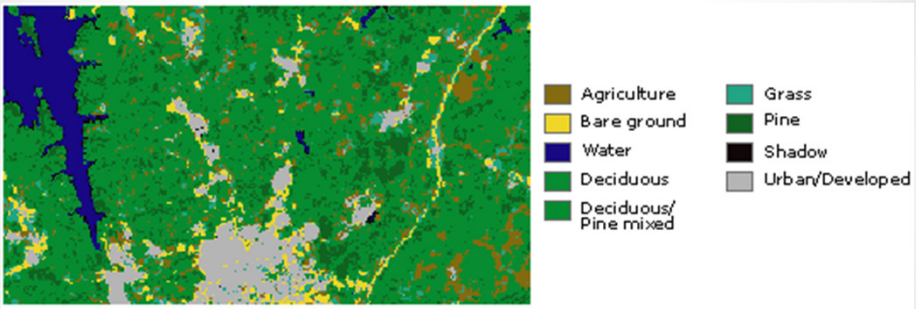
- Let us change from Stretched to Classified:
  - Color transition are less subtle but can see exactly which value ranges correspond to which color
  - Groups cell values into classes
  - Choose 6 classes
  - You can also change the number of categories and the way the categories are formed

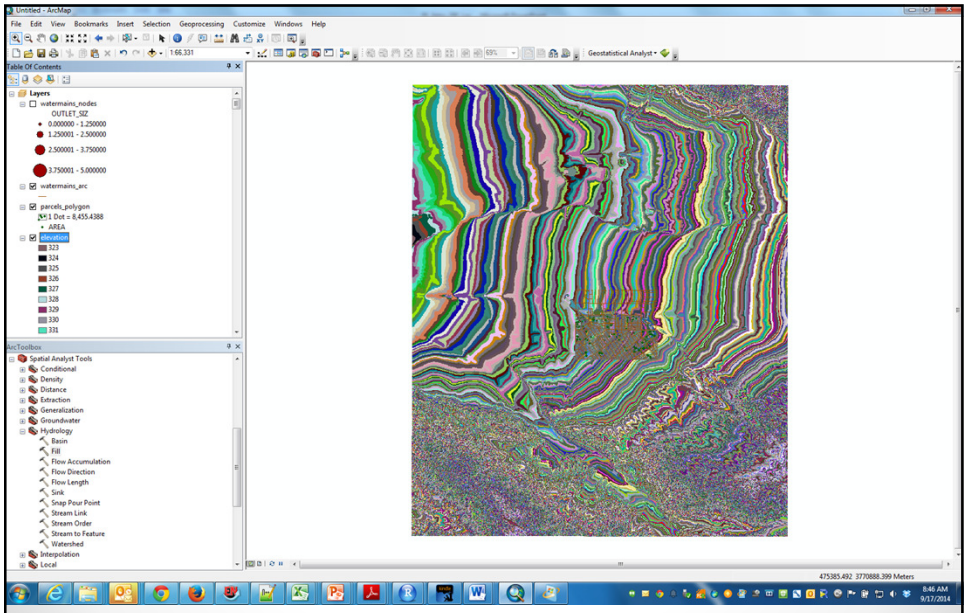


Symbolizing Rasters: Others

- **Manual**
  - Lets you set the class breaks
  - Placing breaks at important threshold values
- **Equal Interval**
  - The range of cell values is divided into equally sized classes
  - You specify the number of classes
  - Emphasize the relative amount of attribute values compared to other values
- **Defined Interval**
  - You specify an interval to divide the range of cell values
  - ArcMap determines the number of classes.
- **Quantile**
  - Each class contains an equal number of cells
- **Natural Breaks (Jenks)**
  - The class breaks are determined statistically by finding adjacent feature pairs between which there is a relatively large difference in data value
- **Unique Values**
  - Different color for each value (<2,048)

Symbolizing Rasters: Unique Values



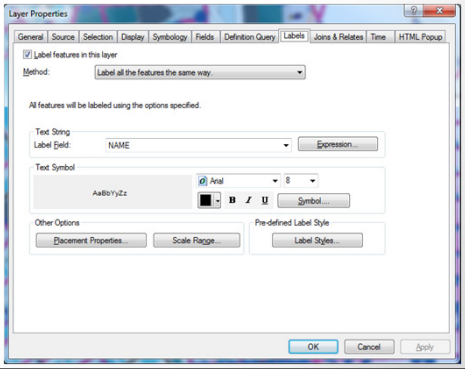


Rasters: Reusing Your Symbology

- If you want to save the symbology and reuse it to another layer
  ➔ Need to save as **LAYER** file option
  - Right click to the raster and click Save As Layer File
  - Save layer file in your directory
  - Go to new Raster
  - Open its properties
  - Select the Symbology tab
  - Click the **Import** button
  - Navigate to the saved layer file and select the saved layer file
- I can also save and load a .lyr file of my raster

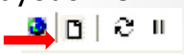
Adding Labels to a Map

- You can label your map features
- Right-click on a layer in the table of contents
- Choose "**Label Features**"
- Let us try it with street_arc
  - You should see the names of the streets to the map
- Note that you can change the field used for naming by going on to "Layer Properties"
  - Click on Labels
  - Choose what field you want to use
  - You can change font style, size, scale, style, and placement



Producing Your First Map

- After you are happy with your map it is time to produce it
- We need to move from "Data View" to "**Layout View**"
- Click **View** and click **Layout View** or Find the View Toolbar at the bottom of the Map Window and click on the Layout View icon



- Go to File>Page and Print Setup and change the Paper size to A4 and the Orientation to Landscape
- Click OK to apply this change
- You can see the map on a virtual page
- The layers of data appear in a data frame on the page
- There is always **at least one data frame** on a map
- This one is called Layers; you can see its name at the top of the ArcMap table of contents (you can also rename it)

Map Layout

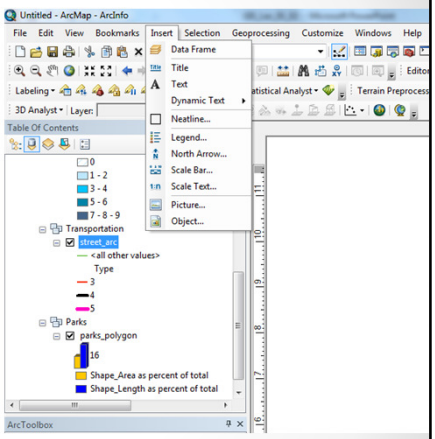
- The active data frame is shown in **boldface** type in the table of contents
- You can have multiple datafarmes in a map
  - Each acts independently of the other
  - Good for comparisons or showing different areas on the same map
- Make sure your **Object Select Tool** is selected and click once inside the Data frame in the Map Document window
- This should highlight the Data frame and activates the Resize option
- Resize your map to fit in your Layout page
- You can use the Pan button to move around your map without changing the scale
- You can also zoom in and out to change the scale of your map

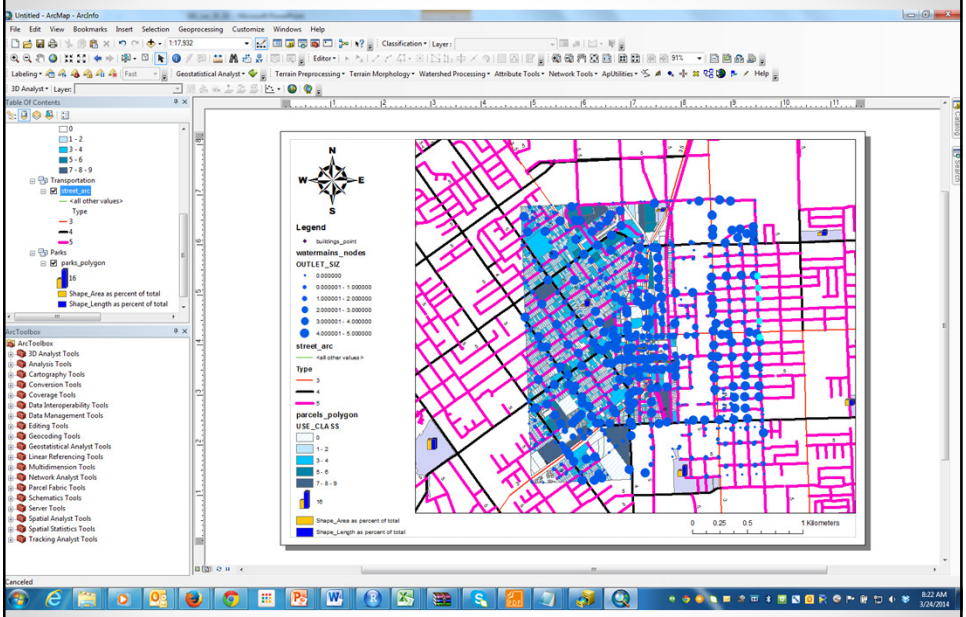
Maps with >1 Dataframe

- If you want to have multiple independent maps on the same layout
- Go to Insert and choose a new "Dataframe":
  - Go to Insert> Dataframe

Inserting the Main Map Elements

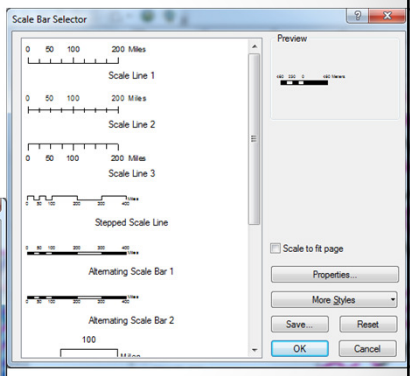
- Every map should have at least:
  - **A title**
  - **A legend**
  - **A scale bar/scale text**
  - **A North Arrow**
  - **The name of the person/company who created it and when**
- You can also add titles, pictures, and text
- You can add all those from the Insert Menu
- Each one of these elements can be modified in ArcMap

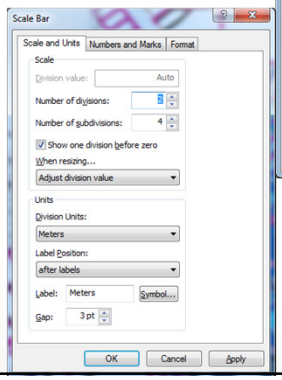




Inserting and Modifying the Scale Bar

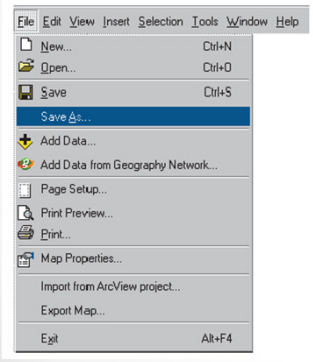
- Click on Insert > Scale Bar
- Choose the type
- Click on Properties
- Make changes:
  - Number of ticks
  - Units
  - Labels (Should match units)

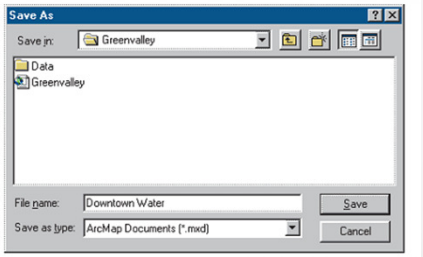




Saving the Map

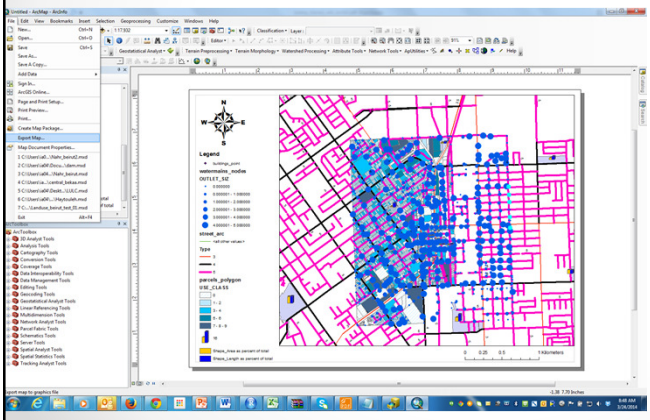
- Click File and click "Save As"
- Browse to the location you want to save in





Printing Your Map

- Click File and click Print
- Choose your printer
- You can also export your map to a JPEG, PDF, and CAD



Export Your Map

- Choose the type of file you want to export to
- Choose Resolution
- Choose location