INTRODUCTION to ESRI ARCGIS
For
Visualization, CPSC 178

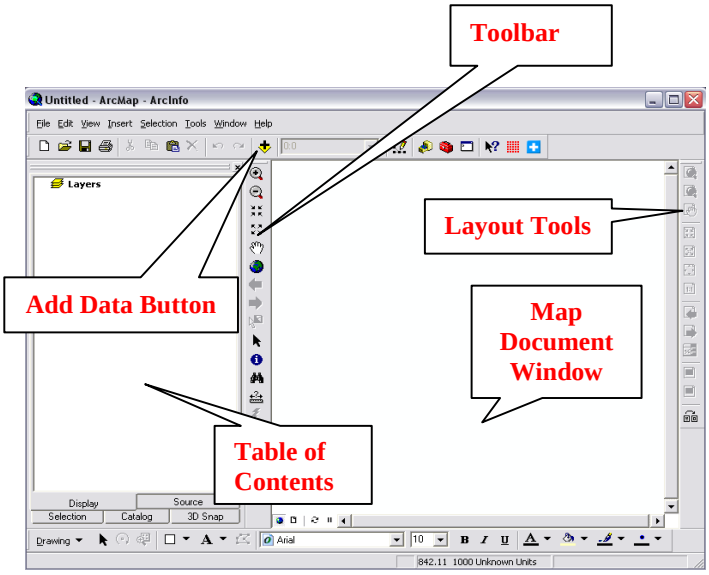
1) Navigate to the **C:/temp** folder

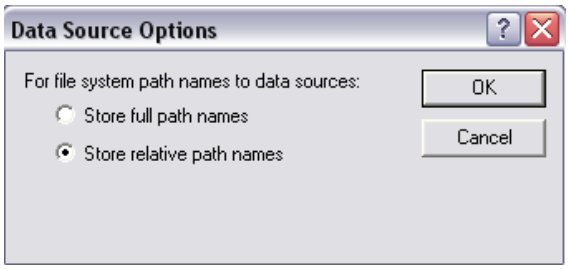
2) Make a directory using your initials.

3) Use your web browser to navigate to www.library.yale.edu/MapColl/ and click on the look for the **"Download GIS Workshop Materials" Quicklink**. On the **Workshop Materials** page, look for the Data Link for the **Visualization CPSC178 Workshop**. Download and Unzip the dataset to your initials folder. This file contains the datasets we will use for the exercises that follow.

4) Start **ArcMap** with a new empty map

5) Use the **Add Data Button**  to open the **Add Data Dialog Box**. Browse to the folder you put the data files in and select the **2000_Election_Counties_Albers.shp** file. Click **Add**.





6) Go to **File>Document Properties**. Click on the **Data Source Options** button. Change the setting to "**Store Relative Pathnames**." Click **OK** twice.

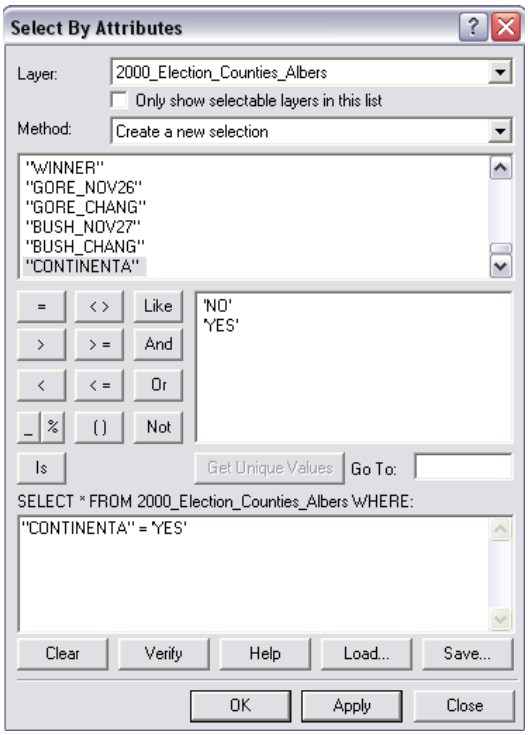
7) Go to **File>Save As** and save your Map Document as **MapEx01.mxd** in your initials folder.

8) Right-Click on the **2000_Election_Counties_Albers** Layer in the **Table of Contents** at the left side of the window, and select **Open Attribute Table**. Take a look at the available data in the shapefile.

9) Close the **Attribute Table**.

Subsetting the Data to the Continental U.S. Using Selection by Attributes

1) Got to **Selection>Select by Attributes.** Scroll to the bottom of the **'Fields'** window and double-click on **"CONTINENTA"** to add it to the **Query Window**. Click on the "=" sign to add it to the **Query Window**. Now click the **Get Unique Values** Button and double-click on "**YES**" to add it to the **Query Window**. **Click Apply**.



2) Close the **Select by Attributes** window. You should now see that the polygons that make up the Continental U.S. are highlighted/selected.

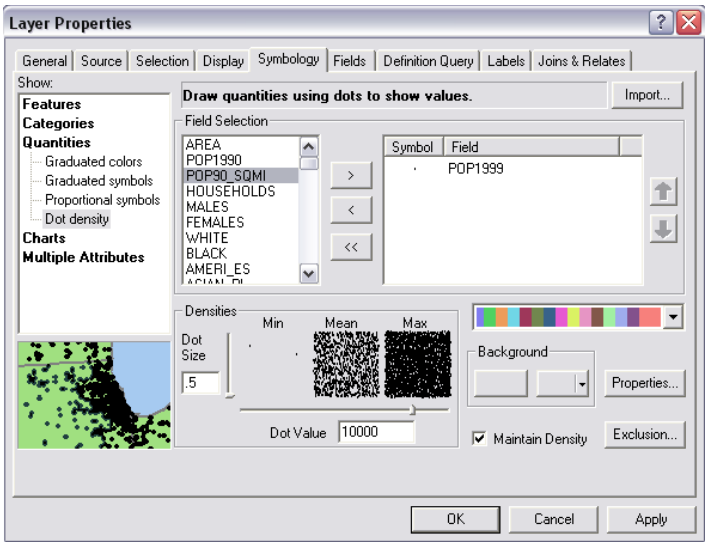
3) Right-click on the **2000_Election_Counties_Albers** Layer in the **Table of Contents** and select **Data>Export Data.**

4) Make sure **Export: Selected Features** is selected and browse to your initials folder and name your export file **Elections_2000_Continent.** Click **OK** and select yes when prompted to add your file as a layer.

5) Right-click on the original **2000_Election_Counties_Albers** Layer and **Remove** it.

6) Click on the **Global Extent Button**  to zoom to the new extent of your data.

Applying Symbology to Visualize Data Attributes



1) Right-click on the **Election_2000_Continent** layer and select **Properties**.

2) Select the **Symbology Tab** and then select

3) **Quantities** and **Dot Density**. Under **Field Selection**, highlight **POP1999** and Click the **Add Button** .

4) Look where you added the **POP1999 Field** and Double-Click on the **'dot' Symbol** to the left of the Field Name. This will open the **Symbol**

Selector. Change the color to **Black**.

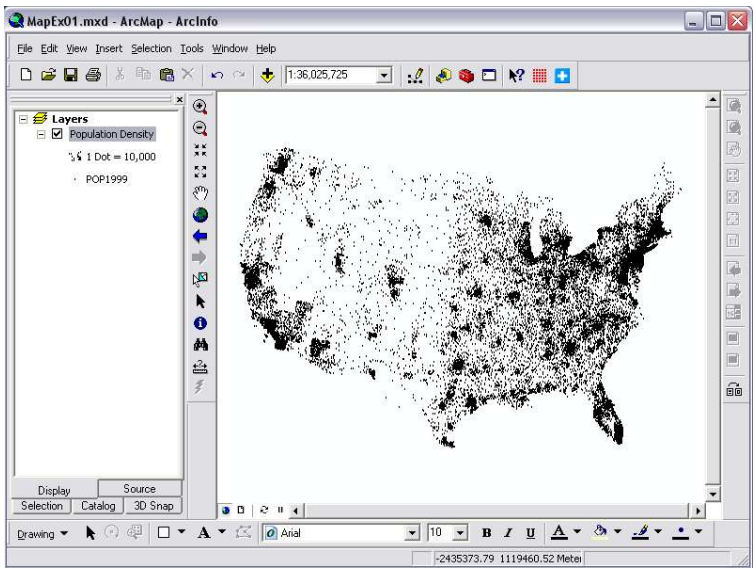
5) Under **Densities**, set the **Dot Size** to **.5** and the **Dot Value** to **10000**.

6) Click the **Background Button** and set the color to '**No Color**.' Click **Apply**.

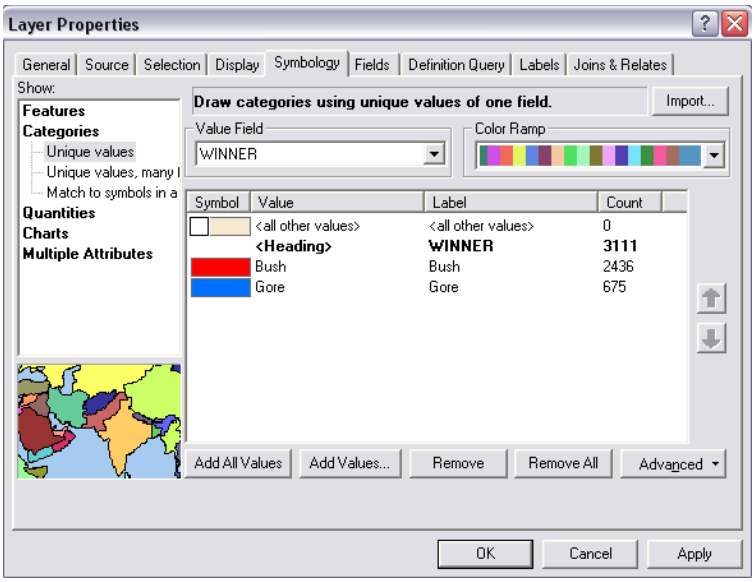
7) Click on the **General Tab** and **Rename** the Layer **Population Density**. Click **OK**.

8) Right-click on the newly renamed Population **Density Layer** and select **Copy**.

9) Right-click on the Layers Icon Layers and select **Paste Layer(s).**



10) Open the **Properties** for the **LOWER Population Density** layer and be sure that the **General Tab** is selected. Rename the Layer **Election Results**.



11) Click on the **Symbology Tab** and choose **Categories>Unique Values**.

12) Change the **Value Field** to **WINNER** and click on the **Add All Values Button** and make sure that the **Gore** and **Bush** values are added.

13) Uncheck the All Other Values item and then double-click on the color patch next to **Bush** to open the **Symbol Selector.** Use the **Symbol Selector** to change the **Fill Color** to **Red** and click **OK**.

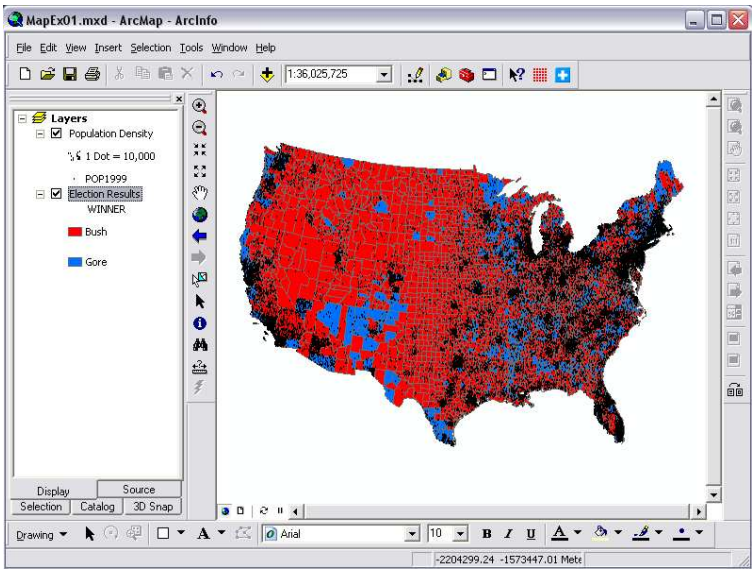
14) Change the **Gore** color patch to **Blue** using the same method.

15) Left-click on the '**Symbol'** field header (above the color patches) and select "**Properties for All Symbols.**" Make the Outline Color '**No Color.**' Click **OK**.

16) Click **OK** to apply and exit the **Properties** window.

17) Right-click in an empty area of the upper toolbar and activate the **"Effects" toolbar**.





18) Change the target layer to **Population Density**, using the **drop-down.**

19) Click on the Transparency Tool  and use the slider to give the Population Density layer a Transparency of about 30%.

20) Save your work!

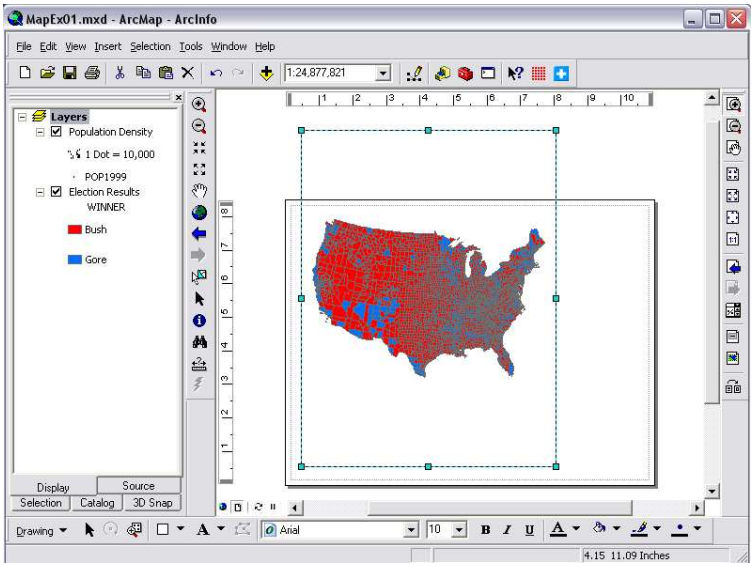
Making the Map:

1) Find the **View Toolbar**  at the bottom of the **Map Window** and click on the **Layout View**  icon.

2) Go to **File>Page and Print Setup** and change the **Paper Orientation** to **Landscape**. Click **OK** to apply this change.

3) Right-click anywhere in the toolbar area at the top of the software window and make sure that the **Layout Toolbar** is active.

4) Select the **Layout Zoom Out** tool  and click in the center of the **Layout** page until you can see the entire data frame extending beyond your page border.

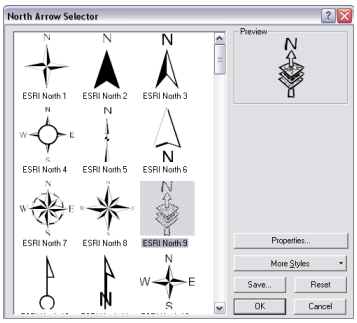


5) Make sure your **Object Select Tool**  is selected and click once inside the **Data Frame** in the **Map Document** window. Notice that this highlights the **Data Frame** and activates the **Resize**

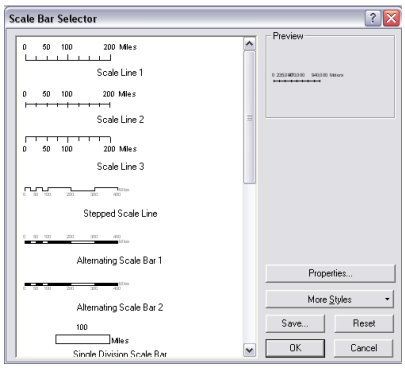
Handles. Use these **Resize Handles** to resize the **Data Frame** so that it fits the **Layout page**.

6) Click on the **Global Extent Button**  to zoom to the new extent of your data.

7) Go to your **Layout View** and **Insert** (from the main menu bar) each of the following elements into your map**:**



   a. **Title –** You will be presented with a Text Box that is highlighted. Name your map **"Presidential Election Results 2000."** Click outside the text box and move it to the top of the page. You can use the text tool in the Drawing Toolbar (at the bottom of the ArcMap window) to increase the size of the Title Text.
   b. **North Arrow** – You will be presented with the North Arrow Selector. Select a north arrow and click **OK** to place it in the map. Use your **Select Elements Tool** to move the north arrow to the bottom-right side of the page. You can resize the north arrow using the resize handles, if you like.



   c. **ScaleBar** – You will be presented with the **Scalebar Selector**. Select the **scalebar** of your choice and click **OK** to insert it into your map layout. Position it appropriately using the **Select Elements** tool.
   d. **Neatline** - Choose **Place Inside Margins** and select an appropriate border thickness from the drop-down menu. Resize using the **Select Elements Tool** as necessary.

8) Again using the **Select Elements tool** , right-click on your **Scalebar** and open the **properties dialog** box. Select the **Scale and Units** tab and change the **Division Units** from **Meters** to **Miles**. Click **OK**.

9) Go to **Insert > Legend** to open the **Legend Wizard**. Click **Next** twice. Use the **Border Drop-Down** menu to select a 1.0-point border. Click **Next** twice, then **Finish** to accept the default setting for the remaining items. Use the **Select Elements** tool  to position the Legend appropriately.

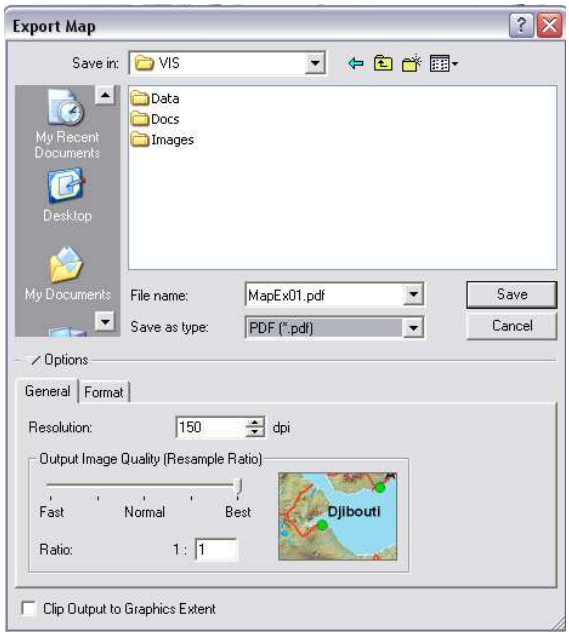
10) Right-click in an empty area of the upper toolbar and activate the "Effects" toolbar.

11) Change the target layer to Population Density, using the drop-down.

12) Click on the Transparency Tool  and use the slider to give the Population Density layer a Transparency of about 30%.

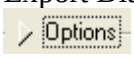
13) **Save** your work!

Exporting Your Map to PDF (*To insert it as a page in a document, or email to a collegue*).



1) Go to **File > Export Map.** Note the options you have when **Exporting** a Map.

2) **Choose PDF *.pdf** (Adobe Acrobat file) from **the Save File as Type** dropdown. Browse to your initials folder and name your file **MapEx01.pdf**.

3) If the **Options** window at the bottom of the Export Dialog is not opened, open it using the 

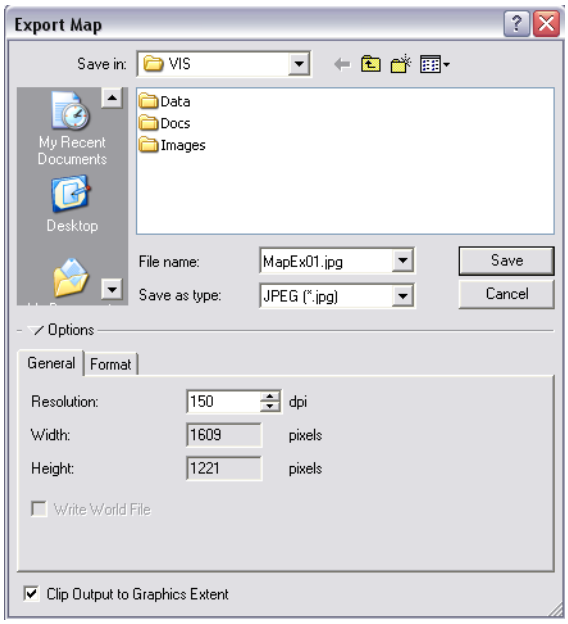
button.

4) Set the **Resolution** to **150 dpi**, click on the format tab and **uncheck** "**Compress Vector Graphics**." Click **Save**.

5) Browse to the folder you saved the **MapEx01.pdf** file into and open it to see the final product.

Exporting Your Map to JPG (*To place it in a Word Doc, PowerPoint, etc… without a page boundary*).

In the previous exercise we exported our map to PDF format, which is a convenient and portable document format. This time we want to save the map as a graphic (without the page border) for use in another program, like Microsoft Word or PowerPoint.



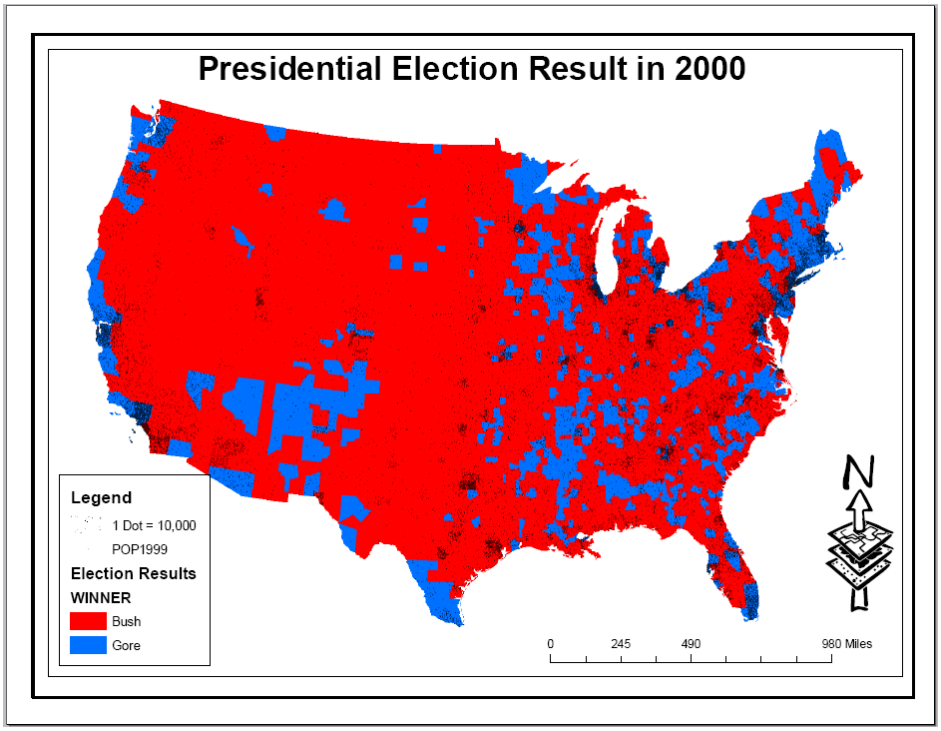
1. Go to **File>Export Map** to open the **Export Map Dialog**.

2. Change the **Type** to **JPEG (*.jpg)** and note the available options.

3. Set the **Resolution** to **150dpi** and check the **"Clip Output to Graphics Extent"** checkbox.

4. Browse to an appropriate **Folder** and **Click Save.**

5. **Browse** to the folder you saved your **JPG** image in and **double-click** to view it in the default image viewer on your machine.



Moving Your PROJECT from One Computer to Another.

Earlier in the exercise you changed a **Map Properties** setting for **Data Source Options** from **"Store Full Pathnames"** to **"Store as Relative Pathnames."** The MXD document that you have been creating does not actually contain the data you are working with. Your MXD Document contains ***REFERENCES*** to your datasets, and instructions on how to symbolize, label, etc… that data. By default, **ArcMap** stores the references to your data as ***absolute paths***. This means that, in this case, the references to your datasets in this exercise look something like this:

C:\Temp*YOURINITIALS*\Visualization_Tutorial_Data\Data\2000_Election_Counties_Albers.shp

So, if you Zip your project directory and take it to another computer, when you unzip the project folder to the new computer and try to open your **EX01.mxd Map Document**, chances are good that **YOUR DATASETS WILL NO LONGER BE FOUND AT THAT EXACT PATH!** This is why we changed to ***relative paths***. When you change to relative pathnames, and if your data is contained in a folder below where your MXD document is saved, your paths should look something like this:

.\Data\2000_Election_Counties_Albers.shp

So that, if you move the entire project as a whole, and everything stays in place relative to the MXD document, your data references should still be valid when you move your project. So, **ALWAYS CHANGE TO RELATIVE PATHNAMES AS THE FIRST THING YOU DO!**

Homework Assignment:

1) Open the **ArcMap Help Files**. Search on the following terms **(*with* the "" marks)** and review the results:

   - **"Working with data frames"** – Pay particular attention to using more than one data frame in a single **Map Layout**.
   - **"Basics of making maps"** – Pay Attention to the section on Map Elements. (FYI, your map is in Albers Equal Area Projection). There is a **.\Docs** folder in the dataset with info about the data in this exercise.
   - **"Working with color ramps" –** Make sure that you understand what Normalization is and why it is important in Choropleth mapping (**Google it!**).
   - **"Drawing features to show quantities"** – A good overview of the different methods of symbolizing quantity. If you are adventurous, use something other than a color ramp!

2) Note that you have shapefiles for both 2000 & 2004 Elections in your data folder.

3) Add a second Data Frame to your Map Document and add the 2004 election data to it. (You could also start from scratch, if you like).

4) Examine the attribute table for both datasets (2000 & 2004) and find some variable for which there is data in both years.

5) **Create a single Map Layout, with two Data Frames**, that shows the change from 2000 to 2004 for your chosen variable.

6) Remember to 'Normalize' your data (population/sq mile, or divorced/total population, etc…) if you use a variable that is a ***raw count***. Use the Help Files for ArcGIS to look up "**Ways to map quantitative data.**"

7) ***Be sure to include all of the Essential Map Elements!!*** *They Are:*

- Title
- North Arrow
- Scale
- Legend
- Cartographers Name
- Date
- Who the map is for
- Projection System
- Data Source(s)
- Descriptive Text (if necessary)
- Location (in the title, or using an inset map)
- Neatline

8) Export your map to PDF and submit it with the original we did in class! Be sure to send a set to Stacey.maples@yale.edu, in addition to submitting through your normal procedures. You should also feel free to contact me at that email address with map related questions.

More Tips to Make Your ArcMap Experience Less Stressful:

- Create a main **Project Folder** for your GIS analysis project. Under this main folder, create a Data folder, under which you should create a series of folders for each type of data you are using, or creating in your project (**shapefile, raster, image, tables, etc…**). For complex projects, you may even find it helpful to create further divisions (**original, working, final, etc…**) within each of your data folders to contain the multiple versions of data files that can accumulate during the course of a GIS project.

- MXD Map Documents are very small! You can save many versions of a project by saving multiple Map Documents.

- ArcMap supports long filenames for MXD Document, table and shapefile names. Use this to your advantage by giving these files very specifically descriptive names. Coverage and raster filenames are limited to 13 characters.

Congratulations! You are now ready to explore ArcMap on your own! If you are interested in additional training materials, or just need help with a specific GIS related issue, feel free to contact us at the Yale Map Collection!

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