

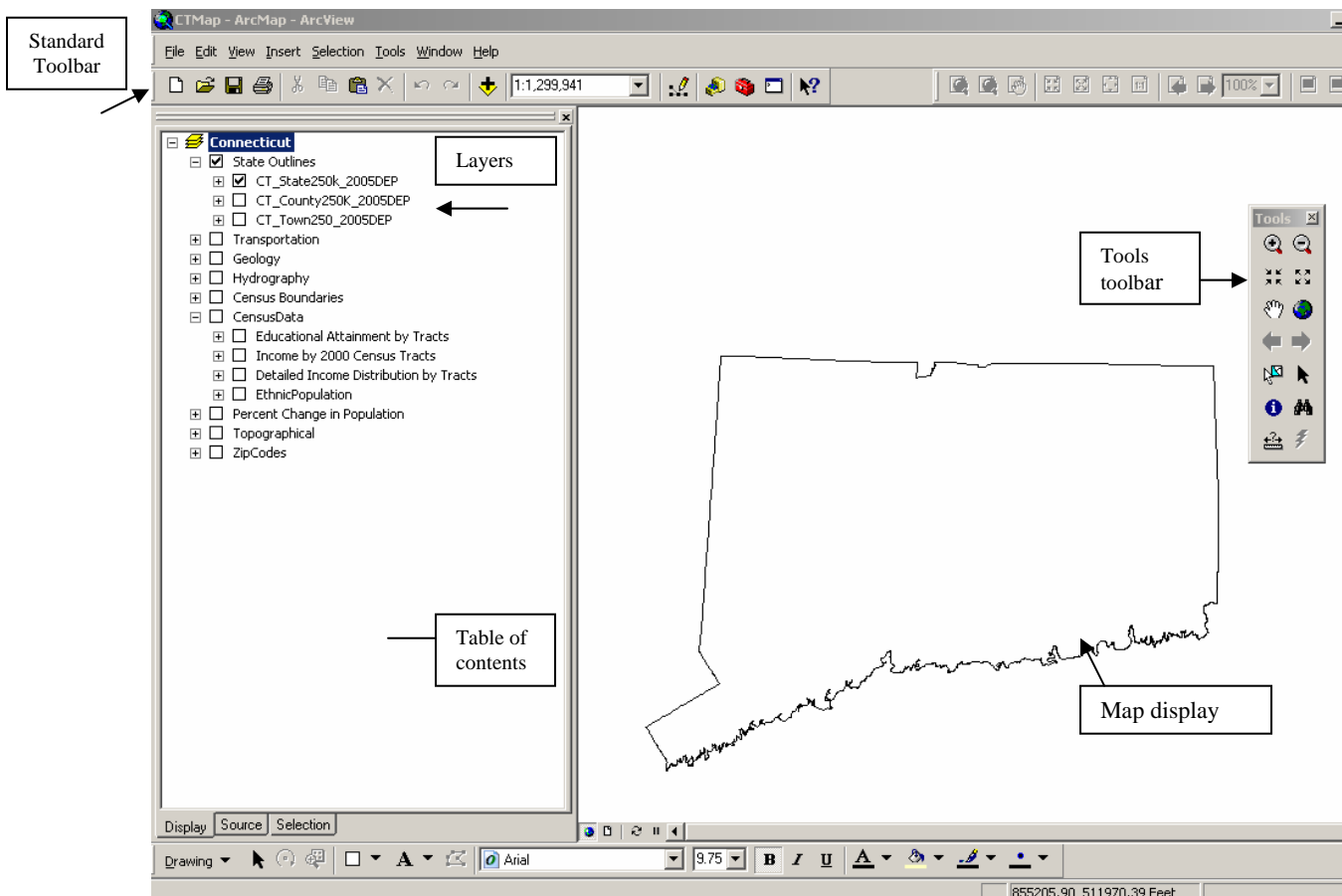
GIS Tutorial: How to Use ArcMap 9.1
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Getting Started With ArcMap

*This document will provide you with a brief introduction to ArcMap and assumes some knowledge of ArcGIS. This tutorial is designed to be used along with the maps and files located at [\\tcddata\GIS\SampleMaps\Connecticut](http://tcddata\GIS\SampleMaps\Connecticut).

What is ArcMap?

ArcMap is an application that allows you to create and interact with maps. You can **view**, **symbolize**, edit, and analyze your geographic data. ArcMap has a variety of tools that you can use for your data including ArcCatalog and ArcToolbox. Below is an example of a screen shot of what your average ArcMap screen will look like. Your map display and table of contents will vary depending on the project you are working on.



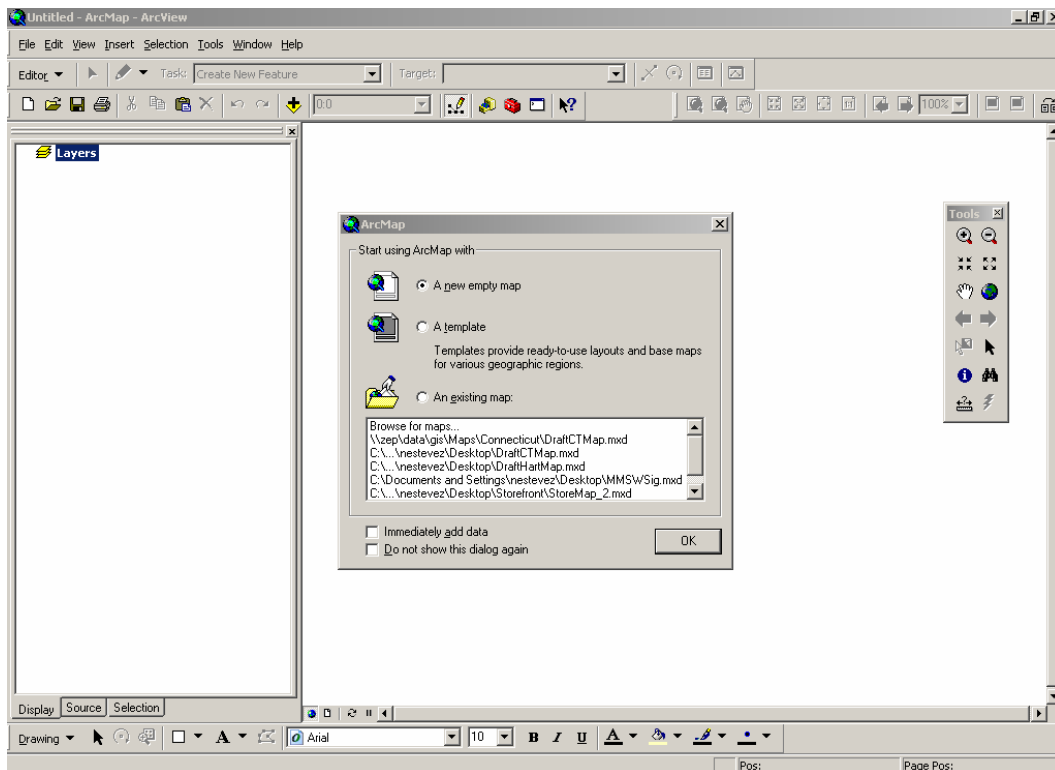
Getting to ArcMap: *These directions will be different if you are on a computer in your office

1. Click on the **Start** menu
2. Click on **Lab Applications**
3. Click on **ArcGIS**
4. Click on **ArcMap**

Viewing Data in ArcMap

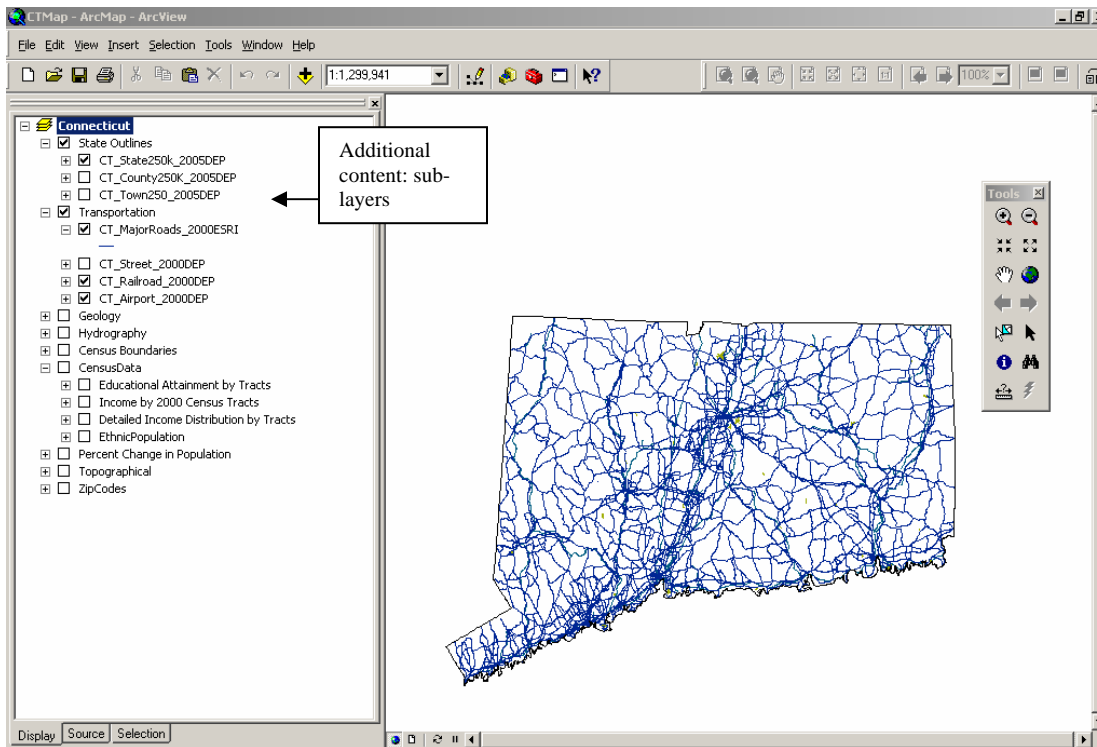
The following exercise will take you step by step as you learn how to view and display data in ArcMap. We will go over panning, zooming, getting information about map features and many more techniques to get you started with ArcMap.

1. Open up ArcMap. You should see a screen like the one below

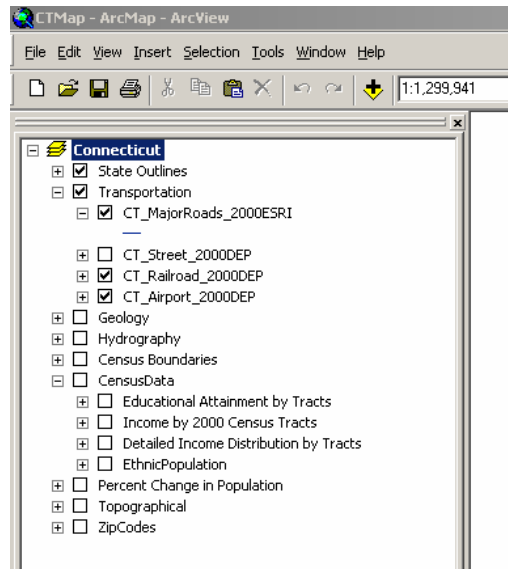


2. Click on the **an existing map** option
3. Now click on **Browse for maps**
4. In the dialog box type: \\tcd\GIS then press enter
5. Navigate to the Sample Maps\Connecticut folder and choose tutorial.mxd
6. Your screen should now look similar to the one below

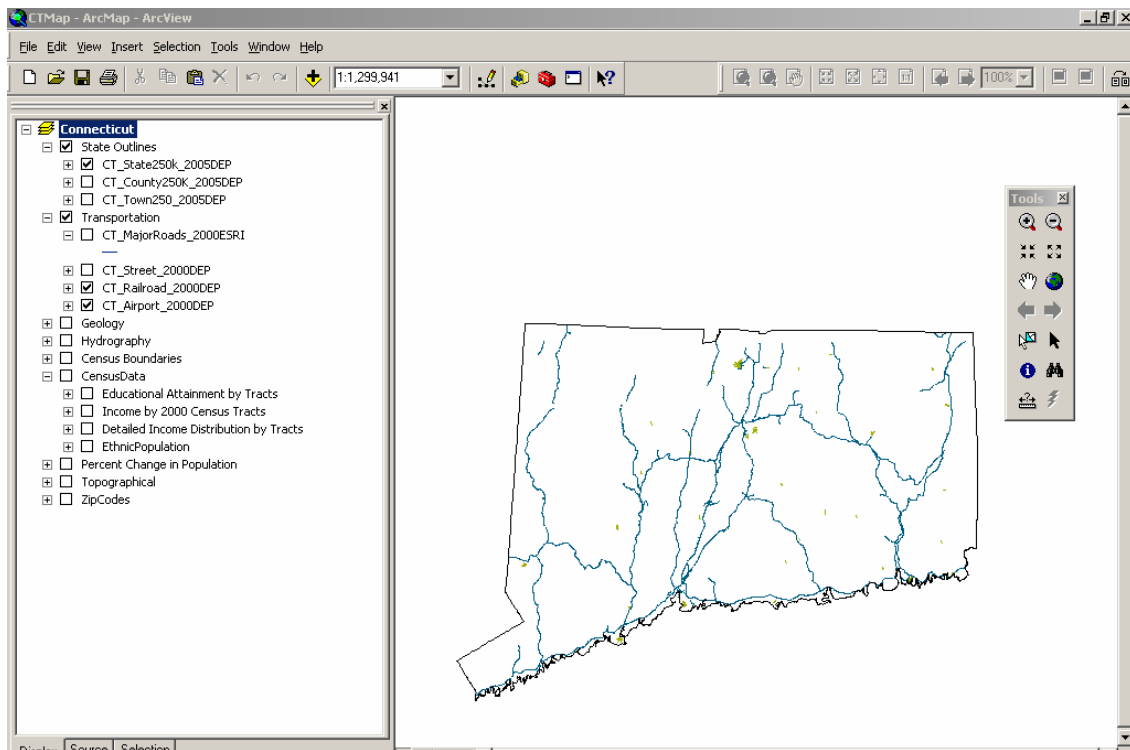
7. In order to **display** a layer it must be turned on. A layer contains different spatial and attribute information about an area. You can also have group layers. A group layer helps you organize layers by a common theme and work like folders to help keep things organized. For example, the State Outline layer is a group layer that contains several sub-layers of different state outlines such as county or town outlines. **Plus signs** beside layers allow you to display layer contents. A **minus sign** allows you to hide the layer's content.



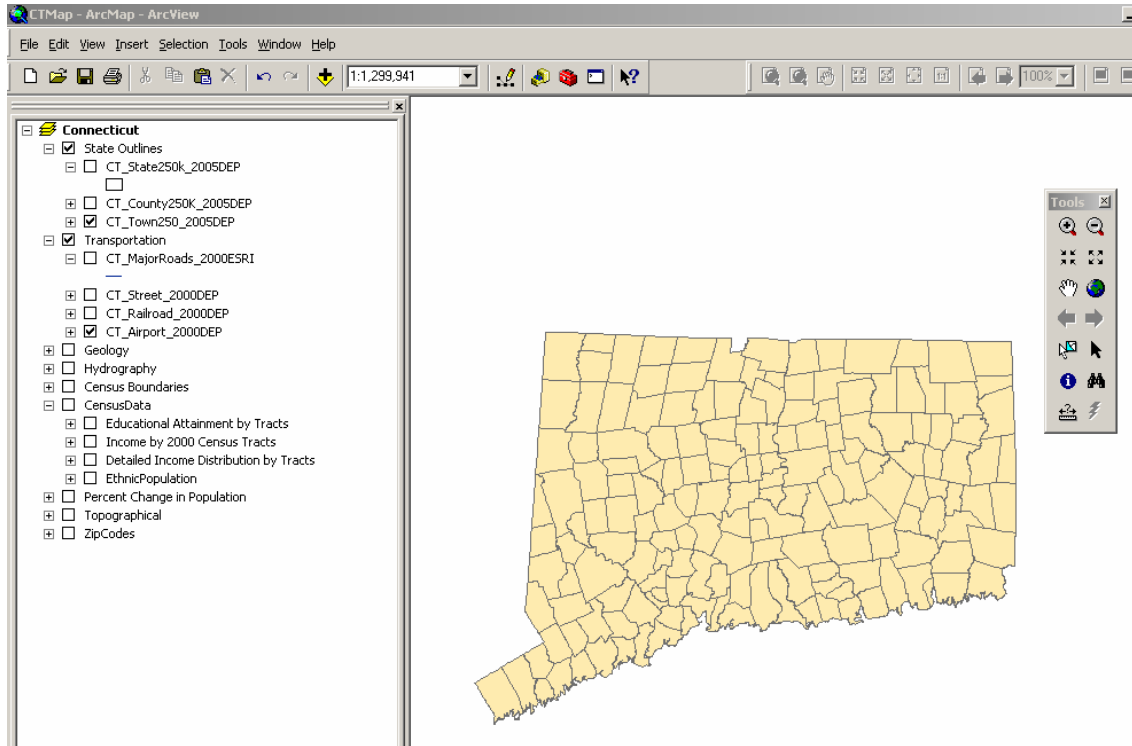
8. To hide the listing of the sub-layers in the State Outline group layer, click on the minus sign. You will see that the sub-layers are no longer being displayed and a new plus sign appears beside the group layer.



9. Now you can click on the **plus sign** to return to a view of the additional content.
10. To turn a layer on or off click on the square box beside the layer. In this case you will first turn off the Transportation sub-layer called **CT_MajorRoads_2000ESRI** by clicking once inside the square box with the check sign in it. Your screen should look similar to the one below.

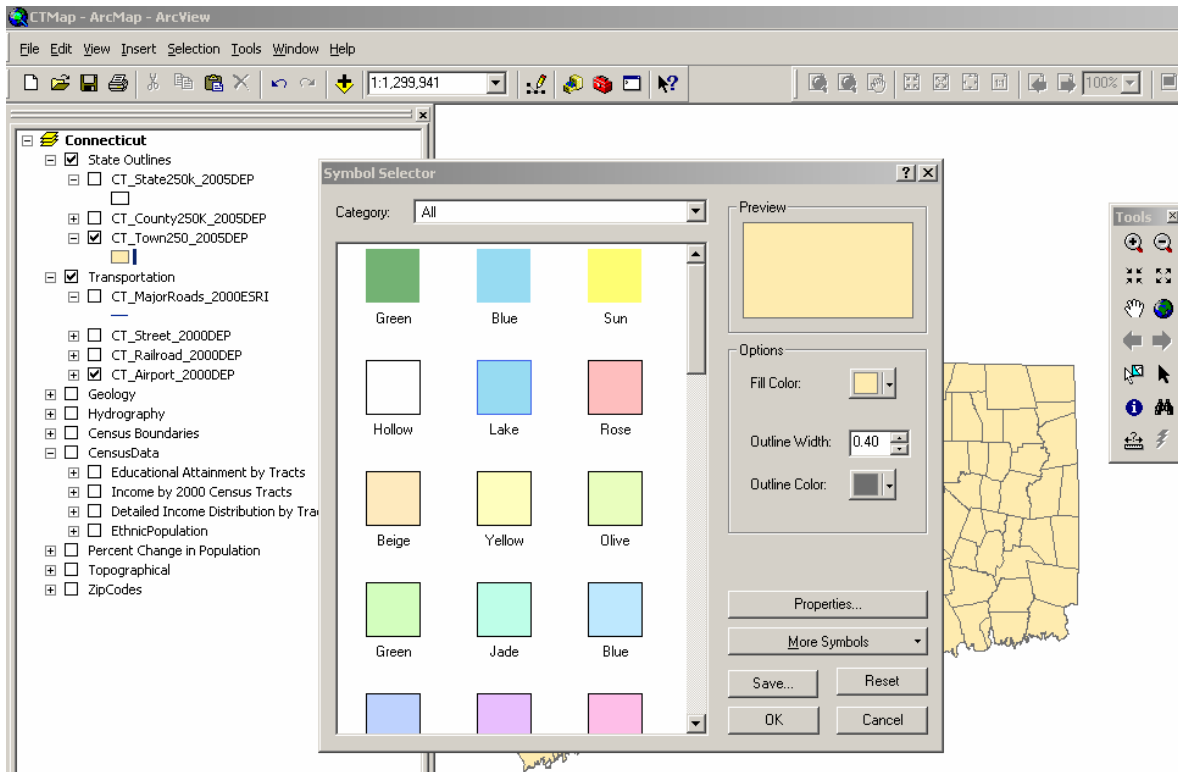


- Now let's continue working with multiple layers displayed. First, turn off the **CT_State250k_2005DEP** sub-layer by clicking on the checked box. Instead, turn **on** the **CT_Town250_2005DEP** layer by clicking on the square box. Also, turn off the **CT_Railroad_2000DEP** layer. Make sure the Group Layers State Outlines and Transportation are checked on.

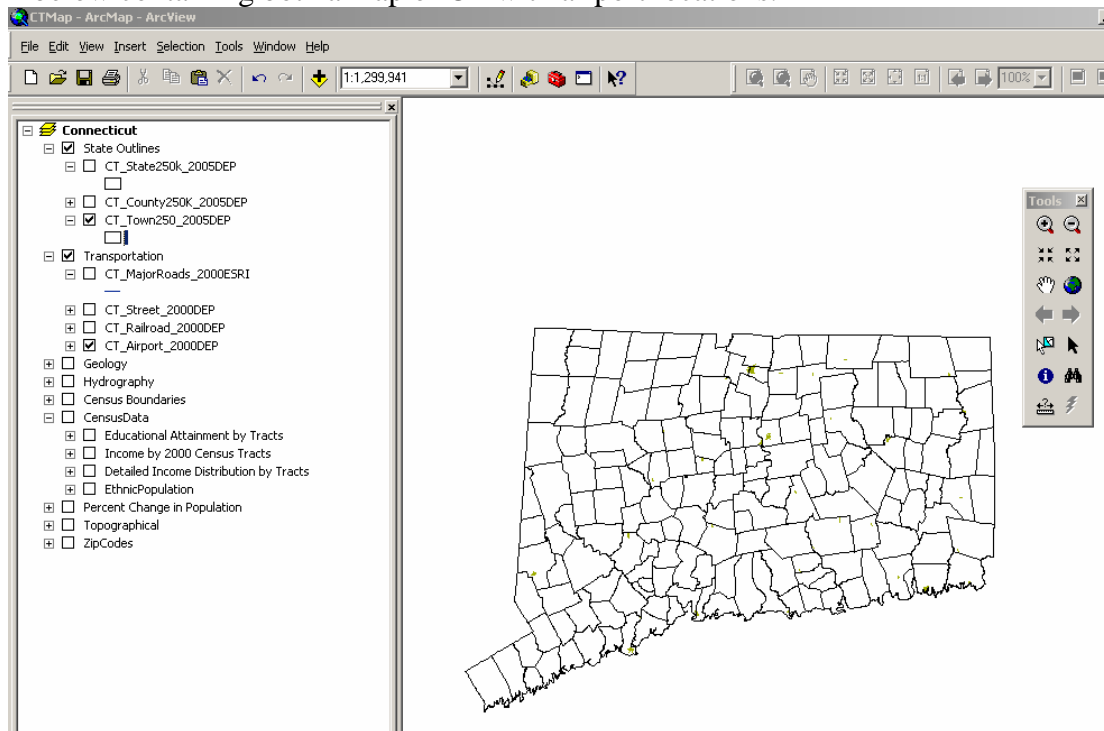


- You will notice that only a map of the CT towns is showing but the airports are not visible. That is because the Airport layer is covered by the State Outlines layer. Layers will appear in the order that they are located on the table of contents. In order to see both layers you can do two things. **A.** You can simply change the color of the State Outline layer by making it hollow which will allow the airports to come through or **B.** you can drag the transportation layer above the State Outline layer which will make it appear first. We will try changing the color first.

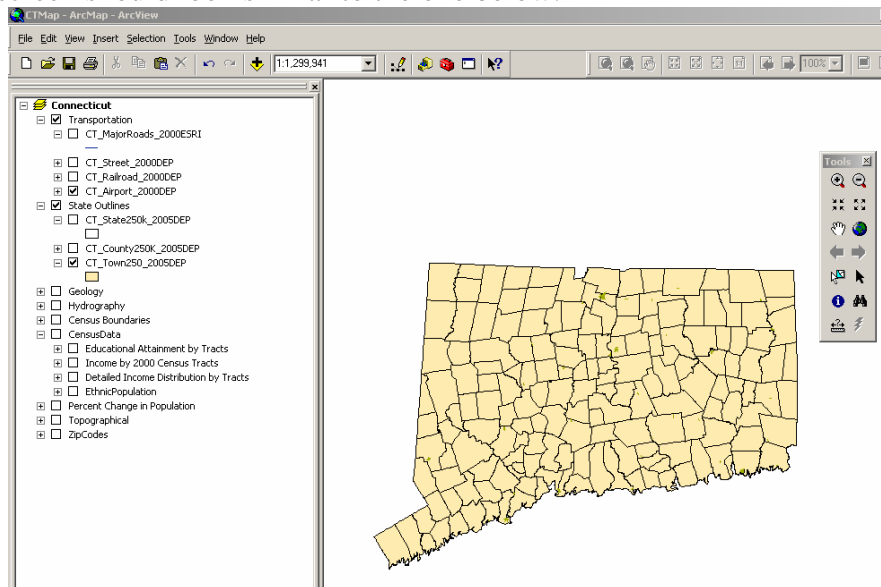
- To change the color, click on the plus sign beside **CT_Town250_2005DEP**. Now you should be able to see a box displaying the current color of the map. Click once inside this box. A new symbol selector window will pop up similar to the one below.



14. Choose the **Hollow** box and then select ok. You should now see a screen like the one below containing both a map of CT with airport locations.

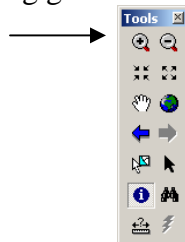


15. Now let's try making the airports visible by dragging the Transportation layer and placing it above the State Outline layer. First, change the color of the map following the same steps as before except change the color to anything but hollow. This will make the airports not visible again.
16. Now click on the Transportation layer (not on the box, but on "transportation" itself until you see it highlighted), drag it up and place it above the State Outline layer then release the mouse button. As you drag the layer, a horizontal black bar indicates its position. Your screen should look similar to the one below.

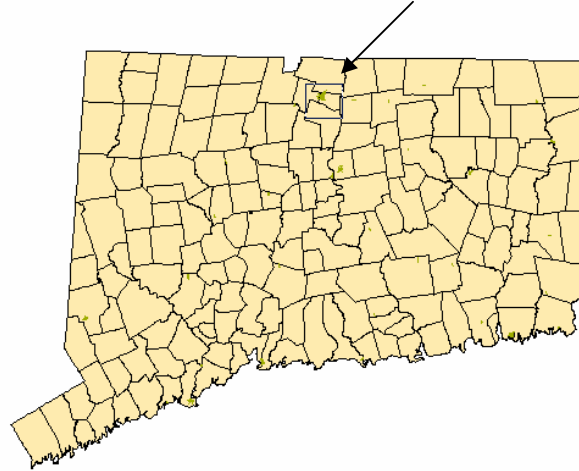


17. Now you should be able to see the airport locations again. However, you will notice that on the current view, the airports look like little blots. Let's try zooming in on an airport to see its shape better.

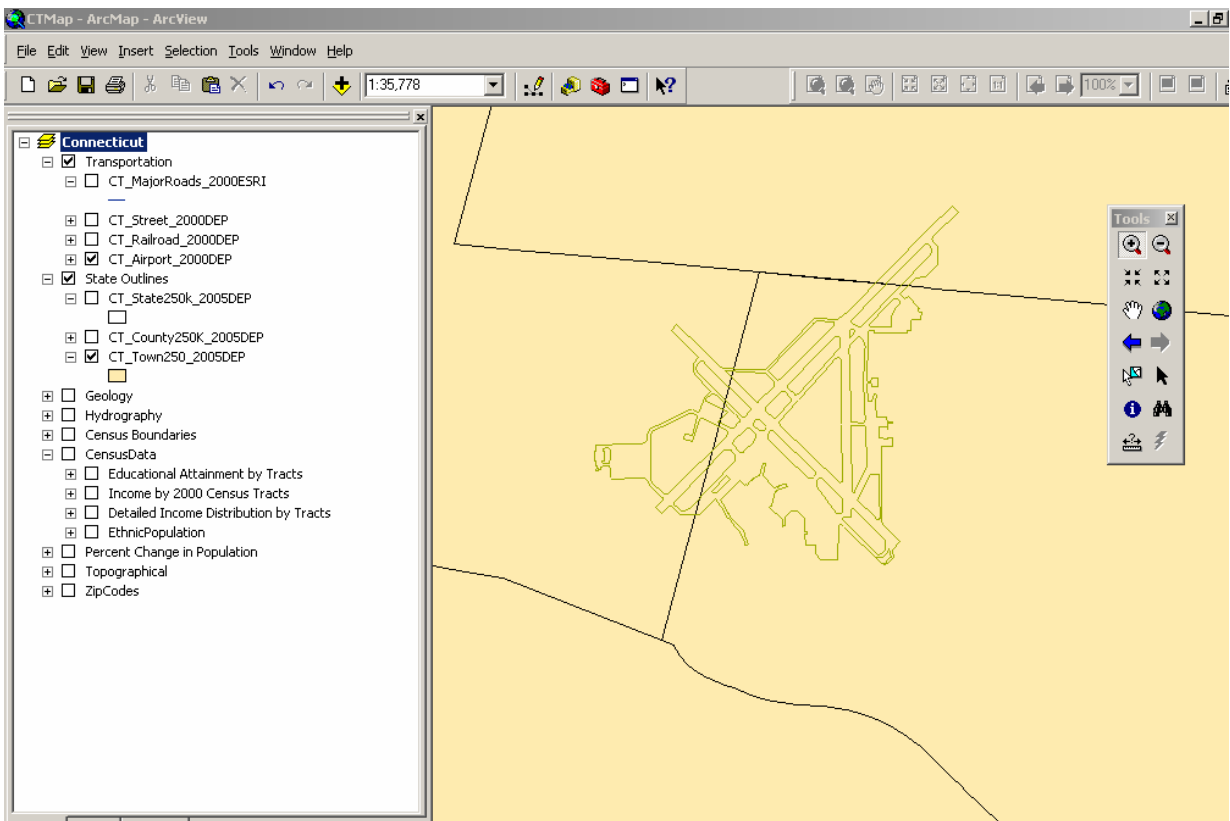
18. To zoom in click on the magnifying glass with the plus sign on it located on the tools bar.



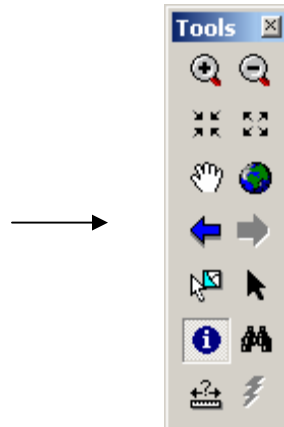
19. Once you have selected the magnifying glass, locate an airport and create a square box around it by clicking and dragging until you have the airport inside of the box like below



20. Now the program will automatically zoom into the selected area and you will see a more detailed picture of the airport similar to the one below

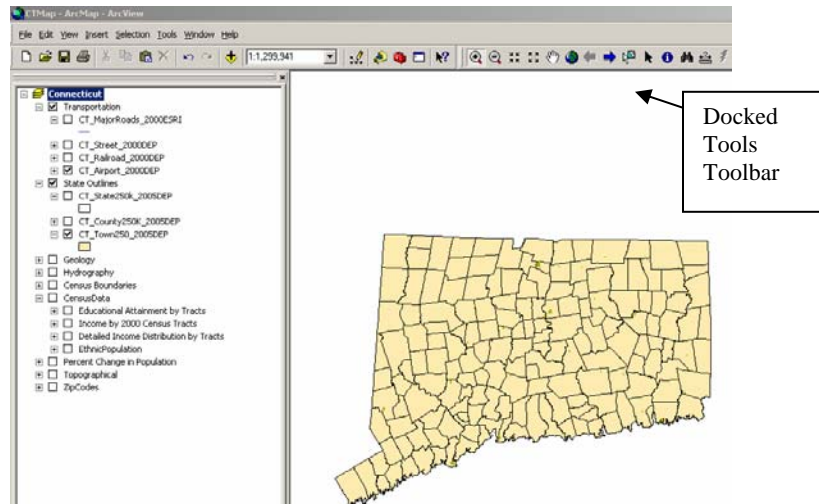


21. To return to the previous extent you can click on the blue arrow on the tools bar. This will take you to the map view you had before you changed it.



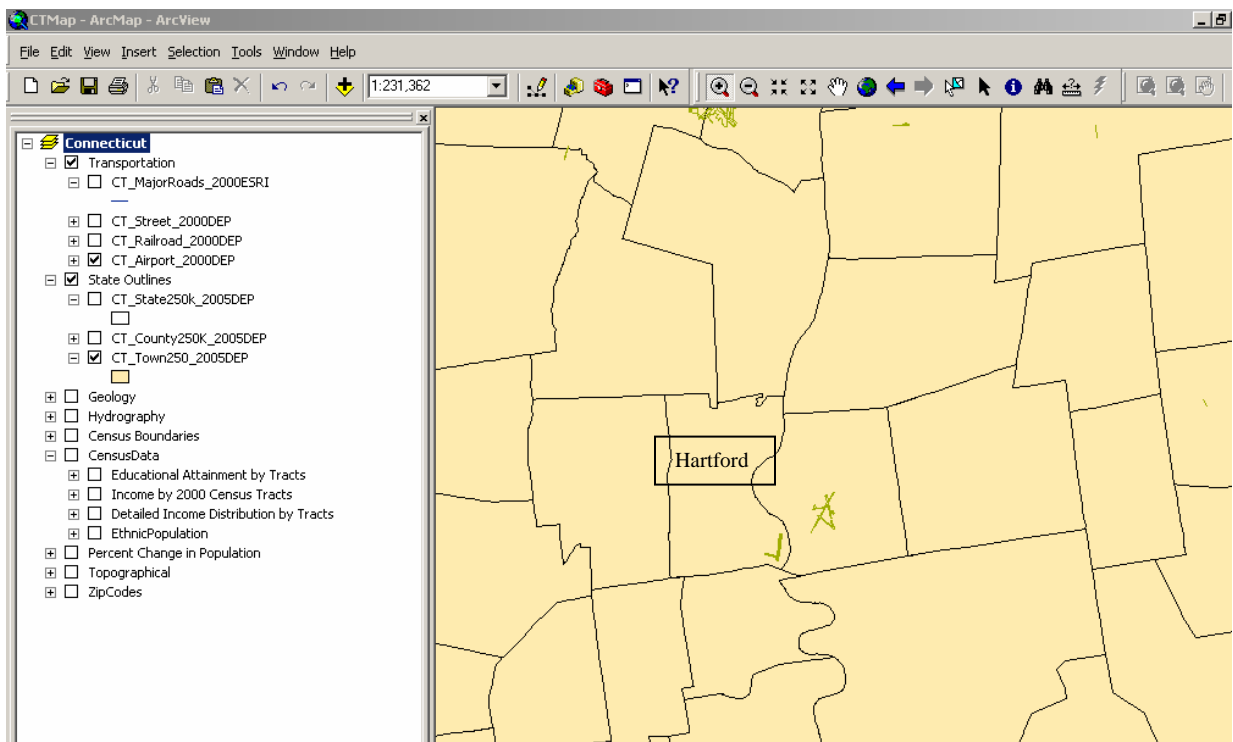
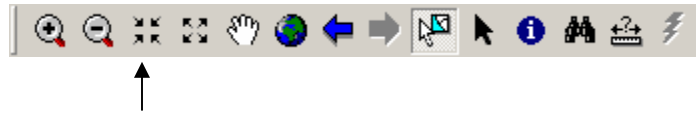
22. Once you have returned to the previous extent we can now begin to try using new tools on the toolbar. But first, you can choose to move the toolbar itself to anywhere that you like. For example, let's try to move the toolbar and dock it on the standard toolbar.

23. To move the tool bar, simply drag it and place it on the standard toolbar like below.



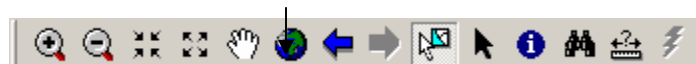
24. Now the tools toolbar is out of the map display area and docked on the standard toolbar.

25. Use the **fixed zoom in** button on the tools toolbar to zoom into Hartford by clicking the map on the area you want to zoom in to.



26. The button that resembles the fixed zoom in button located next to the fixed zoom in button is the **fixed zoom out** button. You can use this button to zoom out.

27. To show the entire area of a map, use the **full extent** button symbolized by the globe.



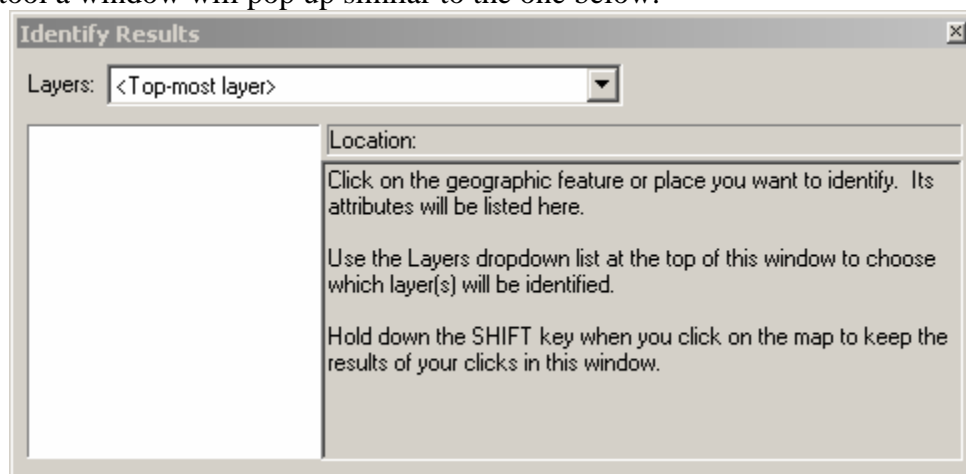
28. Use the **pan** button symbolized by the small hand to move the map around in the map display area.



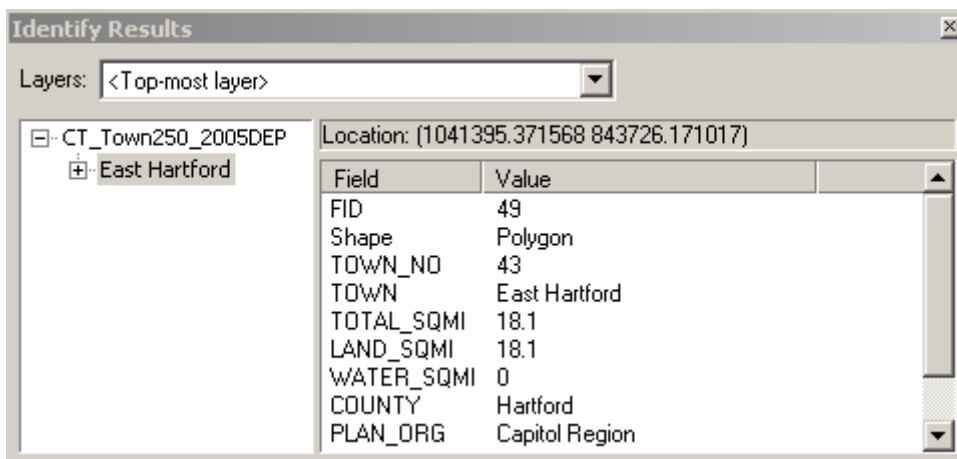
29. Lets try another tool. Select the **identify tool** symbolized by the letter “i”



This tool will help you find more specific information about a chosen geography. After you select the tool a window will pop up similar to the one below.



30. Now, click on the town to the right of Hartford. Some information will appear about this town in the window similar to the information below. In this case the town is identified as being East Hartford.



31. By default the Top-Most layer is used for the data in the Identify results window. You can choose an individual layer or choose to show all information for all layers as well.

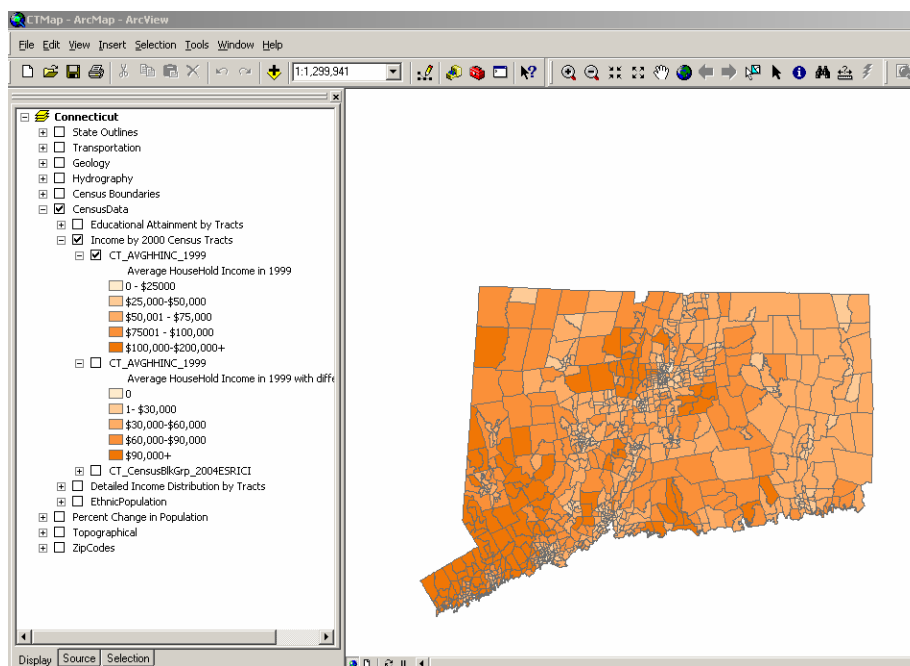
You have just learned how to view and display map data in ArcMap. You learned how to use some basic tools like zooming in, panning, changing map extents and identifying additional information in the map. Now you will learn how to symbolize map data in ArcMap.

Symbolizing and Viewing Data in ArcMap

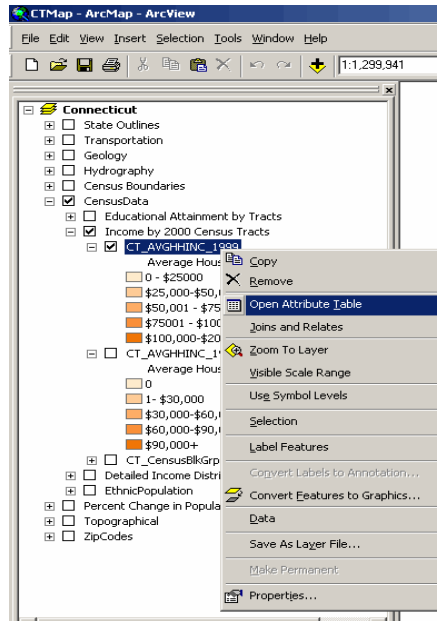
*If you are continuing from the **Viewing data exercise** you can proceed with the directions starting at 1. If you are just beginning this exercise, follow the steps previously outlined on opening ArcMap that can be found on page **1** and **2** of this tutorial. Then continue below.

In this section you will now learn how to change symbology in ArcMap. You will make a **thematic or choropleth map** and learn how to **add labels**, and **legends** to your map, **copy a layer**, **look at attribute tables**, and **export and import** a map for display purposes.

1. Click the **Transportation** layer and the **State Outline** layer **off** until you have an empty map display. You can also click beside the minus sign on each of these layers to hide the contents.
2. Now click on the group layer named, CensusData. Click on the **plus sign** beside CensusData if the additional content is not visible in the table of contents.
3. Now, turn on additional layers in the CensusData group layer. Click on the **plus sign** beside the **Income by 2000 Census Tracts** layer and then click on the square box to turn it on. Next, click on the square box beside the sub-layer called **CT_AVGHHINC_1999**. This layer describes the average household income in CT for 1999. Your screen should look similar to the one below. This map represents the average household income for the state by census tract.



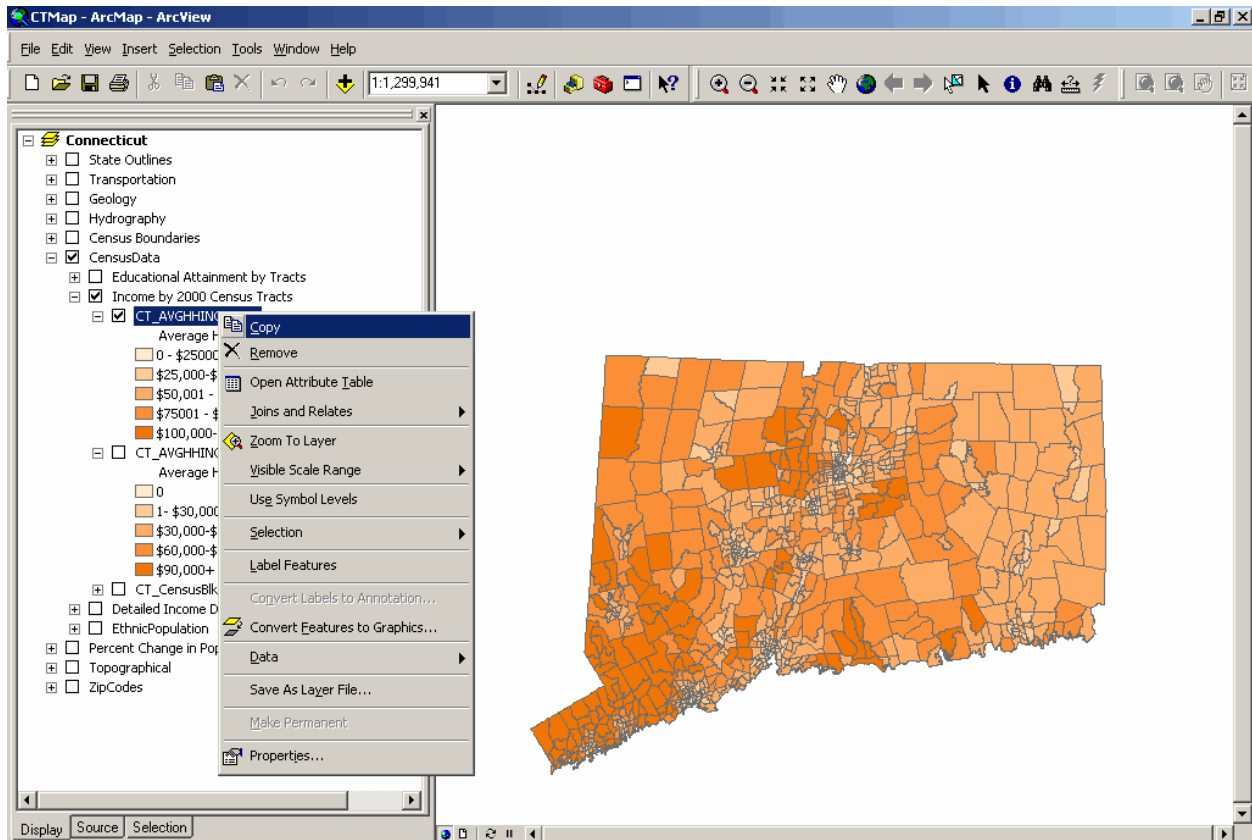
- If you would like to view the different variables and additional information about the CT_AVGHHINC_1999 data layer you simply need to **right click** on the layer and select **open attributes table**.



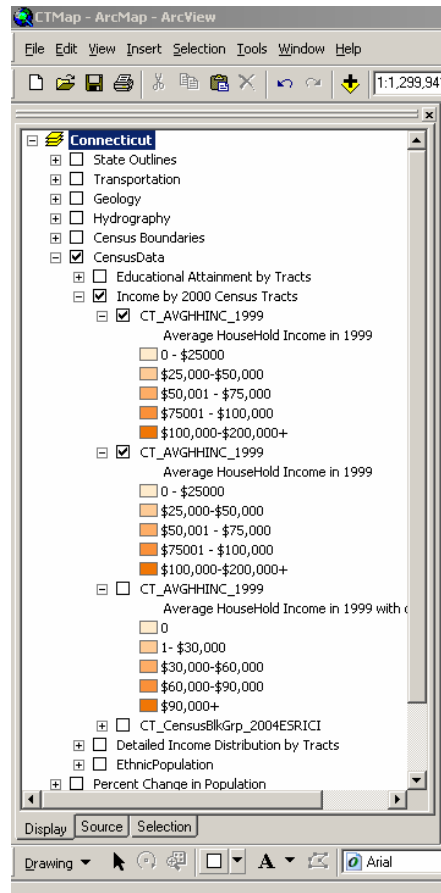
- When you have selected the open attribute table option a table will appear with a list of variables and data that the layer contains.

FID	Shape'	TR	TRDEC	ST	CB	CY	TOTPOP_CY	TOTH_CY	MALES_CY	FEMALES_CY	MEDAGE_CY	MEDHINC
0	Polygon	09001010101	090010101.01	CT	14860	09001	4942	1578	2353	2589	43.7	246
1	Polygon	09001010102	090010101.02	CT	14860	09001	4453	1441	2225	2228	41.8	283
2	Polygon	09001010201	090010102.01	CT	14860	09001	3352	1004	1593	1759	42.9	271
3	Polygon	09001010202	090010102.02	CT	14860	09001	5448	1970	2677	2771	41.3	133
4	Polygon	09001010300	090010103.00	CT	14860	09001	4381	1566	2113	2268	42.3	217
5	Polygon	09001010400	090010104.00	CT	14860	09001	5327	2191	2498	2829	41.7	96
6	Polygon	09001010500	090010105.00	CT	14860	09001	5547	2444	2533	3014	38.6	64
7	Polygon	09001010600	090010106.00	CT	14860	09001	2095	1159	980	1115	40.4	92
8	Polygon	09001010700	090010107.00	CT	14860	09001	3643	1746	1578	2065	43.5	66
9	Polygon	09001010800	090010108.00	CT	14860	09001	3532	1435	1648	1884	40.2	108
10	Polygon	09001010900	090010109.00	CT	14860	09001	4976	1948	2349	2627	40.9	108
11	Polygon	09001011000	090010110.00	CT	14860	09001	5193	1836	2487	2706	39.8	168
12	Polygon	09001011100	090010111.00	CT	14860	09001	4568	1511	2267	2301	39.4	207
13	Polygon	09001011200	090010112.00	CT	14860	09001	1923	755	901	1022	44.7	222
14	Polygon	09001011300	090010113.00	CT	14860	09001	3083	1232	1529	1554	38.3	75
15	Polygon	09001020100	090010201.00	CT	14860	09001	4352	2111	2189	2163	40.4	32
16	Polygon	09001020200	090010202.00	CT	14860	09001	3636	1274	1825	1811	43	143
17	Polygon	09001020300	090010203.00	CT	14860	09001	7191	2432	3532	3659	41.9	157
18	Polygon	09001020400	090010204.00	CT	14860	09001	3780	1347	1832	1948	42.6	126

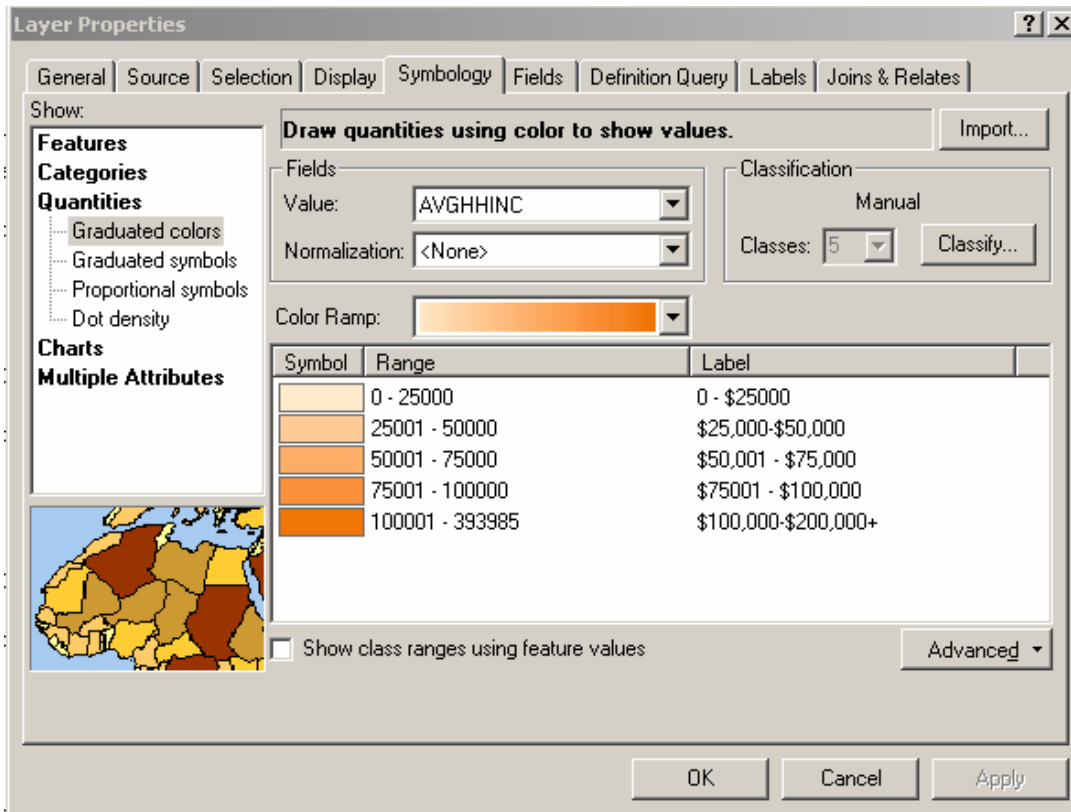
- When you are finished looking at the attributes table you can close the table which will return you to the map.
- Next, you will copy this layer so that you can begin to symbolize your own data. To copy this layer, **right click** on the **CT_AVGHHINC_1999**. A screen will pop up similar to the one below.



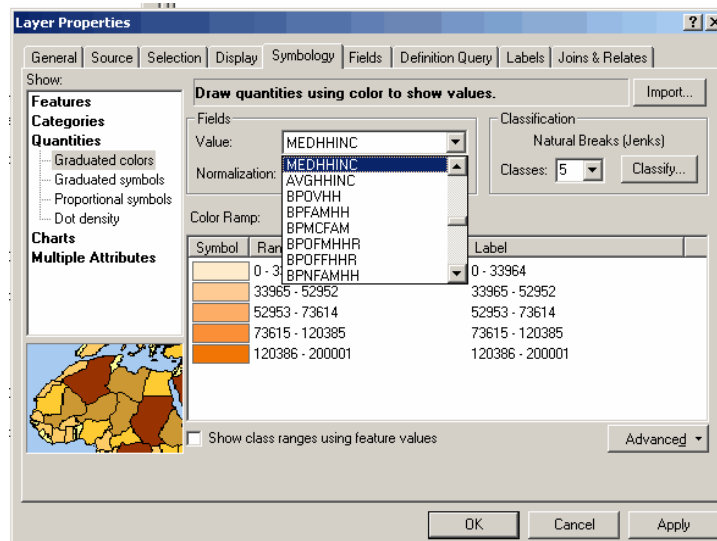
- Now, select **copy** located at the top window.
- Next, **right click** once on the **Income by 2000 Census Tract** group layer and select the **paste layers** option on the window. You should now have a duplicate **CT_AVGHHINC_1999** which you just copied. Your screen should look similar to the one below.



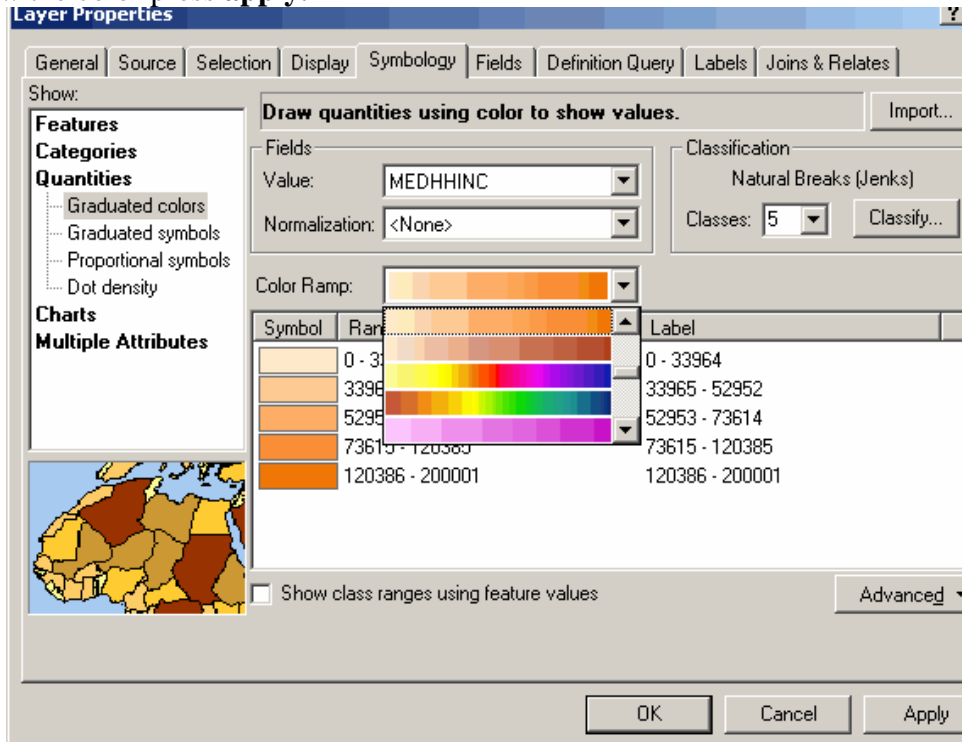
10. Now, turn off one of the **CT_AVGHHINC_1999** layers.
11. Next, rename the **CT_AVGHHINC_1999** layer that has a checked mark beside it by clicking **once** directly on the name and wait until the name gets highlighted. After the name is highlighted click one more time on the name until a box appears around the name which allows you to change the name. Since we will create a map based on median income you can rename the layer, **CT_MEDHHINC_1999**.
12. After you have renamed the layer, right click on the same layer. Once the window appears, click on the **properties** option located at the bottom of the window. You should get a screen like the one below.



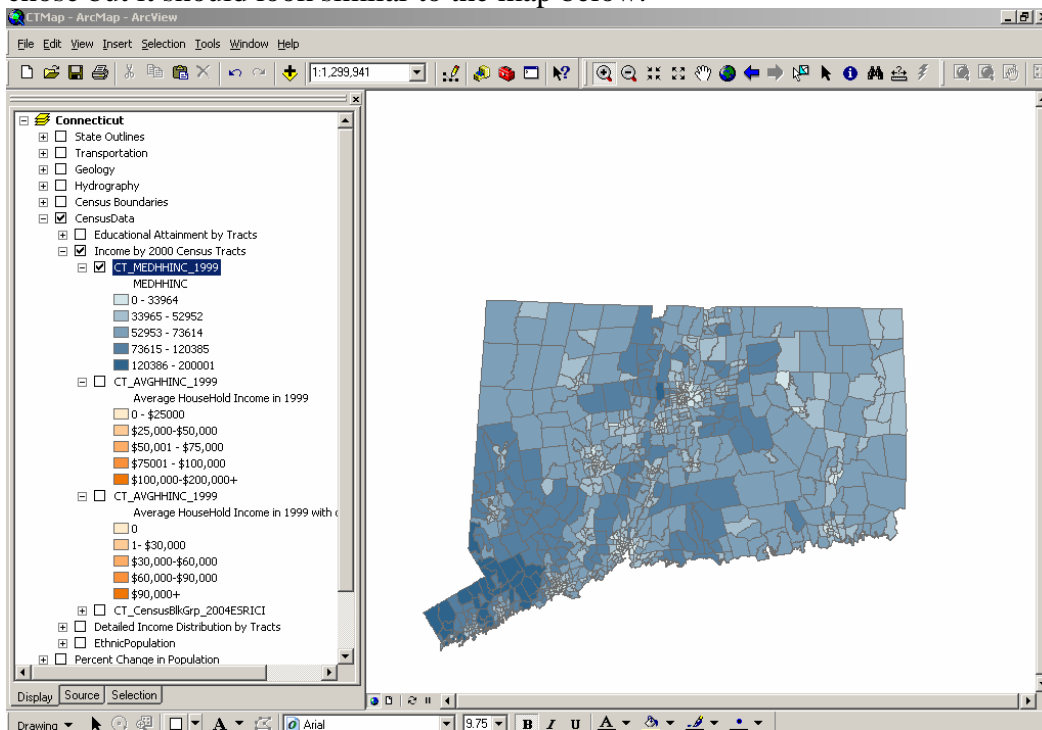
13. Make sure that the **symbology** tab is the one that is showing. The **values** field contains the variables that you will be symbolizing. In this case, it is the AVGHHINC (Average Household Income) variable.
14. Click on the pull down menu next to the values field and **scroll up once** to select the variable named **MEDHHINC**. This variable contains the different ranges of median household income for 1999. Your screen should resemble the one below.



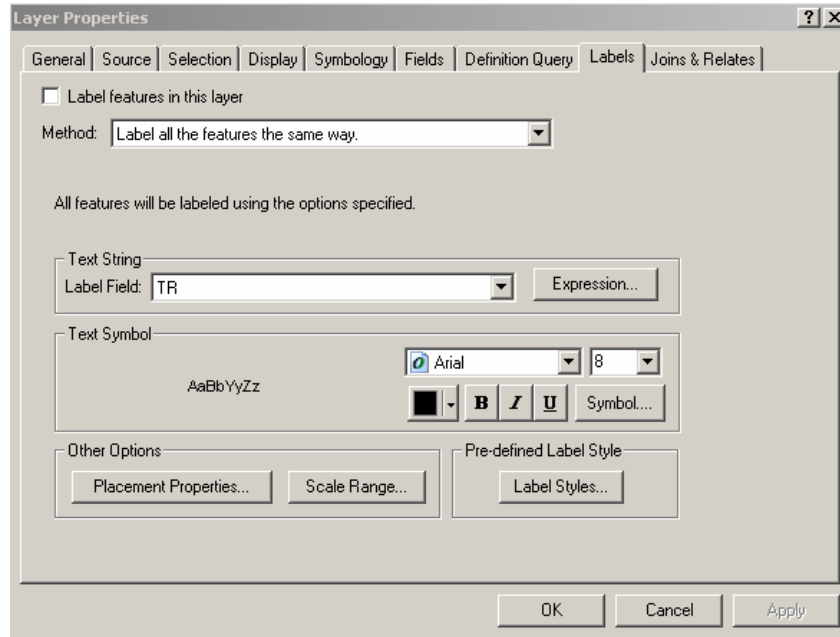
15. Now, on the color ramp map choose the color you want to use to display the data. To do this, use the pull down menu and scroll up or down until you find the color of your preference. To **preview** the color press **apply**.



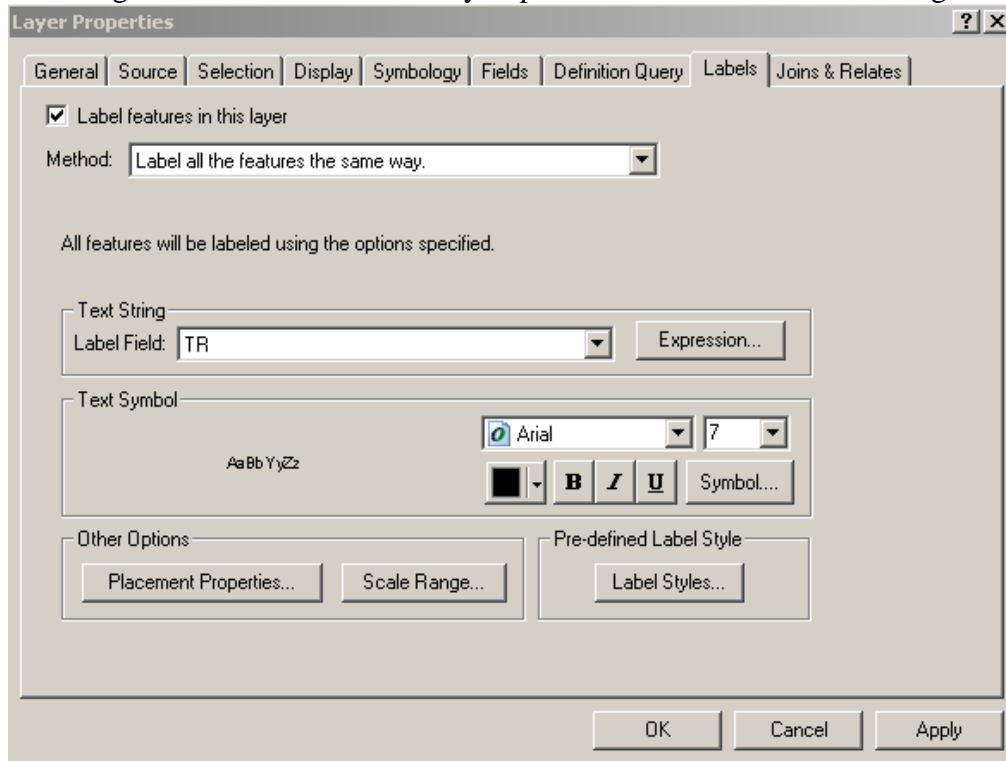
16. Once you have chosen your color press **ok**. Your map will vary depending on the color you chose but it should look similar to the map below.



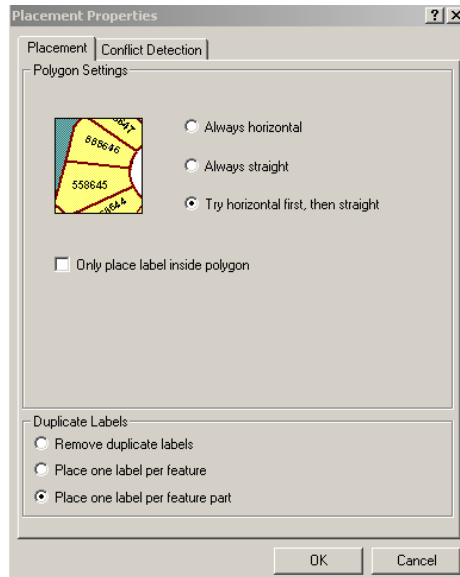
- Now you can add labels to the tracts to identify them. To do this, **right click** on the **CT_MEDHHINC_1999** layer. Choose **properties** and then choose the **labels** tab on the Layer Properties.



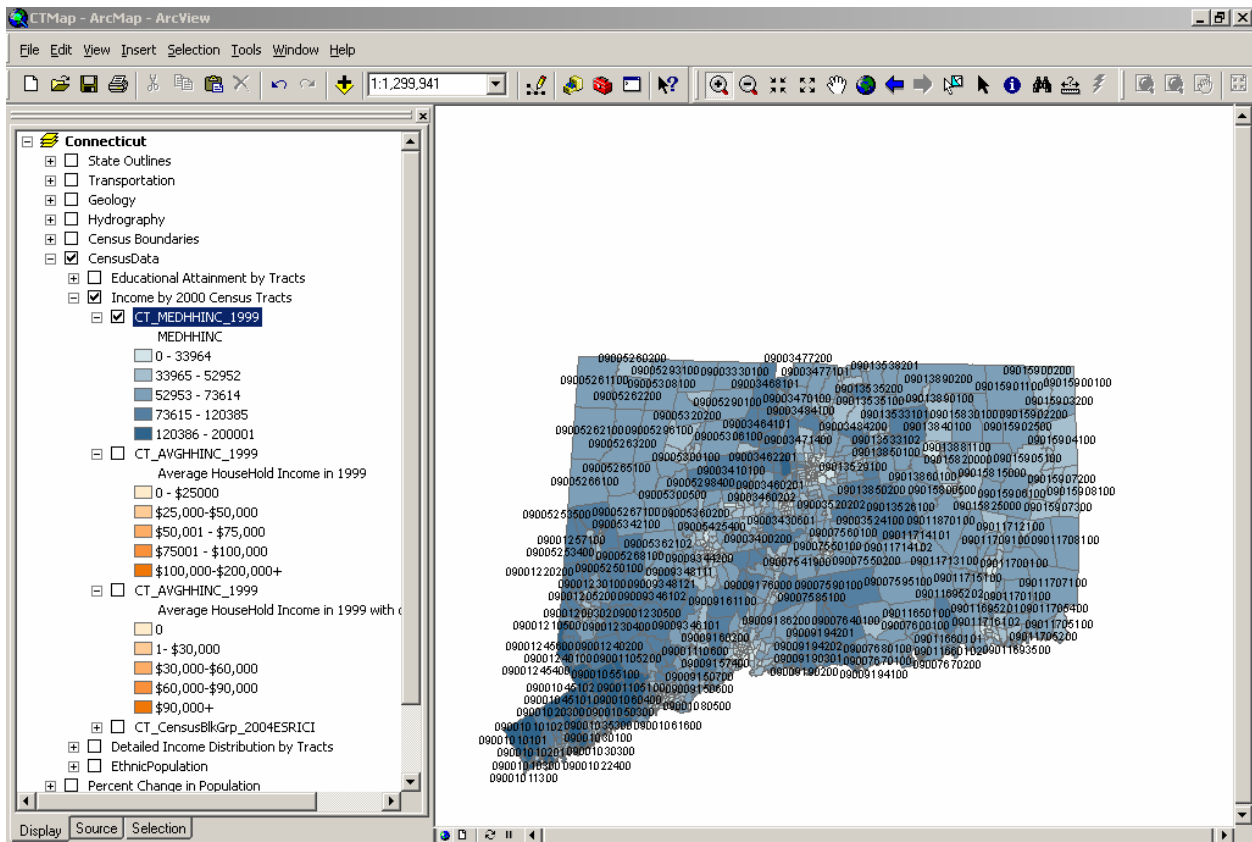
- Click on the box that says **label features in this layer**.
- You can change the font and font size as you please. In this case we will change it to size 7.



20. Now, choose **placement properties** located at the bottom of the screen and then select the options that are chosen below. This option is useful especially when you are dealing with a lot of numbers being placed in small geography because as you will see they can get very crowded and hard to read.

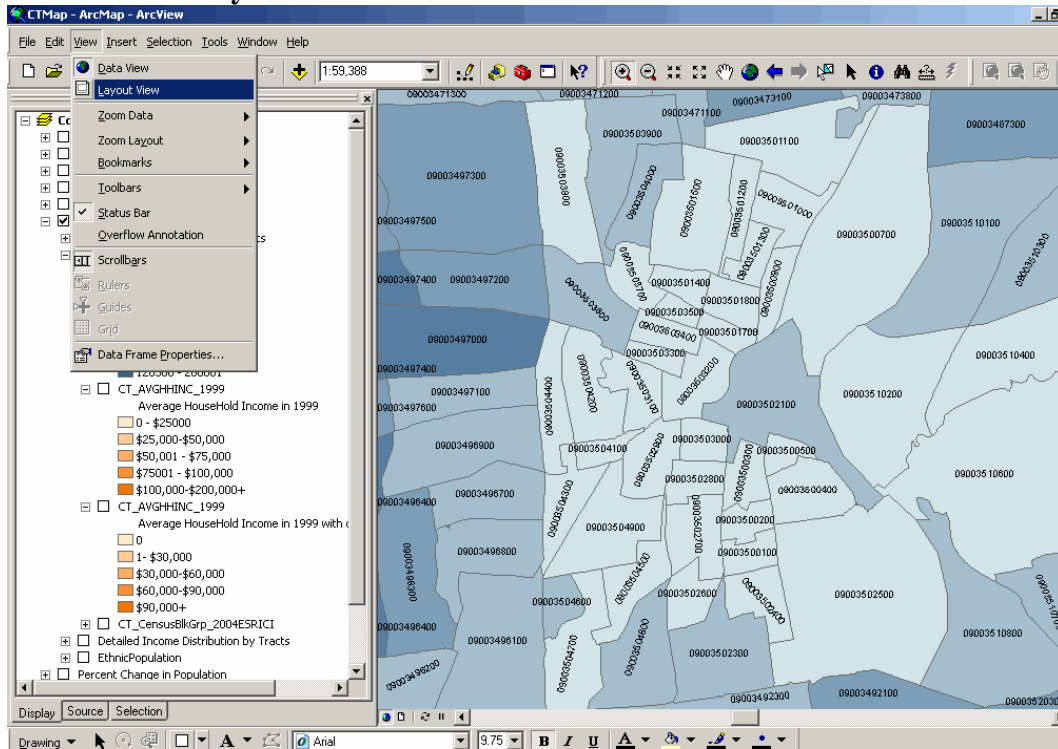


21. You can hit the **apply** button to preview your map. If you are satisfied click **ok**.

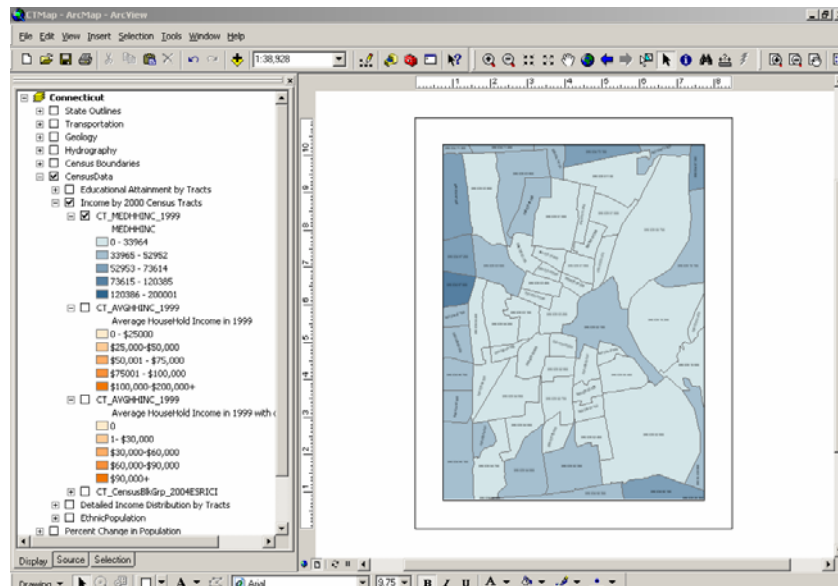


Layout View: Preparing a Map for Printing

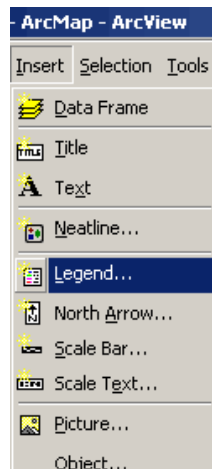
1. Now you are ready to prepare the map for printing by adding a legend, scale bar, title etc. We need to switch from the Data view to the Layout View to do this. Go to **View** on the standard toolbar and select **Layout View**.



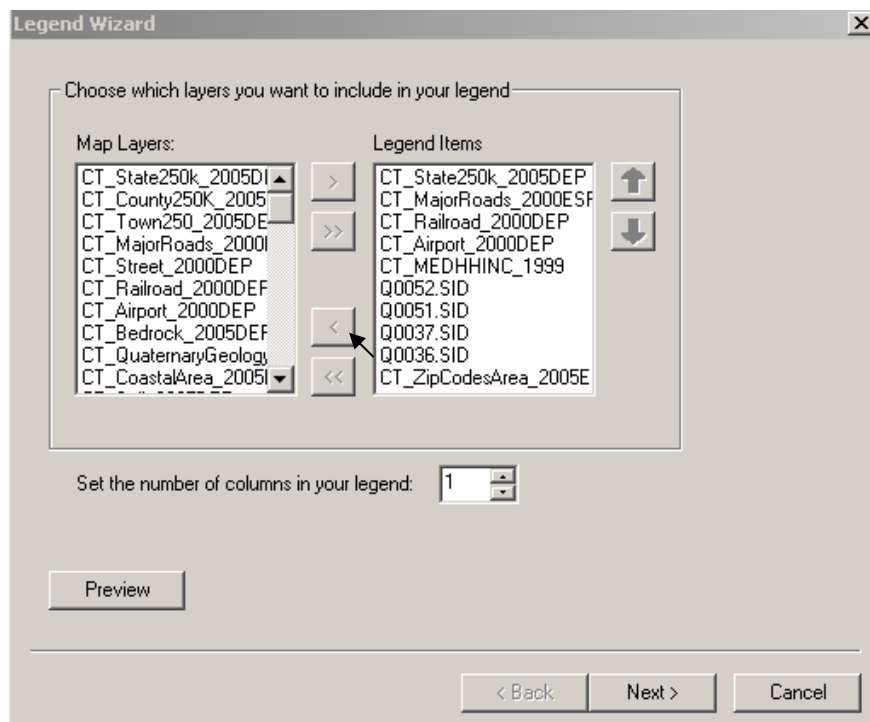
2. Now your screen should look similar to the one below. The zoom and extent levels will be the same as in the Data View



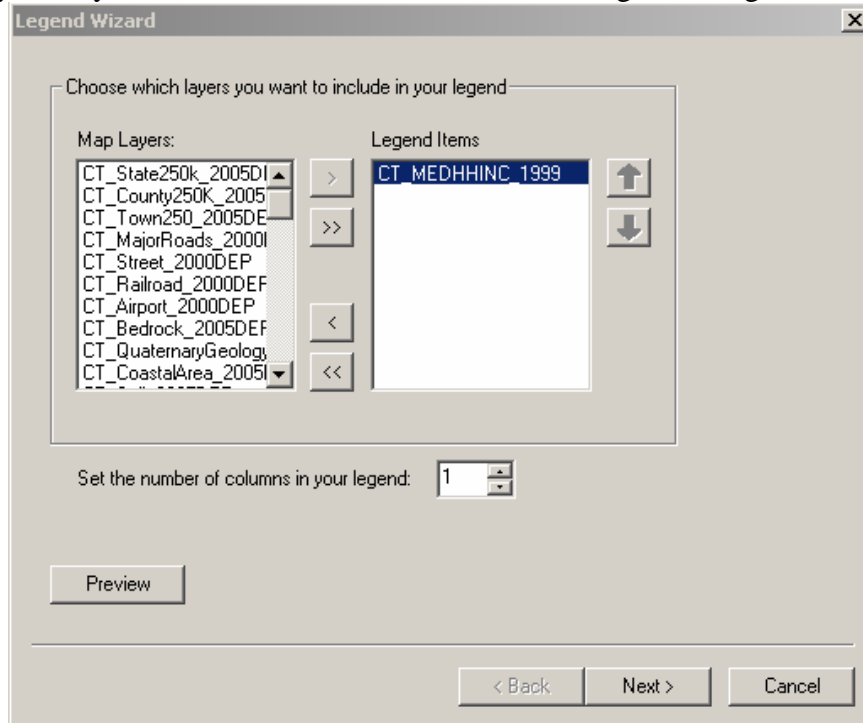
3. Once your map is in layout view, **click on insert** located on the standard toolbar.
4. Select **legend**



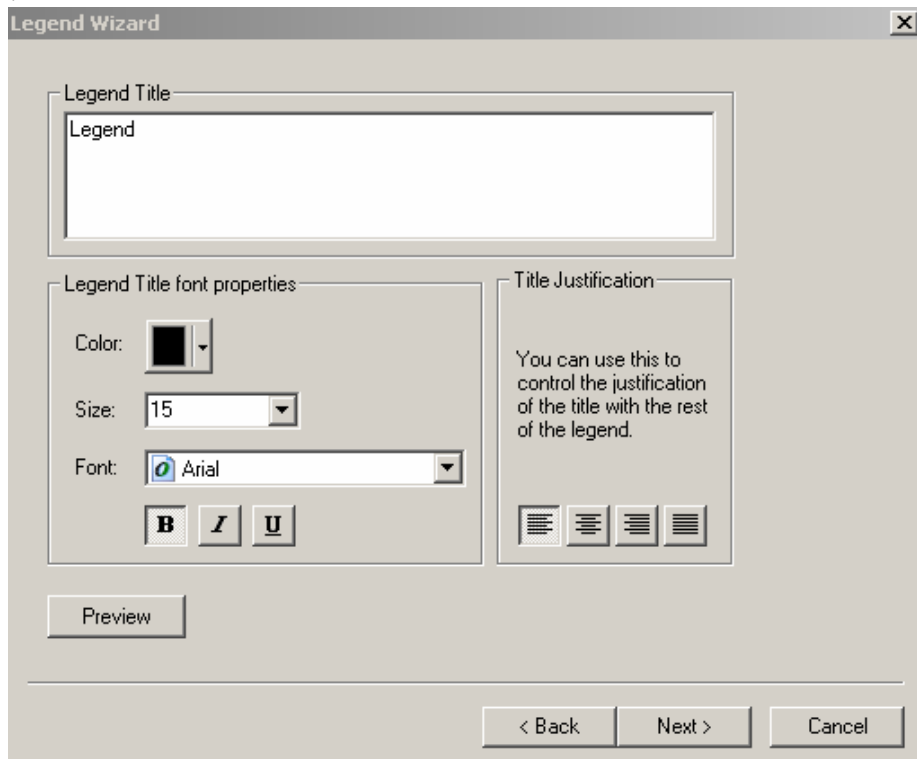
5. A legend wizard will pop up. Under **Legend items**, remove all items **except CT_MEDHHINC_1999**. To remove all the other items you will have to click on an item and then press the arrow on the left side of the legend items screen and move it to the Map layers screen



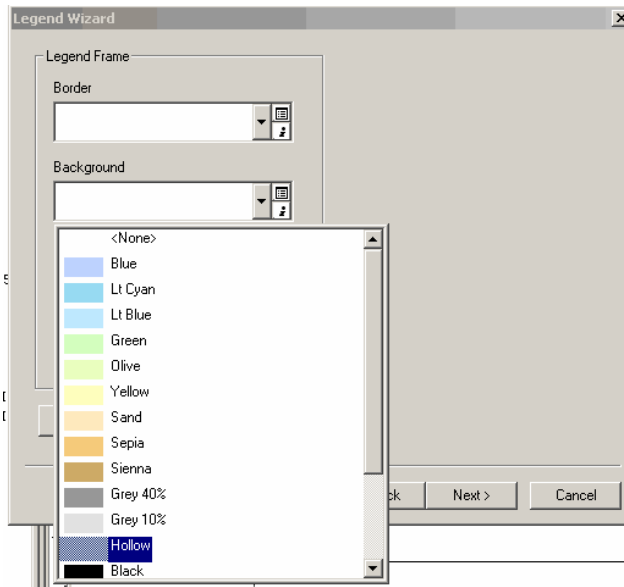
- When you only have CT_MEDHHINC_1999 remaining under legend items click **next**



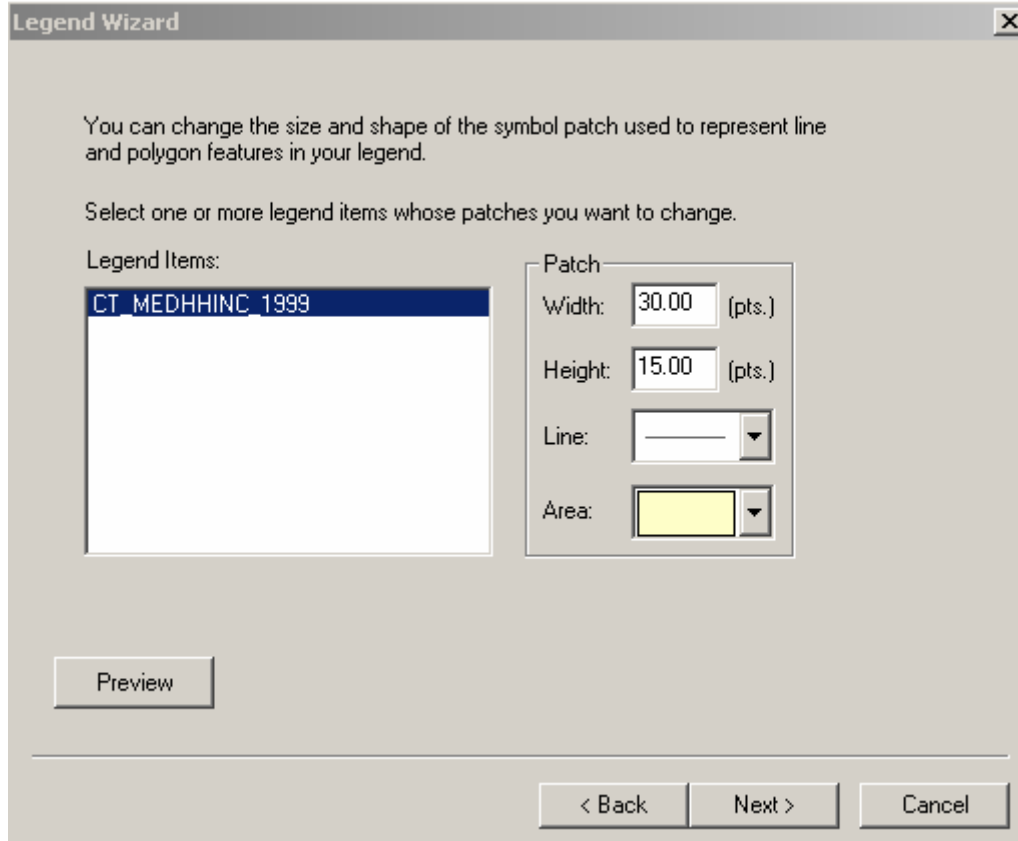
- On the next screen you can change the title of the legend and set its font. Press **next** again.



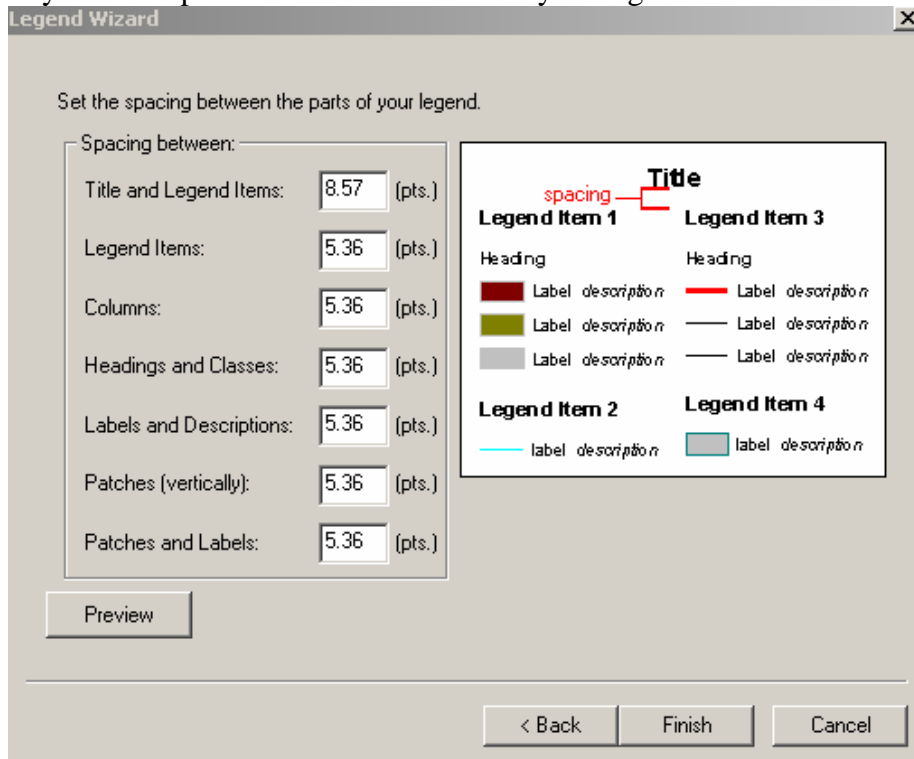
- Another legend wizard will pop up. This time scroll down on the **background** pull down menu and choose **hollow**. Then select **next**.



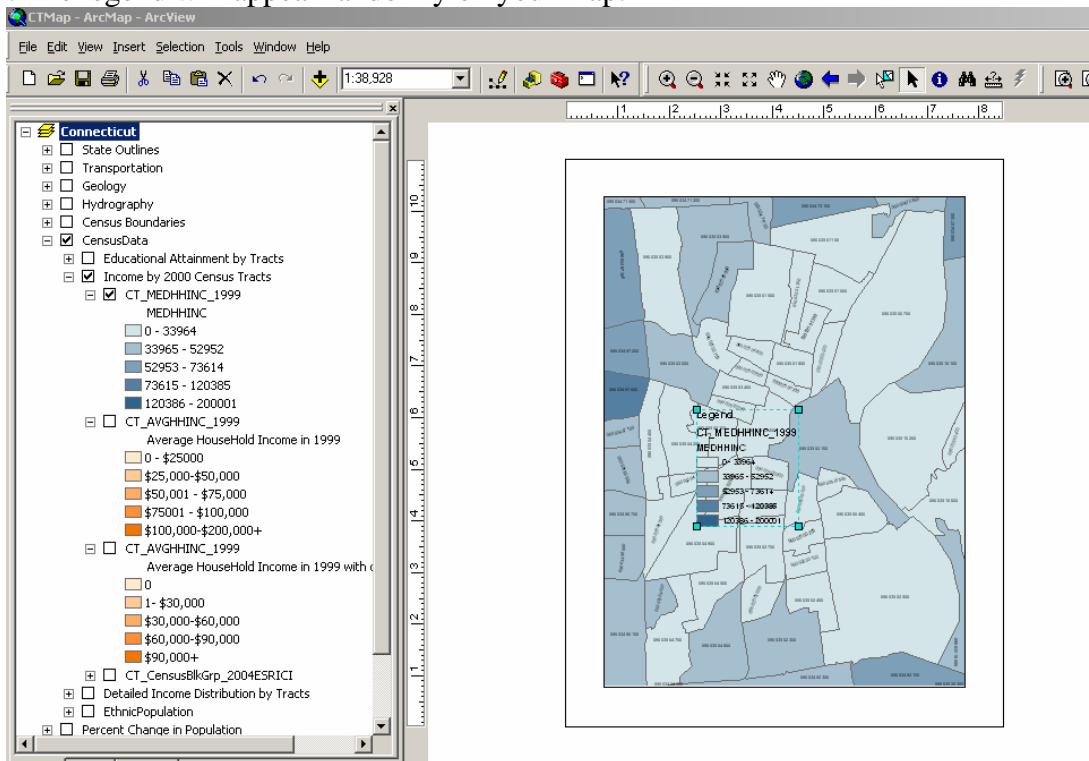
- When the next legend wizard appears, keep the defaults and select next.



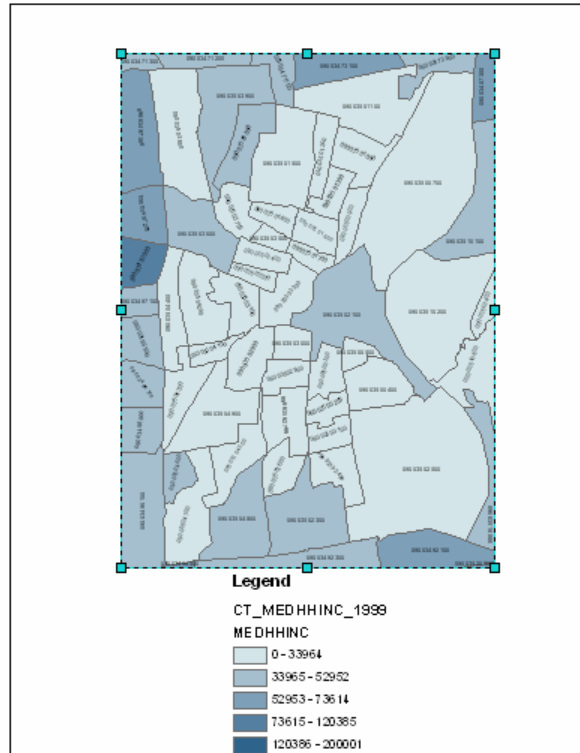
10. Finally select **finish** on the last legend wizard window. As you can see there are many options you can experiment with to customize your legend.



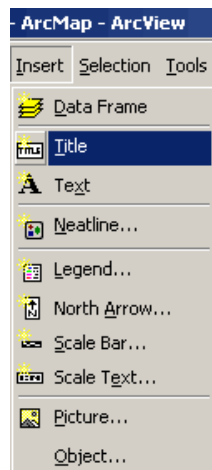
11. The legend will appear randomly on your map.



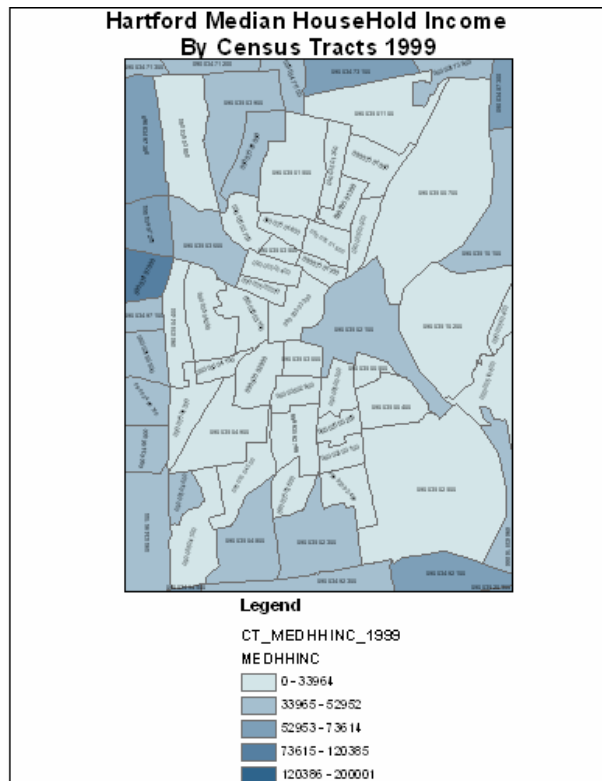
12. You can place the legend anywhere you would like on the map by dragging and resizing it to your preference through the highlighted areas with the green squares. You can also resize the map itself by doing the same.



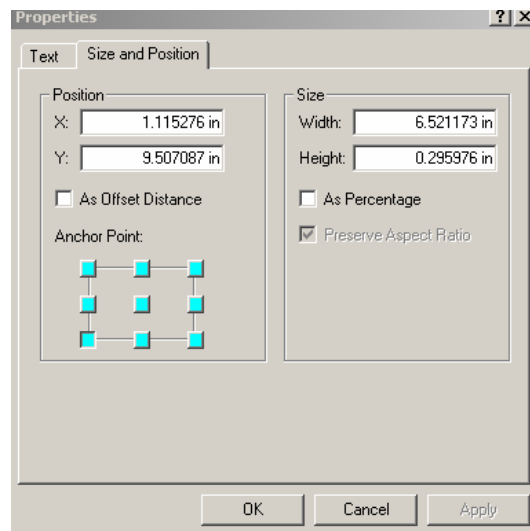
13. Now you are ready to add a title. Remaining in layout view, click once on **insert** located on the standard toolbar and select **title**.



14. When the text box appears, type in the title you wish to give your map.



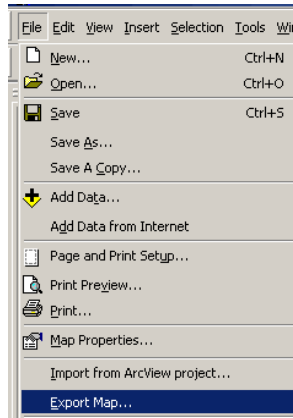
15. You can choose to edit your text or resize the text box by double clicking inside of the title box. A window will appear like below.



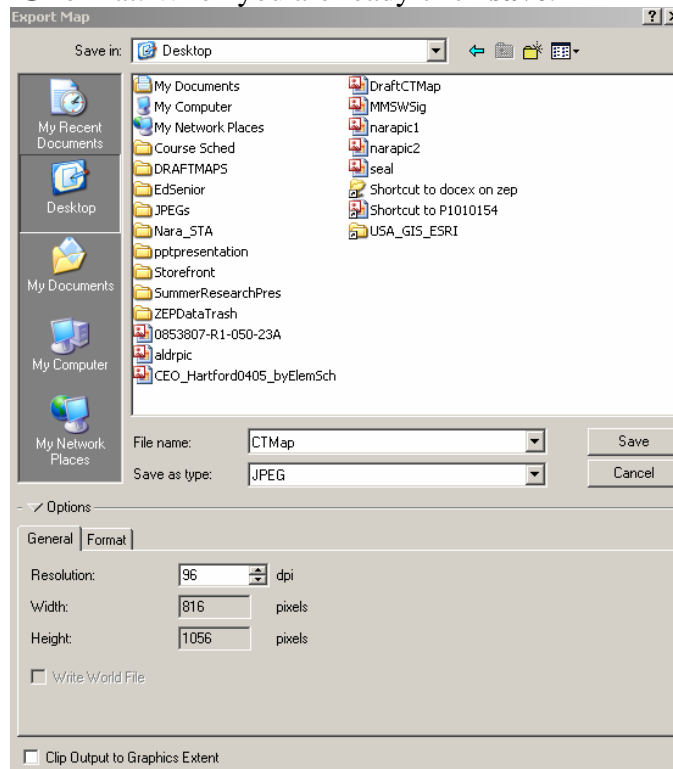
16. When you have created your title to your liking, click **ok**.
17. Now you have made a basic map symbolizing data. You created a title and a legend and your map is ready to be exported to your hard drive for future use in media presentation.

Exporting and Saving a Map

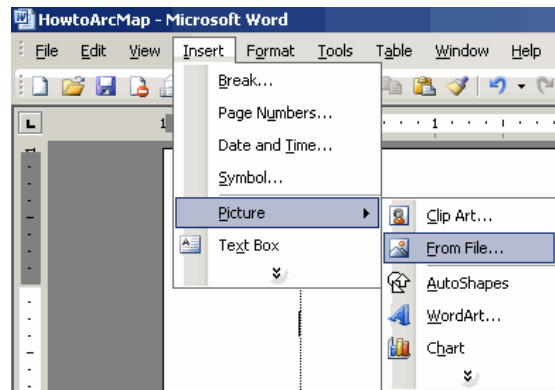
1. To export a map, click on the **file** menu and select **export map**



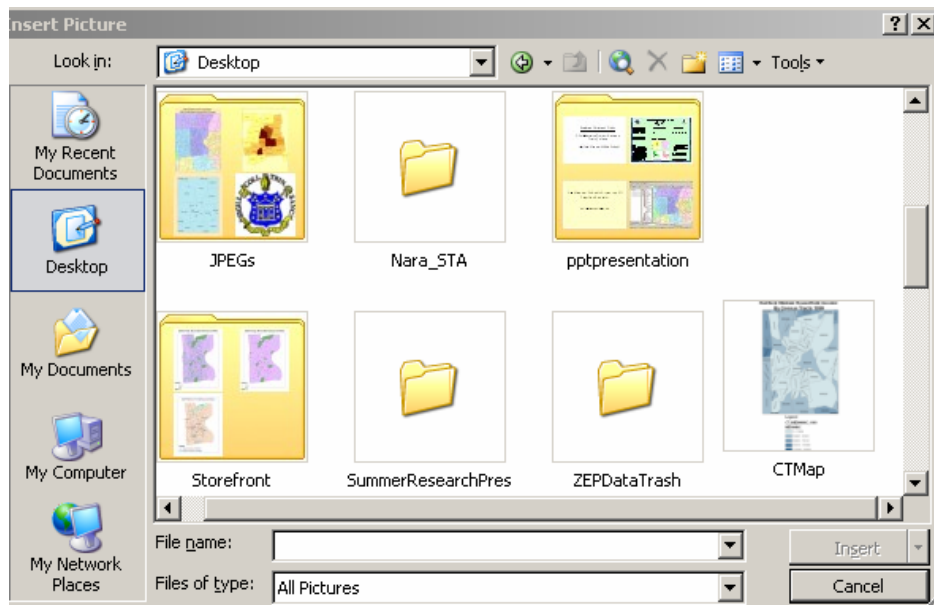
2. You can save the map in a variety of formats. PDF will give you the best overall quality for a stand alone map but if you want to use it in PowerPoint or a word doc you will want to save it as a JPEG. In this case make sure that in the **save as type** option, that you save the map in **JPEG** format. When you are ready click **save**.



3. You have successfully exported your map and it can be imported anywhere you would like it
4. For example, let's say you wanted to **import** the map to a word document. First select **insert** from the word document you choose to work from. Scroll down and select **picture** and then select **from file**.



5. Find your picture from the place you saved it in. When you have found your picture select it by clicking once on it and then **press insert**.



6. Your picture should now be imported to your document.

You have now completed the Layout section of the tutorial. You learned how to add a legend and a title to a map and finally how to export and import the map to a document for display.