

TEXAS WOMAN'S UNIVERSITY www.twu.edu
DENTON • DALLAS • HOUSTON

Thematic Mapping – the display of data on a map

| Chloropleth | Graduated Symbol | Dot Density |
|-------------|------------------|-------------|
| | | |

TWU
TEXAS WOMAN'S UNIVERSITY
DENTON • DALLAS • HOUSTON

TEXAS WOMAN'S UNIVERSITY www.twu.edu
DENTON • DALLAS • HOUSTON

| | |
|---|--------------------------------------|
| <p>Enrollment by Country</p> | <p>Enrollment by Level and State</p> |
| <p>Location of Distance Ed Students</p> | <p>Enrollment by County</p> |

TWU
TEXAS WOMAN'S UNIVERSITY
DENTON • DALLAS • HOUSTON

TEXAS WOMAN'S UNIVERSITY www.twu.edu
DENTON • DALLAS • HOUSTON

A few definitions

- **Geoset** – A geoset contains geographic information needed to draw a map. When a map based on a geoset is drawn, the tables appear as layers in the map.
- **Data Binding** – The linking of data to a map
- **FIPS** – Federal Information Processing Standards

TWU
TEXAS WOMAN'S UNIVERSITY
DENTON • DALLAS • HOUSTON

TEXAS WOMAN'S UNIVERSITY www.twu.edu
DENTON • DALLAS • HOUSTON

Step-through the creation of a map for Enrollment by County for Texas

(See SPSS Maps How-To Handout)

TWU
TEXAS WOMAN'S UNIVERSITY
DENTON • DALLAS • HOUSTON

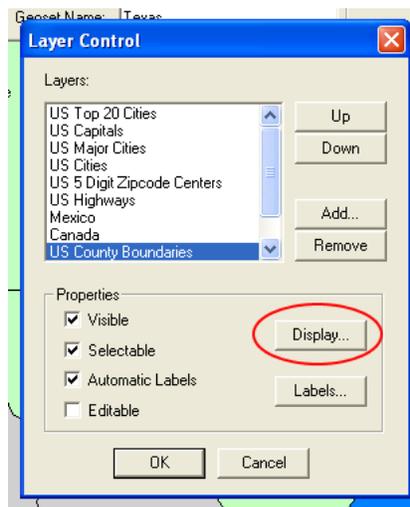
SPSS Maps How-to

TAIR 29th Annual Conference - February 2007

Creating a Texas Geoset

A geoset contains geographic information needed to draw a map. When a map based on a geoset is drawn, the tables appear as layers in the map.¹

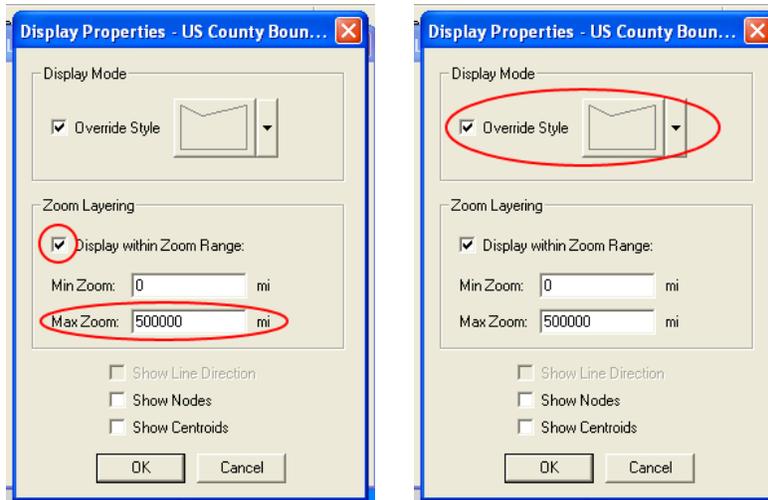
- Open the SPSS Geoset Manager
 - Start > SPSS > Geoset Manager
 - OR**
 - Navigate to C:\Program Files\SPSS\Maps\geosetmanager40.exe
- Open the US map (filename: US.GST)
 - *Note: the file can be found in the Maps folder within ProgramFiles\SPSS.*
- To protect the original file, save the map under a different name within the Maps folder
 - Change the Geoset Name (text box in the toolbar) to Texas
 - File > Save As
 - Name the file Texas
 - Click Save
- Change the projection of the map
 - Map > Projection...
 - Under Category, select Regional Mercator Systems
 - *This will give the map a flat appearance*
 - Under Category Members, select Mercator 60
 - Click OK
- Focus on Texas
 - Select the Zoom In (+) tool
 - Using this tool, draw a square around the state of Texas
 - Select the Hand tool (hand icon), and center the map
- Edit the county map layers
 - Map > Layer Control... *OR* select the Layer Control (stack of papers icon) tool from the toolbars
 - Under Layers, select US County Boundaries, and click Display



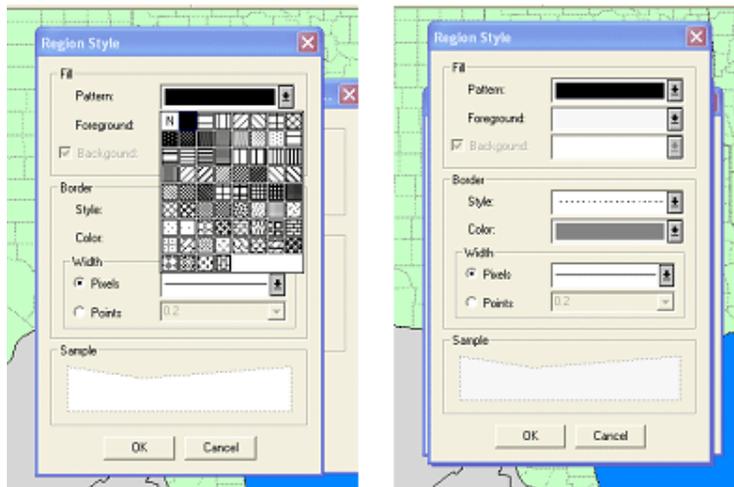
SPSS Maps How-to

TAIR 29th Annual Conference - February 2007

- Check Display within Zoom Range
- Change Max Zoom to 50,000 (no comma)
 - *Doing this allows you to see the county borders*



- Within the Display Properties window, check Override Style (see illustration above)
- Click the Display Mode button (to the right of Override Style)
- Select a Map Color
 - Within the Pattern drop-down menu, select the Solid Black square (next to N)
 - Within the Foreground drop-down menu, select Light Grey
 - *Selecting a subtle color, such as light grey for the overall map will make allow counties to stand out once data is added.*

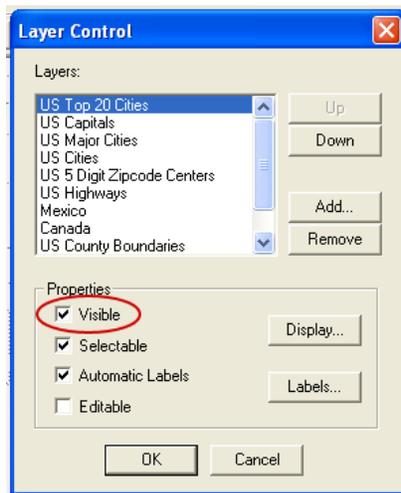


- Select a Border Style
 - Within the Style drop-down menu, select one of the Dotted Line styles
 - Within the Color drop-down menu, select Dark Grey
 - Click OK in the Region Style window

SPSS Maps How-to

TAIR 29th Annual Conference - February 2007

- Click OK in the Display Properties window
- Edit the areas surrounding Texas
 - Reopen the Layer Control window
 - Under Layers, select **Mexico**, and click Display
 - Within the Display Properties window, check Override Style
 - Click the Display Mode button (to the right of Override Style)
 - Within the Pattern drop-down menu, select the Solid Black square (next to N)
 - Within the Foreground drop-down menu, select Light Grey
 - *All the above steps give Mexico the same appearance as the United States counties. It is necessary to retain Mexico as a layer, so the southwest border of Texas is visible.*
 - Click OK twice
 - Under Layers, select **US Top 20 Cities**, and uncheck Visible within the Properties box
 - Repeat the above step for **US Capitals**, **US Major Cities**, **US Cities**, **US 5 Digit Zipcode Centers**, **US Highways**, and **USA**
 - *This will remove these layers from the map, allowing focus to remain on the counties.*



- Under Layers, select **Ocean**, and click Display
- Click the Display Mode button (to the right of Override Style)
 - Change the Ocean color to a lighter color
- Click OK twice
- Save the **geoset**
- Exit Geoset Manager

SPSS Maps How-to

TAIR 29th Annual Conference - February 2007

Creating a Data File

The data file will contain geographic information as well as the information you want to map. For the purpose of this demonstration, we will create a data file containing county names and their respective enrollments. To avoid name mismatches, we will use a county file provided by SPSS and add enrollment data to it. We will also create our own value ranges for the data. Different maps may require different data formats.

- Open the SPSS County file
 - Open > C:\Program Files\SPSS\MapsData\County Age Demographics by Gender
- To protect the original file, save the data under a different name
- Remove all non-Texas data
 - File > New > Syntax
 - Type: FILTER OFF.
USE ALL.
SELECT IF (st_fips='48').
EXECUTE.
 - Run > All (on the menu bar)
 - OR**
 - Data > Select Cases
 - Check If condition is satisfied, then click the If... button
 - Type st_fips='48' in the text box, and click Continue
 - Under Unselect Cases Are, select Deleted
 - Click OK
 - Under Variable View (Ctrl+T), select and clear all columns *except* cnty_fip, county, st_fips, and state
- Add enrollment data
 - Under Variable View, add the variable enrollment

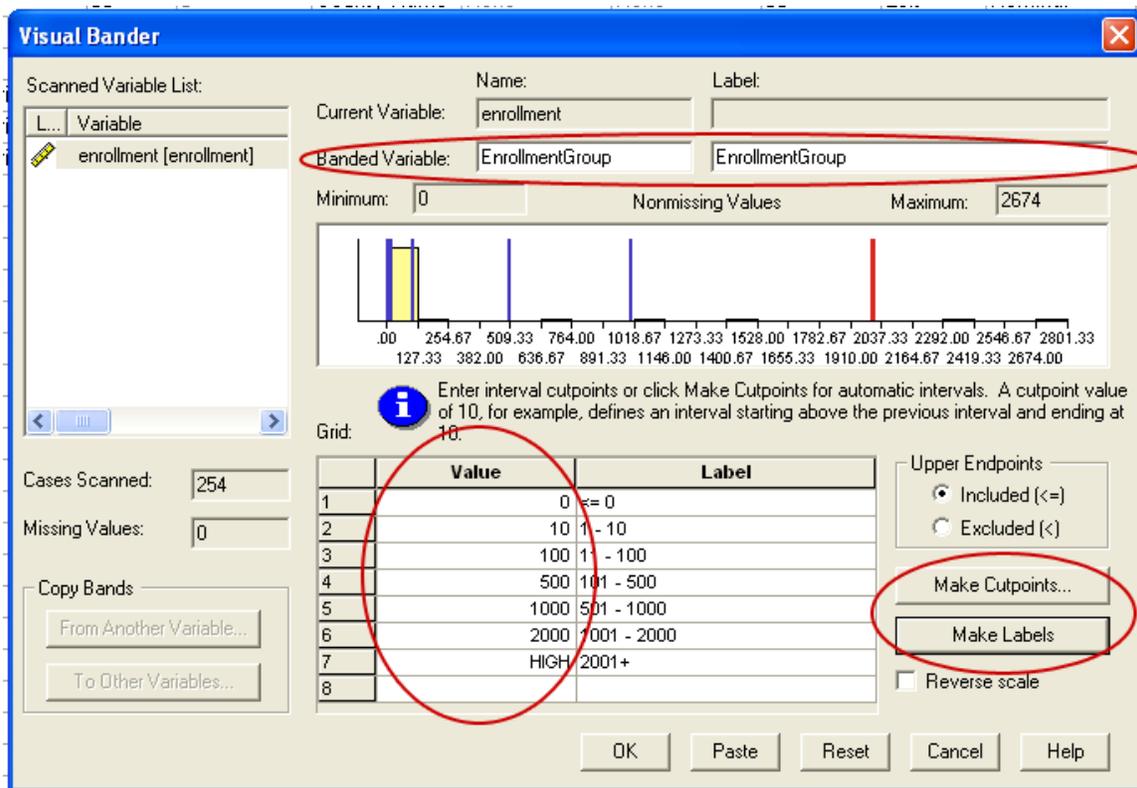
| | Name | Type | Width | Decimals | Label | Values | Missing | Columns | Align | Measure |
|---|------------|--------|-------|----------|------------------|--------|---------|---------|-------|---------|
| 1 | cnty_fip | String | 5 | 0 | 5-Digit County | None | None | 8 | Left | Nominal |
| 2 | county | String | 30 | 0 | County Name | None | None | 30 | Left | Nominal |
| 3 | st_fips | String | 2 | 0 | 2-Digit State FI | None | None | 8 | Left | Nominal |
| 4 | state | String | 2 | 0 | State Abbrevia | None | None | 12 | Left | Nominal |
| 5 | enrollment | | | | | | | | | |
| 6 | | | | | | | | | | |
| 7 | | | | | | | | | | |
| 8 | | | | | | | | | | |

- Under Data View, add the enrollment for each county listed
 - Manually enter the number for each county
- OR**
- Copy and paste data from Excel
 - *Note: Make sure data is sorted by county and that numbers do not contain commas.*

SPSS Maps How-to

TAIR 29th Annual Conference - February 2007

- Create data ranges
 - This will create a new column containing the enrollment range for each county.
 - Transform > Visual Bander
 - Move **enrollment** from the Variables box to the Variable to Band box
 - Click Continue
 - Select **enrollment** from the Scanned Variable List box
 - Under Banded Variable, in the Name and Label textboxes, type **EnrollmentGroup**
 - Click Make Cutpoints...
 - Check Equal Width Intervals
 - First Cutpoint Location: **0**
 - Number of Cutpoints: **6**
 - Click Apply
 - Under Value enter the following information (see illustration below):
 - 1) 0
 - 2) 10
 - 3) 100
 - 4) 500
 - 5) 1000
 - 6) 2000
 - 7) HIGH
 - Under Upper Endpoints, check Included (<=)
 - Click Make Labels
 - Click OK

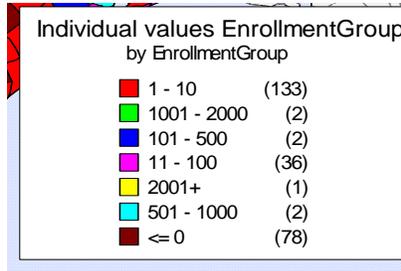


SPSS Maps How-to

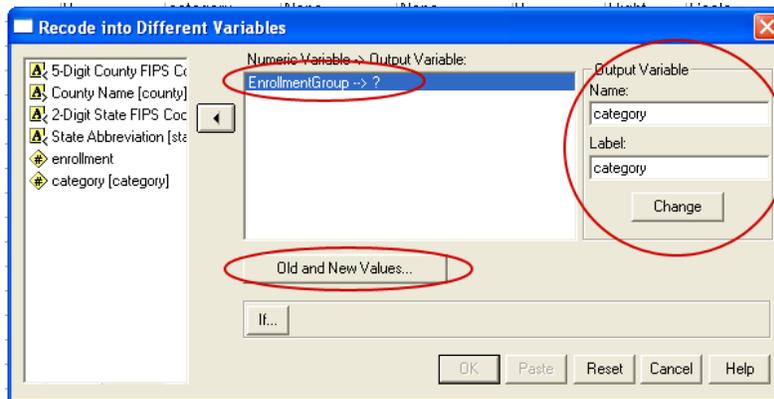
TAIR 29th Annual Conference - February 2007

- ***LEGEND WORK-AROUND***

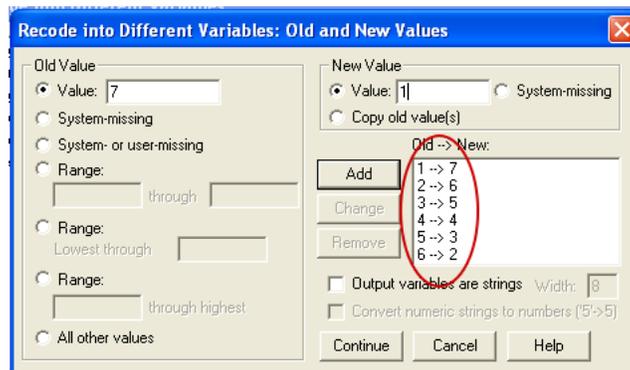
- If you generate an Individual Value map using the variable EnrollmentGroup, the legend SPSS generates will be out of order and look similar to this:



- To create a legend that reads in ascending order, you must recode EnrollmentGroup
 - Transform > Recode > Into Different Variables
 - Move **EnrollmentGroup** to the Numeric Variable -> Output Variable box
 - In the Name and Label textboxes type **category**
 - Click Old and New Values



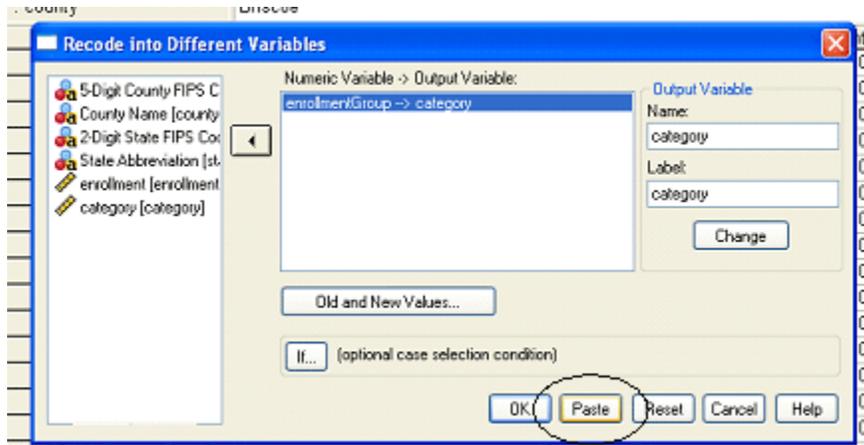
- Under Old Value, in the Value text box, type the number 1
- Under New Value, in the Value text box, type the number 7
- Click Add
- Continue this process for the rest of the variables (see illustration below)



SPSS Maps How-to

TAIR 29th Annual Conference - February 2007

- Click Continue
- In the Recode into Different Variables window, click Change
- Under Variable View (Ctrl + T), change the number of Decimals for **category** to 0
- Save
 - *Note: If you plan on creating enrollment maps often then you can paste the **Visual Bander** and **Recoding** processes shown above to syntax. Just click the **Paste** button instead of the **OK** button.*



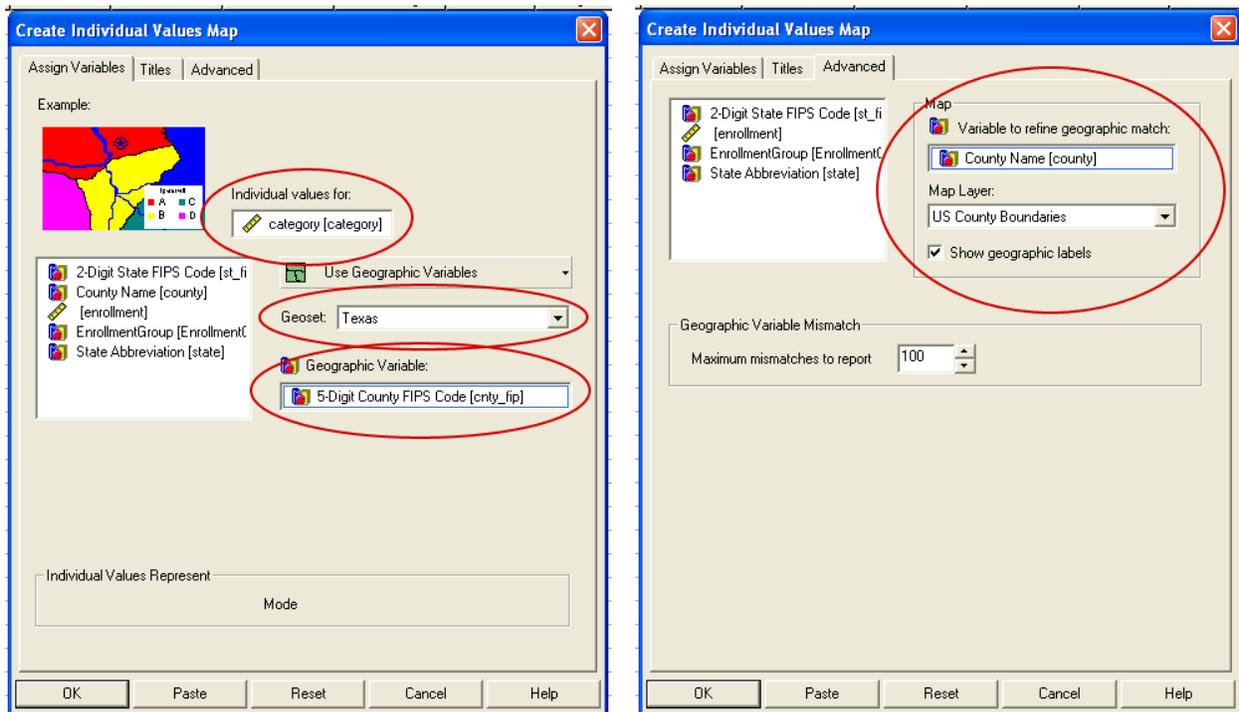
SPSS Maps How-to

TAIR 29th Annual Conference - February 2007

Creating a Map

Since we created our own range, we will be making an individual values map. If you would like SPSS to create a range for your data, create a Range of Values (Graphs > Map > Range of Values...) map and use **enrollment** as your defining variable.

- Open your data file (created within “Creating a Data File” above)
- Graphs > Maps > Individual Values...
 - Under Individual values for:, drag-and-drop **category**
 - Under Geoset, select Texas (created earlier in this How-To)
 - Under Geographic Variable:, drag-and-drop **5-Digit County FIPS Code [cnty_fip]**



- Select the Advanced tab from within the Create Individual Values Map window (see illustration above)
- Under Variables to refine geographic match, drag-and-drop **County Name [county]**
- Under Map Layer, select **US County Boundaries**
- Check Show geographic labels
 - *This step is very important! If you do not check Show Geographic Variables, you will not be able to label your map.*
- Click OK

SPSS Maps How-to

TAIR 29th Annual Conference - February 2007

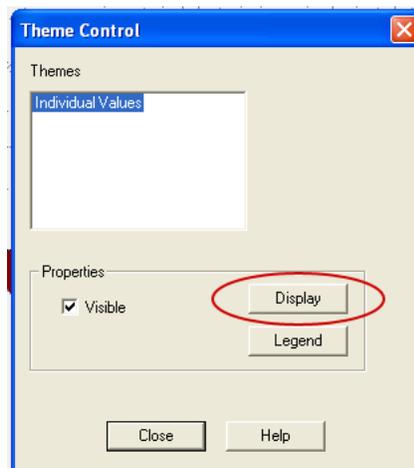
Editing a Map

Creating a map can help people visualize data; however, the purpose of a map may be lost if it is not readable. The final look of a map falls on user preference. Below are some methods and techniques to help you create a visually aesthetic map.

- Remove the map title
 - Double-click the map in your output viewer
 - *This action creates a toolbar at the top of your map*
 - Select the Zoom In (+) tool
 - Using this tool, draw a square around the state of Texas
 - Select the Hand tool (hand icon), and center the map
 - *You may want to enlarge your entire map for easier editing*
 - Click Edit Map Title on the toolbar



- In the Edit Map Title window, uncheck Map Title is Visible
- Click Close
- Change the theme colors and patterns of Texas counties
 - Click Themes on the toolbar
 - Under Themes, select Individual Values
 - Click Display

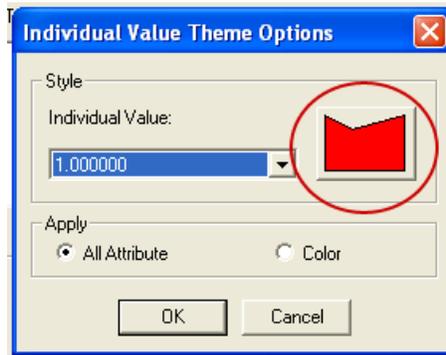


- Under Individual Value, select the lowest value (should be 1.000000)
 - *Note: After recoding the variables, the lowest value you your scale represents the counties with the highest enrollment. The Legend will be adjusted to show this in a later step.*

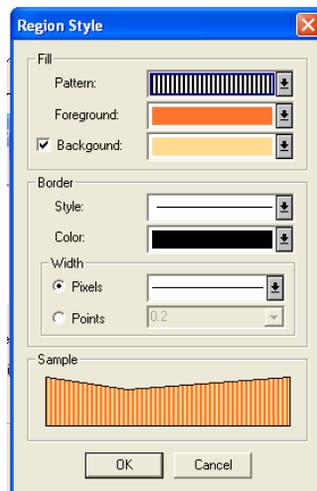
SPSS Maps How-to

TAIR 29th Annual Conference - February 2007

- Click Region Style (see illustration below)



- Under Pattern, select the Solid Black square
- Under Foreground, select the darkest color you would like for your map
 - *Note: As stated earlier, this will represent the county with highest enrollment.*
- Click OK
- Under Individual Value, select the next value (2.000000)
 - *Note: For each lesser enrollment range, you will want to select a lighter color and possibly a pattern to help differentiate from other ranges.*
 - Click Region Style
 - Under Pattern, select a pattern of your choosing
 - Under Foreground, select a lighter color than the previous value
 - Under Background, choose a color to go with your foreground
 - *Note: It make take several attempts to find colors and patterns that agree with your map.*



- Click OK
- Repeat the above steps for each Individual Value, varying the color/patterns into lighter shades.

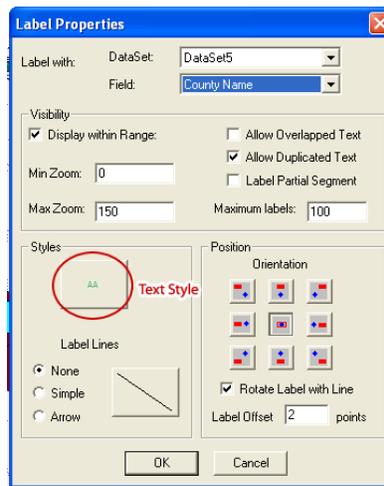
SPSS Maps How-to

TAIR 29th Annual Conference - February 2007

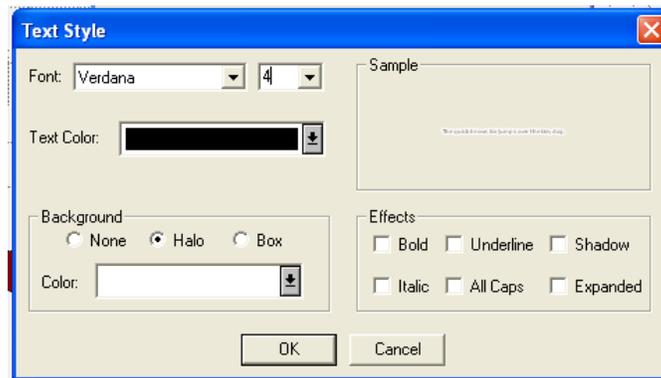
- Create Labels
 - Click Map Layers on the toolbar



- Under Layers, select **US County Boundaries**, click Labels
- Within the DataSet drop-down menu, select **DataSet5**
- Within the Field drop-down menu, select **County Name**
- Check Display within Range
- Set Min Zoom to 0 and Max Zoom to 50,000 (no commas)
- Check Allow Overlapped Text
- Uncheck Allow Duplicated Text
- Click Text Style (see illustration below)



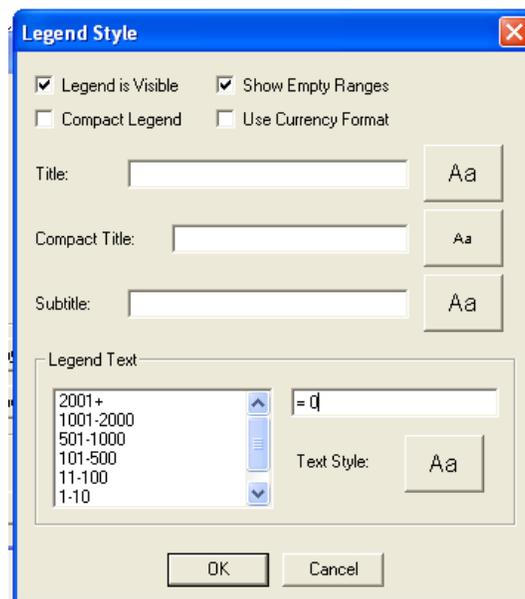
- Under Font, select Verdana and size 4
- Under Text Color, select black
- Under Background, select Halo and choose Color white
- Uncheck Bold
- Uncheck All Caps



SPSS Maps How-to

TAIR 29th Annual Conference - February 2007

- Click OK three times
- Modify the legend
 - Click Themes on the toolbar
 - Under Themes, select Individual Values
 - Click Legend
 - Change Title, Compact Title, and Subtitle as needed
 - *Note: To save on space, you can eliminate all titles, leaving simply the range of values key.*
 - Under Legend Text, select **1.000000**
 - Change the value in the textbox to 2001+
 - Continue the above steps for each Individual Value, changing the values to the appropriate ranges
 - *Warning: Modify your legend at the end. SPSS will not save the values, so should you close the map, you will lose legend changes.*



Exporting to Other Software

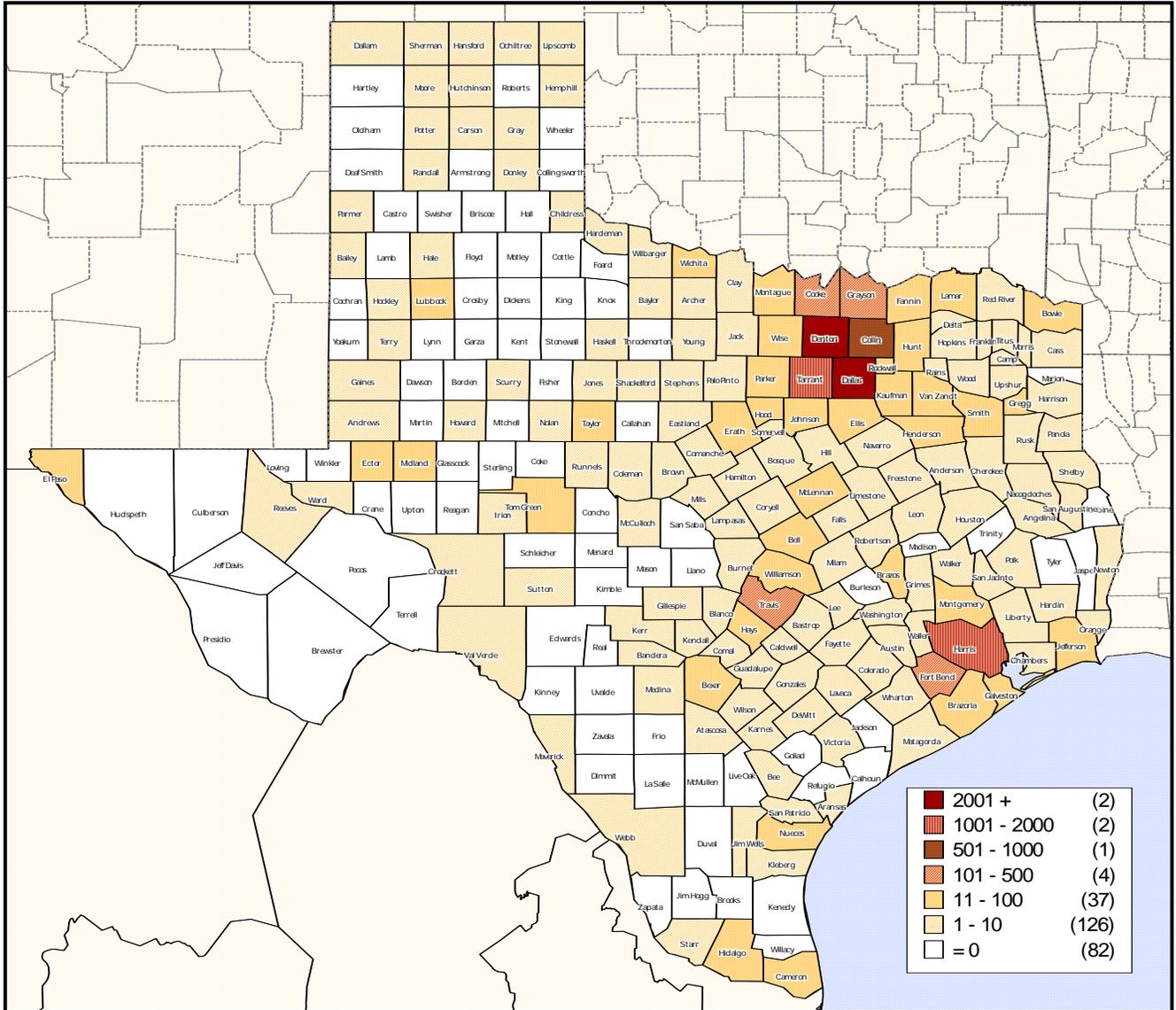
Additional modifications can be made in word processing and image editing software by copying and pasting the map into these other applications. You can also print a map to PDF.

¹SPSS Training Department. Introduction to SPSS Maps. Chicago. 2000.

Texas Woman's University

Texas Enrollment Distribution by County Map

Fall Semester, 2005



TEXAS WOMAN'S UNIVERSITY www.twu.edu
DENTON • DALLAS • HOUSTON

SPSS Maps Add-on

- Pricing
 - Version 10 - \$299
 - Upgrade - \$60
 - SPSS 15 - \$319




TEXAS WOMAN'S UNIVERSITY www.twu.edu
DENTON • DALLAS • HOUSTON

Alternatives to SPSS

- ArcGIS
 - Full-featured
 - Requires training (\$300)
 - Free to try; \$250 for education license
 - www.esri.com/software/arcgis/



- Microsoft MapPoint
 - Integrate with MS Office
 - North America only
 - Free to try; \$299 to purchase
 - www.microsoft.com/mappoint/




TEXAS WOMAN'S UNIVERSITY www.twu.edu
DENTON • DALLAS • HOUSTON

Other Resources

- History
 - Wikipedia
http://en.wikipedia.org/wiki/Thematic_map
 - Edward R. Tufte
<http://www.edwardtufte.com/tufte/>
- Color Choices
 - Color Brewer
http://www.personal.psu.edu/cab38/ColorBrewer/ColorBrewer_intro.html



Contact

Kate Amorella
Senior Research Analyst
940-898-3013
kamorella@twu.edu

Tracy Stegmair
Senior Research Analyst
940-898-3021
tstegmair@twu.edu

www.twu.edu/irp