Labeling SABINS Features with Multiple Schools of Service

September 2011

This manual explains how to label school attendance boundaries with their corresponding school names in ArcGIS. This process requires three steps. The first step integrates school attendance boundary data with the names of corresponding schools. The second step formats school name information from the National Center for Education Statistics' Common Core of Data (CCD). The final step uses a GIS to display the names of schools as labels for the attendance boundaries they serve.

This guide assumes the user has already downloaded SABINS data from **www.sabinsdata.org** and has it unzipped. For assistance in this, please see the *Using the SABINS Data Finder* tutorial.

Three files are necessary to follow all steps outlined in this tutorial document.

1. A shapefile of school attendance boundary polygons. For this example, we will use the kindergarten shapefile called **PY_SABINS_0910_00_US.shp**.

2. The second file is a SABINS-to-CCD crosswalk table that links unique school IDs *(NCESSCH)* with their corresponding school boundary IDs *(SABINSID)*. There is a unique table for each grade. For kindergarten, the table is **NS_SABINS_CCD_0910_00.dbf**.

3. The third file lists school names by their associated school IDs. One file contains all schools and is named **ccd_names.dbf**.

File 1 is downloaded using the SABINS Data Finder while files 2 and 3 are downloaded from **www.sabinsdata.org/user-resources/school-data**.

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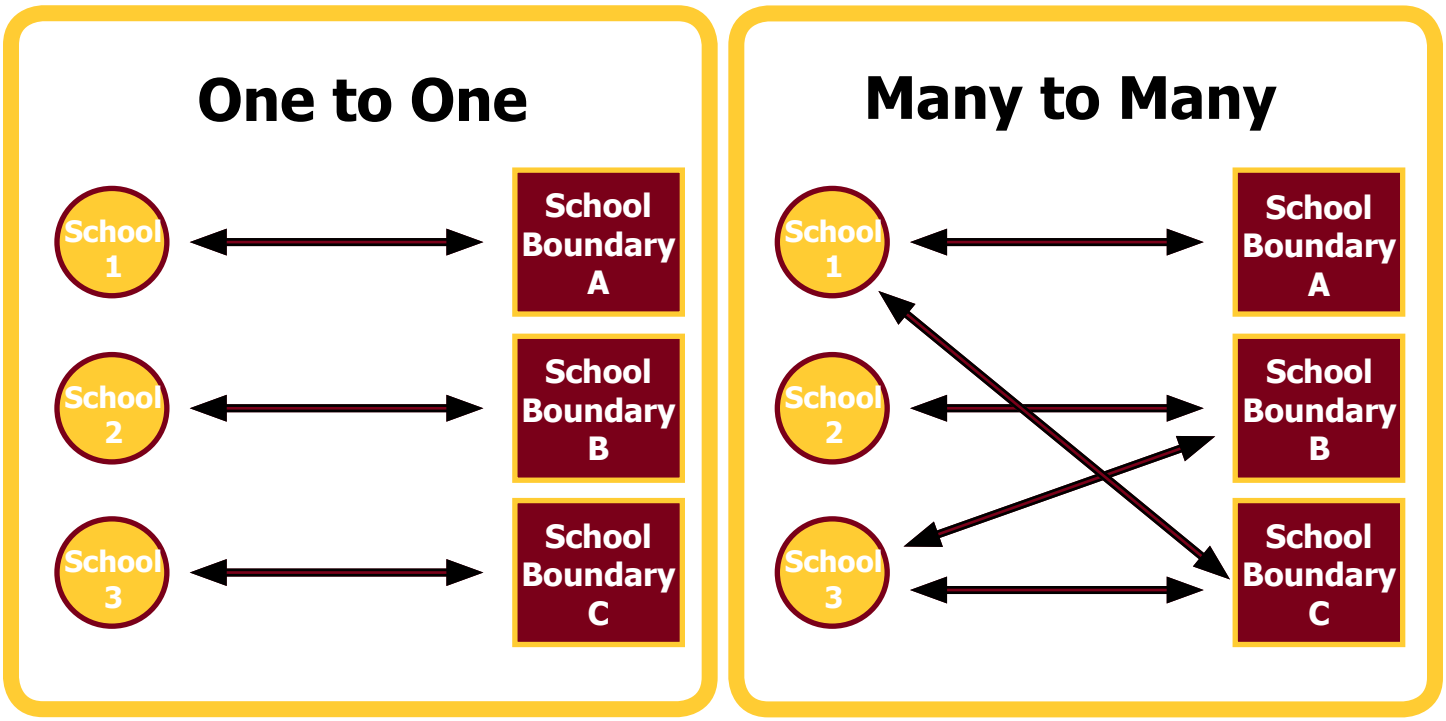
Background Information

Schools and school attendance boundaries have a somewhat counter-intuitive relationship. In most cases, one school serves a single attendance boundary. But schools and school attendance boundaries do not always have a one-to-one relationship. Some schools serve multiple, separate attendance boundaries, and sometimes more than one school serves the same attendance boundary. This makes the relationship between schools and school attendance boundaries a more complicated many-to-many relationship.

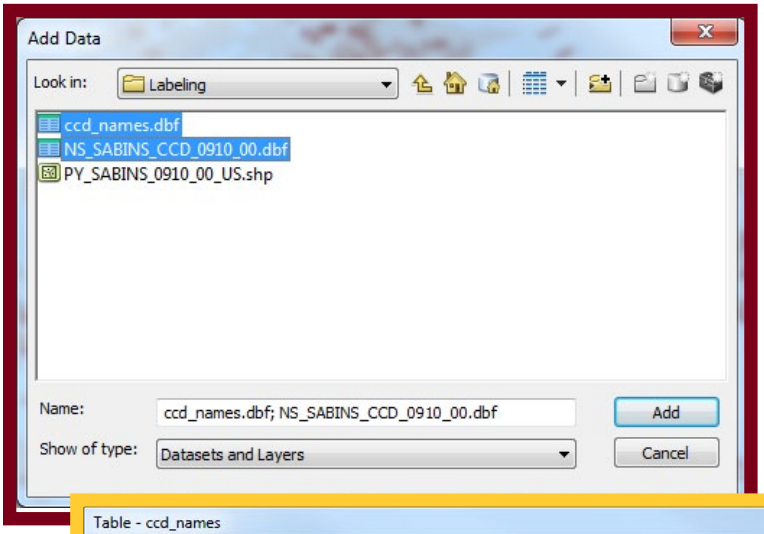
To accommodate schools' and attendance boundaries' many-to-many relationship, the SABINS project stores information about either entity in separate tables. In the attendance boundary shapefile (**PY_SABINS_0910_00_US.shp**), each school attendance boundary is listed once and identified by a unique 27-digit SABINSID. In the school names data table (**CCD0910.dbf**), each school is listed once and identified by a unique 12-digit NCESSCH. A third table lists the NCESSCH and SABINSID fields side by side; schools and school attendance boundaries may be listed multiple times depending on their corresponding relationships.

In order to label attendance boundaries with the schools that serve them, users must first use GIS to join the school names table (**ccd_names.dbf**) with the crosswalk table (**NS_SABINS_CCD_0910_00.dbf**). Then users will restructure the data using a statistical package (in this tutorial, we use SPSS, but you may also use SAS, STATA, R, or another package). Afterward, you will join this restructured table with the school attendance boundary shapefile and use it to label the school attendance boundary polygons.



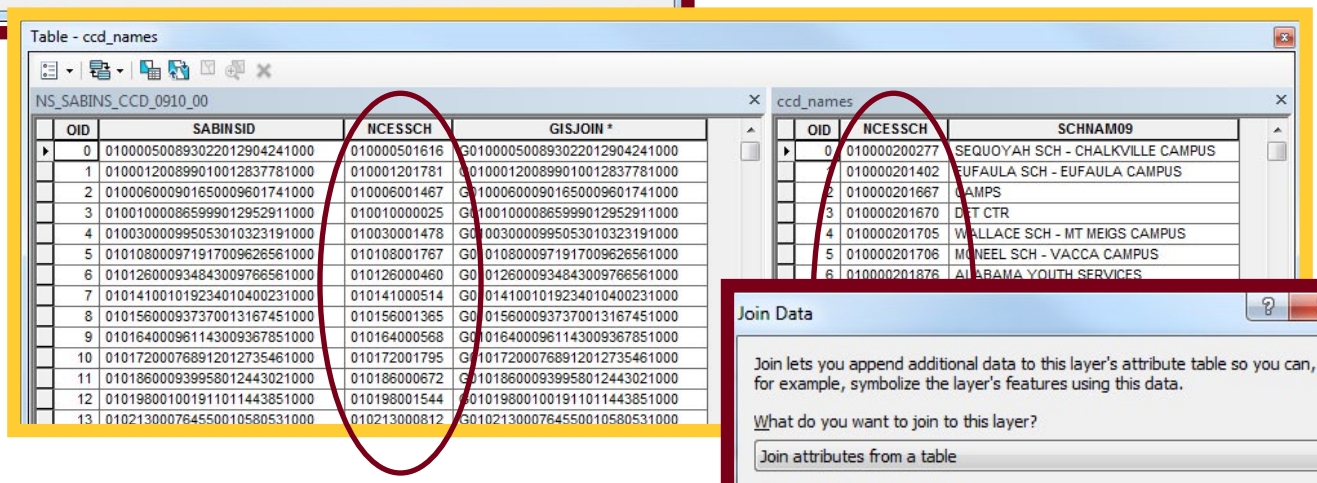
Join School Names to School Association Table

Start Esri ArcMap and open a new document. Click the add data button, and browse to the location of the school name and crosswalk files. For this example, the files names are as follows: **NS_SABINS_CCD_0910_00.dbf** and **ccd_names.dbf**.



Each of the tables is shown below. The CCD-to-school attendance boundary crosswalk table is opened on the left; the school names file is portrayed on the right.

Notice the NCESSCH field in each table.



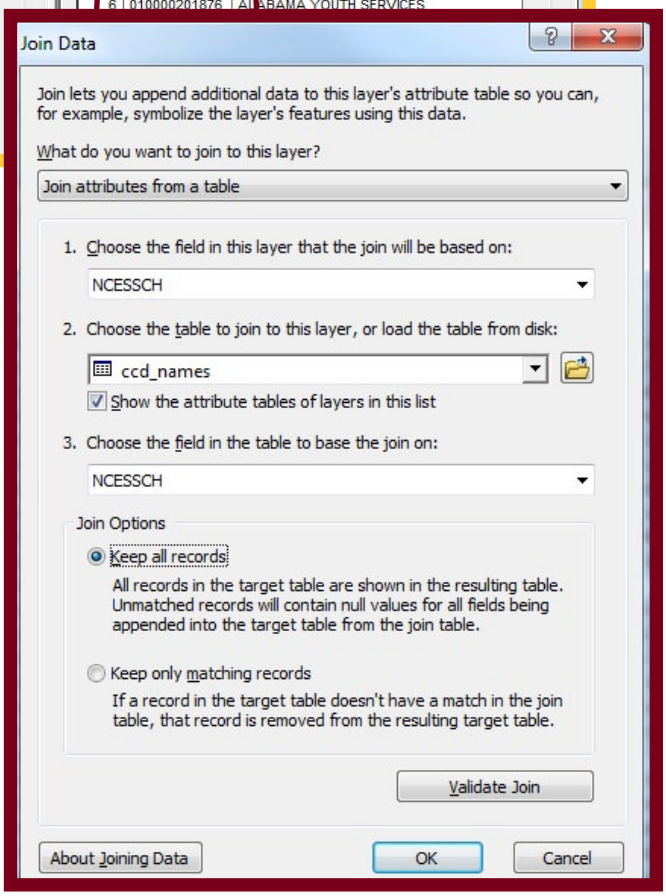
Join the two files by right clicking **NS_SABINS_CCD_0910_00.dbf** in the table of contents. Then select Joins and Relates>Join… In the dialogue box that opens:

a. Under "What do you want to join to this layer?" select **Join attributes from a table**.

b. For both the numbers 1 and 3 (the field the join will be based on), select **NCESSCH**. Select **ccd_names.dbf** under number 2, "Choose the table to join to this layer, or load the table from disk:"

c. Make sure the radio button next to "Keep all records" is selected.

d. Press OK.



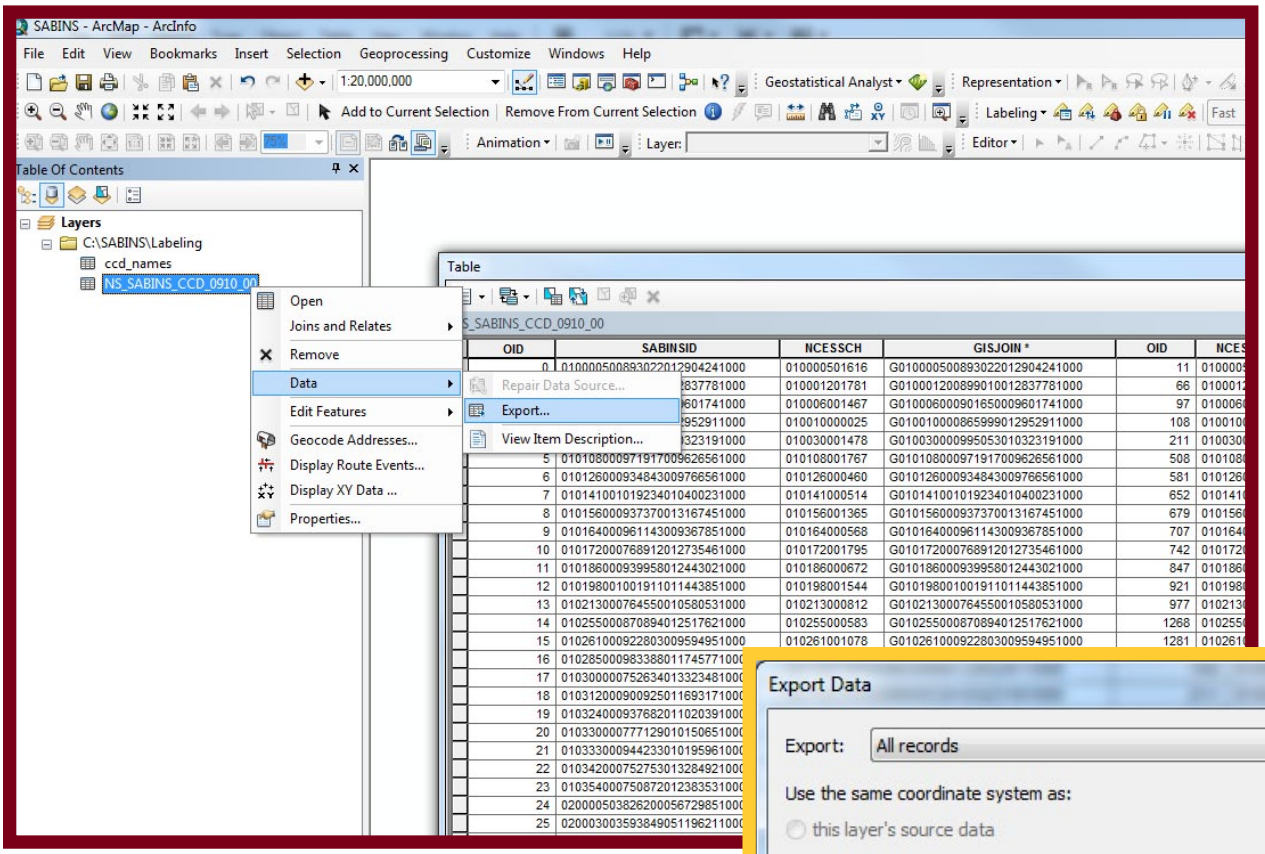
Join School Names to School Association Table

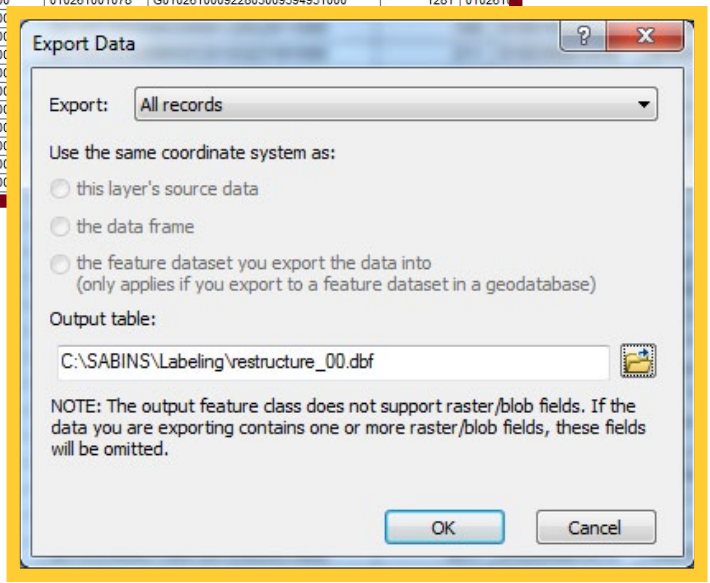
After we verify the join worked correctly be inspecting the results in the file's attribute table, it is best to export the joined file. It is important to realize that a table join does not result in a permanent change to the files involved. Rather, it is considered virtual because the join disappears if the map document is not saved. Exporting the file while a join is intact will create a new file that permanently contains all of the attributes of the original file and the joined data.

To export, right click **NS_SABINS_CCD_0910_00.dbf** in the table of contents, and select Data>Export Data…

Choose to export the joined data as a dBASE file.

For the purposes of this tutorial, the exported file is called **restructure_00.dbf**.





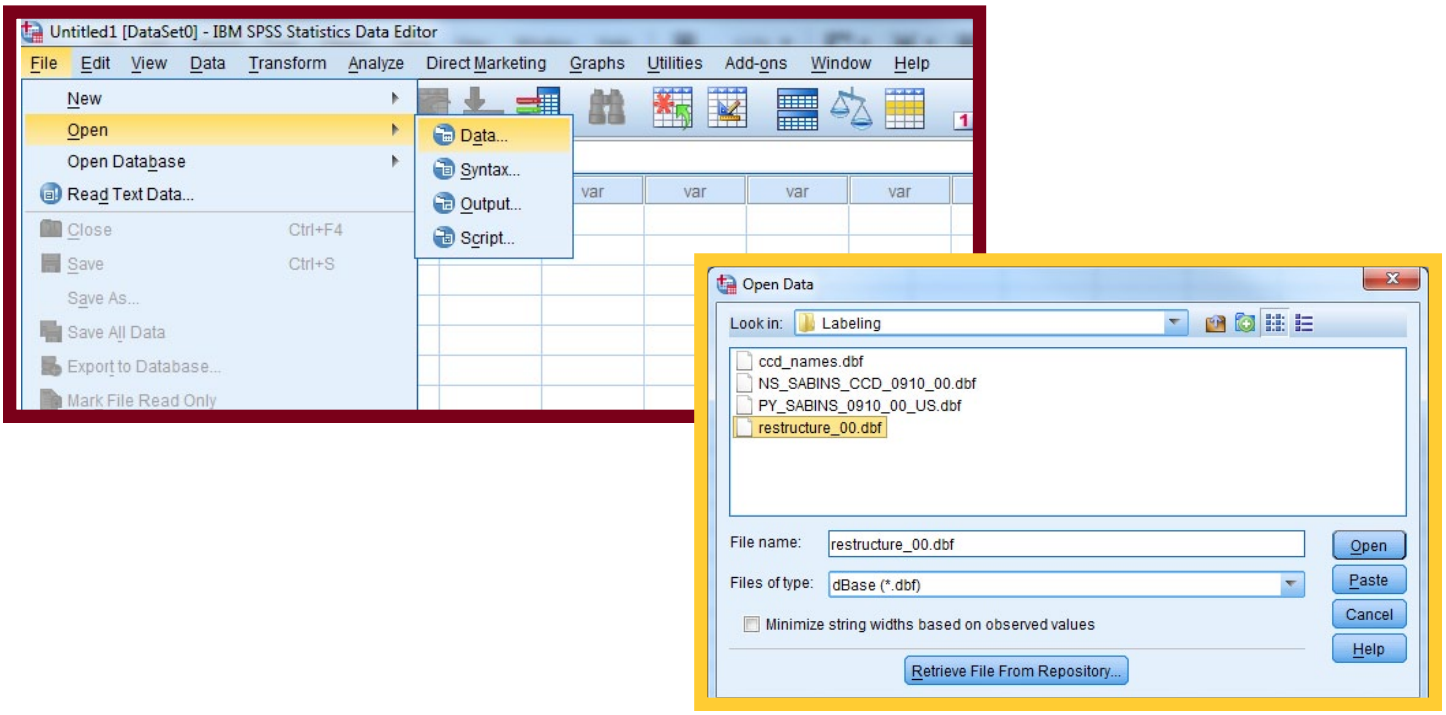
A dialogue box will appear asking, "Do you want to add the new table to the current map?"

Select No, as the next step uses the new table outside of GIS.

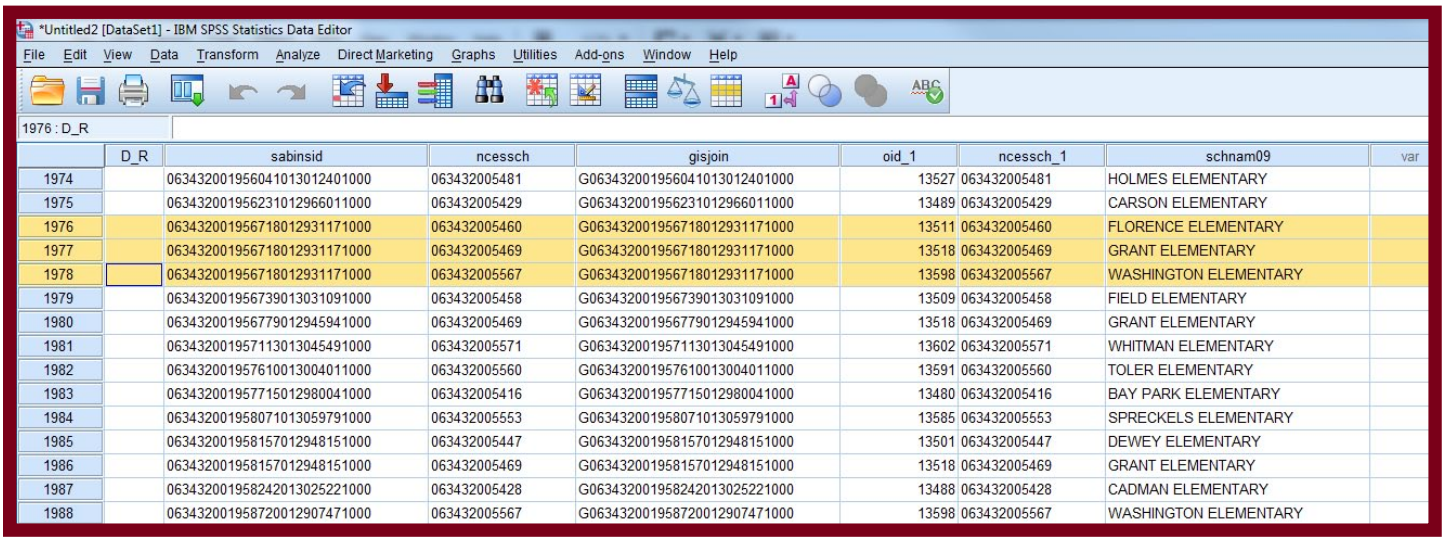
Restructure Data in SPSS

The next step in the process is does not use GIS. Rather, a statistical package is needed to restructure the data. In this example, SPSS is used.

Load your data table into SPSS by clicking File, and then selecting Open and Data. Navigate to the location where you saved **restructure_00.dbf** (Hint: You will only be able to see your file if after you have selected dBase (*.dbf) in the box labeled "Files of type:").



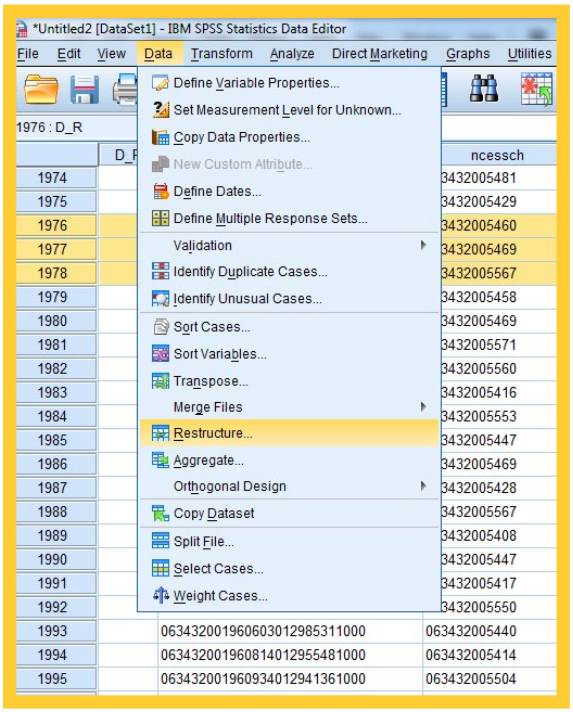
This figure below highlights an example of a SABINSID listed three times alongside the three schools that serve that same polygon. The restructuring process will make one record that has a single SABINSID and separate fields for each schname09 and NCESSCH code.



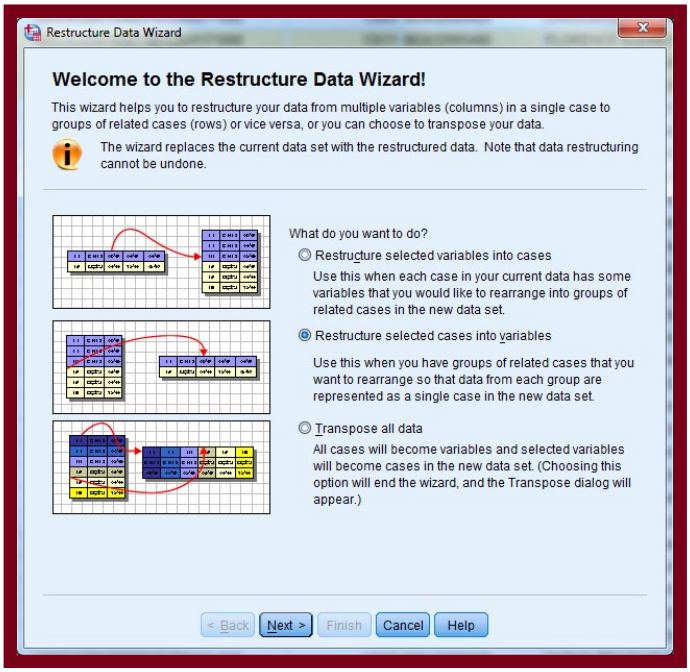
	D_R	sabinsid	ncessch	gisjoin	oid_1	ncessch_1	schnam09	var
1974		063432001956041013012401000	063432005481	G063432001956041013012401000	13527	063432005481	HOLMES ELEMENTARY	
1975		063432001956231012966011000	063432005429	G063432001956231012966011000	13489	063432005429	CARSON ELEMENTARY	
1976		063432001956718012931171000	063432005460	G063432001956718012931171000	13511	063432005460	FLORENCE ELEMENTARY	
1977		063432001956718012931171000	063432005469	G063432001956718012931171000	13518	063432005469	GRANT ELEMENTARY	
1978		063432001956718012931171000	063432005567	G063432001956718012931171000	13598	063432005567	WASHINGTON ELEMENTARY	
1979		063432001956739013031091000	063432005458	G063432001956739013031091000	13509	063432005458	FIELD ELEMENTARY	
1980		063432001956779012945941000	063432005469	G063432001956779012945941000	13518	063432005469	GRANT ELEMENTARY	
1981		063432001957113013045491000	063432005571	G063432001957113013045491000	13602	063432005571	WHITMAN ELEMENTARY	
1982		063432001957610013004011000	063432005560	G063432001957610013004011000	13591	063432005560	TOLER ELEMENTARY	
1983		063432001957715012980041000	063432005416	G063432001957715012980041000	13480	063432005416	BAY PARK ELEMENTARY	
1984		063432001958071013059791000	063432005553	G063432001958071013059791000	13585	063432005553	SPRECKELS ELEMENTARY	
1985		063432001958157012948151000	063432005447	G063432001958157012948151000	13501	063432005447	DEWEY ELEMENTARY	
1986		063432001958157012948151000	063432005469	G063432001958157012948151000	13518	063432005469	GRANT ELEMENTARY	
1987		063432001958242013025221000	063432005428	G063432001958242013025221000	13488	063432005428	CADMAN ELEMENTARY	
1988		063432001958720012907471000	063432005567	G063432001958720012907471000	13598	063432005567	WASHINGTON ELEMENTARY	

Restructure Data in SPSS

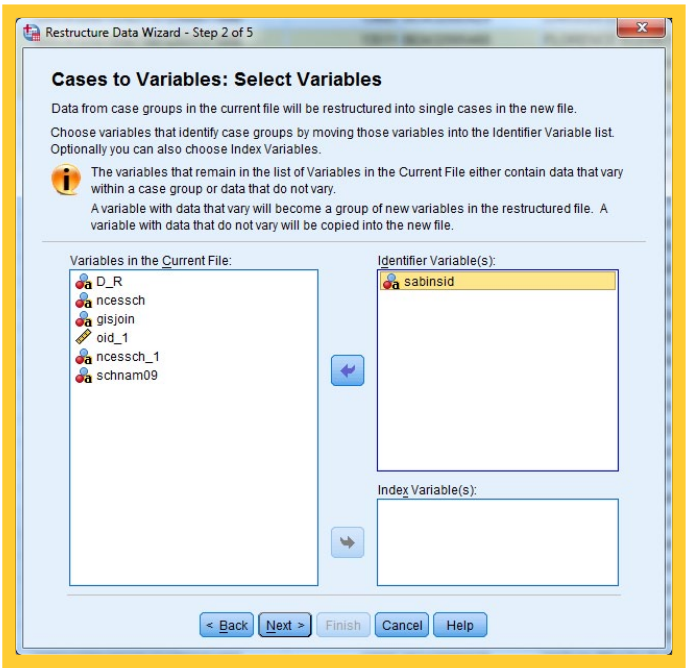
Open the **Restructure Data Wizard** by selecting Data, then Restructure.



Under Step 1, select the radio button next to "**Restructure selected cases into variables**," and press Next.

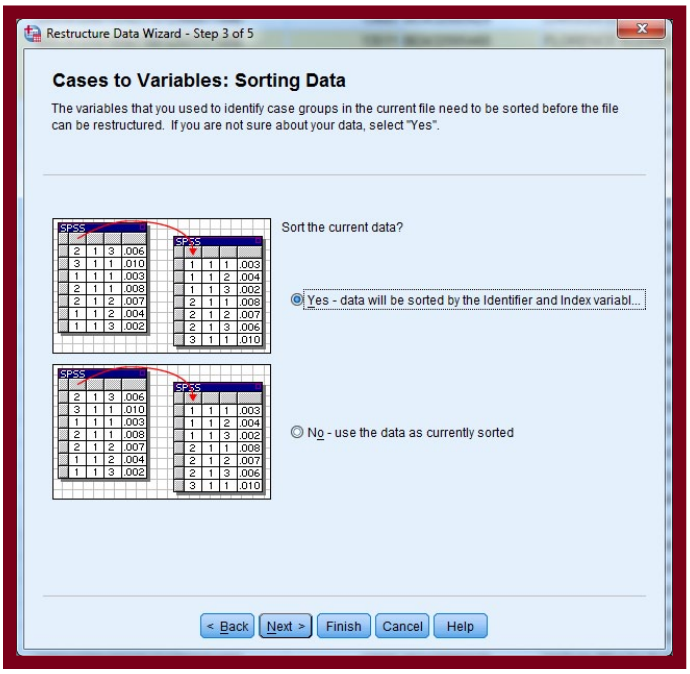


Under Step 2, Select Variables, move the field "**sabinsid**" into the box labeled Identifier Variable(s): and press Next.

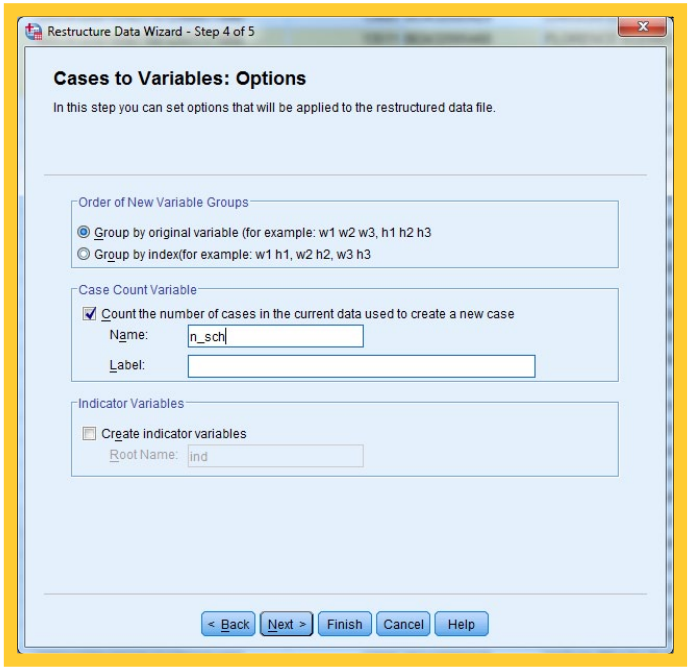


Restructure Data in SPSS

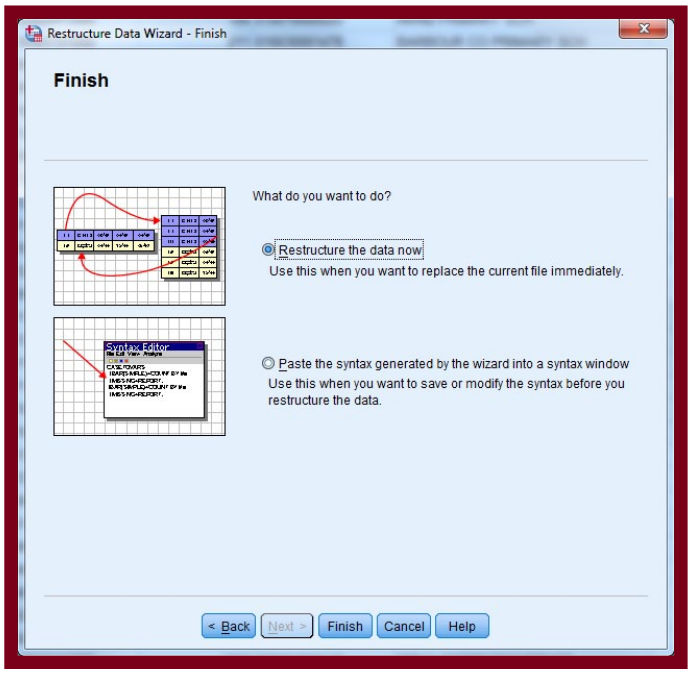
Under Step 3, Sorting Data, select the radio button next to **Yes – data will be sorted by the Identifier and Index variables**. Select Next.



Under Step 4, Options, select the radio button next to **Group by original variable (for example: w1 w2 w3, h1 h2 h3)**. In addition, click the check box next to **Count the number of cases in the current data used to create a new case**, and name the new field "**n_sch**". This new field will list how many schools serve any given attendance boundary. Press Next.



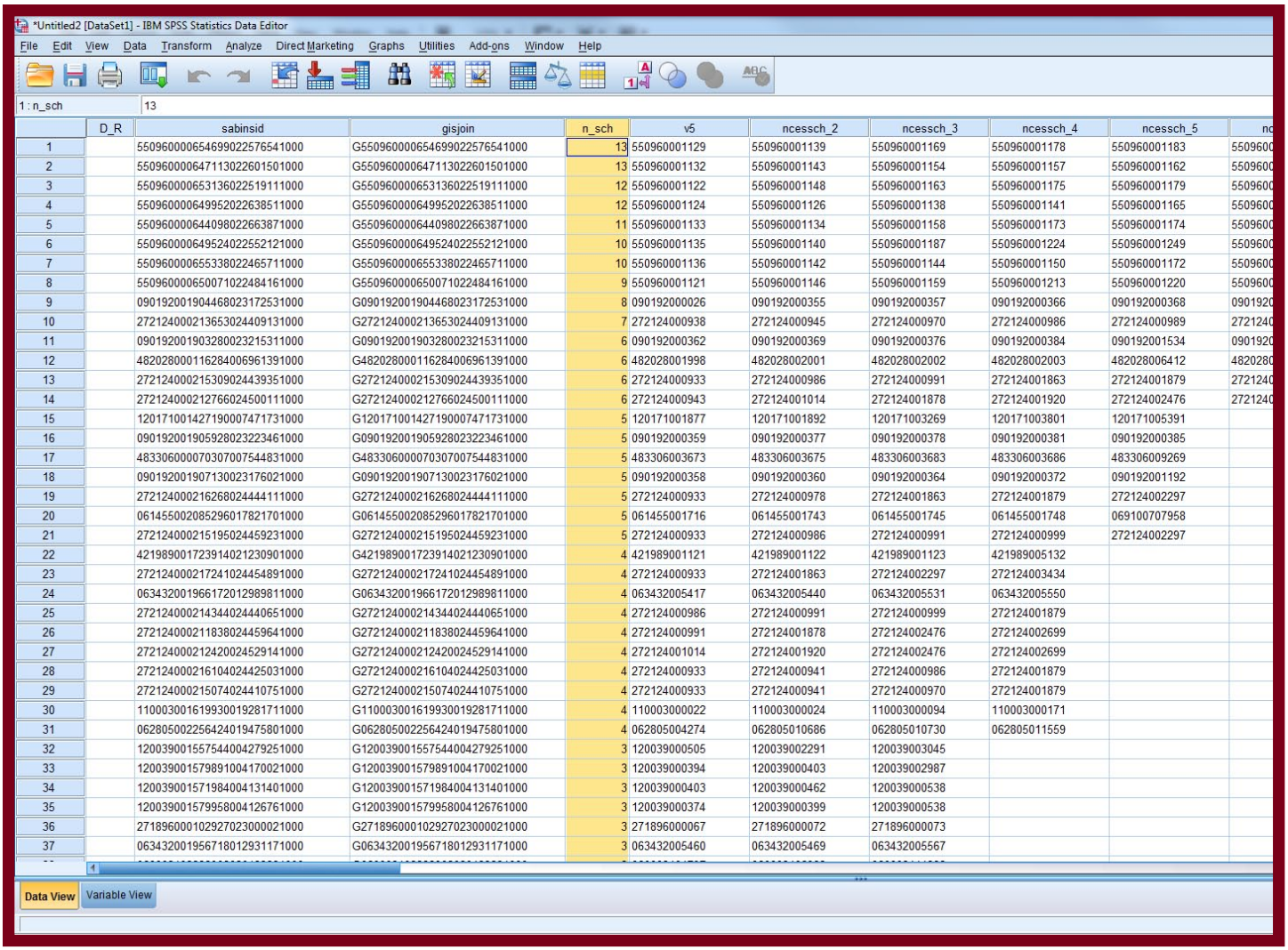
Under Step 5, Finish, select the radio button next to **Restructure the Data Now**. Press Finish.



Restructure Data in SPSS

Save the restructured file as **restructure_wide_00.dbf**. Be sure you do save it as a dBASE file and not the default .sav format.

Notice in your new table the n_sch field you made in the previous step. If you sort in descending order on this field, you see the school attendance boundaries that are shared by multiple schools. Two school attendance boundaries each are shared by 13 different schools, while a few hundred SABINSID records contain at least two schools each. Scroll to the right, and you see that all of the individual school names are listed in each school attendance boundary record.



	D_R	sabinsid	gisjoin	n_sch	v5	ncessch_2	ncessch_3	ncessch_4	ncessch_5	nc
1		550960000654699022576541000	G550960000654699022576541000	13	550960001129	550960001139	550960001169	550960001178	550960001183	550960
2		550960000647113022601501000	G550960000647113022601501000	13	550960001132	550960001143	550960001154	550960001157	550960001162	550960
3		550960000653136022519111000	G550960000653136022519111000	12	550960001122	550960001148	550960001163	550960001175	550960001179	550960
4		550960000649952022638511000	G550960000649952022638511000	12	550960001124	550960001126	550960001138	550960001141	550960001165	550960
5		550960000644098022663871000	G550960000644098022663871000	11	550960001133	550960001134	550960001158	550960001173	550960001174	550960
6		550960000649524022552121000	G550960000649524022552121000	10	550960001135	550960001140	550960001187	550960001224	550960001249	550960
7		550960000655338022465711000	G550960000655338022465711000	10	550960001136	550960001142	550960001144	550960001150	550960001172	550960
8		550960000650071022484161000	G550960000650071022484161000	9	550960001121	550960001146	550960001159	550960001213	550960001220	550960
9		090192001904468023172531000	G090192001904468023172531000	8	090192000026	090192000355	090192000357	090192000366	090192000368	090192
10		272124000213653024409131000	G272124000213653024409131000	7	272124000938	272124000945	272124000970	272124000986	272124000989	272124
11		090192001903280023215311000	G090192001903280023215311000	6	090192000362	090192000369	090192000376	090192000384	090192001534	090192
12		482028000116284006961391000	G482028000116284006961391000	6	482028001998	482028002001	482028002002	482028002003	482028006412	482028
13		272124000215309024439351000	G272124000215309024439351000	6	272124000933	272124000986	272124000991	272124001863	272124001879	272124
14		272124000212766024500111000	G272124000212766024500111000	6	272124000943	272124001014	272124001878	272124001920	272124002476	272124
15		120171001427190007471731000	G120171001427190007471731000	5	120171001877	120171001892	120171003269	120171003801	120171005391	
16		090192001905928023223461000	G090192001905928023223461000	5	090192000359	090192000377	090192000378	090192000381	090192000385	
17		483306000070307007544831000	G483306000070307007544831000	5	483306003673	483306003675	483306003683	483306003686	483306009269	
18		090192001907130023176021000	G090192001907130023176021000	5	090192000358	090192000360	090192000364	090192000372	090192001192	
19		272124000216268024444111000	G272124000216268024444111000	5	272124000933	272124000978	272124001863	272124001879	272124002297	
20		061455002085296017821701000	G061455002085296017821701000	5	061455001716	061455001743	061455001745	061455001748	069100707958	
21		272124000215195024459231000	G272124000215195024459231000	5	272124000933	272124000986	272124000991	272124000999	272124002297	
22		421989001723914021230901000	G421989001723914021230901000	4	421989001121	421989001122	421989001123	421989005132		
23		272124000217241024454891000	G272124000217241024454891000	4	272124000933	272124001863	272124002297	272124003434		
24		063432001966172012989811000	G063432001966172012989811000	4	063432005417	063432005440	063432005531	063432005550		
25		272124000214344024440651000	G272124000214344024440651000	4	272124000986	272124000991	272124000999	272124001879		
26		272124000211838024459641000	G272124000211838024459641000	4	272124000991	272124001878	272124002476	272124002699		
27		272124000212420024529141000	G272124000212420024529141000	4	272124001014	272124001920	272124002476	272124002699		
28		272124000216104024425031000	G272124000216104024425031000	4	272124000933	272124000941	272124000986	272124001879		
29		272124000215074024410751000	G272124000215074024410751000	4	272124000933	272124000941	272124000970	272124001879		
30		110003001619930019281711000	G110003001619930019281711000	4	110003000022	110003000024	110003000094	110003000171		
31		062805002256424019475801000	G062805002256424019475801000	4	062805004274	062805010686	062805010730	062805011559		
32		120039001557544004279251000	G120039001557544004279251000	3	120039000505	120039002291	120039003045			
33		120039001579891004170021000	G120039001579891004170021000	3	120039000394	120039000403	120039002987			
34		120039001571984004131401000	G120039001571984004131401000	3	120039000403	120039000462	120039000538			
35		120039001579958004126761000	G120039001579958004126761000	3	120039000374	120039000399	120039000538			
36		271896000102927023000021000	G271896000102927023000021000	3	271896000067	271896000072	271896000073			
37		063432001956718012931171000	G063432001956718012931171000	3	063432005460	063432005469	063432005567			

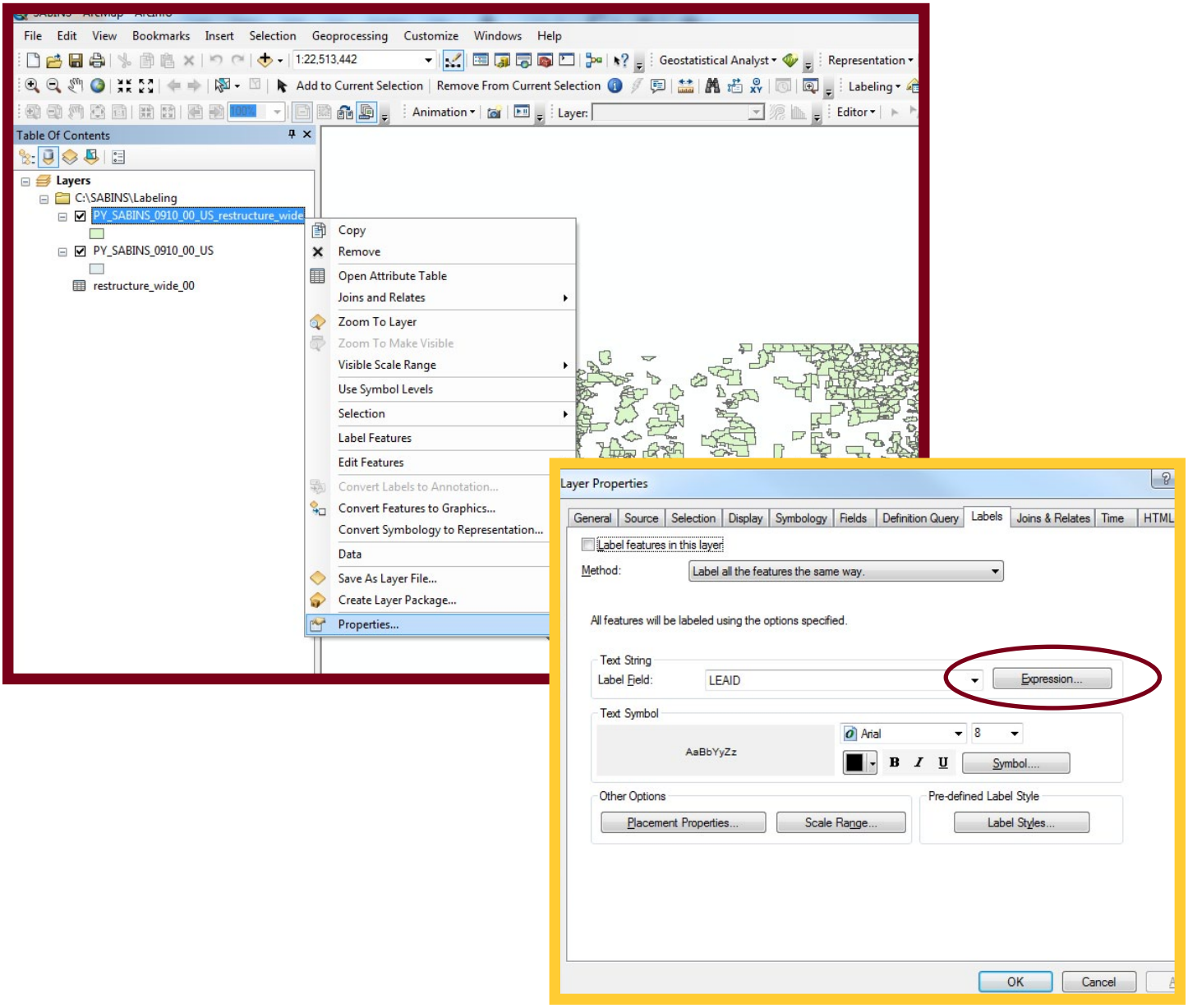
Labeling Features in ArcGIS

The final step takes place in ArcGIS, so you can close SPSS and open ArcMap. Add the files **restructure_wide_00.dbf** and **PY_SABINS_0910_00_US.shp** to a map document.

Then, using the join instructions described earlier, join **restructure_wide00.dbf** to **PY_SABINS_0910_00_US.shp** by the field named GISJOIN. While not required, you may export the joined shapefile following the instructions described earlier. In this example, the exported shapefile is called **PY_SABINS_0910_00_US_restructure_wide.shp**, and it is added to the map when prompted.

Prepare school labels by right clicking **PY_SABINS_0910_00_US_restructure_wide.shp** in the table of contents and selecting Properties…

In the Layer Properties box, go to the Labels tab, and select the Expression… button.



Labeling Features in ArcGIS

In the Label Expression dialogue box, you will use simple visual basic code (VB) to label the school attendance boundaries with multiple fields. The code below will label up to three school names, but you may adjust this number depending on how many names are associated with the schools in your shapefile. This code will write each label in a new line within its corresponding polygon.

In the space labeled Expression write the following:

[SCHNAM09_1] & VBNEWLINE & [SCHNAM09_2] & VBNEWLINE & [SCHNAM09_3]

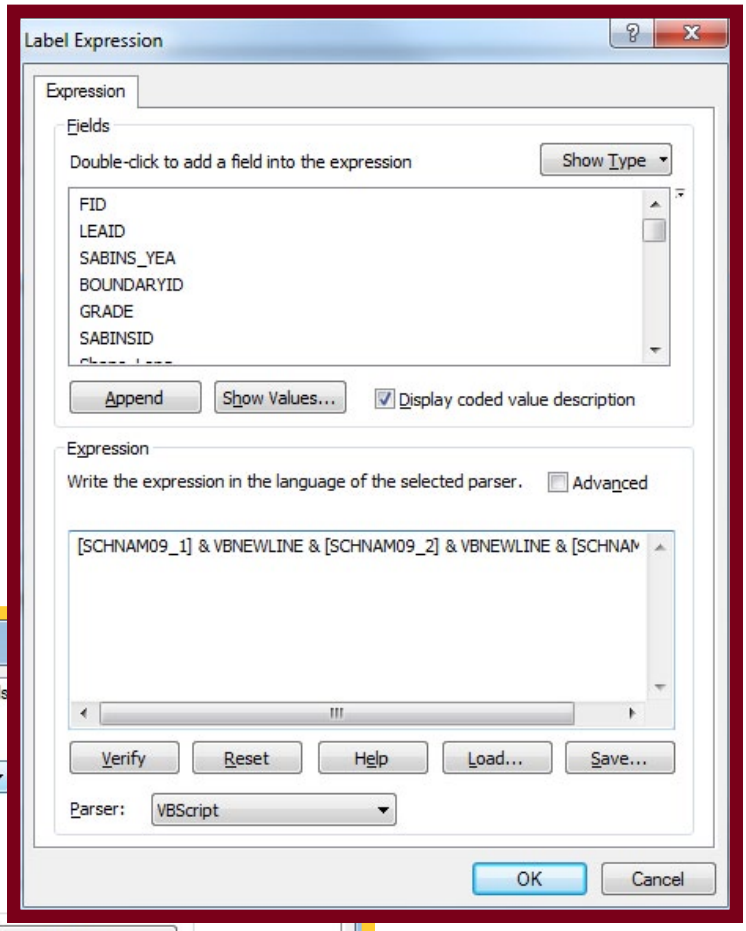
Press OK.

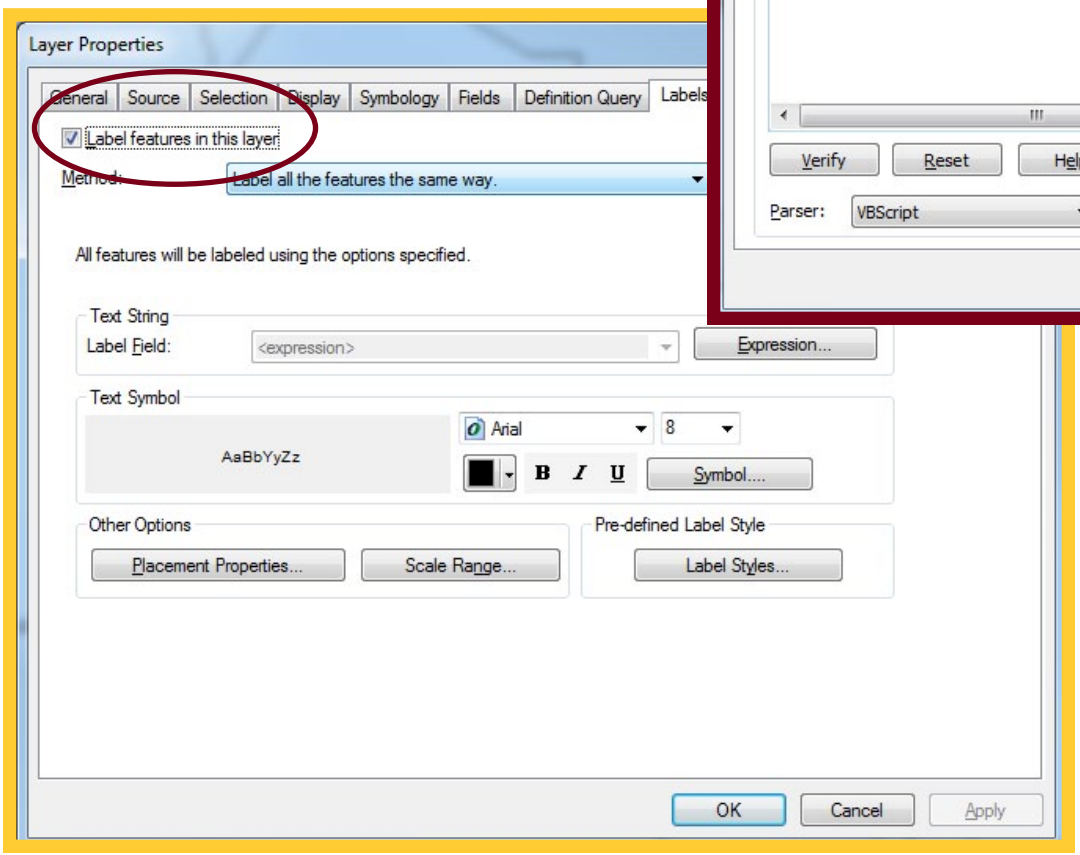
Check **on** the "Label features in this layer" option on the Labels tab.

Press OK.

You can find more information about VB code in a tutorial found at Esri.

http://www.esri.com/news/arcuser/1104/files/vbscript_label.pdf





Labeling Features in ArcGIS

Congratulations!

Your labeled polygons should look similar to those shown below.

Additional label formatting can easily be accomplished using the options available in the Labels tab of Layer Properties, including changes to font, size, color, italicizing, etc.