

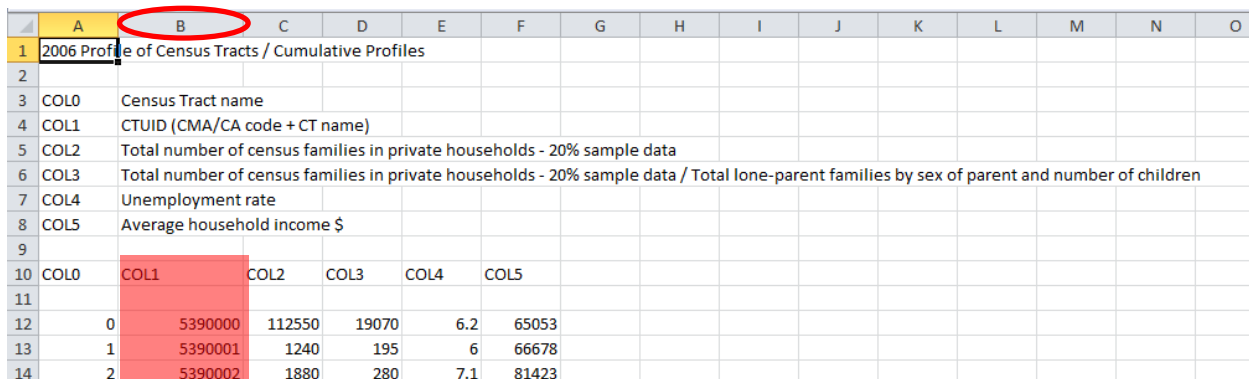
Mapping Tabular Data in ArcGIS

This tutorial will describe how to format an Excel table to bring into ArcGIS where it will be joined to a boundary file. The tabular data used in this workshop is census data extracted from CHASS and the boundary file was downloaded and extracted from Scholars GeoPortal. It is important to highlight that the geography (country, province/state, census division, census tract, etc.) for which the data was collected must match the geography of the boundary file exactly (they need to have a common field in which the data in each row (record) is unique). Therefore, if the data was collected based on census divisions in Canada, you cannot join it to a boundary file of Canadian census tracts. All the data needed to complete this workshop can be downloaded in Part A: Step 1 below. However, if you wish to work through this process with your own (tabular) data and require a boundary file, [Scholars GeoPortal](#) and [Statistics Canada](#) are good sources for Canadian census boundary files (provinces and territories, census divisions, census tracts, etc.).

Part A. Preparing the Excel File

This example includes income and earning statistics from the 2006 census and is based on Census Tracts in Canada.

1. Download and unzip sample data from http://www.brocku.ca/maplibrary/Instruction/Mapping_tabular_data.zip
2. Run Excel.
3. Open **census.csv** (change the file type to “Text Files” in the Open dialogue box to see the CSV format).
4. Identify the column holding the geography information and expand it to see all the information. (i.e. second column representing CTUID standing for **C**ensus **T**ract **U**nique **I**Dentifier).
5. The data type of this column must match the data type of the column from the boundary file in which it will be matched or “joined” to. Format this column by right-clicking the grey rectangle above the column (i.e. Column B) and selecting **Format Cells...**
6. From the **Number** tab, select **General** from *Category:* and click **OK**.



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	2006 Profile of Census Tracts / Cumulative Profiles														
2															
3	COL0	Census Tract name													
4	COL1	CTUID (CMA/CA code + CT name)													
5	COL2	Total number of census families in private households - 20% sample data													
6	COL3	Total number of census families in private households - 20% sample data / Total lone-parent families by sex of parent and number of children													
7	COL4	Unemployment rate													
8	COL5	Average household income \$													
9															
10	COL0	COL1	COL2	COL3	COL4	COL5									
11															
12	0	5390000	112550	19070	6.2	65053									
13	1	5390001	1240	195	6	66678									
14	2	5390002	1880	280	7.1	81423									

7. Using the descriptions for each “COL” (column), enter a truncated field name in the cells just above the data (i.e.. using row 11 in the above screenshot).

Field names must begin with a letter, contain only letters, numbers and underscore characters, and be limited to 64 characters long. DO NOT INCLUDE SPACES OR SPECIAL CHARACTERS.

10	COL0	COL1	COL2	COL3	COL4	COL5
11	Ctname	Ctuid	Total_census_families	Total_Lone_Parent_families	Unemployment_Rate	Avg_Household_Income
12	0	5390000	112550	19070	6.2	65053
13	1	5390001	1240	195	6	66678
14	2	5390002	1880	280	7.1	81423



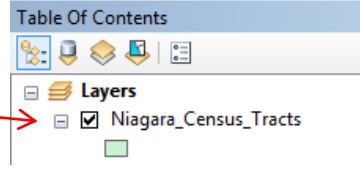

Identifying a range of cells to use in ArcGIS

8. Click the top-leftmost cell to be included in the range (in the above example, cell "B11").
9. Hit **F8** to begin the selection.
10. On the keyboard hold down **CTRL** and hit **END** to stretch the range to the lowest rightmost cell of data.
11. From the Excel ribbon, select **FORMULAS** and click **NAME MANAGER**. This tool allows us to assign a name to the selection of cells we are going to import to ArcGIS.
12. Click **NEW** and provide a descriptive name for the range of cells (i.e. Census_import). DO NOT INCLUDE SPACES OR SPECIAL CHARACTERS.
13. Click OK and close the Name Manager.
14. Select **File > Save as...** and save the file as an *Excel Workbook 97-2003* (i.e. census_data.xls). DO NOT INCLUDE SPACES OR SPECIAL CHARACTERS.
15. CLOSE EXCEL BEFORE CONTINUING.

In summary:

- 1) Include a row of field names that meet the following criteria:
 - a) Begins with a letter
 - b) Includes only letters, numbers and underscores (NO SPACES OR SPECIAL CHARACTERS)
 - c) 64 characters is maximum length
- 2) Identify a range of cells to be imported to ArcGIS
- 3) Save as Excel Workbook 2003 (.xls).
- 4) Close Excel before continuing.

Part B. Preparing the Boundary File

1. Run ArcMap (Start >All Programs > ArcGIS >ArcMap) and create a new BLANK document.
2. Click **Add Data**  button.
3. From the dialogue box, click the folder connection  button. Click COMPUTER and navigate to the DIRECTORY holding the boundary file data.
4. Click OK after selecting the folder. NOTE: THIS IS JUST A CONNECTION TO THE FOLDER! YOU WILL NOT SEE DATA FILES YET.
5. From the **Look in:** dropdown, select your folder connection.
6. Select **Niagara_Census_Tracts.shp** and click **Add**. The census tract map appears in the map window and also as a layer in the Table of Contents panel.  A screenshot of the 'Table of Contents' window in ArcMap. It shows a 'Layers' panel with a list of layers. The layer 'Niagara_Census_Tracts' is checked and highlighted in green. A red arrow points from the text in step 6 to this layer.
7. **Right-click** the **Niagara_Census_Tracts** layer and select **Open Attribute Table**.
8. Find the field representing the geography you will base your map on (**CTUID**). **Right-click** the field heading and select **Properties...**
9. The *Field Properties* window will display the name, alias and type of data. Take note of the **type**: "**String**" is a format that allows for both letters and numbers, however it is **NOT** compatible with number formats (including **General**). Therefore, the data will need to be transferred to a field that is of a compatible format. (*Note that if you are ever mapping based on text (ex. Country names) then string **IS** the format you will need.) **Close** the *Field Properties* window.
10. Click the **Table Options**  button at the top left corner of the *Attribute Table* and choose **Add Field...**
11. **Name** the new field appropriately but uniquely from the original column (i.e. **CTUID_2**). Remember not to include spaces, special characters and to begin with a letter.
12. Change the **Type** to **Double** as it allows for decimals and click **OK**.
13. **CTUID_2** will be added as a column at the very end (on the right).

14. Right-click the heading of the new **CTUID_2** column and select **Field Calculator...**
15. Click **Yes** on the warning about calculating outside of an edit session.
16. In the *Field Calculator* window, double-click the field heading containing the codes you will be using to join the data to the boundary file (i.e. *CTUID*). It will be added to the calculator window at the bottom. It should look something like this:

Click **OK**.

CTUID_2 =
[CTUID]

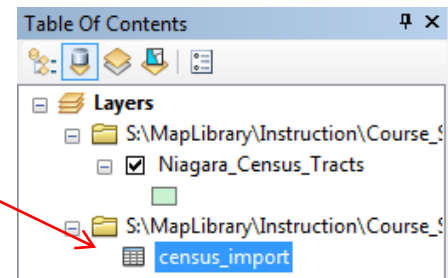
17. The newly created **CTUID_2** field should now be populated with the values of the CTUID field but formatted as double and ready to join to our census data.

CTUID_2
0
0
0
0
0

CTUID_2
5390203.02
5390011
5370086
5390018.02
5390102.02

Part C. Using an Excel file in ArcMap

1. Click **Add Data** and navigate to and double-click the Excel workbook created in Part A. Select the **Named Range** (“census_import”) and click **Add**.
2. Notice the table listed in the **Table of Contents**. Right-click the table listing and select **Open**.
3. Right-click the **Niagara_Census_Tracts** layer and select **Open Attribute Table**.
4. To view both tables at the same time, click table options and select **Arrange Tables > New Horizontal Tab Group**. Resize the table window to see both tables.



Notice the common fields with census tract identifiers.

census_import					
CTUID	Total_Census_Families	Lone_Parent_Families	Unemployment_Rate	Avg_Household_Income	
5390000	112550	19070	6.2	65053	
5390001	1240	195	6	66678	
5390002	1880	280	7.1	81423	
5390003.01	1255	385	7.5	45319	
5390003.02	2055	225	5.9	81577	
5390004.01	1210	185	5.5	90799	
5390004.02	1105	190	5.9	63559	

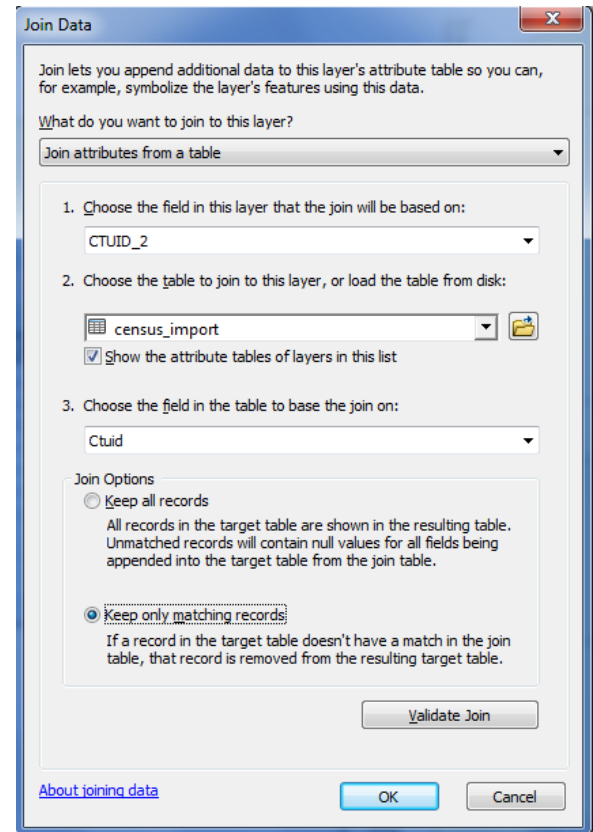
FID	Shape *	CTUID	CMAUID	PRUID	Shape_area	Shape_len	CTUID_2
0	Polygon	5370300.00	537	35	0.00509	0.355134	5370300
1	Polygon	5370301.00	537	35	0.001231	0.170171	5370301
2	Polygon	5370302.00	537	35	0.000408	0.116573	5370302
3	Polygon	5370303.01	537	35	0.000207	0.096302	5370303.01
4	Polygon	5370303.02	537	35	0.000702	0.132722	5370303.02
5	Polygon	5390001.00	539	35	0.000314	0.101105	5390001
6	Polygon	5390002.00	539	35	0.000932	0.157848	5390002

In order to map census profile data a “join” must be defined between the boundary file and the profile data table. The common **CTUID** field will be used to accomplish the join.

5. Right-click **Niagara_Census_Tracts** in the **Table of Contents** and select **Joins and Relates > Join**.
6. Fill in the dialogue box as follows:
 - a. Join attributes from a table
 - b. CTUID_2
 - c. Census_import
 - d. Ctuid
 - e. Keep only matching records
7. Click **OK** to apply the join.

Notice the new data fields added to the attribute table.

CTUID_2	Ctuid	Total_Census_Families	Lone_Parent_Families	Unemployment_Rate	Avg_Household_Income
5390001	5390001	1240	195	6	66678
5390002	5390002	1880	280	7.1	81423
5390003.01	5390003.01	1255	385	7.5	45319
5390003.02	5390003.02	2055	225	5.9	81577
5390004.01	5390004.01	1210	185	5.5	90799
5390004.02	5390004.02	1105	190	5.9	63559
5390005	5390005	635	160	7.5	39634



Part D. Mapping Census Data

1. From the **Niagara_Census_Tract** attribute table, right-click the field heading for **Avg_Household_Income** and select **Properties**.
2. Click the button beside **Numeric** and select ‘**currency**’. Click **OK** twice to return to the table. The field is now formatted as currency. **Close** the table window.
3. Double-click the **Niagara_Census_Tracts** layer to access **Layer properties**.
4. Click the **Symbology** tab.
5. Make the following selection
 - a. Show: Quantities > Graduated colors
 - b. Fields: Value > Avg_Household_Income
6. Click **OK**.

A thematic map is created showing household income by census tract.

