

Using 2006 Census Data and ArcMap 9.x

This guide covers how to:

- Step 1.** Download census data and boundary files.
- Step 2.** Import census and boundary files into ArcMap.
- Step 3.** Join data.
- Step 4.** Create a thematic map through two different methods.

Step 1. Downloading Census Data and Boundary Files

From our website (<http://www.library.utoronto.ca/maplib/>), type in **census of Canada** into the search box and click **GIS Data** below the search box.

Type: **“Census of Canada”** (not case sensitive).

“Census of
Canada”

Select
“GIS” Data”

The screenshot shows the University of Toronto Libraries website. At the top, there is a navigation bar with the following links: Home, Geographic Information Systems (GIS), Maps, Air Photos, GPS, Reference, and Contact Us. Below the navigation bar is a search box containing the text "census of canada" and a "GO" button. To the right of the search box is a "GIS Data" link. Below the search box are several sections: "Advanced Search", "Subject Search", "Geography Search", "Recent Data" (with an RSS icon), and "All Data". To the right of the search box is a section titled "About the GIS and Map Collections and Services in the Data, Map and GIS Centre". This section contains text describing the University of Toronto GIS and Map Collections and Services, and a link to the "National Map Collection microfilm 23139". Below this text is a small image of a map. To the right of the map is a section titled "National Map Collection microfilm 23139" with a link to "Click the image to enter the Digital Map Project". Below this link is a note: "(Plugins Required) Refresh screen to display a different image".

The results should look like this:

The screenshot shows the University of Toronto Libraries website. The header includes the logo and navigation links. The main content area is titled "GIS Data at the University of Toronto Map Library". It contains a search bar and a list of search results. The third result, "Census of Canada Aggregate Data - Profile Files 2006 (2006)", is circled in black. A blue arrow points to the right of this result, and an arrow from the text "Click here to download" points to this blue arrow. The left sidebar contains search options and information resources.

Under “Census of Canada Aggregate Data – Profile Files (2006)” click the blue arrow.

Scan over the **Conditions of Use Agreement** before clicking ‘I Agree.’

The screenshot shows the "Conditions of Use Agreement" page. The header is the same as the previous screenshot. The main content area contains a list of terms and conditions. The "I Agree" button at the bottom is circled in black. The left sidebar is the same as the previous screenshot.

You will then be brought to the following page:

Canadian Census Analyser @ CHASS
2006 Census Profile / 2006 Recensement Profils
 (updated 13-11-2008)

<p>Profile of Census - Canada, provinces, territories (cumulative)</p> <ul style="list-style-type: none"> • Age and Sex • Marital status, Common-law status, Families, Dwellings and households • Language, immigration, citizenship, mobility and migration • Aboriginals people • Labour market activity, industry, occupation, education, language of work, place of work and mode of transportation • Ethnic origin and visible minorities • Income and earnings and housing and shelter costs • Additional immigration and place of birth <p>Profile of Federal Electoral Districts (2003 Representation Order) (cumulative)</p> <ul style="list-style-type: none"> • Age and Sex • Marital status, Common-law status, Families, Dwellings and households • Language, immigration, citizenship, mobility and migration • Aboriginals people • Labour market activity, industry, occupation, education, language of work, place of work and mode of transportation • Ethnic origin and visible minorities • Income and earnings and housing and shelter costs • Additional immigration and place of birth <p>Profile of Census Tracts (cumulative)</p> <ul style="list-style-type: none"> • Age and Sex • Marital status, Common-law status, Families, Dwellings and households • Language, immigration, citizenship, mobility and migration • Aboriginals people • Labour market activity, industry, occupation, education, language of work, place of work and mode of transportation • Ethnic origin and visible minorities • Income and earnings and housing and shelter costs • Additional immigration and place of birth 	<p>Profil pour le Canada, les provinces et les territoires (cumulatif)</p> <ul style="list-style-type: none"> • Âge et sexe • État matrimonial, union libre, familles, logements et ménages • Langues, immigration, citoyenneté, mobilité et migration • Peuples autochtones • Activités sur le marché du travail, industrie, profession, scolarité, langue de travail, lieu de travail et mode de transport • Origine ethnique et minorités visibles • Revenu et gains et logement et coûts d'habitation • Supplémentaires immigration et lieu de naissance <p>Profil des circonscriptions électorales fédérales (Ordonnance de représentation de 2003) (cumulatif)</p> <ul style="list-style-type: none"> • Âge et sexe • État matrimonial, union libre, familles, logements et ménages • Langues, immigration, citoyenneté, mobilité et migration • Peuples autochtones • Activités sur le marché du travail, industrie, profession, scolarité, langue de travail, lieu de travail et mode de transport • Origine ethnique et minorités visibles • Revenu et gains et logement et coûts d'habitation • Supplémentaires immigration et lieu de naissance <p>Profil des secteurs de recensement (cumulatif)</p> <ul style="list-style-type: none"> • Âge et sexe • État matrimonial, union libre, familles, logements et ménages • Langues, immigration, citoyenneté, mobilité et migration • Peuples autochtones • Activités sur le marché du travail, industrie, profession, scolarité, langue de travail, lieu de travail et mode de transport • Origine ethnique et minorités visibles • Revenu et gains et logement et coûts d'habitation • Supplémentaires immigration et lieu de naissance
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Click here for age and sex profile data at a census tract level

Under **Profile of Census Tracts (cumulative)**, click on **Age and Sex**.

You will then be brought to a page like this:

2006 Census / Age and sex

Français PR Help ?

<p>Narrow CMA / tracted CA</p> <p>by Province:</p> <ul style="list-style-type: none"> Alberta British Columbia Manitoba New Brunswick Newfoundland and Labrador Northwest Territories Nova Scotia Nunavut Ontario Prince Edward Island Quebec Saskatchewan Yukon Territory <p>by Name Alphabetically:</p> <p style="font-size: x-small;">A B C D E F G H K L M N O P Q R S T V W</p> <p>Narrow Census Category</p> <p>by Profile:</p> <ul style="list-style-type: none"> * Age and sex * Marital status, common-law status, families, dwellings and households * Language, immigration, citizenship, mobility and migration * Aboriginals people * Labour market activity, industry, occupation, education, language of work, place of work and mode of transportation * Ethnic origin and visible minorities * Income and earnings and housing and shelter costs * Additional immigration and place of birth 	<p>All provinces</p> <p>Census metropolitan areas(CMA) / tracted census agglomerations(CA):</p> <div style="border: 1px solid gray; padding: 2px; font-size: x-small;"> <ul style="list-style-type: none"> Saint John [310] (N.B.) Saint-Jean-sur-Richelieu [459] (Que.) Sarnia [562] (Ont.) Saskatoon [725] (Sask.) Sault Ste. Marie [590] (Ont.) Sherbrooke [433] (Que.) St. Catharines - Niagara [539] (Ont.) St. John's [001] (N.L.) Thunder Bay [595] (Ont.) Toronto [355] (Ont.) Trois-Rivières [442] (Que.) Vancouver [333] (B.C.) Victoria [935] (B.C.) Windsor [559] (Ont.) Winnipeg [602] (Man.) </div> <p>Cumulative Profiles --> Age and sex</p> <p>Census Category:</p> <div style="border: 1px solid gray; padding: 2px; font-size: x-small;"> <ul style="list-style-type: none"> Population, 2001 - 100% data Population, 2006 - 100% data Population percentage change, 2001 to 2006 Land area in square kilometres, 2006 Total population by sex and age groups - 100% data Male, total 0 to 4 years 5 to 9 years 10 to 14 years 15 to 19 years 20 to 24 years 25 to 29 years 30 to 34 years 35 to 39 years 40 to 44 years 45 to 49 years 50 to 54 years 55 to 59 years 60 to 64 years 65 to 69 years </div>
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Select your 'CMA'

Select your variables here. Hold the Shift key and click to select multiple variables

In the top box, you can choose your Census Metropolitan Area (CMA). In this example, we are using Toronto.

Under **Census Category**, you can select the variables you need. Make sure you select **Land area in square kilometers, 2006**. Hold Ctrl. and select the other variables you wish to map out.

In the next section, "Include in the result", be sure to check **CTUID**. This will be used later in ArcMap. Select **dBASE** as the output format. This format works best when used with ArcMap. Hit **Submit Query**.

Select 'CTUID'

Include in the result:

- CTUID (CMA/CA code + CT name) CMA / tracted CA code CMA / tracted CA name
 Province code Province abbrev. Province name

CT names (the format of CT name is xxxx.yy):
(e.g: 1.01-4.00 7-9 59 302)

Select 'dBASE'

Data category to be listed as:

columns: rows:

Select the output format:

dBASE (maximum 255 columns allowed) ▼

Submit your request:

Submit Query

You should be given two links as shown below. The first link has the dbf file and the second link is for a text file containing column descriptions for the dbf file. **Save both files.**

2006 Profile of Census Tracts / Cumulative Profiles

Your request is being processed. Please wait until the url to download the file is displayed!

10 lines processed!
20 lines processed!
29 lines processed!
DONE!

dbf file (dBase binary format): http://dc1.chass.utoronto.ca/census/temp/1209142804_SDeLVT0E.dbf
the columns description of dbf file: http://dc1.chass.utoronto.ca/census/temp/1209142804_SDeLVT0E.txt

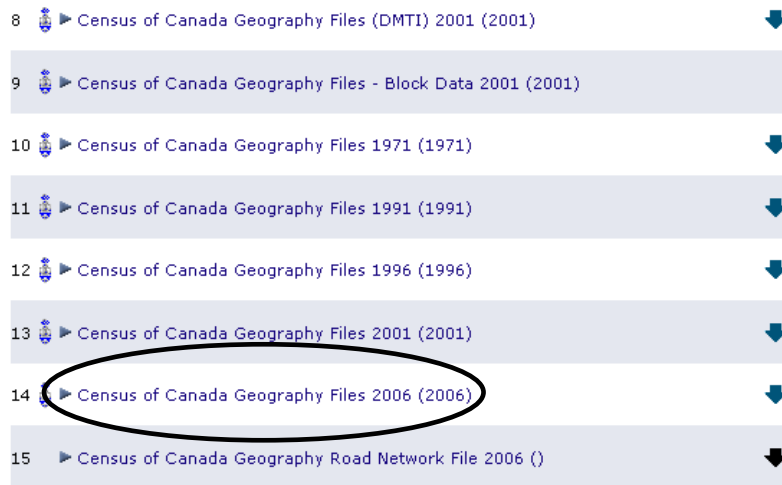
The two links...

(Note: the above image is an example, the lines processed will vary as will the time it takes to generate your file)

Refer to the "columns description of dbf file," to recall the meaning of your values. ex. "COL2", "Land area in square kilometres, 2006"

Now that your census data is saved, you will need to download the census geography files. You can download these files from our website (<http://www.library.utoronto.ca/maplib/>).

Type in “census of Canada” into the search box and click “GIS Data” below the search box. Click on “Census of Canada Geography Files 2006.”



Because you previously downloaded census data at the census tract level, you will need to download the census tract boundary file. To find the census tract files enter “census tract” in the box to filter your results (see below). Download **CANADA DIGITAL BOUNDARY FILE- Census Tract**.

The screenshot shows the University of Toronto Libraries GIS Centre search page. The search results are filtered for 'census tract'. The search filter box contains the text 'census tract'. The search results list several files, including 'CANADA DIGITAL BOUNDARY FILE - CENSUS TRACT (CT) - (gct_000a06a_e.zip - SHAPEFIL)'. An arrow points to the search filter box with the text 'Typing 'Census Tract' into the Filter refines your search.' Another arrow points to the 'CANADA DIGITAL BOUNDARY FILE - CENSUS TRACT (CT) - (gct_000a06a_e.zip - SHAPEFIL)' result with the text 'Select 'Canada Digital Boundary File'...'.

Note: The difference between Cartographic Boundary Files – generalized boundary files depicting geographical areas using only the major land mass of Canada and its coastal

islands – Digital Boundary depict the full extent of the geographical areas, including the coastal water area.

Step 2. Loading Census Data and Boundary Files into ArcMap

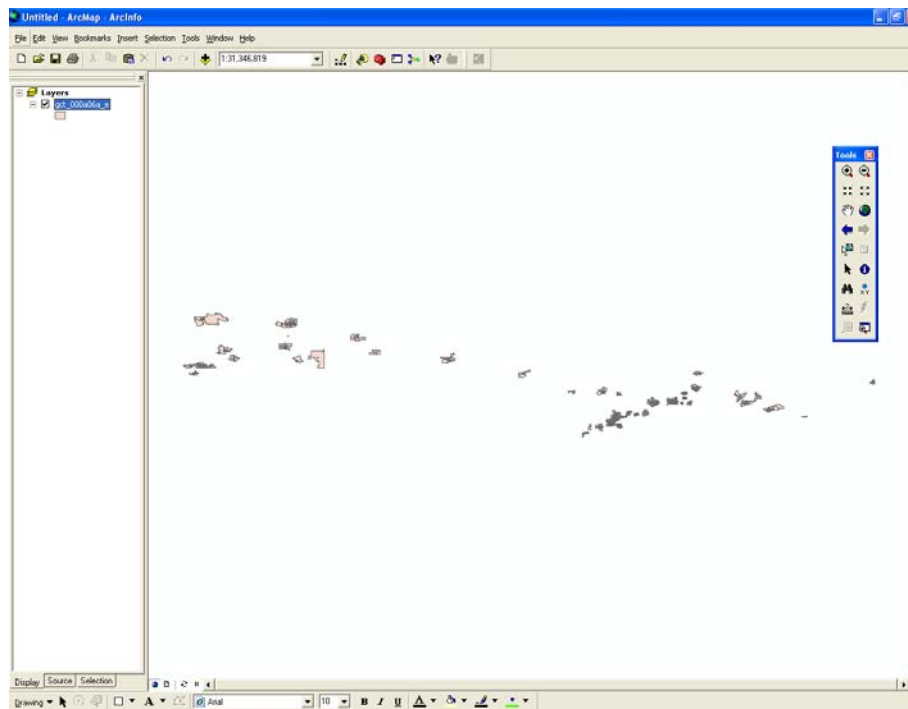
Unzip the Canada Digital Boundary File before opening it in ArcMap.

Open ArcMap. Click on the **Add Data** button to add the Toronto census dbf file and the Canada Digital Boundary file.

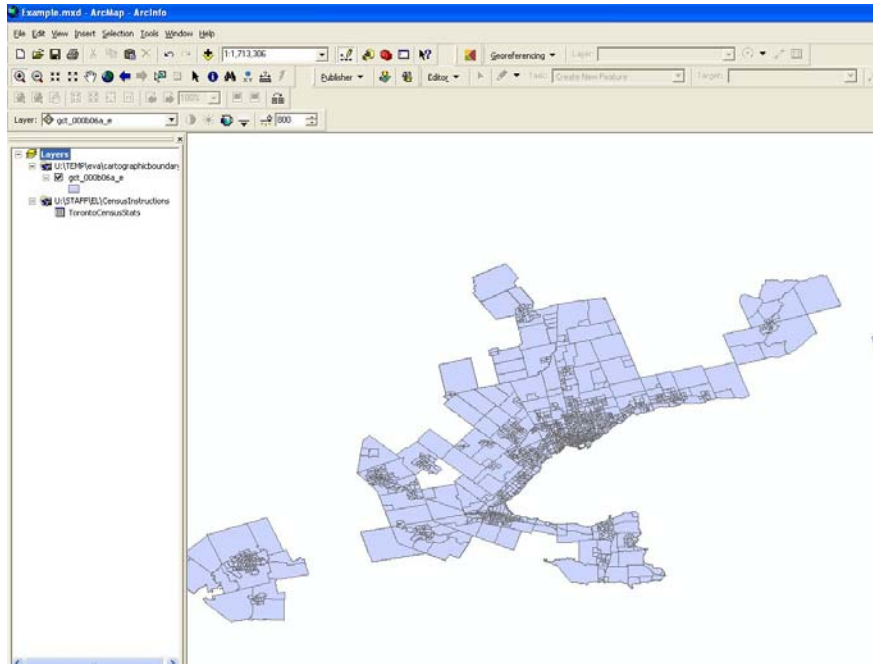
The 'Add Data' icon...



After bringing these two files in, you should have something that looks like this:



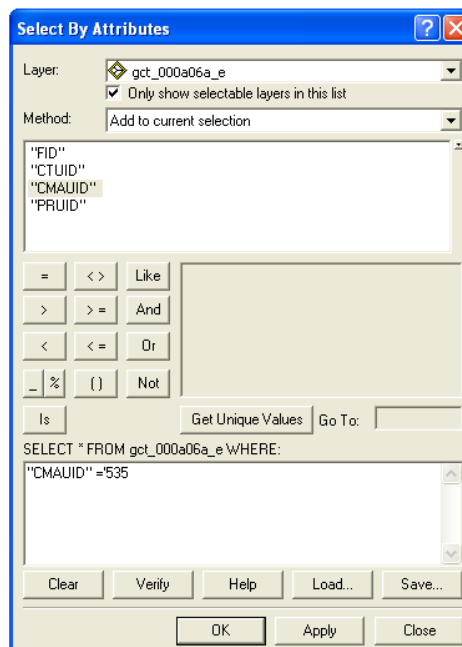
Zooming into the Golden Horseshoe Region brings us this:



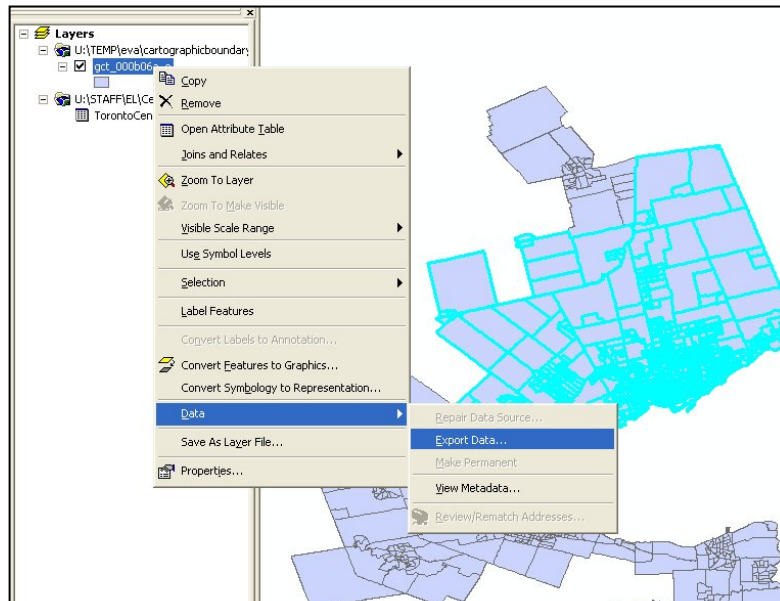
Extracting the Toronto CMA boundary files

We will now extract the polygons that belong to the Toronto CMA so that it is easier for us to view and manage the data.

Under the Selection menu, click on **Select by Attributes**. Click on **CMAUID** and type **'535'** after CMAUID in the query box (see figure below). Since the Toronto CMA code is '535', we are creating a query that selects all polygons with a CMAUID equal to '535'.

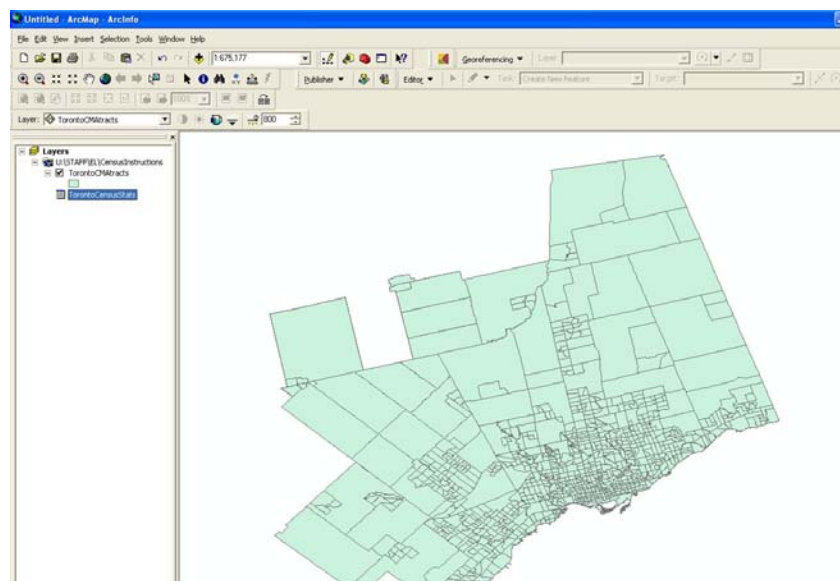


Now that all of the Toronto CMA polygons have been selected by our query. We will now export this selection and save it as a new file. To do this, right click on the boundary file and click **Data** and **Export Data**.



Ensure you are exporting the selected data (this should be the default setting). Save the exported data and load it up in ArcMap and you can remove the old boundary file by right-clicking it and selecting **Remove**.

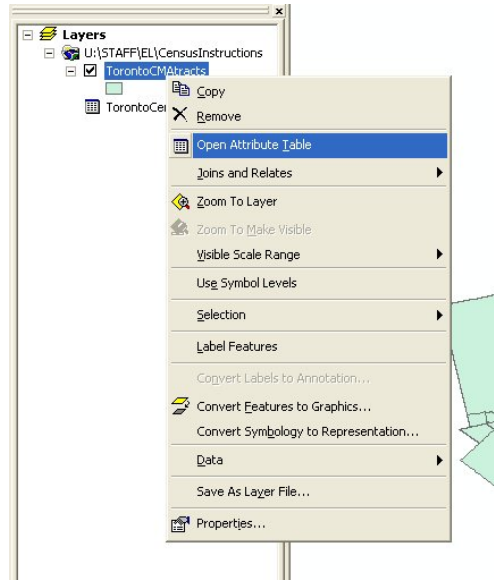
Your boundary file should now look similar to this:



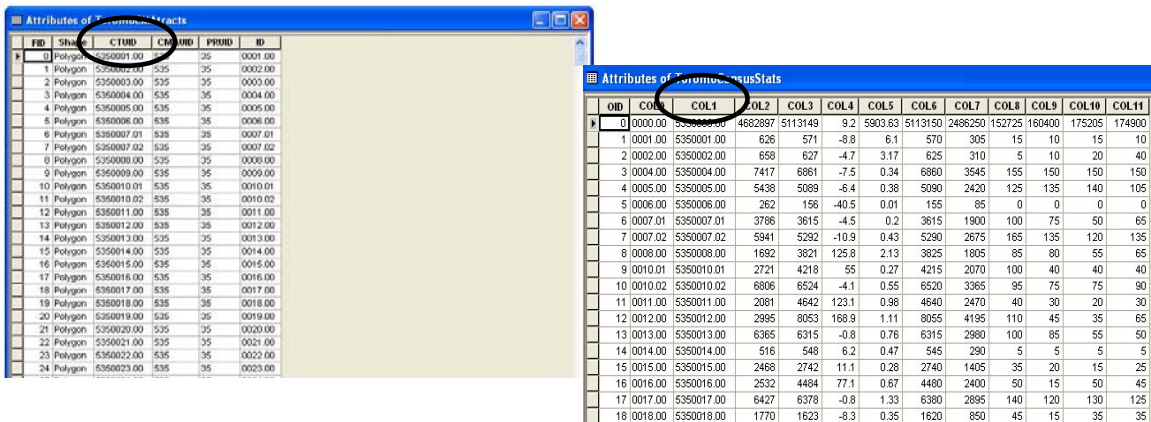
Step 3. Joining the data

At this point, the census tract boundary file is separate from our census data. We need to join these two tables but in order to join them, a common field containing the same values must be identified.

To identify a common field for joining the two tables, open the attribute table for both the boundary file and the census data table by right clicking on each file and selecting **Open Attribute Table**.

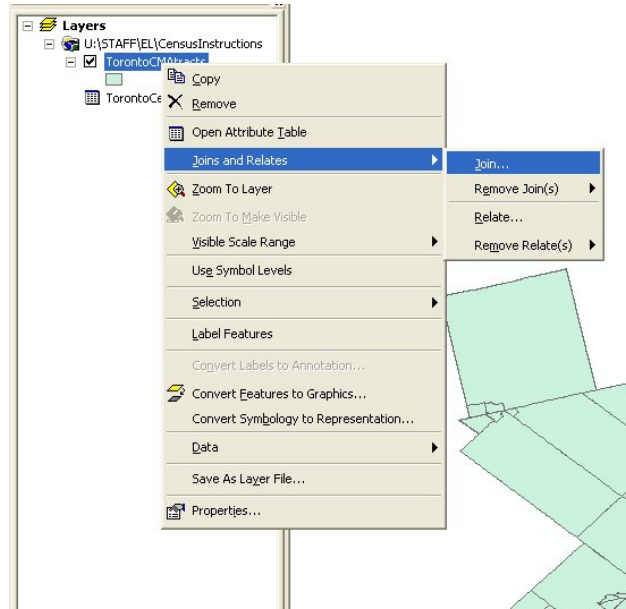


You will notice that **CTUID** from the boundary file is common to **COL1** in the census table. We will use these two fields highlighted below for our join.

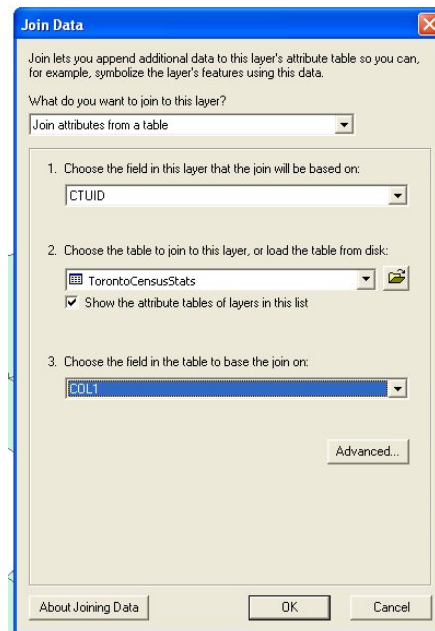


To join the census data to the boundary file, right click on the boundary file and click on **Join and Relates**. Select **Join**.

Note: Do not join starting with the dbf file to the boundary file.



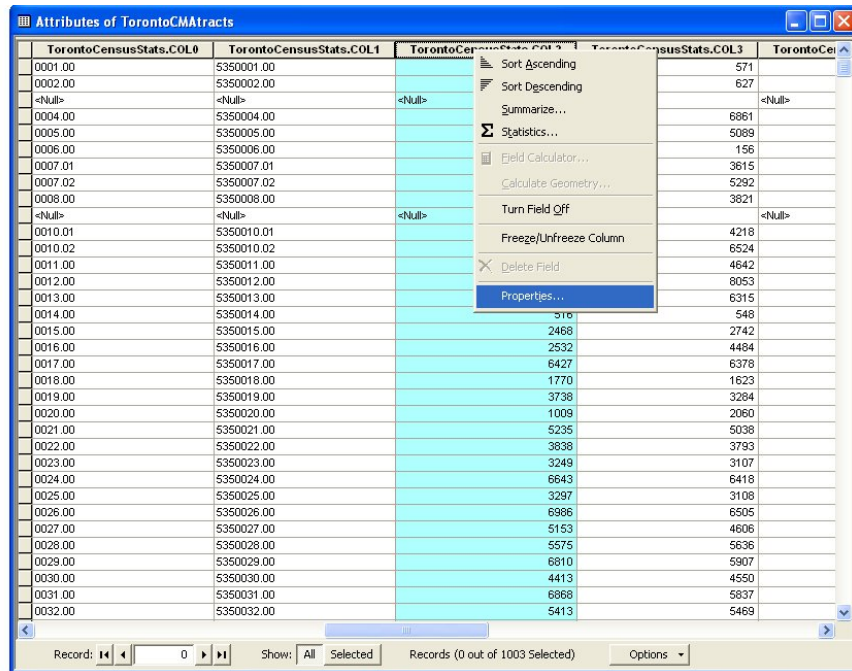
In the Join window, choose the fields that the join will be based on. In this example, we use **CTUID** for as the field to base the join on and the **census table** to join. We are basing this join on **COL1** from the census table. Click OK.



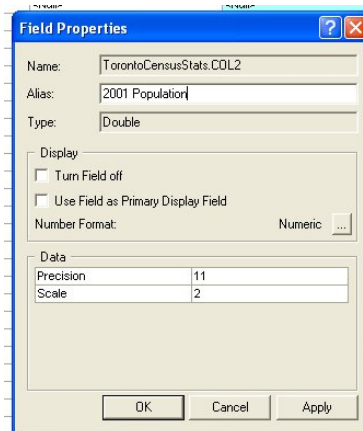
After joining the two tables, some rows may have null values. It is possible that no census data are available for certain tracts because they are suppressed. For example, if a tract is very small in area, data may be suppressed to protect the privacy of its residents. A link to the list of all the suppressed tracts can be found on the Data Library webpage (<http://www.chass.utoronto.ca/datalib/cc06/cc06.htm>).

Changing the column headings

The census table was downloaded with very generic column names like COL1. Although we cannot change the name of the columns of the dbf file, we can add aliases to each column to make it easier to work with the data. Open the attribute table, and right-click on the column that you want to add an alias. Click **Properties**.



Under **Alias**, type in the appropriate name. Remember to refer back to the text file that you saved when you downloaded the census table.

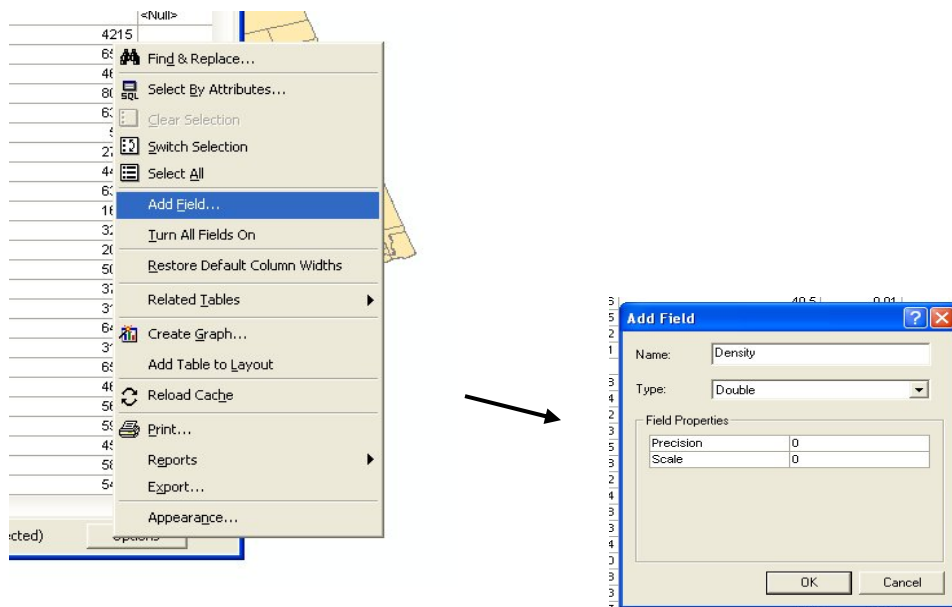


Step 4. Making a Thematic Map

This final section will show you how to create a thematic map displaying population density for the Toronto CMA. There are two ways to do this. If you need a thematic map and the density values in tabular form, follow **Method 1**. If you simply need a thematic map without the density values, follow **Method 2**.

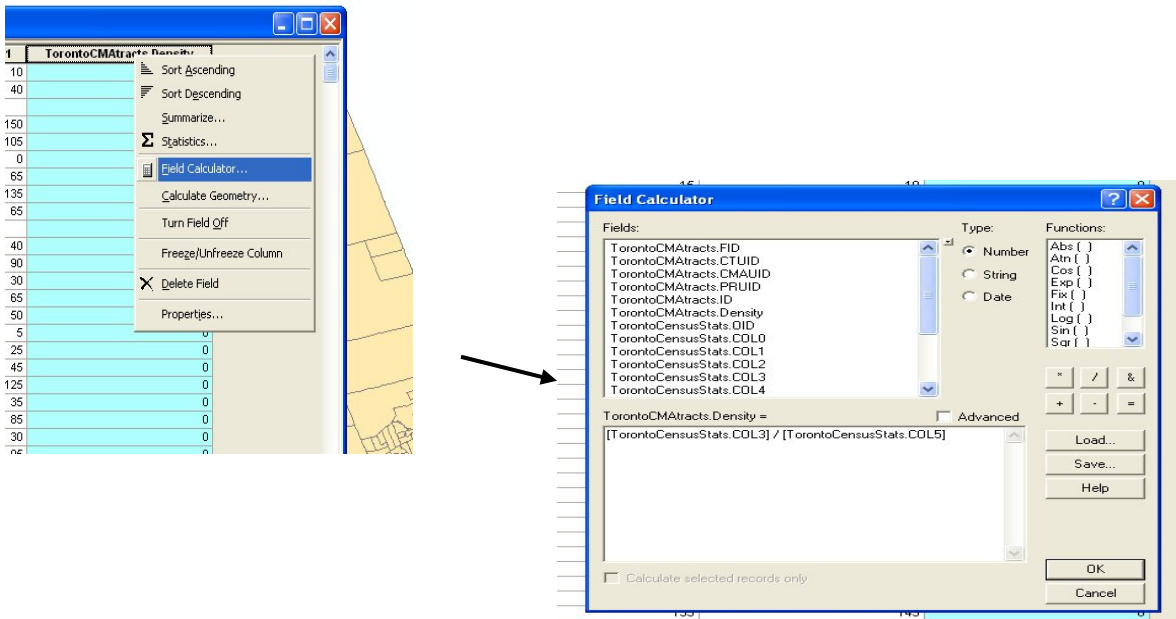
Method 1

Before we can calculate population density, we will need to create a new field in the attribute table of the boundary file. To do this, we need to open the attribute table first. In the bottom right-hand corner, hit **Options**, select **Add Field**. In the name, type **Density** and choose **Double** as the number type. Click OK.



Your new field should now appear in the attribute table. We will now calculate the density values. Highlight the density column and right-click on it.

Select **Field Calculator**. In the field calculator, enter the equation for density (population divided by land area).

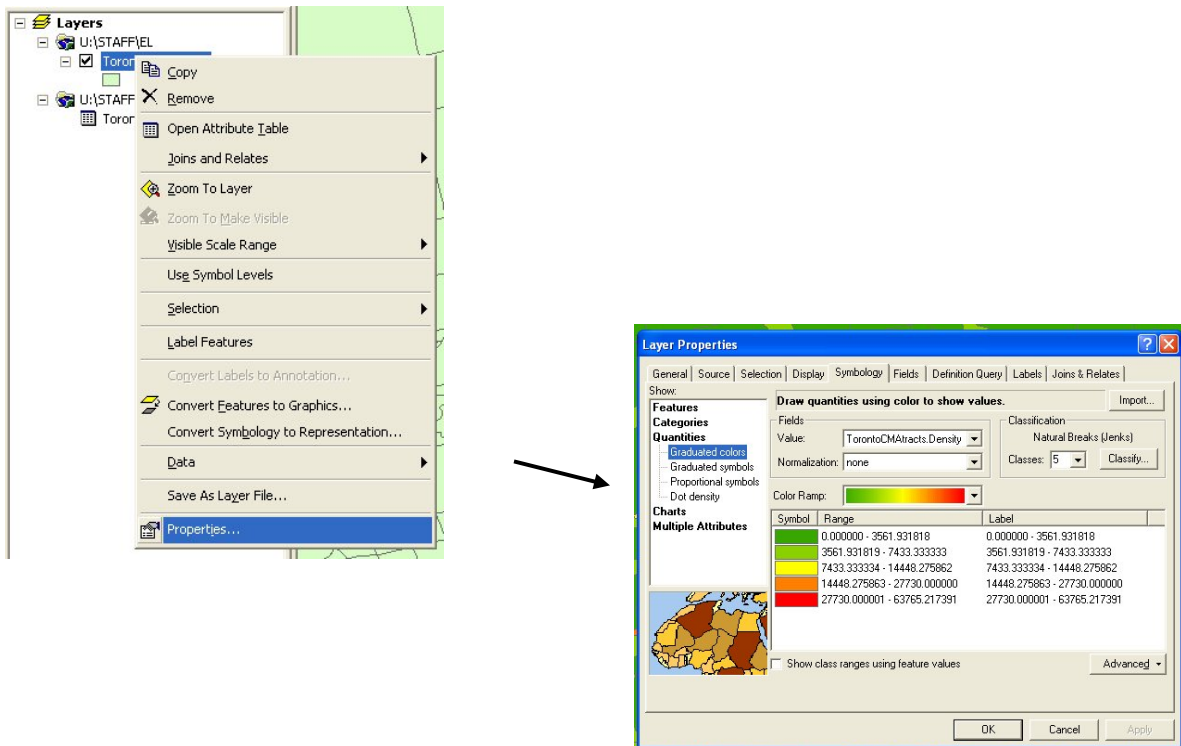


Your calculated values should now appear in the attribute table.

The screenshot shows the 'Attributes of TorontoCMAtracts' table with the following columns: TorontoCensusStats.COL10, TorontoCensusStats.COL11, and TorontoCMAtracts.Density. The table contains 1003 records, with the following data points visible:

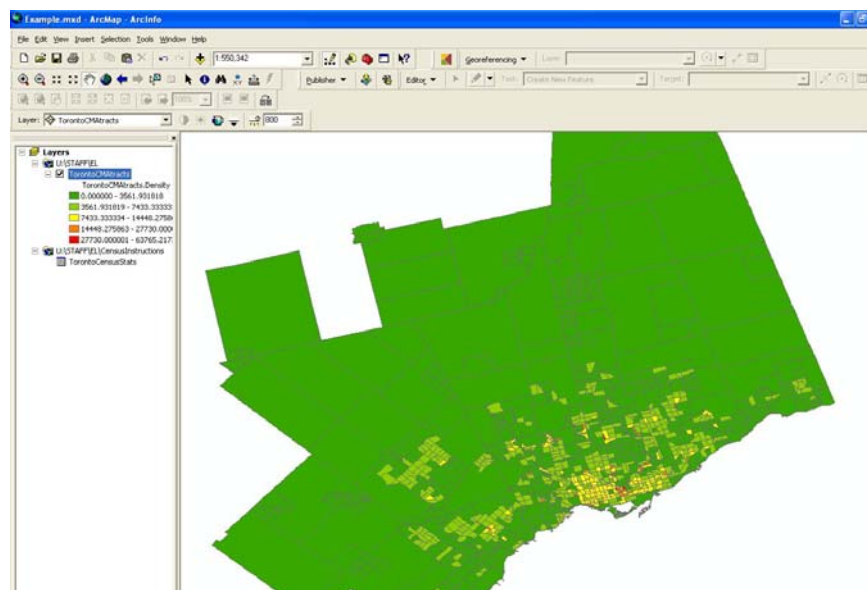
TorontoCensusStats.COL10	TorontoCensusStats.COL11	TorontoCMAtracts.Density
15	10	93.608557
20	40	197.791798
<Null>	<Null>	0
150	150	20179.411765
140	105	1392.105263
0	0	15600
50	65	18075
120	135	12306.976744
55	65	1793.896714
<Null>	<Null>	0
40	40	15622.222222
75	90	11861.818182
20	30	4736.734694
35	65	7254.954955
55	50	8309.210526
5	5	1165.957447
15	25	9792.857143
50	45	6692.537313
130	125	4795.468722
35	95	4637.142857
100	85	13136
45	30	2746.686667
100	95	5725
135	120	6896.363636
95	110	4569.117647
185	150	9039.43662
80	60	5864.150943
175	190	8339.74359
135	145	9400
135	145	8411.940299
155	170	8686.764706
250	225	11973.684211
280	235	22450
70	100	13021.428571

To display a thematic map based on population density, right click on the boundary file and go to **Properties**. Click on the **Symbology** tab.



Click **Quantities**, and then click **Graduated colors**. Under **Fields**, choose the density field. The program automatically breaks up the population densities into 5 different groups and the intervals by clicking on **Classify** and by double-clicking on the range. Click OK.

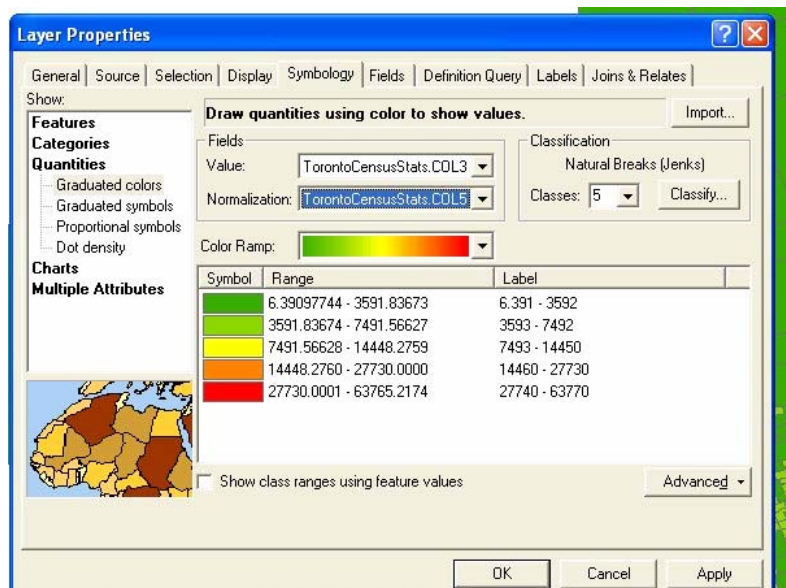
Your map should now look like this:



Method 2:

In this method, population density does not need to be calculated as a separate field in the attribute table. The Normalization function in ArcMap can compute population density automatically. However, data is not displayed in tabular form. Therefore, if you need the values in addition to the thematic map, use **Method 1**.

Right click on the boundary file and click Properties. In the **Symbology** tab, click **Quantities**, then click **Graduated colors**. Under **Fields**, choose the population field and then choose the land area field as the Normalization field. Click OK.



You have now created a thematic map using census data. If you have any questions or comments, please contact us at gis.maps@utoronto.ca.

U:\staff\docs\ArcMapCensus2006.doc

<http://www.library.utoronto.ca/maplib/docs/ArcMapCensus2006.pdf>