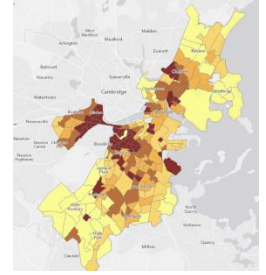


Downloading Census Data from American Factfinder for use in ArcGIS



Written by Barbara Parmenter, revised by Carolyn Talmadge on September 15, 2014

OBTAINING DATA FROM AMERICAN FACTFINDER (AFF)	1
PREPARING AMERICAN FACTFINDER DATA FOR USE IN ARCMAP	5
OBTAINING GIS FILES FOR CENSUS GEOGRAPHY	8
JOINING THE AFF TABLE TO YOUR CENSUS TRACT POLYGONS IN ARCMAP	10
SETTING A PROJECTED COORDINATE SYSTEM FOR YOUR MAP	15

In this tutorial, we will be obtaining information about housing tenure at the **Census Tract** level from the **2010 Census** for a single county using American Factfinder. You can then use a similar process to download any other Census 2010, American Community Survey, or Census 2000 data for other geography levels and/or for whole states or multiple counties. You have many, many options in American Factfinder – this shows one possible path.

Obtaining Data from American FactFinder (AFF)

1. Data management is critical when dealing with the multiple tables of the Census. Before beginning this tutorial:
 - a. Create a **Census 2010** folder in your personal workspace
 - b. Create two subfolders: **AFF Data** and **Census Geography**
2. Go to the US Census web site – <http://census.gov>
3. Click on the *Data* tab – *Data Tools and Apps* – and select **American FactFinder**



4. Click on **Advanced Search** and select **Show Me All**.
5. Click on **Topics** in the left column and expand **Dataset**.

Search - Use the options on the left (topics, geographies, ...) to narrow your search

Your Selections

Search using...

Dataset:
2010 SF1 100% Data

1 clear all selections and start a new search

Search using the options below:

Topics
(age, income, year, dataset, ...)

Geographies
(states, counties, places, ...)

Race and Ethnic Groups
(race, ancestry, tribe)

Industry Codes
(NAICS industry, ...)

EEO Occupation Codes
(executives, analysts, ...)

Recommendations (4)

New information on same-sex couples from the 2010 Census will include the number of married couples and a set of preferred estimates of same-sex spouses and unmarried partners at the national level. These estimates were developed to account for data gaps in the 2010 Census.

Select Topics

Select Topics to add to "Your Selections"

- People
- Housing
- Product Type
- Document Type
- Dataset** 2

2013 Population Estimates (50)
2013 Annual Survey of Public Pensions (1)
2013 Annual Survey of State Government Tax Collections (2)
2012 ACS 5-year estimates (2,269)
2012 ACS 3-year estimates (2,753)
2012 ACS 1-year estimates (2,840)
2012 Business Patterns (14)
2012 Commodity Flow Survey (12)
2012 Economic Census (72)
2012 Economic Census of Island Areas (24)
2012 Nonemployer Statistics (6)
2012 Population Estimates (26)
2012 Annual Survey of Public Pensions (7)
2012 Annual Survey of State Government Tax Collections (2)

Note: The Race & Ethnicity topic is available under the Race and Ethnic Groups button on the left.

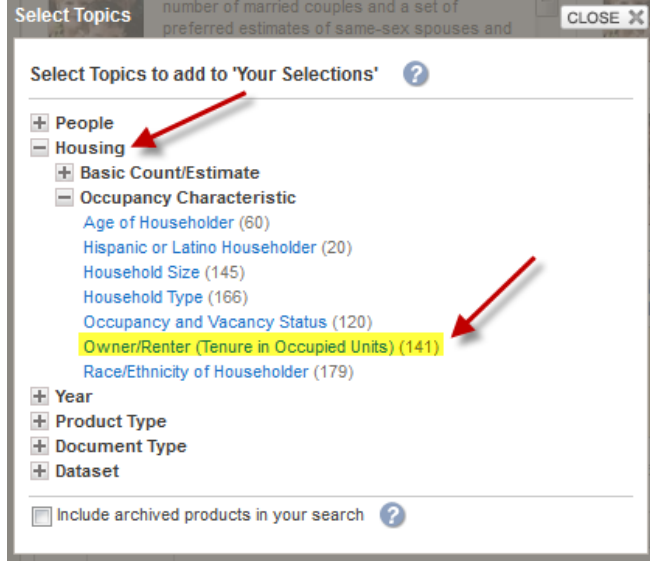
☐ Include archived products in your search

6. Scroll down to click on **2010 SF1 100% Data** – this will send this criteria to your Selection box in the upper left of the site:

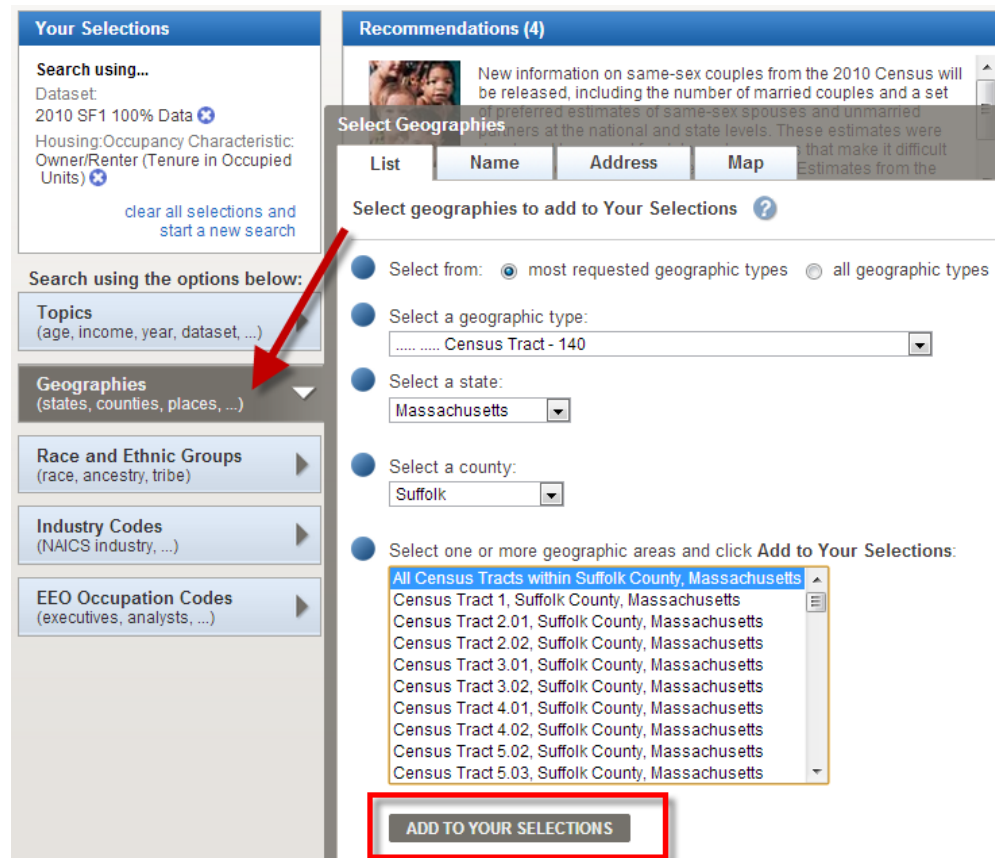
Dataset

- 2012 Population Estimates (3)
- 2011 ACS 5-year estimates (2,145)
- 2011 ACS 3-year estimates (2,748)
- 2011 ACS 1-year estimates (2,841)
- 2011 American Housing Survey (56)
- 2011 Annual Survey of Manufactures (8)
- 2011 Population Estimates (19)
- 2010 ACS 5-year Selected Population Tables (680)
- 2010 ACS 5-year American Indian and Alaska Native Tables (275)
- 2010 ACS 5-year estimates (2,305)
- 2010 ACS 3-year estimates (2,966)
- 2010 ACS 1-year estimates (3,073)
- EEO Tabulation 2006-2010 (5-year ACS data) (113)
- 2010 SF1 100% Data (771)**
- 2010 SF2 100% Data (274)
- 2010 Redistricting Data SF (PL 94-171) (29)
- 2010 Demographic Profile SF (11)
- 2010 National Redistricting Data SF (27)

7. Scroll up in the **Topics** list and click on **Housing** – then under *Occupancy Characteristic*, click on **Owner/Renter (Tenure in Occupied Units)**.



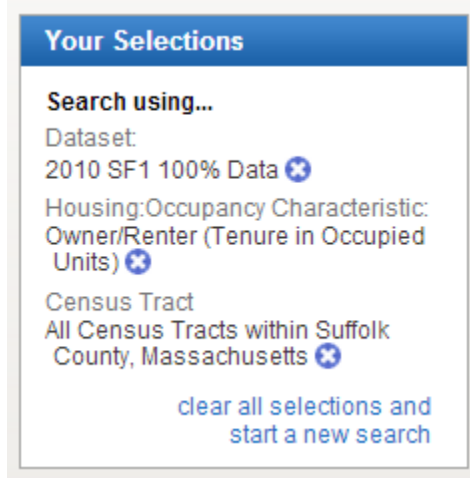
8. Close the **Topics** box (see above graphic).
9. Click on **Geographies** on the left column – this brings up *the Select Geographies overlay*.
10. Fill out the box so that you are selecting all Census Tracts for a specific state and a county in that state – below we are selecting all census tracts in Suffolk County, Massachusetts.




11. Be sure to click on ADD TO YOUR SELECTIONS.
12. **Close** the *Select Geographies* overlay.




13. Be sure that the **Your Selections** box in the upper left corner contains what you want – the data set, the general topic, and the census geography level for the specific location you want (all tracts, not just one tract). If it does not say this, clear your selections and start over from Step 3 above.



14. Checkmark a table of interest – to see what variables a table contains, click on the *Information* icon  for that table.

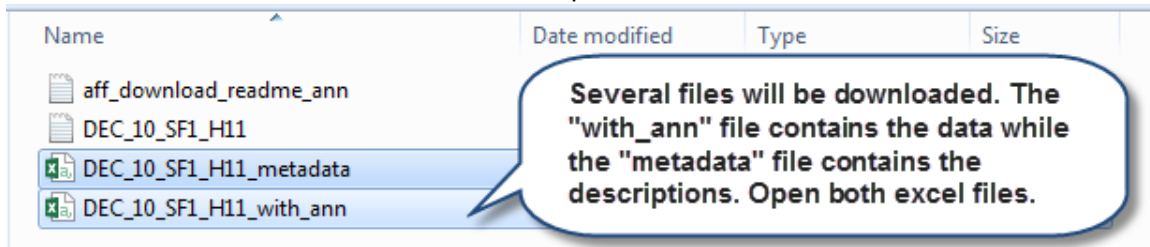
For this exercise, we highly recommend a table with just a few variables, for example, **H11. TOTAL POPULATION IN OCCUPIED HOUSING UNITS BY TENURE** – this will show you how many people live in rented units, units owned through a mortgage, and units owned free and clear or without payment. This is an easy table to process in Excel.

<input type="checkbox"/>	H1	HOUSING UNITS
<input type="checkbox"/>	H10	TOTAL POPULATION IN OCCUPIED HOUSING UNITS
<input checked="" type="checkbox"/>	H11	TOTAL POPULATION IN OCCUPIED HOUSING UNITS BY TENURE
<input type="checkbox"/>	H11A	TOTAL POPULATION IN OCCUPIED HOUSING UNITS BY TENURE (WHITE A
<input type="checkbox"/>	H11B	TOTAL POPULATION IN OCCUPIED HOUSING UNITS BY TENURE (BLACK

15. Click on **Download** ( **Download**) and follow the instructions (your file will be built, and then you will click on another *Download* option).
16. The file is in compressed format – save it to your *Census 2010/AFF Data* folder. Navigate to your AFF folder. Right click on the zipped drive and select *extract here* or open with Power Archiver and extract to AFF folder.

Preparing American Factfinder Data for Use in ArcMap

Double-click on both downloaded **CSV** files to open them:



Note: If you are opening the file from within Excel, you will need to set the option to look for *all* file types:

The “DEC_10...with_ann” file should look something like this – this file contains the data but the headings don’t make sense without also looking at the metadata file.

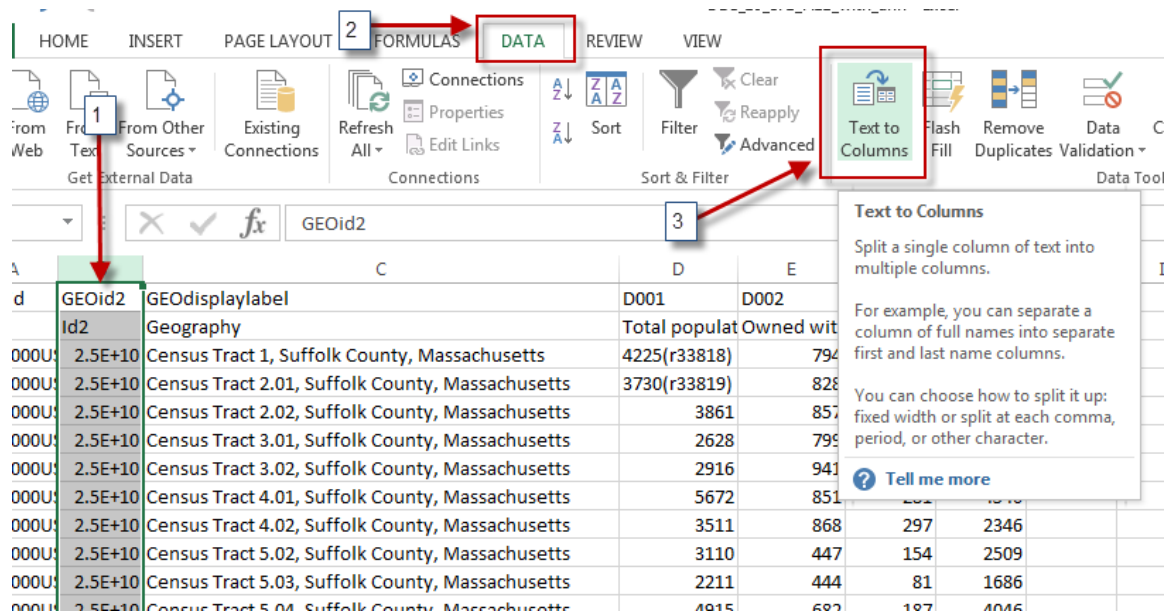
	A	B	C	D	E	F	G	H
1	GEO.id	GEO.id2	GEO.displ	D001	D002	D003	D004	
2	1400000US250	2.5E+10	Census Tr	4225	794	231	3200	
3	1400000US250	2.5E+10	Census Tr	3730	828	262	2640	
4	1400000US250	2.5E+10	Census Tr	3861	857	349	2655	
5	1400000US250	2.5E+10	Census Tr	2628	799	270	1559	
6	1400000US250	2.5E+10	Census Tr	2916	941	413	1562	
7	1400000US250	2.5E+10	Census Tr	5672	851	281	4540	
8	1400000US250	2.5E+10	Census Tr	3511	868	297	2346	
9	1400000US250	2.5E+10	Census Tr	3110	447	154	2509	
10	1400000US250	2.5E+10	Census Tr	2211	444	81	1686	
11	1400000US250	2.5E+10	Census Tr	4915	682	187	4046	

Now look at the “DEC_10..._metadata” file. This file explains the column header codes in the data file - it should look something like what you see below. This is a very important file!!! Typically the first data column (D001 here) is the **Universe** of things counted in this table. This table is counting people in occupied housing units. In the case of this table if you wanted to show the % of the population that is in rented housing units, you would divide D004 by D001 and multiply by 100. This process is called “normalizing”.

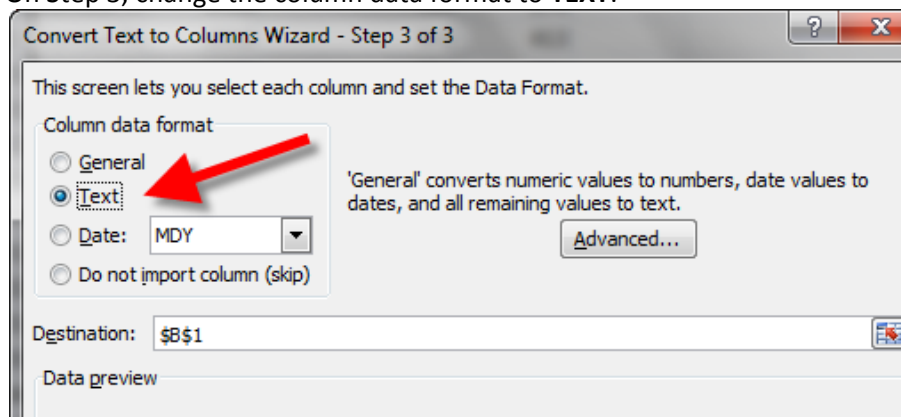
	A	B	C	D	E
1	GEO.id	Id			
2	GEO.id2	Id2			
3	GEO.displ	Geography			
4	D001	Total population in occupied housing units:			
5	D002	Owned with a mortgage or a loan			
6	D003	Owned free and clear			
7	D004	Renter occupied			

A few important steps left.

1. ArcGIS does not like extra characters in the column names. Delete all periods (.) and extra characters (-) in all the column names.
2. The Geo ID in the *Census Tracts polygon attribute table* to which you will be joining this data table is in a text format. **GEOID2** in this file must also be *text* for the join to work properly.
 - a. Click on the tab (B) above **GEOID2** to highlight the entire column.
 - b. Click on the Excel Tab for **Data**, then click on **Text to Columns**:



- c. Click **Next** to leave the first setting at Delimited.
- d. Click **Next** to leave the second setting at Tab.
- e. On Step 3, change the column data format to **TEXT**:



- Census.gov now includes the description of the column under the column heading in the excel sheet (e.g. Under D001 it says Total Population). However, ArcMap does not like this extra row and the text causes the software to read it as a “string” (e.g. text) instead of “double” (e.g. numbers). Therefore, it is necessary to delete this row so that ArcMap realizes that this is a number field and not a text field.

	C	D	E	F	G	H	I
		D001	D002	D003	D004		
2	Id2	Geography	Total populat	Owned with	Owned fr	Renter occupied	
	0	Census Tract 1, Suffolk County, Massachusetts	4225	794	231	3200	
	0	Census Tract 2.01, Suffolk County, Massachusetts	3730	828	262	2640	
	0	Census Tract 2.02, Suffolk County, Massachusetts	3861	857	349	2655	
	0	Census Tract 3.01, Suffolk County, Massachusetts	2628	799	270	1559	
	0	Census Tract 3.02, Suffolk County, Massachusetts	2916	941	413	1562	
	0	Census Tract 4.01, Suffolk County, Massachusetts	5672	851	281	4540	
	0	Census Tract 4.02, Suffolk County, Massachusetts	3511	868	297	2346	
	0	Census Tract 5.02, Suffolk County, Massachusetts	3110	447	154	2509	
	0	Census Tract 5.03, Suffolk County, Massachusetts	2211	444	81	1686	
	0	Census Tract 5.04, Suffolk County, Massachusetts	4915	682	187	4046	

Optional Tip – Although you need to delete the 2nd row of text, you can change the column headings to the descriptions if it makes it easier (e.g. Change D001 to Tot_Pop). However, there can be no spaces or periods and the heading needs to be under 9 characters. For excel sheets containing several fields, it’s probably easier to refer to the codes later rather than changing all the column headings.

- To make things easier later, rename the worksheet to something comprehensible, e.g., *Housing_Tenure* - the worksheet name will be the identifier in ArcCatalog.

26	1400000U:25025010405
27	1400000U:25025010408
28	1400000U:25025010500

Housing_tenure

- Very important step – **save your modified CSV file as an Excel Workbook (.xlsx)** – give it a comprehensible name, e.g., *2010 Census H11_population by housing tenure.xlsx*
- Note: your table may have columns, like D001, where the data has text values in it. This will cause this information to not be mappable in ArcMap. Follow the directions below if this is the case:
 - Delete any information in parentheses

	A	B	C	D	E
1	GEOid	GEOid2	GEOdisplaylabel	D001	D002
2	Id	Id2	Geography	Total populat	Owned with
3	1400000U:25025000		Census Tract 1, Suffolk County, Massachusetts	4225(r33818)	794
4	1400000U:25025000		Census Tract 2.01, Suffolk County, Massachusetts	3730(r33819)	828
5	1400000U:25025000		Census Tract 2.02, Suffolk County, Massachusetts	3861	857
6	1400000U:25025000		Census Tract 3.01, Suffolk County, Massachusetts	2628	799

- b. So your table should now look like this:

D	E	F	G	H
D001	D002	D003	D004	
Total populat	Owned with	Owned fre	Renter occupied	
4225	794	231	3200	
3730	828	262	2640	
3861	857	349	2655	
2628	799	270	1559	
2916	941	413	1562	

Final STEP: Save your file and EXIT out of Excel – you CANNOT have Excel open still when you work with this data in ArcGIS!

7. **Extra step for Alaska, Alabama, Arkansas, Arizona, California, Colorado, and Connecticut.** (Ignore this section if you are not working in these states)

Some states have FIPS codes that start with a zero, and because Excel removes that leading zero, the table won't join properly unless we put it back on. If you're working in Alaska, Alabama, Arkansas, Arizona, California, Colorado, or Connecticut, you'll have to add that zero back on manually.

To add the zero back on, at the beginning of the table, under Column A, at Row2 type in: **=concatenate("0",B2)** That's a zero inside the quote

A2							
	A	B	C	D	E	F	G
1	GEO.id	GEO.id2	Geo displ	D001	D002	D003	D004
2	06001400100	6001400100	Census Tr	2935	1935	581	419
3	1400000US06001400200	6001400200	Cen				652
4	1400000US06001400300	6001400300	Ce				2436
5	1400000US06001400400	6001400400	Ce				1958
6	1400000US06001400500	6001400500	Ce				1930
7	1400000US06001400600	6001400600	Cen				913
8	1400000US06001400700	6001400700	Census Tr	4039	1481	253	2305

Use the Concatenate function to add a leading "0" then copy this to all the other rows.

Hit **Enter**.

If the result of that formula looks right (i.e. it has a leading zero), copy that cell's formula to the rest of the column.

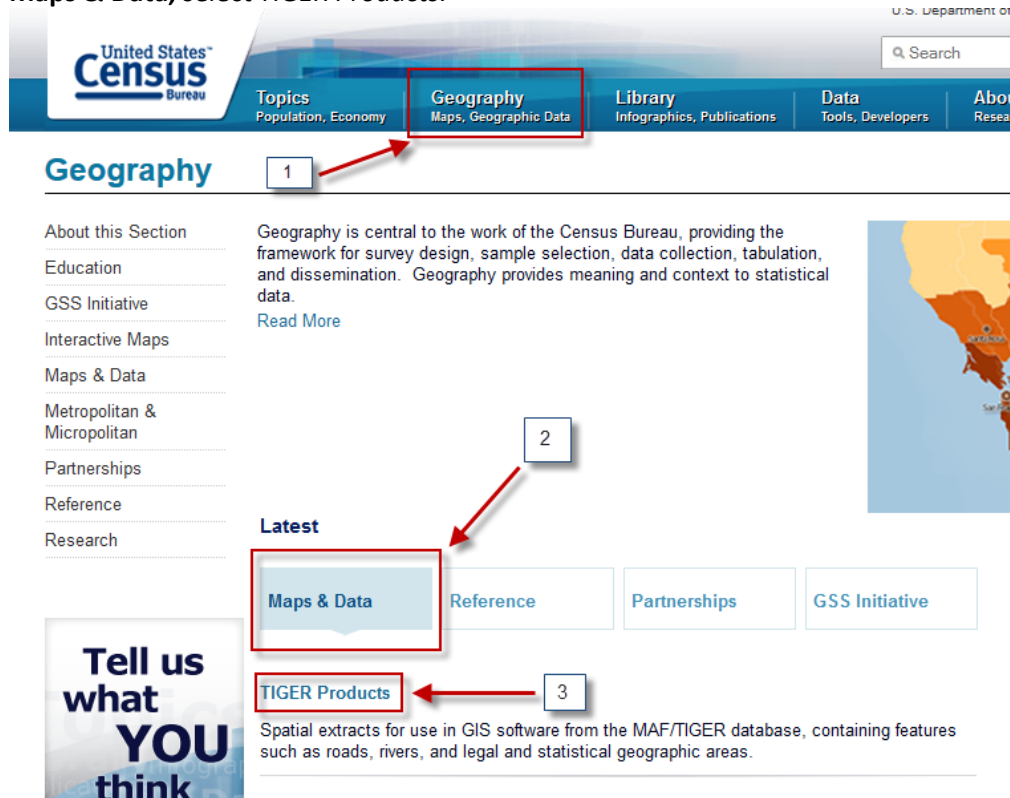
You're almost done! To keep this compatible with the rest of the directions, copy all of the cells in this new column, and right click on the GEOid2 column. Click the options below **"Paste Special"**, choose **Values**, and your leading zeroes should be all set. Ensure your column is still named GeoID2.

Delete the column you added but be sure you still have the fixed GeoID2 column. Save the file!

Obtaining GIS files from Census Geography

Now you need to get your Census tract polygons...

1. Go to the Census web site (<http://census.gov>) and click on the **Geography** tab. Under **Maps & Data**, select **TIGER Products**.



2. Click on **Tiger/Line Shapefiles** in the **TABLE** as shown below:

Geography

Geography

Main **About** **Maps & Data** **Reference** **Partnerships** **Education** **Research**

Maps & Data

- Maps & Data Main Page

Maps

- Census Data Mapper
- Reference
- Thematic
- Maps Available for Purchase

Data

- TIGER Products
- Partnership Shapefiles
- Relationship Files
- Comparability Files
 - Places
 - County Subdivisions

TIGER Products

TIGER = Topologically Integrated Geographic Encoding and Referencing

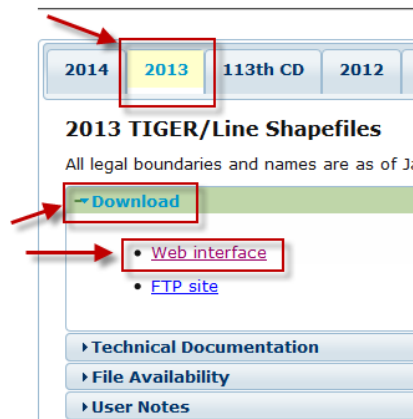
The Census Bureau offers several file types and an application for mapping census geographic data based on data for products are:

- TIGER/Line Shapefiles - New 113th Congressional District Shapefiles
- TIGER/Line Shapefiles pre-joined with Demographic Data - 2010 Census selected geography
- Cartographic Boundary Files
- KML Prototype Files
- TIGERweb

Which product should I use?

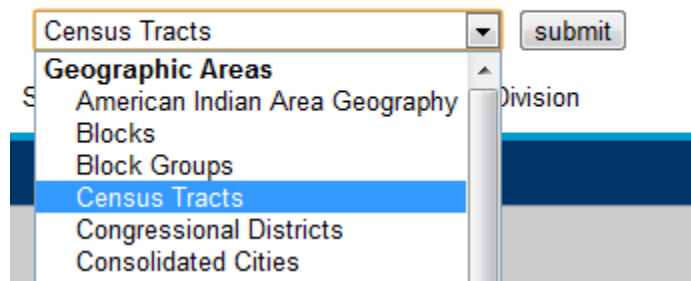
Product	Best For...	File Format	Type of Data
TIGER/Line Shapefiles	Most mapping projects--this is our most comprehensive dataset . Designed for use with GIS (geographic information systems).	Shapefiles (.shp) and database files (.dbf)	Boundaries, roads, address information, water features, and more

3. Click on the link for the **2013 Tiger/Line Shapefile** and expand **Download**. Then click on **Web Interface**.



4. Under *Select a Layer Type* use the pulldown menu to choose **Census Tracts** then *Submit*.

Select a layer type



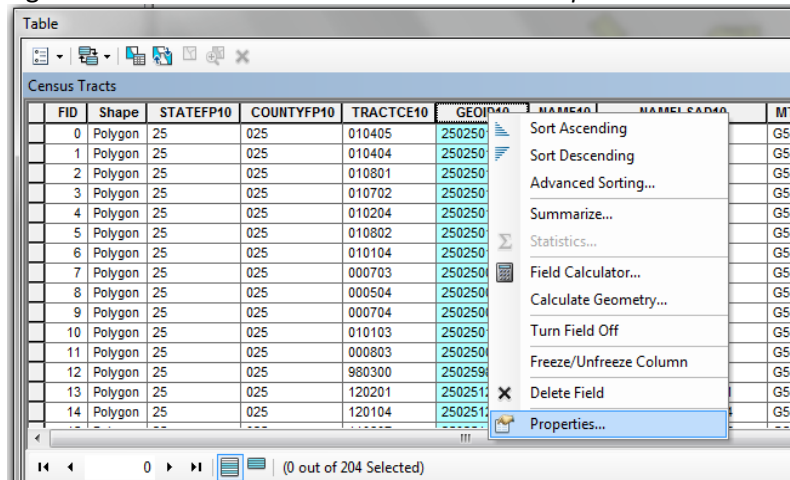
5. **Select your State of interest and download** the data set – it is compressed in a .zip file.
6. Save the zip file to the **Census Geography** folder. Navigate to the folder and right click on the zipped file. Select *extract here* or *Extract files* and select the geography folder.

Joining the AFF table to your Census Tract polygons in ArcMap

Now you're ready for mapping!

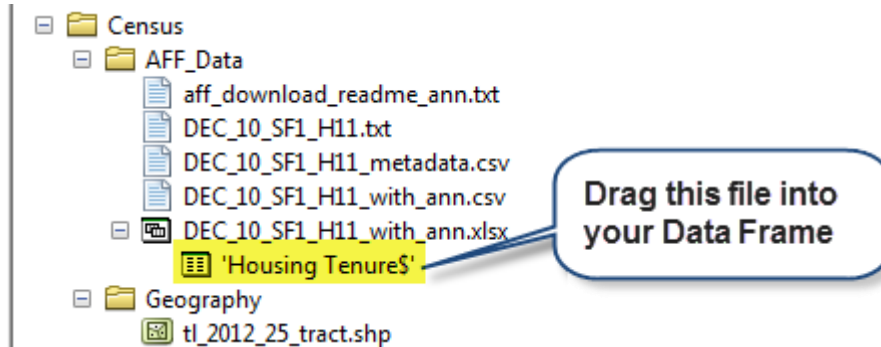
1. Start a session of ArcMap with a blank map.
2. Add your **Census Tracts** geography data set to the map (e.g., *tl_2013_25_tract.shp*).
3. Rename your Census Tract geography layer to *Census Tracts*.
4. Open the *Census Tracts* polygon attribute table and take a look at it.
5. The *GeoID* column is what we will be using for joining our AFF data.

- Right-click on **GEOID** field name and choose *Properties*.



You'll see it is a **STRING** type attribute field – that's important to know. Close the table.

- Add your American Factfinder table to the map - you need to drill down to the worksheet level:



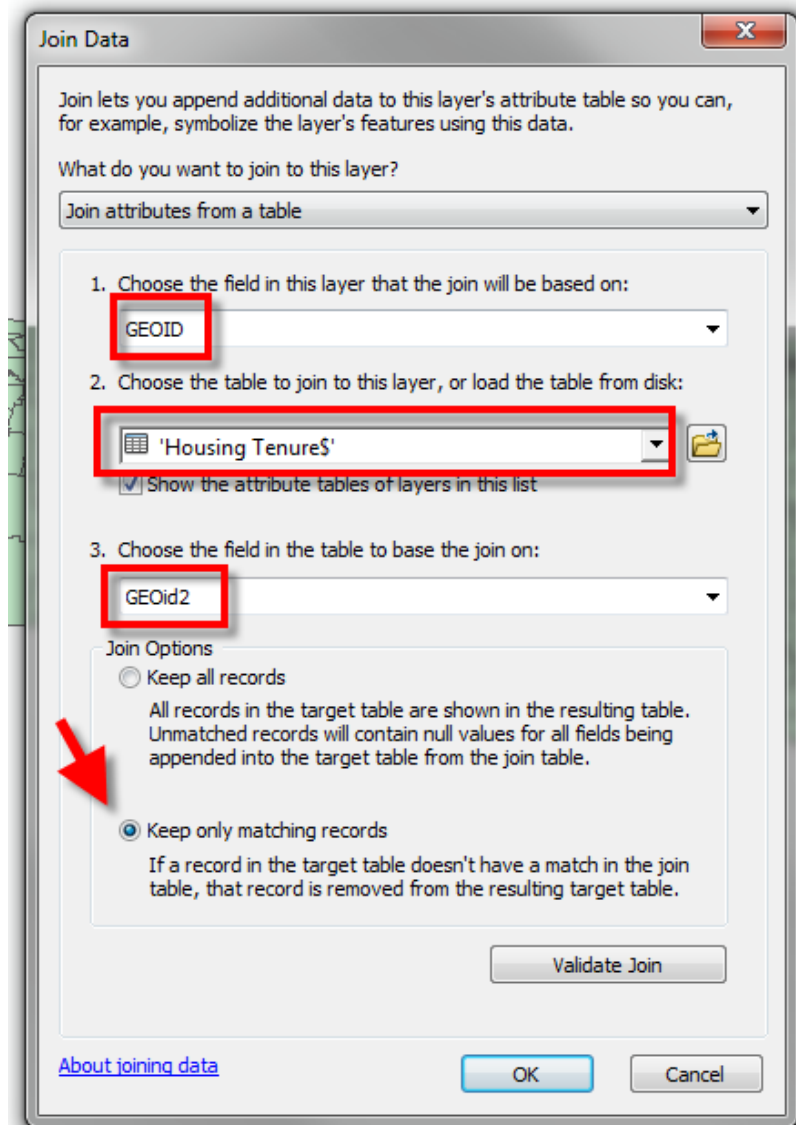
- Open the *American Factfinder Table* by right-clicking on it and choosing *Open*.

The screenshot shows a QGIS Table window titled 'Table' with the 'Housing_tenure\$' table loaded. The table has columns: GeoID, GeoID2, and Geography. The data is as follows:

	GeoID	GeoID2	Geography
	1400000US25025000201	25025000201	Census Tract 2.01, Suffolk County, Massachuse
	1400000US25025000202	25025000202	Census Tract 2.02, Suffolk County, Massachuse
	1400000US25025000301	25025000301	Census Tract 3.01, Suffolk County, Massachuse
	1400000US25025000302	25025000302	Census Tract 3.02, Suffolk County, Massachuse
	1400000US25025000401	25025000401	Census Tract 4.01, Suffolk County, Massachuse
	1400000US25025000402	25025000402	Census Tract 4.02, Suffolk County, Massachuse
	1400000US25025000502	25025000502	Census Tract 5.02, Suffolk County, Massachuse

- GEOid2** will be your join field – check its properties to ensure that it is also a **STRING** type and that all the census data appears correctly.
- Close the table.
- Right click on your *Census Tracts* and choose **Join and Relates – Join...**

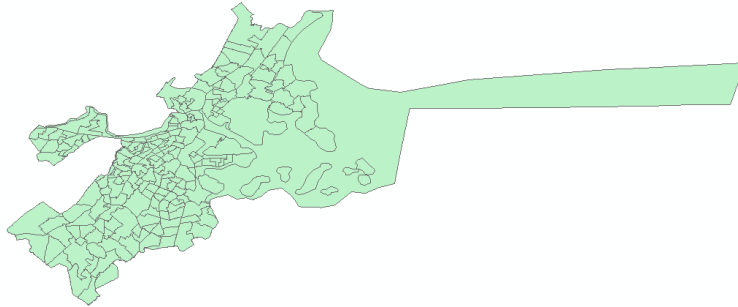
12. Fill in the dialog box as follows – you are joining attributes from a table, using *GEOID* in your Census Tracts layer and *GEOid2* in your AFF table – click OK when done:



Note: By clicking “Keep only matching records”, only Suffolk County will remain visible in the shapefile because we only downloaded census data for this one county in Mass. If we select “Keep all records”, Massachusetts would remain whole, however, the attribute table would only have census information for the census tracts within Suffolk County. The rest of the census tracts would read “Null” in those joined fields.

13. Open the *Census Tracts* attribute table to ensure that the join was made correctly. If it was, you should see your AFF data when you scroll to the right in the table.
14. Close the table.

One tip – if your area of interest is near water or has water features in it (like Boston), your tract data set may look like this – it includes a lot of water:



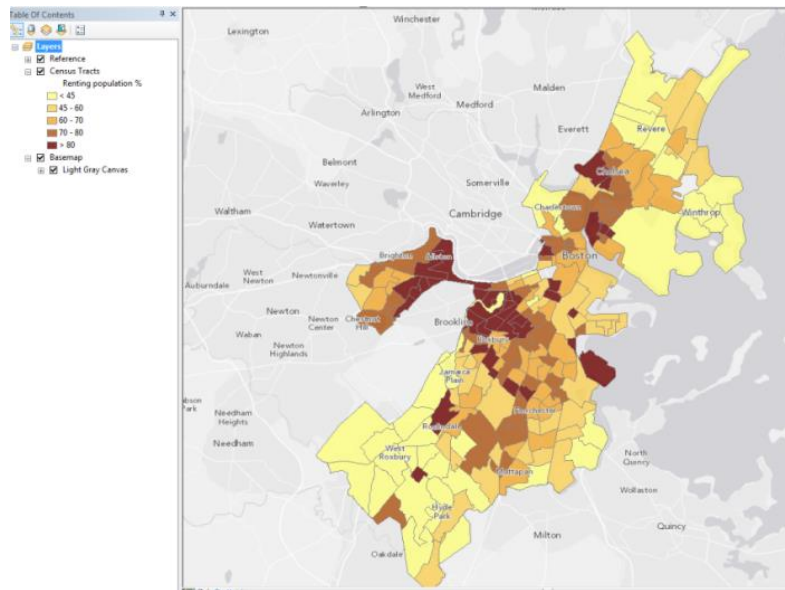
To get rid of the water tracts when you make a map, go to the Symbology tab in properties. Click on *Quantities* and choose your variable, but then also click on *Classify*.

In the *Classify* dialog box, click on **Exclusion**. You can exclude all census tracts where the land area field = 0 (no land), as follows:

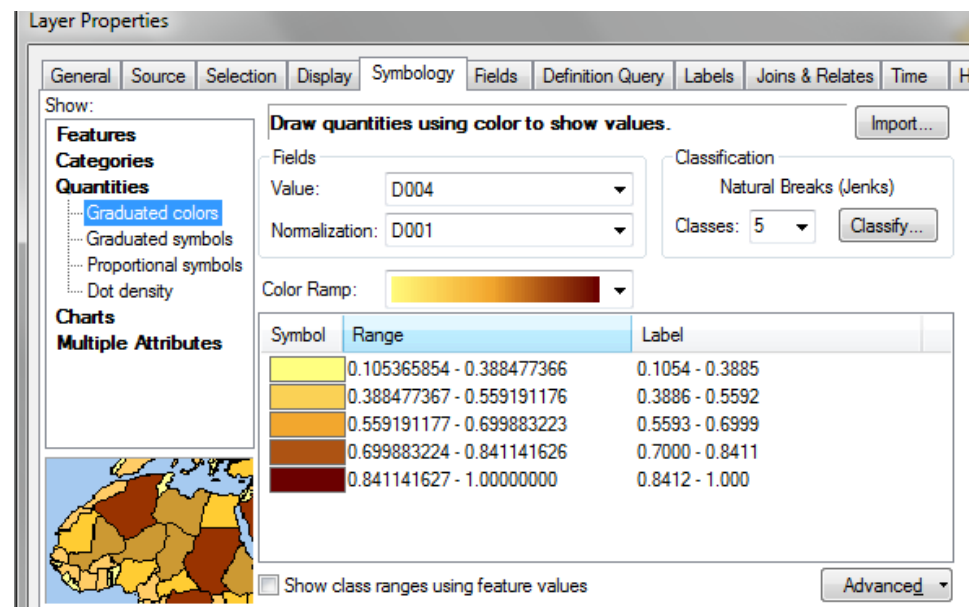
The screenshot shows the ArcGIS software interface with the Symbology tab selected. The 'Draw quantities using color to show values' section is active, showing a color ramp for the variable 'D004'. The 'Classify' button is highlighted with a red arrow. Below this, the 'Data Exclusion Properties' dialog box is open, showing the 'Exclude clause' section. The exclusion clause is set to 'tl_2012_25_tract.ALAND' = 0, which is also highlighted with a red arrow. The 'Classify' dialog box is also visible, showing the 'Natural Breaks (Jenks)' method and 5 classes.

Now you can make a map of your data following the usual methods. If you are unfamiliar with mapping numeric values, see the ArcGIS 10.2 online help – [About Symbolizing Layers to Represent Quantity](#).

Here is an example of a map showing the percent of people in rental housing units for each tract in Suffolk County (population renting normalized by total population in housing units). The map is using the “Light Gray Canvas” option from ESRI’s basemap choices (Click on **File – Add Data – Add Basemap** to get this option):



Here is the symbology properties for the map above:

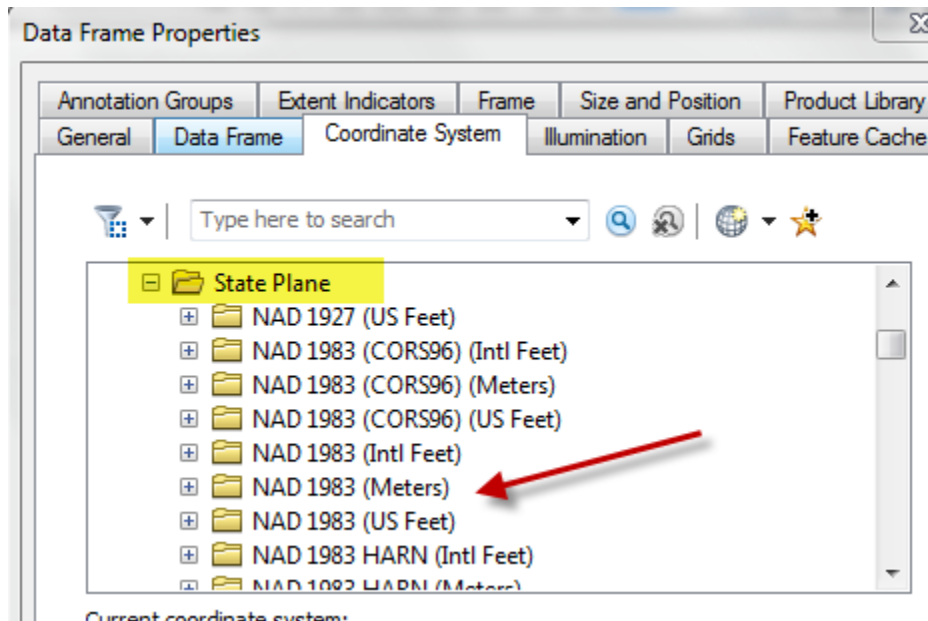


Setting a Projected Coordinate System for your Map

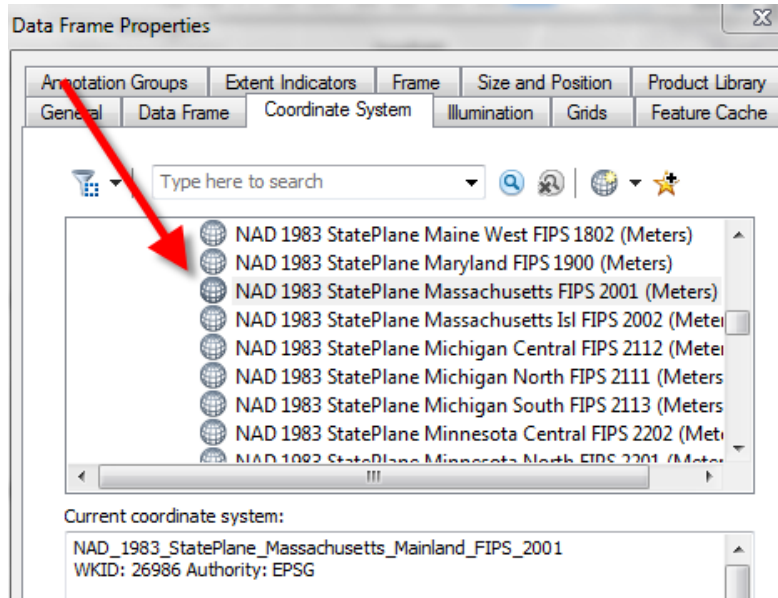
It is good cartographic practice to put your map into a projected coordinate system. The TIGER data is in a geographic coordinate system and can appear stretched in an odd way on your map. You can fix this problem by setting a projected coordinate system appropriate for your region.

You will need to know the best coordinate system to use for your area. In the case of Massachusetts, we will use the Massachusetts State Plane (NAD83) – meters coordinate system. If you don't know what coordinate system to use, you can leave your map as is or ask a lab assistant.

1. Click on **View – Data Frame Properties.**
2. Click on the **Coordinate System** tab.
3. In the dialog box, expand the **Projected Coordinate Systems** folder. Make sure they you are not still in “*Geographic Coordinate System*” folder.
4. Scroll down to the **State Plane** folder– open that folder and select NAD 1983 (Meters) from the list:



5. Find **NAD_1983_StatePlane_Massachusetts Mainland** (not Isl which means Islands) and click on it:



6. Click **OK**
7. Click **Yes** when warned that the coordinate system is different from the data in your maps.

You're done!