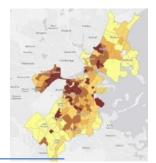
# **Census Tutorial:** Downloading and Mapping American Factfinder Census Data for use in ArcMap



Written by Barbara Parmenter, revised by Carolyn Talmadge on February 22,2016 Tufts Data Lab

# Contents

Obtaining Data from American FactFinder (AFF)	1
Preparing American Factfinder Data for Use in ArcMap	5
Joining the AFF table to your Census Tract polygons in ArcMap	10
Removing Water Only Census Tracts	14
Setting a Projected Coordinate System for your Map	17

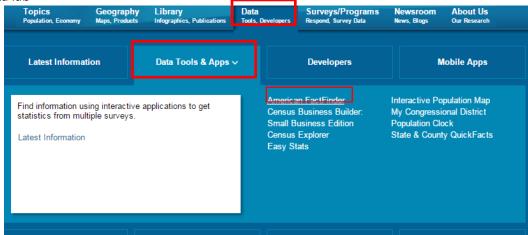
## Skills covered in this tutorial include:

- Obtaining excel data from the American Fact Finder on Census.Gov
- Obtaining Geography Data from census.gov
- Cleaning Excel Data for Joins
- Joining Excel Data in ArcMap

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 <u>http://census.gov</u>
- 3. Click on the *Data* tab → *Data Tools* & *Apps* → select **American FactFinder.** This is the web interface to access census excel/tabular data.



- 4. Click on Advanced Search and select Show Me All.
  - Community Facts



5. Click on Topics in the left column and expand Dataset.

← → C 🗋 factfinder.cens	us.gov/faces/nav/jsf/pages/searchresults.xhtml?refresh=t
U.S. Department of Commerce United States <sup>*</sup> Bureau	FactFinder
MAIN COMMUNITY FACTS	GUIDED SEARCH ADVANCED SEARCH DOWNLOAD CENTER
Search - Use the options	s on the left (topics, geographies,) to narrow your sea
Your Selections 'Your Selections' is empty load search   save search	To search for tables and other files in American Fa
Search using the options below: <b>Topics</b> (age, income, year, dataset,)	Select Topics to add to 'Your Selections'    People  Housing  Business and Industry
Geographies (states, counties, places,) Race and Ethnic Groups (race, ancestry, tribe)	Governments             Year             Product Type             Program             Dataset
Industry Codes (NAICS industry,) EEO Occupation Codes	2 2014 ACS 1-year estimates (2,688) 2014 Population Estimates (50) 2014 Annual Survey of Public Pensions (1) 2014 Annual Survey of State Government Tax Collections (2) 2013 ACS 5-year estimates (2,286)
(executives, analysts,)	2013 ACS 3-year estimates (2,631) 2013 ACS 1-year estimates (2,752) 2013 American Housing Survey (147) 2013 Annual Survey of Manufactures (8) 2013 Business Patterns (14) 2013 Annual Survey of Public Employment & Payroll (5)
	Note: The Race & Ethnicity topic is available under the Race and Ethnic Groups button on the left.

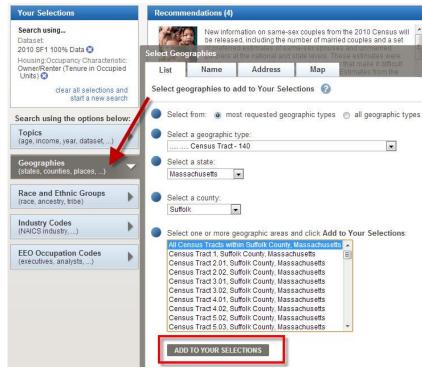
6. Scroll down to click on 2010 SF1 100% Data – this will send this criteria to your Selection box in the upper left of the site:



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

Select Topics number of married couples and a set of preferred estimates of same-sex spouses and CLOSE X
Select Topics to add to 'Your Selections' 🕜
+ People
- Housing
+ Basic Count/Estimate
<ul> <li>Occupancy Characteristic</li> </ul>
Age of Householder (60)
Hispanic or Latino Householder (20)
Household Size (145)
Household Type (166)
Occupancy and Vacancy Status (120)
Owner/Renter (Tenure in Occupied Units) (141)
Race/Ethnicity of Householder (179)
+ Year
+ Product Type
+ Document Type
+ Dataset
Include archived products in your search (2)

- 8. <u>Close the **Topics** box</u>.
- 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 **Census Tracts** for a specific state and a county in that state. You can follow the example below if you want to select all census tracts in Suffolk County, Massachusetts. Alternatively, you could pick a state and county of your choosing.



- 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 5 above.

Your Selections
Search using Dataset: 2010 SF1 100% Data 🕄
Housing:Occupancy Characteristic: Owner/Renter (Tenure in Occupied Units) 🕄
Census Tract All Census Tracts within Suffolk County, Massachusetts 😒
clear all selections and start a new search

14. You should now have a list of available datasets about housing characteristics. **Checkmark** one of interest

and see what variables it contains by clicking on the *Information* icon for that table. For this exercise, we <u>highly recommend</u> a table with just a few variables. In this exercise, we have used the H11 table for total population in occupied housing.

- 15. After checking a table, click on **Download (** ) and follow the instructions. This creates a zip file. Save it in your *Census 2010/AFF Data* folder.
- 16. Navigate to your AFF folder. Right click on the zipped folder and select *extract here* or open with Power Archiver and extract to AFF folder.

# Preparing American Factfinder Data for Use in ArcMap

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

Name	Date modified	Туре	Size
aff_download_readme_ann DEC_10_SF1_H11		es will be down file contains t	
DEC_10_SF1_H11_metadata	the "metadata" file contains the		
DEC_10_SF1_H11_with_ann	description	ns. Open both	excel files.

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

2. The "DEC\_10...with\_ann" file should look something like this.

A1 - (- f.					GEO.	id			
	А	В	С	D		E	F	G	Н
1	GEO.id	GEO.id2	GEO.displ	D001		D002	D003	D004	
2	Id	Id2	Geograph	Total p	оорі	Owned wi	Owned fre	Renter oc	upied
3	14000000	2.5E+10	Census Tra	4225(r	338:	794	231	3200	
4	14000000	2.5E+10	Census Tra	3730(r	338:	828	262	2640	
5	14000000	2.5E+10	Census Tra	3	861	857	349	2655	
6	140000US	2.5E+10	Census Tra	2	628	799	270	1559	
7	14000000	2.5E+10	Census Tra	2	916	941	413	1562	
8	14000000	2.5E+10	Census Tra	5	672	851	281	4540	
9	14000000	2.5E+10	Census Tra	3	511	868	297	2346	
10	14000000	2.5E+10	Census Tra	3	110	447	154	2509	
11	14000000	2.5E+10	Census Tra	2	211	444	81	1686	
12	14000000	2.5E+10	Census Tra	4	915	682	187	4046	
13	14000000	2.5E+10	Census Tra	3	371	818	248	2305	
14	14000000	2.5E+10	Census Tra	3	974	264	107	3603	
15	14000000	2.5E+10	Census Tra	4	397	474	150	3773	
16	14000000	2.5E+10	Census Tra	2	619	90	25	2504	
17	14000000	2.5E+10	Census Tra	4	794	447	154	4193	
18	14000000	2.5E+10	Census Tra	7	869	907	316	6646	
19	14000000	2.5E+10	Census Tra	1	601	11	6	1584	
20	14000000	2.5E+10	Census Tra		720	33	34	653	
21	14000000	2.5E+10	Census Tra	2	914	498	168	2248	
22	14000000	2.5E+10	Census Tra	5	407	289	60	5058	

3. 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!!!

	А	В	С	D	E			
1	GEO.id	Id						
2	GEO.id2	ld2						
3	GEO.displ	Geograph	Geography					
4	D001	Total popu	Total population in occupied housing units:					
5	D002	Owned wi	Owned with a mortgage or a loan					
6	D003	Owned free and clear						
7	D004	Renter oc						

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. 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 few important steps left.

- 1. ArcGIS does not like ANY extra characters in the column names. Delete all periods (.) and extra characters (-) in all the column names. The only acceptable character is underscores (\_).
- 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.
  - 1. Click on the tab (B) above **GEOID2** to highlight the entire column.
  - 2. Click on the Excel Tab for Data
  - 3. Click on Text to Columns:

	-						
HC	DME IN	ISERT PAGE LAYOUT FORMULAS DATA REV	EW VIEW				
From Web		m Other Existing Connections al Data → Connections → Properties → Properties → Connections → Properties → Connections → Z↓ ZZ → Sor	t Filter	Clear Reapply Advanced	Text to Columns		Data C Validation ~ Data Tool
	- Set Batelin				Text to Colum		Dutu Tool
		$\times$ $\checkmark$ $f_x$ GEOid2	3				
	1	с	D	E	Split a single o multiple colur		d into
d	GEOid2	GEOdisplaylabel	D001	D002			
					column of runnames into separate		
		Geography	Total populat				
0000	2.5E+10	Census Tract 1, Suffolk County, Massachusetts	4225(r33818)	794			
000U:	2.5E+10	Census Tract 2.01, Suffolk County, Massachusetts	3730(r33819)	828	You can choo	se how to sn	lit it un:
000U	2.5E+10	Census Tract 2.02, Suffolk County, Massachusetts	3861	857	You can choose how to split it up: fixed width or split at each comma,		
000U	2.5E+10	Census Tract 3.01, Suffolk County, Massachusetts	2628	799	period, or oth	er character.	
000U:	2.5E+10	Census Tract 3.02, Suffolk County, Massachusetts	2916	941	🙆 Tell me n	000	
0000	2.5E+10	Census Tract 4.01, Suffolk County, Massachusetts	5672	851		1010	
0000	2.5E+10	Census Tract 4.02, Suffolk County, Massachusetts	3511	868	297	2346	
0000	2.5E+10	Census Tract 5.02, Suffolk County, Massachusetts	3110	447	154	2509	
0000	2.5E+10	Census Tract 5.03, Suffolk County, Massachusetts	2211	444	81	1686	
00011	2 55±10	Concus Tract 5 04 Suffolk County Massachusotte	/015	601	107	1016	

- 4. Click **Next** to leave the first setting at Delimited.
- 5. Click **Next** to leave the second setting at Tab.
- 6. In Step 3, change the column data format to **TEXT**, and then hit **Finish**.

Convert Text	to Columns Wizard	- Step 3 of 3	2	×					
This screen lets you select each column and set the Data Format.									
Column data									
© <u>G</u> eneral © <u>T</u> ext		'General' converts numeric values to numbers, date	value	s to					
Date:	MDY -	dates, and all remaining values to text. Advanced							
	mport column (skip)	Advanceam							
Destination:	\$B\$1			<b>5</b>					
Data <u>p</u> review	N								

3. 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.

A2 * :	$\land \lor Jx$	IQ						
Calibri - 11 - A	a \$ * % * 🖻	С	D	E	F	G	н	I
B I 🚍 🖄 - 🗛	▼ ↓ €.0 .00 ◆		D001	D002	D003	D004		
2 Id Id2	Geography		Total populat	Owned with	Owned fr	Renter oc	upied	
🔏 Cu <u>t</u>	0 Census Tract 1, Su	ffolk County, Massachusetts	4225	794	231	3200		
E Copy	0 Census Tract 2.01	, Suffolk County, Massachusetts	3730	828	262	2640		
Paste Options:	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		
Paste Special	0 Census Tract 4.01	, Suffolk County, Massachusetts	5672	851	281	4540		
Insert	0 Census Tract 4.02	, Suffolk County, Massachusetts	3511	868	297	2346		
	0 Census Tract 5.02	, Suffolk County, Massachusetts	3110	447	154	2509		
<u>D</u> elete	0 Census Tract 5.03	, Suffolk County, Massachusetts	2211	444	81	1686		
Clear Co <u>n</u> tents	0 Census Tract 5.04	Suffolk County, Massachusetts	4915	682	187	4046		

**Optional Tip** – Although you need to delete the 2<sup>nd</sup> 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 <u>no</u> <u>spaces or periods and the heading needs to be under 9 characters</u>. For excel sheets containing several fields, it's probably easier to refer to the codes later rather than changing all the column headings.

4. To make things easier later, rename the worksheet to something comprehensible, e.g.,

Housing Tenure - the worksheet name will be the identifier in ArcCatalog.

		<	Housing To	enure	(+)
	45	140000US2	5025040200	2502504	0200 Cens
1			5025040100		

5. 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. Since ArcMap uses the first eight rows to determine what the data type is for each column, ex: string, float, double, integer, etc., it will be necessary to delete the information in parentheses under Tot\_Pop for it to be mappable as a number.

	Α	В	С	D	E	F	G
1	GEOID	GEOID2	Geo_display	Tot_Pop	Own_Loan	Own_Free	Renter
2	1400000US25025000100	25025000100	Census Tract 1, Suffolk County, Massachusetts	4225(r33818)	794	231	3200
3	1400000US25025000201	25025000201	Census Tract 2.01, Suffolk County, Massachusetts	3730(r33819)	828	262	2640
4	1400000US25025000202	25025000202	Census Tract 2.02, Suffolk County, Massachusetts	3861	857	349	2655
5	1400000US25025000301	25025000301	Census Tract 3.01, Suffolk County, Massachusetts	2628	799	270	1559
6	1400000US25025000302	25025000302	Census Tract 3.02, Suffolk County, Massachusetts	2916	941	413	1562

6. **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)**.

A2	2 × E 🗙	$\checkmark f_x$	=CONCATENATE("0", B2)
	Α	В	с
1	GEOID	GEOID2	Geo_display
2	CATENATE("0", B2)	25025000100	Census Tract 1, Suffolk County, Massachusetts
3	1400000US25025000201	25025000201	Census Tract 2.01, Suffolk County, Massachusetts

4 1400000US25025000202 25025000202 Census Tract 2.02, Suffolk County, Massachusetts

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!

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

# **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 Geography tab and then Maps & Data .

Census					U.S. Department of C	Commerce   Blogs
CCTTS GUS Bureau	Topics Population, Economy	Geography Maps, Products	Library Infographics, Publications	Data Tools, Developers	Surveys/Programs Respond, Survey Data	Newsroom News, Blogs
Late	est Information		About	Educa	ation	GSS Initia
Int	eractive Maps	м	aps & Data	Metropolitan &	Micropolitan	Partnersł
	Reference		Research			

2. Under Geographic Data, select TIGER Products. Then click on Tiger/Line Shapefiles in the TABLE as shown:

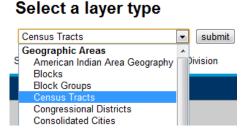
# Geography

Maps & Data	TIGER P	roducto				
Maps & Data Main Page	HGER P	roducis				
Maps	TIGER products	gically Integrated Geographic Encod are spatial extracts from the Census	Bureau's MAF/1	IGER database, cont		
Census Data Mapper	rivers, as well as application. Our	legal and statistical geographic area	as. The Census E	lureau offers several f	ile types and a	n online
Reference		ne Shapefiles - New 2015 Shapefile				
Thematic			2			
Maps Available for Purchase		ne Geodatabases				
Data	<u>Cartograp</u>	ne with Selected Demographic and hic Boundary Shapefiles				
<ul> <li>TIGER Products</li> </ul>	<ul> <li><u>KML - Ca</u></li> </ul>	rtographic Boundary Files				
Census Geocoder	<ul> <li><u>TIGERwe</u></li> </ul>	<u>•b</u>				
<ul> <li>Partnership Shapefiles</li> </ul>	25 Years and	d Counting				
<ul> <li>Relationship Files</li> </ul>		tory Map (Part 1)				
<ul> <li>Gazetteer Files</li> </ul>	<ul> <li>Happy 25</li> </ul>	th Anniversary, TIGER				
<ul> <li>Block Assignment Files</li> </ul>						
<ul> <li>Name Lookup Tables</li> </ul>	TIGER Data	and Product FAQs				
<ul> <li>Tallies</li> </ul>	Which produ	ict should I use?				
■ LandView	Product	Best For	File Format	Type of Data	Level of Detail	Descr Attril
	<u>TIGER/Line</u> <u>Shapefiles</u>	Most mapping projectsthis 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	Full detail (not generalized)	Exten

3. Click on 2014 and expand Download tab. Then click on Web Interface.



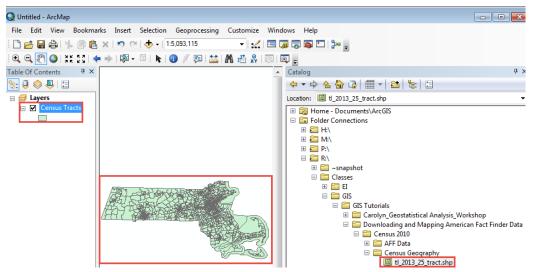
4. Under Select a Layer Type choose Census Tracts then Submit.



- 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

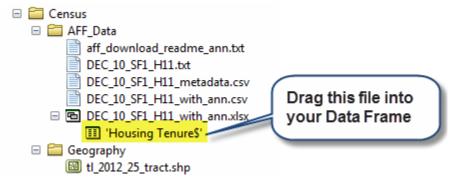
- 1. Start a session of ArcMap with a blank map.
- 2. Add your **Census Tracts** geography data set to the map (e.g., *tl\_2014\_25\_tract.shp*) from your H Drive.



- 3. Rename your Census Tract geography layer to Census Tracts in your Table of Contents.
- 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.
- 6. 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.

Ce	nsus T	racts						
1	FID	Shape	STATEFP10	COUNTYFP10	TRACTCE10	GEOI	140	
	0	Polygon	25	025	010405	250250	а.	Sort Ascending
	1	Polygon	25	025	010404	250250	₹.	Sort Descending
	2	Polygon		025	010801	250250		Advanced Sorting
	3	Polygon		025	010702	250250 <sup>-</sup>		Advanced Sorting
	4	Polygon		025	010204	250250		Summarize
	5	Polygon		025	010802	250250	$\Sigma$	Statistics
	6	Polygon		025	010104	250250	_	
	7	Polygon		025	000703	250250		Field Calculator
	8	Polygon		025	000504	250250		Calculate Geometry
	9	Polygon		025	000704	250250		-
	10	Polygon		025	010103	250250		Turn Field Off
Ц	11	Polygon		025	000803	250250		Freeze/Unfreeze Column
H	12	Polygon		025	980300	250259		
H	13	Polygon		025	120201	250251		Delete Field
Н		Polygon	25	025	120104	250251	P	Properties
						III L		
ŀ	•	(	) > >1	🔲   (0 out of 3	204 Selected)			

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



8. If you get the following error, it means that your version of ArcGIS and Excel are having connectivity issues. A solution may be to save your Housing Tenure excel sheet as an Excel 97-2003 Workbook (\*.xls) or CSV.



9. Open the *American Factfinder Table* in the **Table of Contents** by right-clicking on it and choosing *Open*.

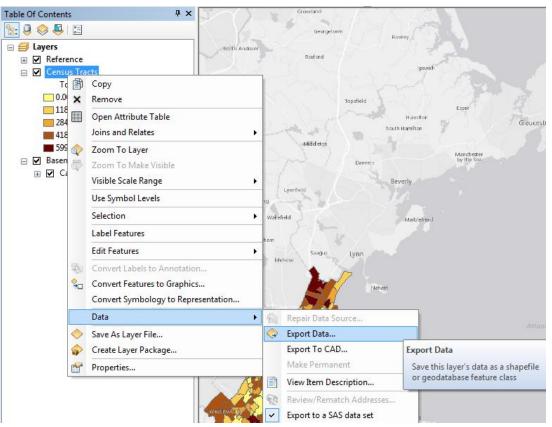
Ta	Table									
	🗐 -   🖶 -   🖫 🎦 🖓 🛛 🖓 🛪									
ŀ	ło	ousing_tenure\$								
lΓ	٦	GeoID	GeoID2	Geography						
		1400000US25025000201	25025000201	Census Tract 2.01, Suffolk County, Massachuse						
IIC		1400000US25025000202	25025000202	Census Tract 2.02, Suffolk County, Massachuse						
IE		1400000US25025000301	25025000301	Census Tract 3.01, Suffolk County, Massachuse						
IE		1400000US25025000302	25025000302	Census Tract 3.02, Suffolk County, Massachuse						
ill.		1400000US25025000401	25025000401	Census Tract 4.01, Suffolk County, Massachuse						
IIC		1400000US25025000402	25025000402	Census Tract 4.02, Suffolk County, Massachuse						
IIC		1400000US25025000502	25025000502	Census Tract 5.02, Suffolk County, Massachuse						

- 10. **GEOID2** will be used to join this AFF data to the 2014 Census. Check its properties to ensure that it is also a **STRING** type, close table when done.
- 11. Right click on your Census Tracts and choose Join & Relates, then select 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:

Join Data
Join lets you append additional data to this layer's attribute table so you can, for example, symbolize the layer's features using this data.
What do you want to join to this layer?
Join attributes from a table
<ol> <li>Choose the field in this layer that the join will be based on:         GEOID         2. Choose the table to join to this layer, or load the table from disk:     </li> </ol>
<ul> <li>'Housing Tenure\$'</li> <li>Show the attribute tables of layers in this list</li> </ul>
<ol><li>Choose the field in the table to base the join on:</li></ol>
GEOID2
Join Options
Keep all records
All records in the target table are shown in the resulting table. Unmatched records will contain null values for all fields being appended into the target table from the join table.
Keep only matching records
If a record in the target table doesn't have a match in the join table, that record is removed from the resulting target table.
Validate Join
About joining data OK Cancel

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 MA. If we select "Keep all records", MA 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.

- 12. Open *Census Tracts* attribute table to ensure that the join was made correctly. If so, you should see your AFF data when you scroll to the right in the table. Close table.
- 13. It is important to know that when you make a join it is not permanent until you export the data. Up until that point it is temporary, and some data analyses will not recognize the join. Export it if you plan to use this data and don't want to have to redo the join at a later time. Export the data by right clicking on the census tracts, select **Data** and then **Export Data**.



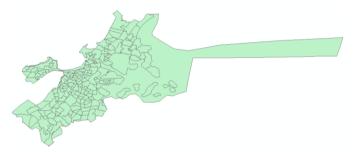
14. Save the layer with an appropriate name (include Census tracts so you know the boundaries). It can be good to acknowledge exactly what has been joined, especially if you will end up having multiple joined layers. Also make sure to save as a shapefile, otherwise you will encounter an error.

Export Data	a 🔣		
Export:	All features		
Use the sa	ame coordinate system as:	Saving Data	×
this lay	er's source data	-	🖌 Census 2010 🔹 🛧 🏠 🖓 🖓
🔘 the dat	ta frame	AFF Data	
	ature dataset you export the data into pplies if you export to a feature dataset in a geodatabase)	Census Ge	eography
Output fea	ature class:		
H:\Censu	us_Practice\Geography\CensusTracts_Households shp		
		Name:	Census Tracts Save
		Save as type:	
	OK Cancel		File and Personal Geodatabase feature dasses Shapefie Database feature dasses

- 15. Exporting data is always good practice to ensure something is permanent. It also sometimes resolves minor ArcGIS glitches, such as layers not drawing on the map.
- 16. Now before hitting OK you will need to decide if you want to save this new shapefile to the coordinate system it came with (2013 Census Data uses GCS\_North\_American\_1983), or if you have already put the data frame into a certain projection you could select data frame (this map ultimately uses NAD\_1983\_StatePlane\_Massachusetts\_Mainland\_FIPS\_2001).
- 17. If you decide to add this new .shp to your map its symbology will need to be redone.

## **Removing Water Only Census Tracts**

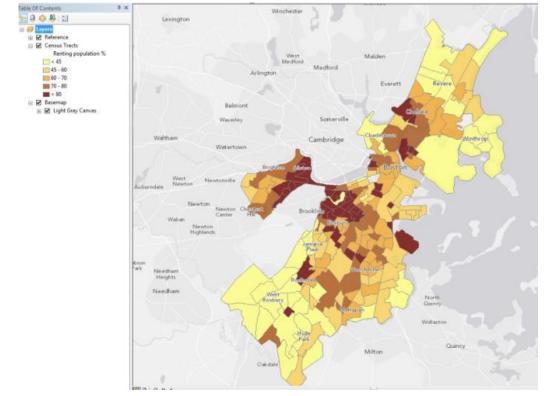
One tip – if your area of interest is near water or has water features in it (like Boston), your tract data set may look like this – it includes a lot of water:



- 1. To get rid of the water tracts when you make a map, go the layer's **Symbology** tab in properties.
- 2. Click on *Quantities* and choose the variable.
- 3. Then click on *Classify*.
- 4. In the *Classify* dialog box, click on **Exclusion**. You can exclude all census tracts where the **land area field = 0** (no land), and hit OK. These steps are outlined below:

- Table Of Contents Ψ× 🗞 📮 😓 🖾 🗄 🗉  *L*ayers 🖃 🚞 R:\Classes\GIS\GIS 🚹 🖃 🗹 Census Tracts 23 Layer Properties 2 R:\Classes\GIS\GIS General Source Selection Display Symbology Fields Definition Query Labels Joins & Relates Time HTML Popup 'Housing Tenu Show Draw quantities using color to show values Import.. Features Fields Classification Categories Quantities Natural Breaks (Jenks) Value: 4 Tot Pop • Graduated colors Classes: 5 -Classify ... Normalization: none • Graduated symbols Proportional symbols Color Ramp: • Dot density Charts Symbol Range Label Multiple Attributes 0.000000 -Data Exclusion Properties 23 Classification Query Legend Classification Method: Natural Breaks (Jenks) • Exclude clause: "tl\_2013\_25\_tract.MTFCC" Classes: 5 . "tl\_2013\_25\_tract.FUNCSTAT Data Exclusion "tl\_2013\_25\_tract.ALAND" 7 6 Exclusion ... Sampling ... "tl\_2013\_25\_tract.AWATER" "tl\_2013\_25\_tract.INTPTLAT" ÷ Columns: 100 ≑ Show Std. Dev. Show Mean Like = <> 000000 000000 000000 000000 > >= And 15 4187 5998 ĕ < = 0r < 2841 \_ % () Not 10-Get Unique Values Go To: ls In Null SELECT \* FROM Census Tracts WHERE: "tl\_2013\_25\_tract.ALAND" =0 ..... 5 Clear Verify Help Load. Save. 0 0.000000 2229.250000 4458.500000 6687.750000 Snap breaks to data values OK Cancel
- 5. 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.
- 6. Now is a good time to save, with all your data ready to be mapped.

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  $\rightarrow$  Add Data  $\rightarrow$  Add Basemap to get this option):



Here are the symbology properties for the map above. **Note**: Do not just accept the default colors. Play around with the different color schemes!

General	Source	Selection	Display	Symbology	Fields	Definition Qu	Jery	Labels	Joins & Re	elates	Time
Show:			Draw oua	antities using	ı color t	to show valu	Jes.			_ Ir	nport
Feature	-	I I	Fields	-			_	- Classifica	tion		
Categor			Value:	D004				0.000.000		(lenk	e)
Quantities Graduated colors			value.	D004	D004 -			Natural Breaks (Jenks)			
	uated syn		Normalizat	ion: D001		•		Classes:	5 👻	Clas	ssify
	ortional sy										
Dot o		· · · · ·	olor Ramp	:		-					
Charts				_							
Multiple	e Attribu	tes	Symbol	Range			Lab	el			
			(	).105365854 -	0.38847	7366	0.10	)54 - 0.388	35		
			(	).388477367 -	0.55919	1176	0.38	86 - 0.558	2		
				).559191177 -			0.55	693 - 0.699	99		
11	6 9.3	A 42 T		).699883224 -				00 - 0.84			
Č	C.	June 1		).841141627 -	1.00000	000	0.84	12 - 1.000	)		
1A	5	15									
$r / \gamma$											

## 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.

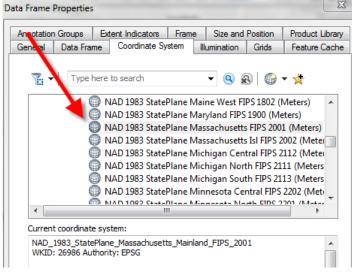
You will need to know the best coordinate system to use for your area. In the case of Massachusetts, we will use the Massachusetts State Plane (NAD83) – meters coordinate system. If you don't know what coordinate system to use, use this resource:

http://www.geo.hunter.cuny.edu/~jochen/gtech201/lectures/lec6concepts/map%20coordinate%20systems/how%20 to%20choose%20a%20projection.htm it is a quick read that gives you an understanding of what needs to go into selecting a projection, and at the end provides a table.

- 1. Click on View → Data Frame Properties.
- 2. Click on the Coordinate System tab.
- 3. Scroll down till you find the **Projected Coordinate Systems** folder. Make sure you are not still in the *"Geographic Coordinate System"* folder.
- 4. Scroll down to the State Plane folder open that folder and select NAD 1983 (Meters) from the list:

Annotation	Groups	Exte	ent Indicators	Frame	Size and	Position	Product Libra
General	Data Fra	me	Coordinate Sy	stem	Illumination	Grids	Feature Cac
7	Type	here t	to search		- 🭳 🕯	3 💮	- 🔆
						-	
	E State		ne 1927 (US Feet)				^
	-		1927 (03 Feet) 1983 (CORS96)		-+)		
			1983 (CORS96)		-		
	-		1983 (CORS96)		-		
			1983 (Intl Feet)		4		
			1983 (Meters)	-			
			1983 (US Feet)				
	-		1983 HARN (Ir				
			1092 LIADNI (N				-

5. Find NAD\_1983\_StatePlane\_Massachuestts 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! You have successfully found AFF and Census data, downloaded and edited them to be used in ArcGIS, joined them together, and mapped the data for future analyses. This routine of data search and prep might sometimes take longer than creating the map, but doing it correctly is important to assure that conclusions drawn from its map(s) are sound.