

US Census Bureau TIGER/Line Shapefiles

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Good Morning, I'd like to thank MEGUG for inviting me today.

Goals

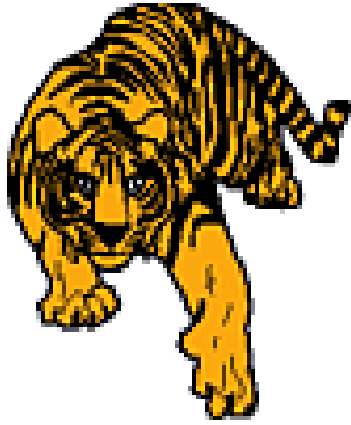
- Background of TIGER files
- Shapefiles
- How you can use shapefiles
- The limitations of shapefiles
- Types of shapefiles available and where can you find them
- Schedule
- How to connect census data to shapefiles
- How to compare 2000 and 2010 tracts

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Today I'm going to discuss the following information, 1. TIGER, including a background or history, and an update on the realignment of the files. Next I'll talk about shapefiles, how to use them, their limitation, the types of census shapefiles available, where you can find them and a schedule of release. And then finally I'll discuss how to connect shapefiles to census data (like AFF data).

TIGER Background



- Digital database
- Adapts the theory of topology
- National coverage



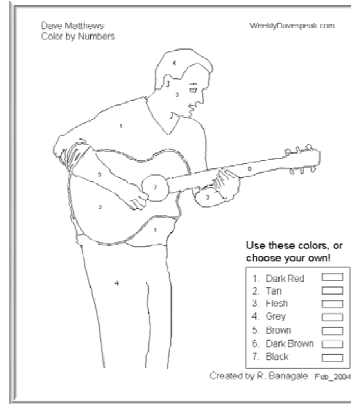
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Before we begin let's take about the TIGER/Line shapefiles, I should provide you with a little background on the TIGER files. TIGER/Line files are not maps!!! The TIGER files are a digital database, an organized collection of data for the purpose, in the case to assist the census bureau with performing our job, counting everybody in the right place. The TIGER/Line shapefiles are extracts from the TIGER database. TIGER stands for Topologically Integrated Geographic Encoding and Referencing. The TIGER files adapts the theory of topology. Think of topology as the structure of the TIGER database that defines the locations and relationship of all the features in the database to each other as well as geographic entities that we tabulate data too. The TIGER file is a National database. There's lots of information on the TIGER/Line files on our TIGER web page off of the home page.

2010 Census TIGER/Line shapefiles

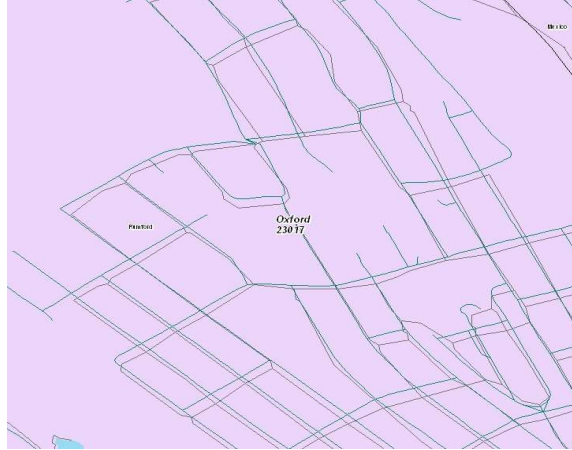
- Extracts from the TIGER/Line files
- Designed for use with GIS software



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Census Bureau TIGER/Line Shape files are extracts of selected geographic and cartographic information from the Bureau's MAF/TIGER database. The TIGER/Line shape files are designed for use with GIS software. The GIS software provides you with the tools to make maps. Think of it like this. Everyone remembers the color by number paint sets. Well think of shapefiles as the outline between the areas and as the number that fills in an area. The numbers tell us the color and we can think of that like census data.

TIGER has been spatially enhanced



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We just completed the Census. Prior to the Census beginning in 2003, we hired the Harris Corporation to spatially enhance the TIGER/Line files as part of our MTAIP. Once completed the TIGER/line features, such as roads, rail and rivers were spatially enhanced to an accuracy of 7.6 meters. The result, a spatially accurate line file that we can use to assist us with census operations, such as GPS map spot collection of housing units, as well as working with partners and provide them with this product which helps with better work performance and easier data sharing. A win/win for all involve. So keep this in mind because now if you attempt to compare a 2000 shapefile with a 2010 shapefile you may have spatial alignment issues. Also keep in mind the number of census blocks in your community most probably increased because the MTAIP added and corrected many road, rail and water features that previously did not exist in our database. In 2000 there were over 8 million blocks in 2010 there are over 11 million blocks in the database. This info is available on our website.

Use Census data w/ TIGER line Shapefiles

- Thematic maps



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So now lets go back to our goals. #1. How you can use shapefiles. The possibilities are truly endless. The first thought that comes to mind is creating a thematic map to help you think about what is occurring along the landscape. Heres a thematic map of the number housing units by block in Rumsford, ME.

- Research and analysis
- Environmental
- Social
- Economic



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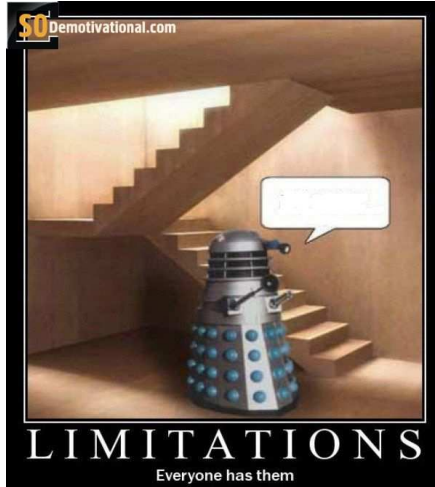
We don't often work on end product maps other than for census purposes and programs (delineations, assignment areas based on pop so we can determine the costs of the program), but over the years I have heard about people using our data for a variety of purposes.

The first thing that comes to mind is using census data and maps to research and analysis ideas. For example, an Environmental example I heard of: # of HU's in a block or block group to help understand how septic sewage effects water quality.

Social example: Race to make decisions on where to place a business. Information on age, senior citizens, may help a community determine where to place a nursing home.

Economic example: Block grant information is based on HU and population numbers by block. Demographic information to help cite a business. So just think of all the possibilities that a map with demographic information may help with any task that you are doing.

Shapefile Limitations



- Limited attribute information
- May have to manipulate your external data
- Only as good as the tools used to create them.

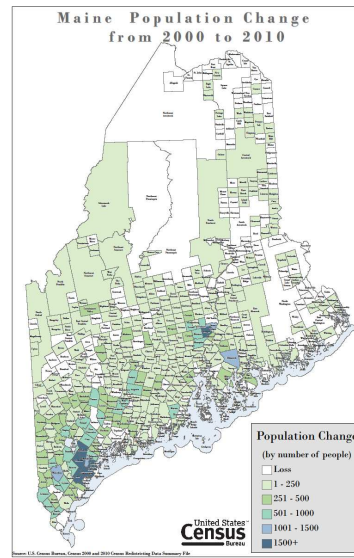
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1. TIGER/Line files have limited attribute information.
2. Which means that you have to manipulate your external data and then attach that data to the shape files
3. Shape files are only as good as the tools used to create them. No warranty, expressed or implied, is made with regard to the accuracy of the data in the TIGER/Line Shapefiles.

SHAPEFILES USAGE

- Internal Census Operations
- External Census Projects



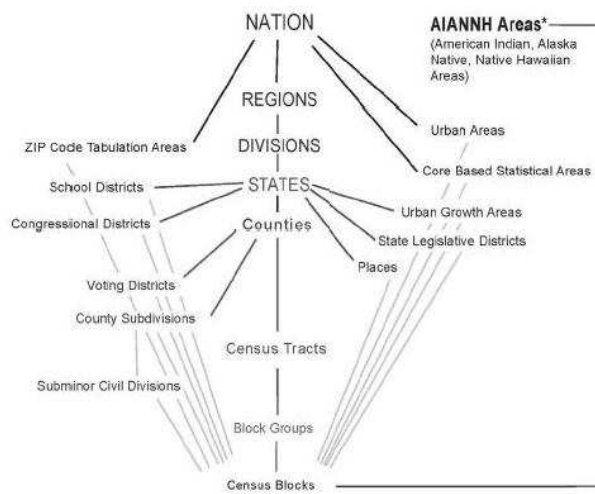
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Internal: we used extracts of the TIGER/Line file (shapefiles) to help us with a variety of census projects and program. For example, we determine the best location of our LCO offices with the help of shapefiles, within the LCO we delineated, assignment areas based on pop so we can determine the costs of the program.

External: Many of the projects and programs that we worked with local communities involved in some form the use of shapefiles. For example, the LUCA, NC, Redistricting, PSAP. All projects we performed with local governments also used shapefiles.

The Census Bureau began releasing shapefiles in 2007 because the shapefile became a standard file for GIS applications. Whether were using our own shape files to make thematic maps or using some other source's shapefiles to correct our files, shapefiles have become the primary type of GIS file that we use.

Figure A-1.
Standard Hierarchy of Census Geographic Entities



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The upside down census tree showing all of the available geographic layers available from the census bureau.

How are shapfiles organized



- Statistical
- Legal

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So now lets talk about the type of shapefiles that are available and where you can find them. Census Bureau shapefiles on the internet are organized by legal entities and statistical entities. For example State Legislative districts are legal entities and maps showing tract boundaries are statistical entities.



Statistical Entities



- Blocks and Block Groups
- Census Designated Places
- Census Tracts
- Zip Code Tabulation Areas



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Statistical Areas

Blocks and Block Groups

Census Designated Places

Census Tracts

Zip Code Tabulation Areas

All of the file types are available for download on our website.



Legal Entities



- American Indian reservations (both federally and state-recognized)
- Congressional districts
- Counties and equivalent entities (except census areas in Alaska)
- Incorporated places
- Minor civil divisions (MCDs, legal county subdivisions)
- School districts (elementary, secondary, and unified)
- States and equivalent entities State legislative districts (upper and lower chambers) Subminor civil divisions (sub-MCDs, in Puerto Rico only)
- Urban growth areas (in Oregon and Washington)
- Voting districts



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Legal Areas

American Indian off-reservation trust lands

American Indian reservations (both federally and state-recognized)

American Indian tribal subdivisions (within legal American Indian areas)

Congressional districts

Counties and equivalent entities (except census areas in Alaska)

Hawaiian home lands

Incorporated places

Minor civil divisions (MCDs, legal county subdivisions)

School districts (elementary, secondary, and unified)

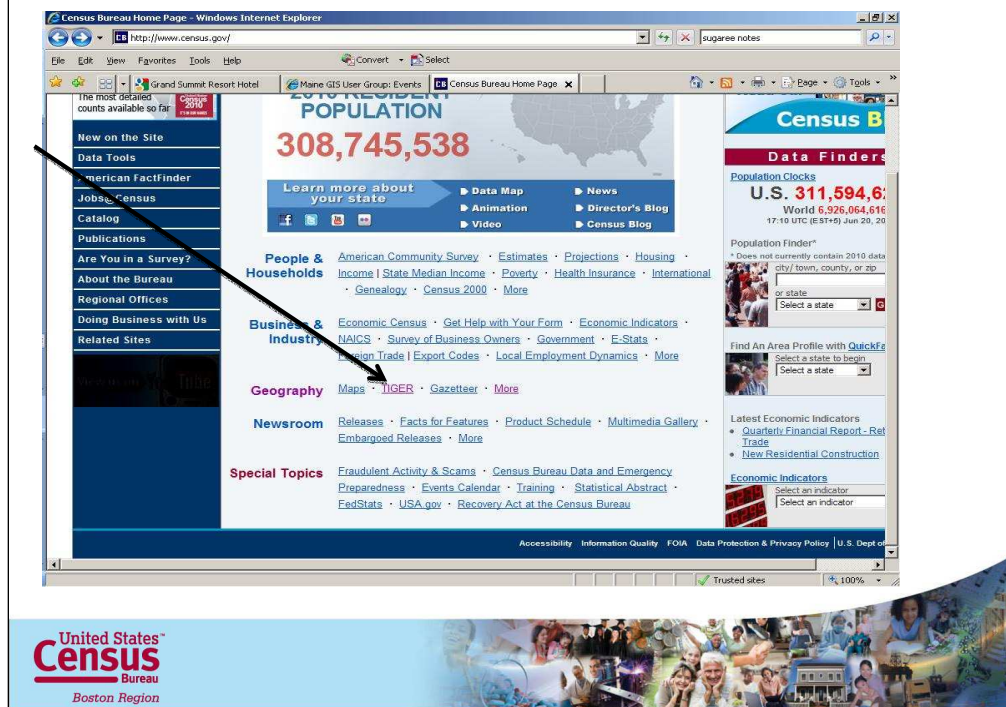
States and equivalent entities State legislative districts (upper and lower chambers)

Subminor civil divisions (sub-MCDs, in Puerto Rico only)

Urban growth areas (in Oregon and Washington)

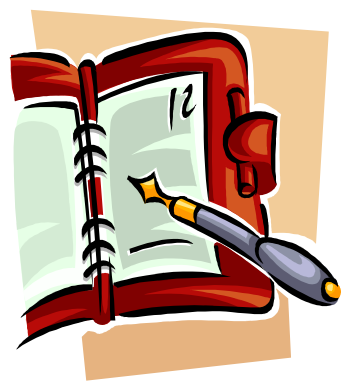
Voting districts

What shapefiles are available and where can they be found?



The TIGER/Line Shapefiles are available free to download from our website. Just click on the TIGER link on the Census Bureaus home page. On this TIGER there's also lots of information regarding documentation, history, geography and maps in pdf format. As well as information on the MAF/TIGER Accuracy Improvement Project and how this work increased the # of blocks in our database. In addition there is a page regarding on how to download TIGER/Line Shapefiles, how to download 2010 census, ACS data and other Census data to use with TIGER/Line shapefiles. Including how to join census data to TIGER/Line shapefiles and creating a thematic map. I can show you these webpages on the internet.

Schedule for releasing shapefiles



- 2010 Census Redistricting Data Files
- National Summary File of Redistricting Data
- Summary file 1 by ZIP Code Tab Areas
- 2011 Island Areas Summary File
- 2012 Urban Area Update
- 2013 113th CD Summary File
- Future TBD – PUMS File

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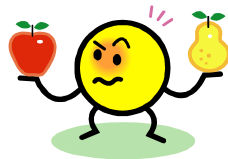


The current schedule also is located on the 2010 TIGER/Line Shapefiles Main Page.

Data Product Supported	Geography Released	TIGER/Line Shapefiles Release Dates
1. 2010 Census Redistricting Data (P. L. 94-171) State-based Files to Block for the U.S. and Puerto Rico Completed		
2. National Summary File of Redistricting Data/Summary File 1 National Files Completed		
3. Summary File 1 by 5-digit ZIP Code Tabulation Areas Completed		
4. Island Areas Summary File Island Areas released in 2011		
5. Urban Area Update, Urban Areas released in 2012.		
6. 113th Congressional District Summary File by 113th Congressional Districts released in 2013.		
7. Public Use Microdata Sample (PUMS) File by Public Use Microdata Areas To Be Determined		

How to compare 2000 Tracts/blocks with 2010 Tracts/blocks

http://www.census.gov/geo/www/2010census/tract_rel/tract_rel.html



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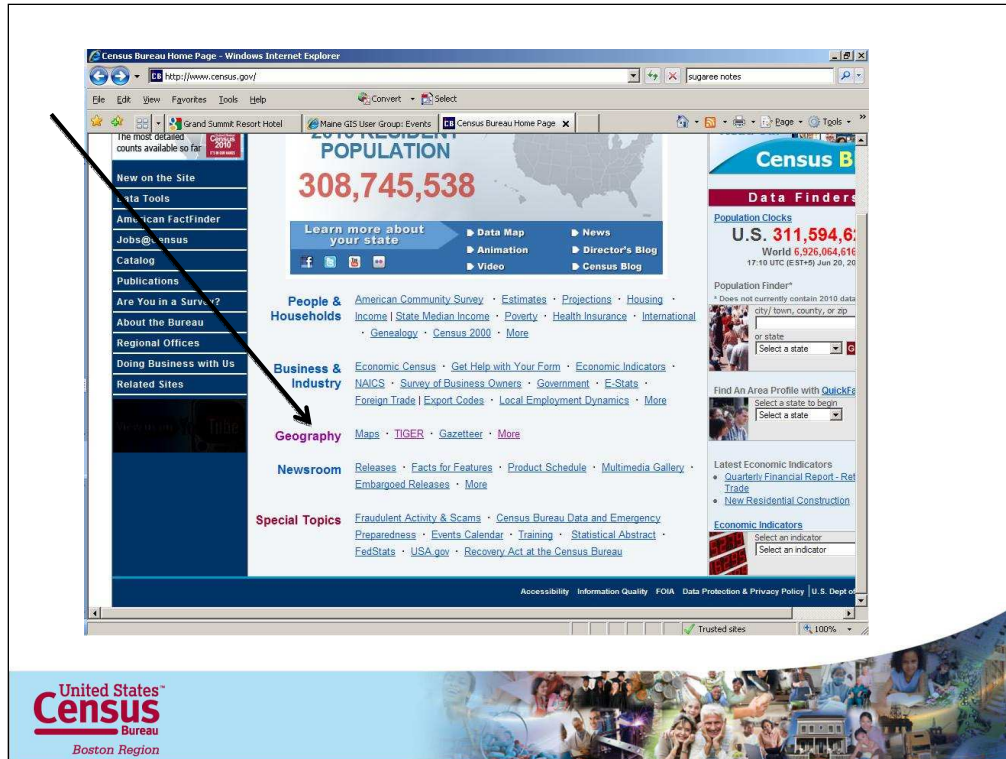


Go to this website

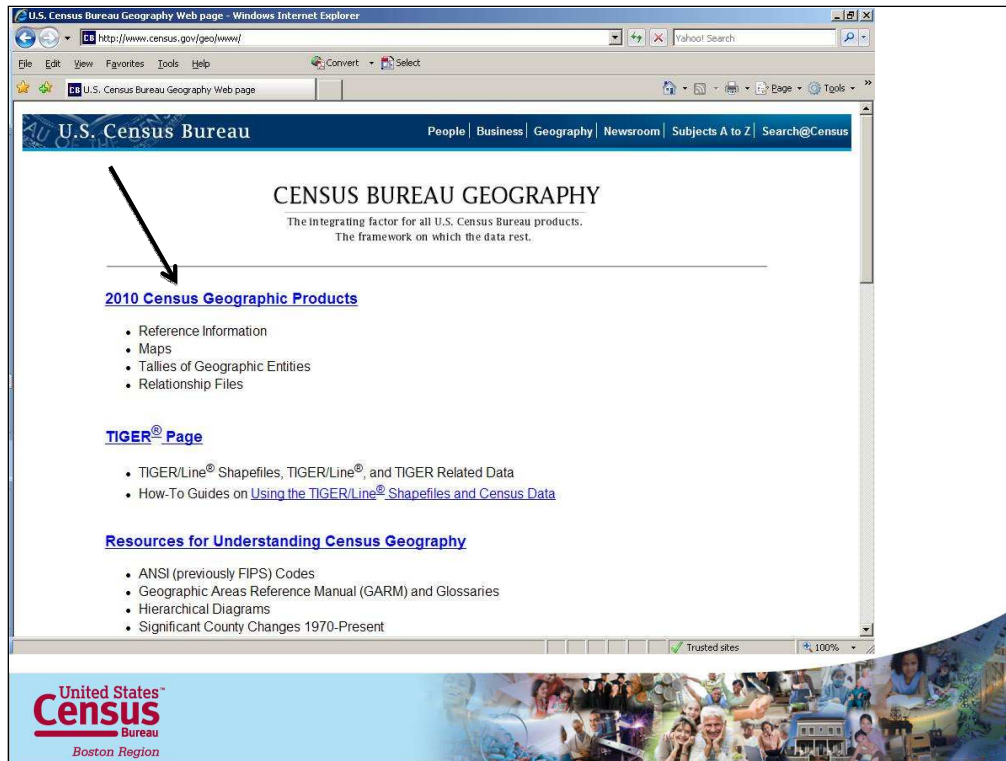
http://www.census.gov/geo/www/2010census/tract_rel/tract_rel.html

Find it by going to the home page, click on the geography link. Now I'll go through a step by step process of view this information on the web.

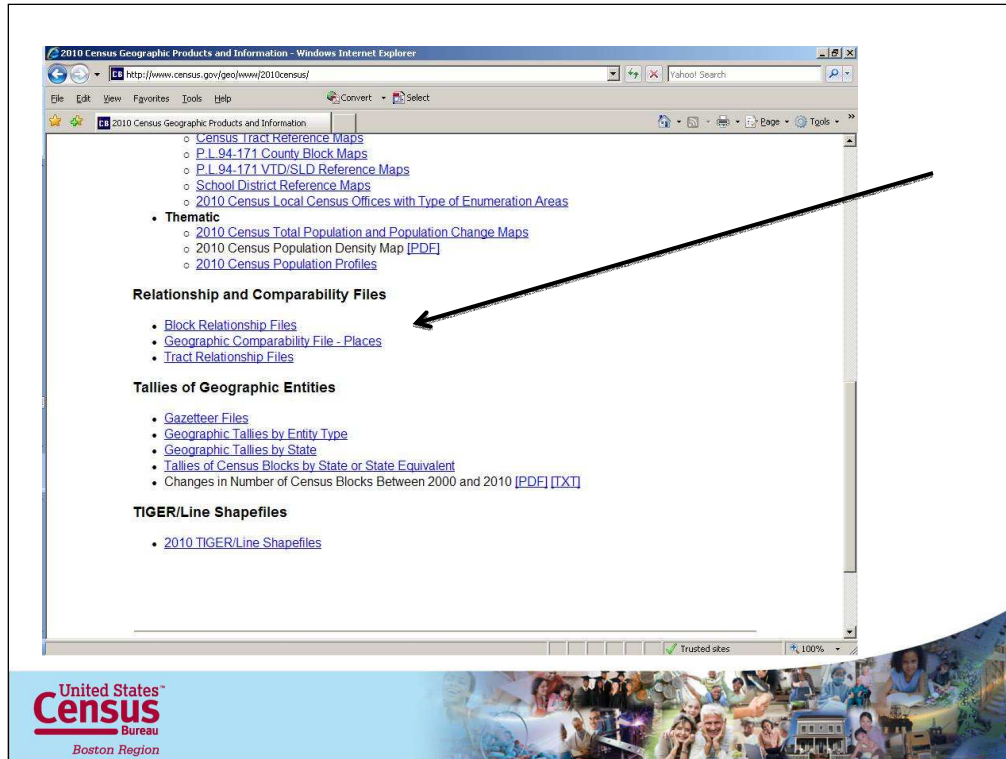
The field labelled "Part00" indicates if the tract is Whole (within) or Part (Part of).



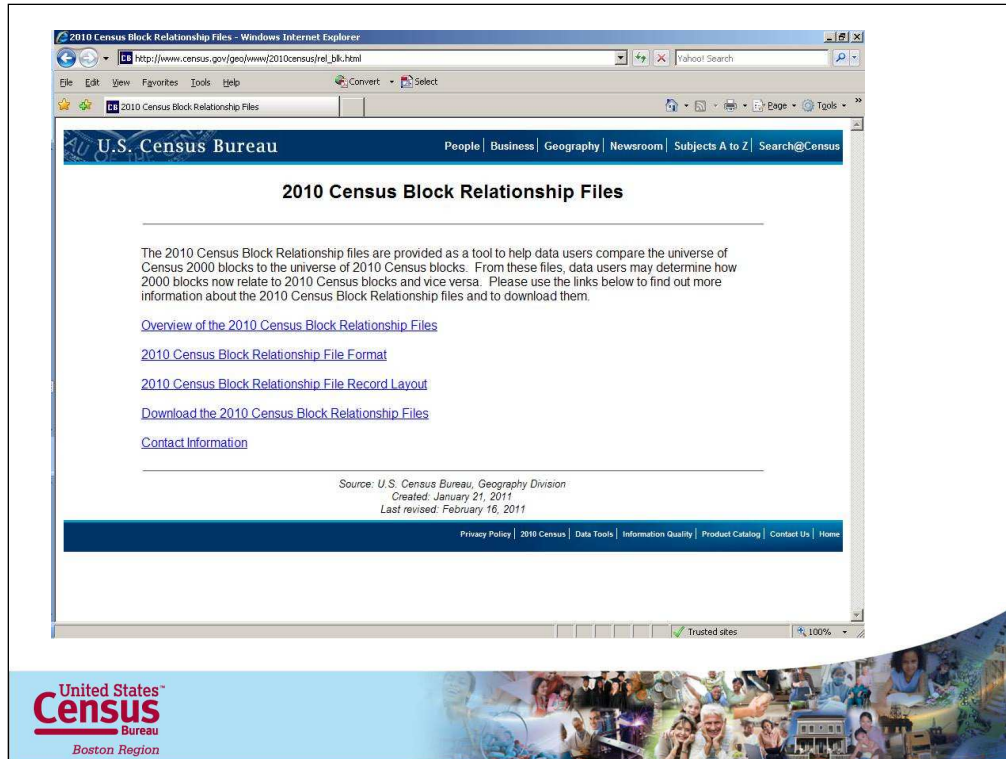
Find it by going to the home page, click on the geography link



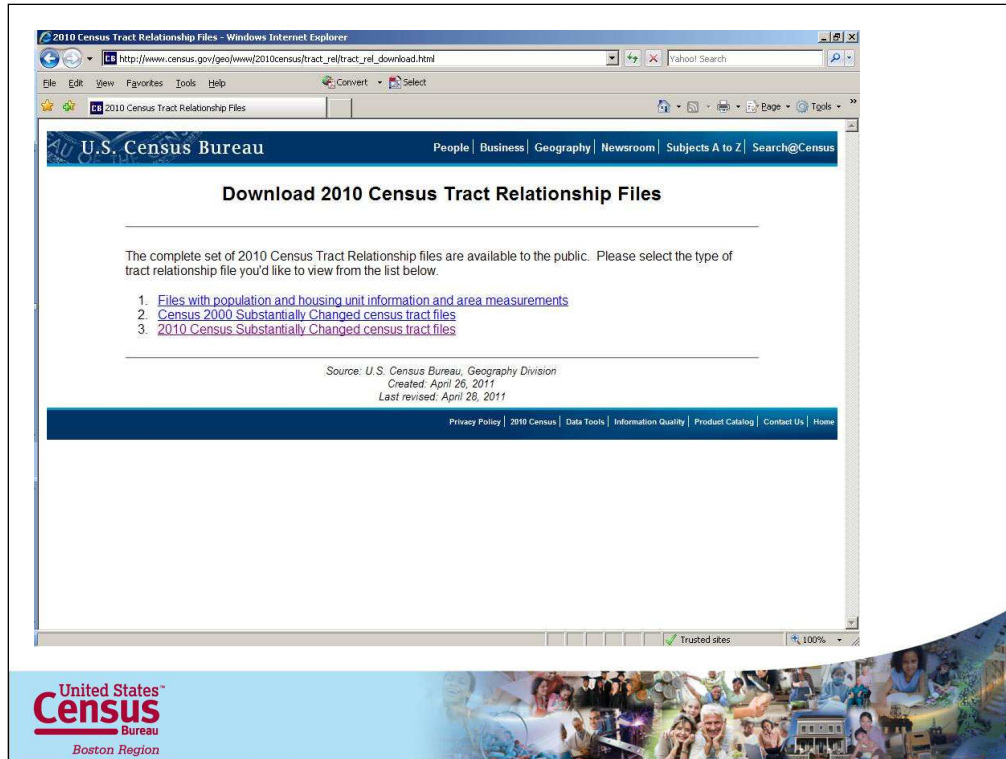
Click on the 2010 Census Geographic Products link



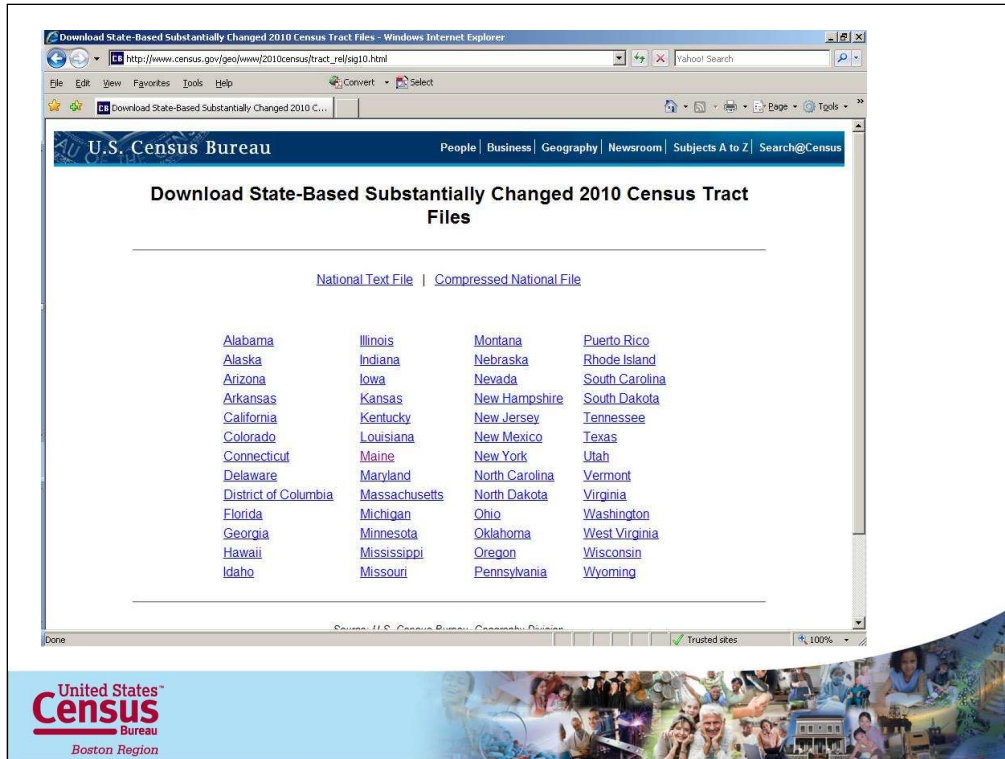
On this 2010 Geographic Products and Information page scroll down to almost the bottom of the page where it says “Relationship and Comparability Files.” Here’s where you can choose between information on block or tract relationship files.



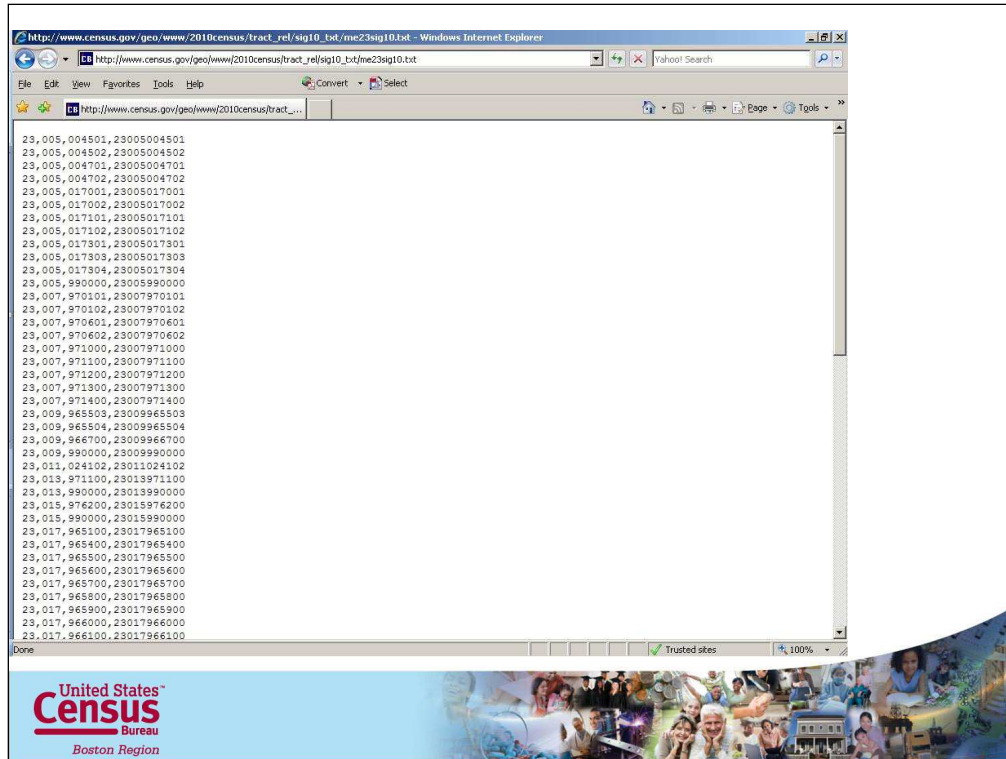
Note on this page there is information regarding overview, file format, record layout and downloading the info. The data is available in in ASCII format. This same information is displayed on the 2010 Census Tract relationship page. So lets go into the 2010 Census Tract Relationship Files page.



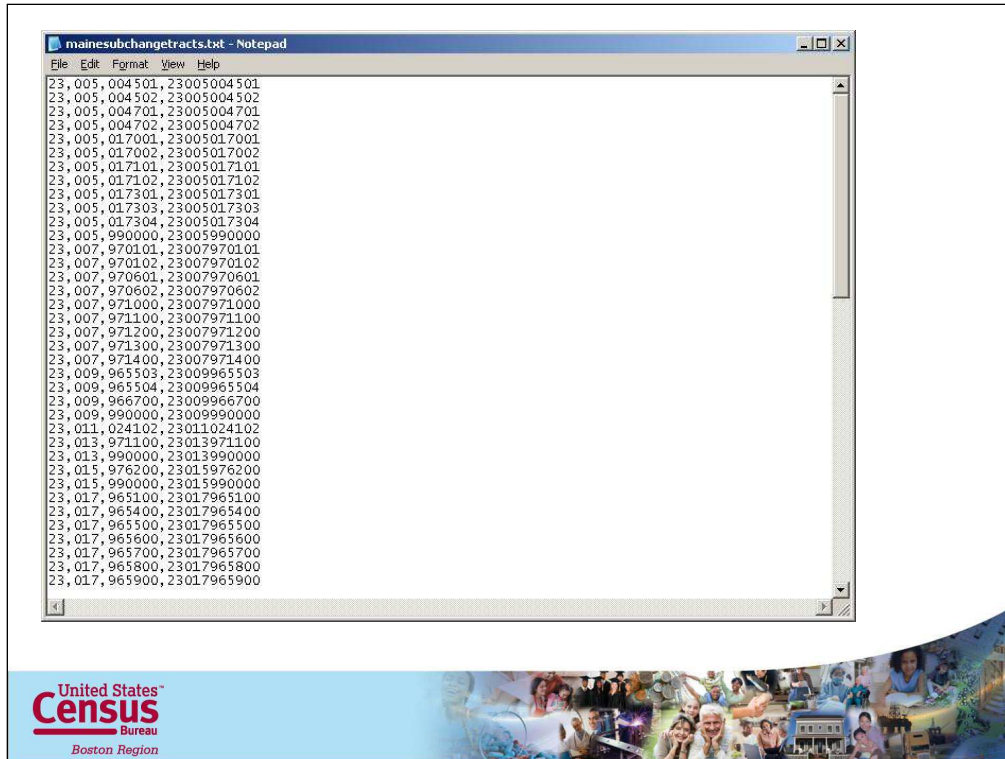
Now you have the choose between viewing the population and housing unit info and area measurements files, or either the 2000 or 2010 census tracts that have substantially changed. Choose one of these.



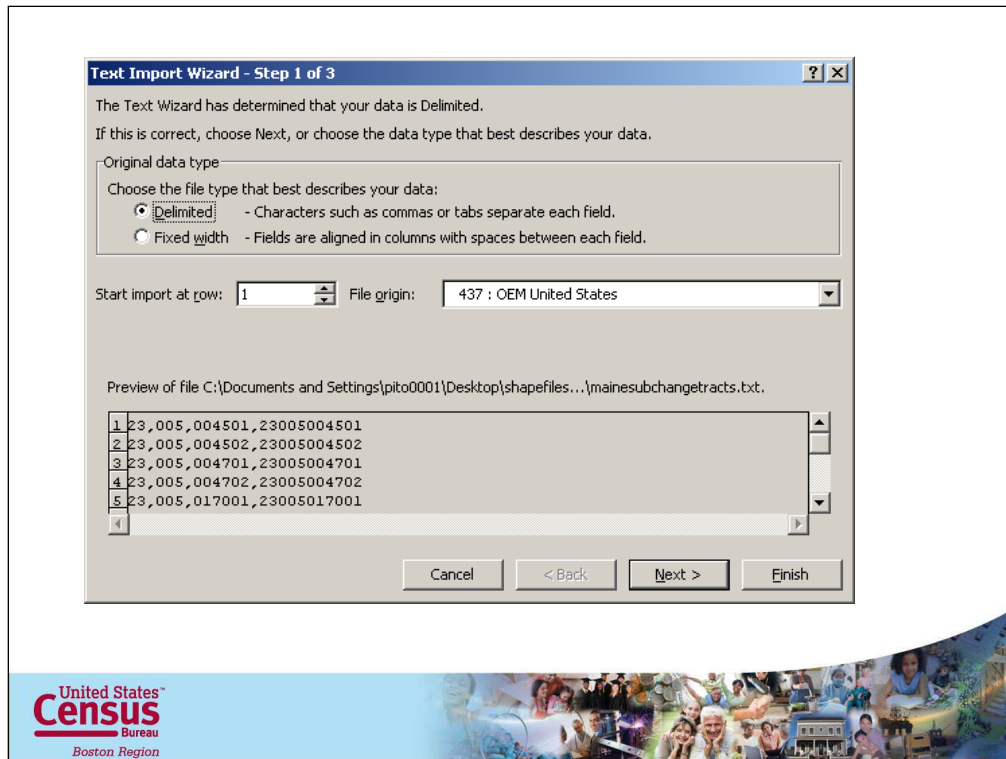
Choose your state: Maine



The file will come up as a text file. No worries. Either print this out the way it is or not down only the tracts your interested in, or tag it to your shape file to visually see where the changes have occurred. Keep in mind the fips information. Now lets copy and save it as a text file that we can use to join to our shapefile of tracts for maine. To do that copy and paste the information into a text editor.



Save it to your hard drive.



Open excel and open the new text file. This should automatically start the text import wizard. Click Next.

Text Import Wizard - Step 2 of 3

This screen lets you set the delimiters your data contains. You can see how your text is affected in the preview below.

Delimiters

☐ Tab
☐ Semicolon
☒ Comma
☐ Space
☐ Other:

☐ Treat consecutive delimiters as one

Text qualifier: {none}

Data preview

23	005	004501	23005004501
23	005	004502	23005004502
23	005	004701	23005004701
23	005	004702	23005004702
23	005	017001	23005017001

Cancel < Back Next > Finish

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The delimiters should be comma and make sure your text qualifier is none. Click Next.

Text Import Wizard - Step 3 of 3

This screen lets you select each column and set the Data Format.

Column data format

☐ General
☒ Text
☐ Date: MDY
☐ Do not import column (skip)

'General' converts numeric values to numbers, date values to dates, and all remaining values to text.

Advanced...

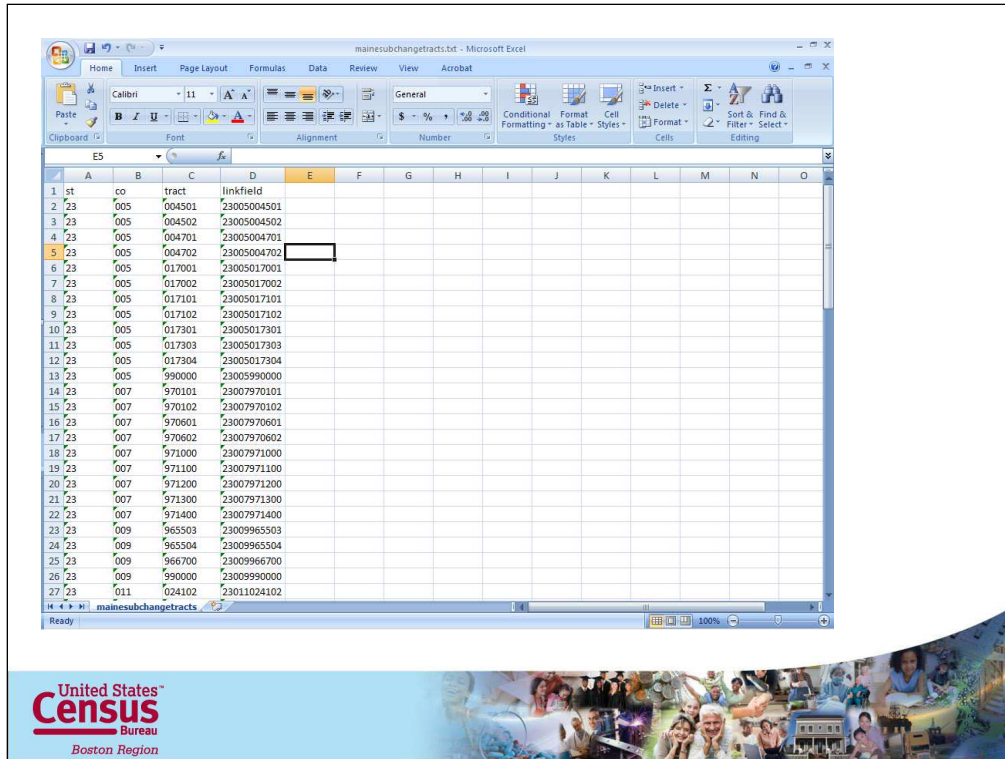
Data preview

Text	Text	Text	Text
23	005	004501	23005004501
23	005	004502	23005004502
23	005	004701	23005004701
23	005	004702	23005004702
23	005	017001	23005017001

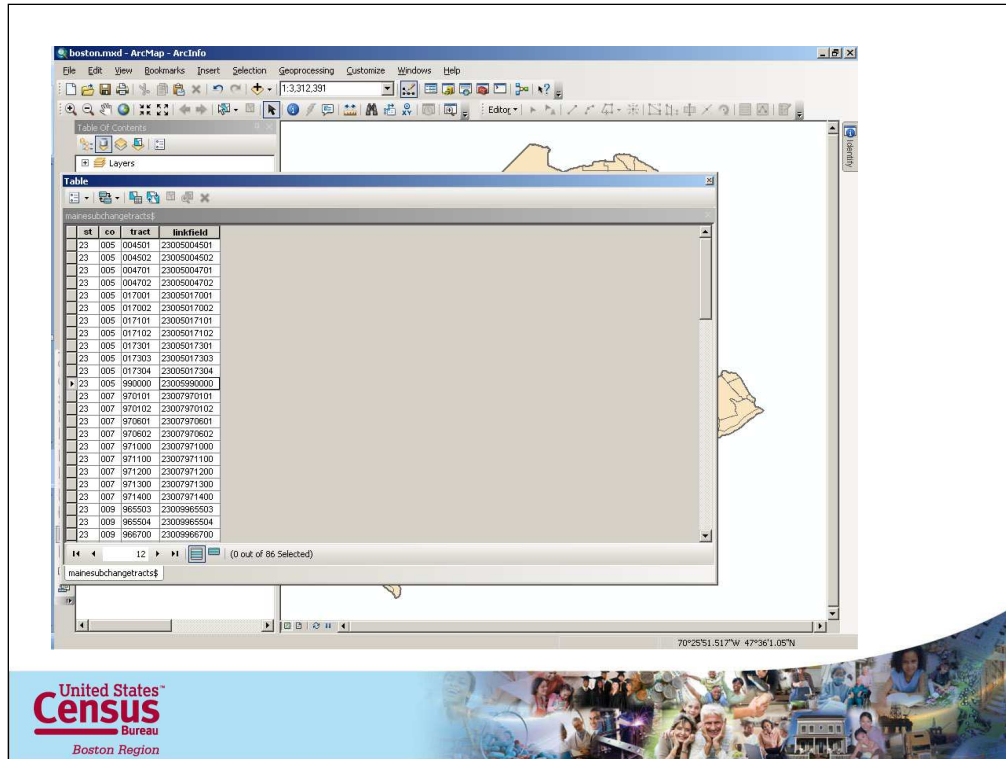
Cancel < Back Next > Finish

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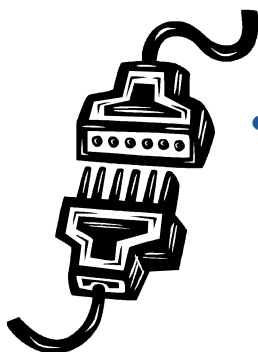
Make sure your fields are formatted in text. Click finish.



Wala. Maine substantially changed tracts in text format ready to attach to your shapefile. Make sure you input a header row and type the header names in. If you don't know what to add, the header information is available back at the 2010 census tract relationship files under the link 2010 census tract relationship file record layout. Note our linkfield that's the field we will use to join to our shapefile.

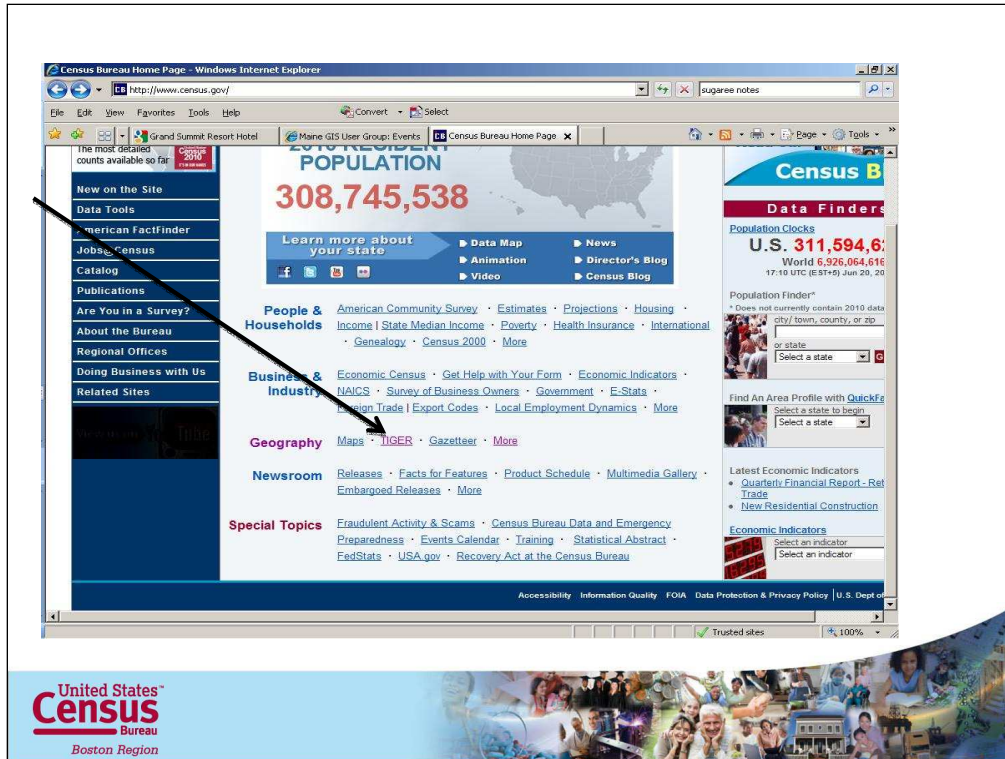


Important save the excel file as a excel 97-2003 workbook. This file type can be opened in ArcMap 10. Bring your tract shape files also. Look at the attribute table for both of the fields to confirm the link field. Heres the maine substantially changed tract text file with the linkfield column.

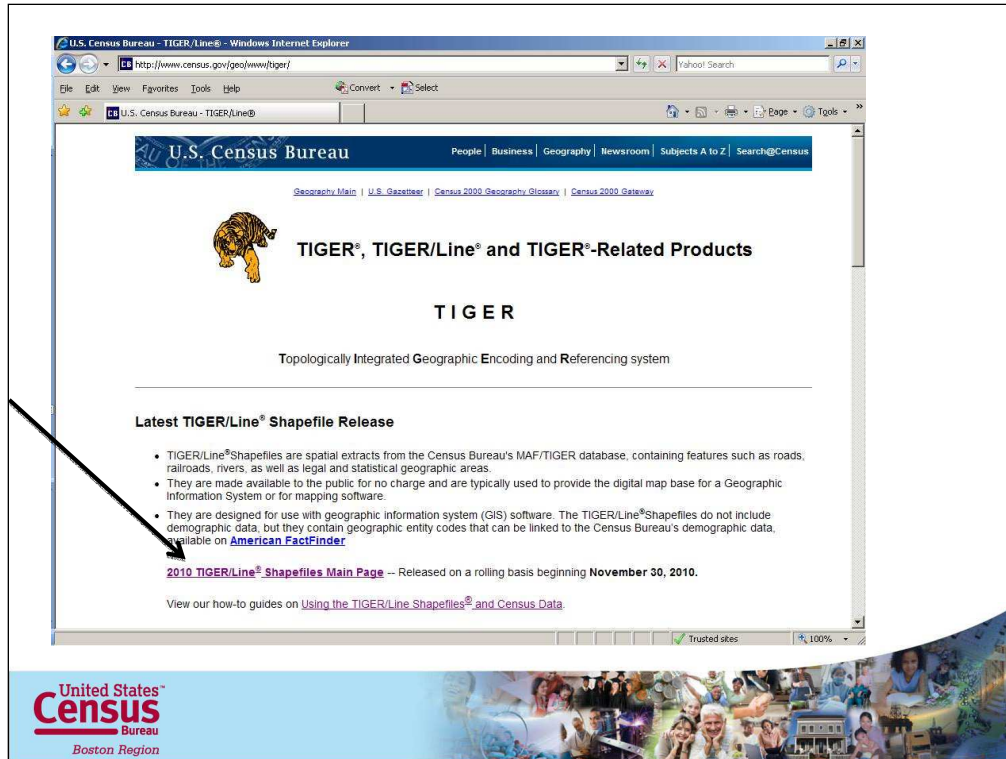


- Now download your shapefiles to link to the data.

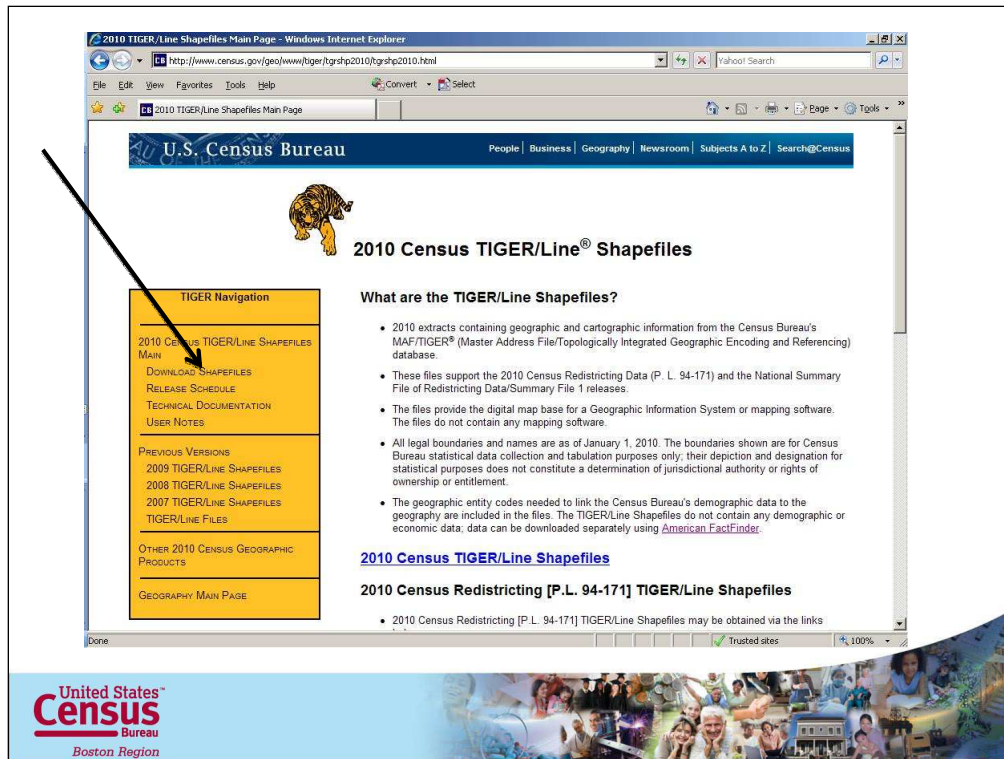




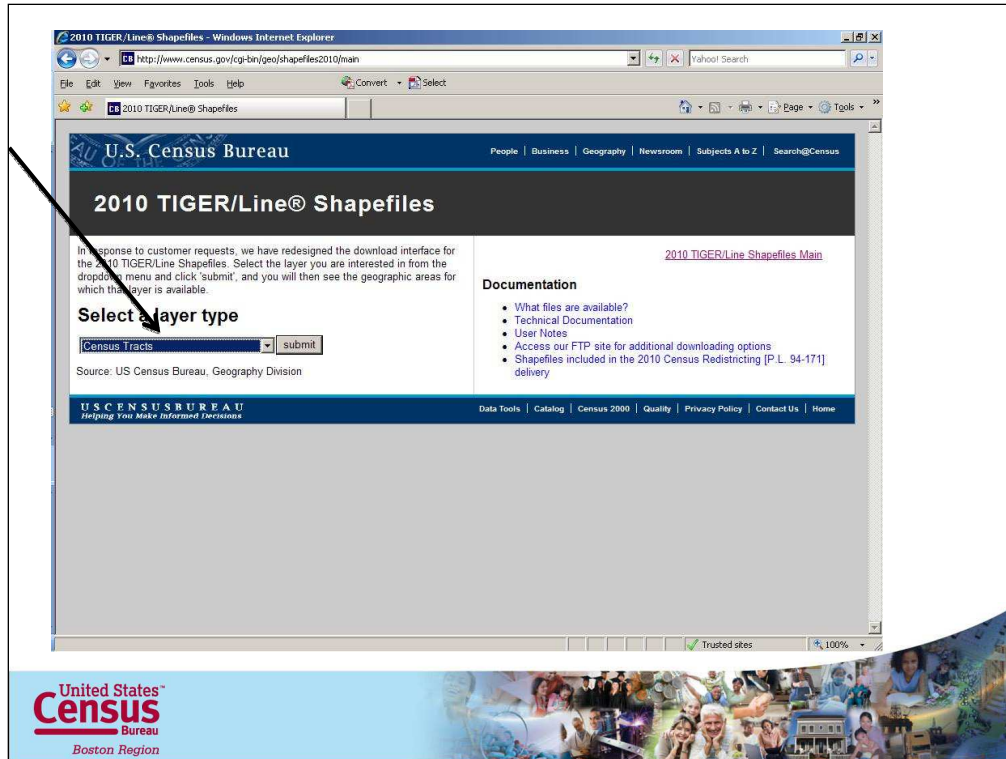
The TIGER/Line Shapefiles are available free to download from our website. Just click on the TIGER link on the Census Bureaus home page.



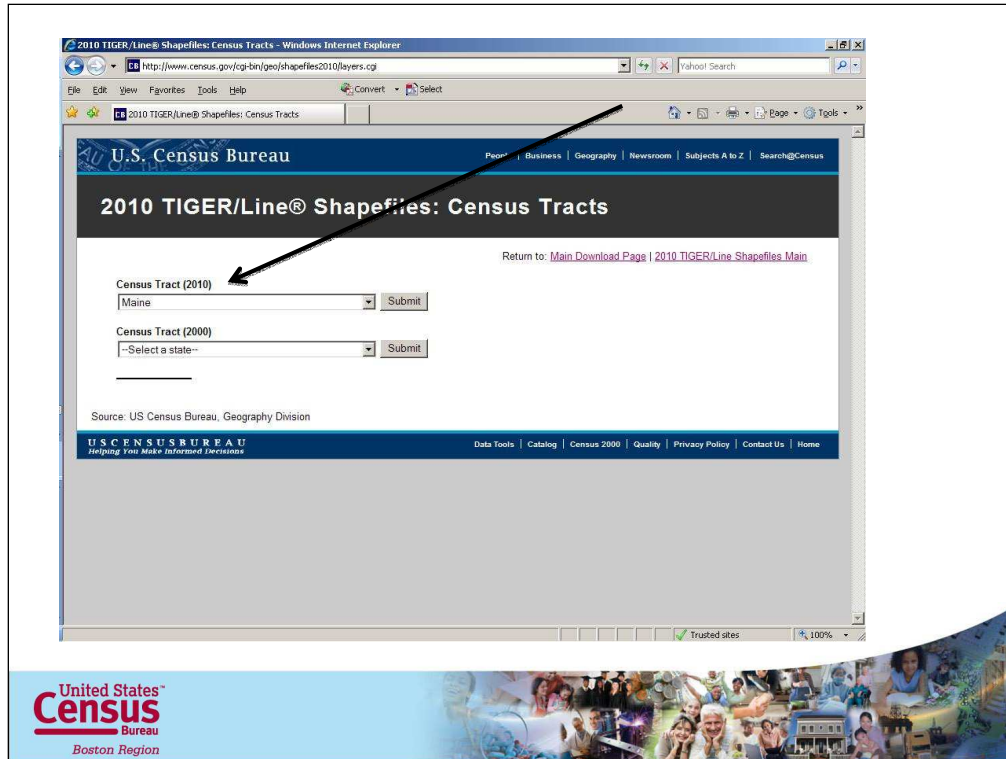
Click on the first link on this page



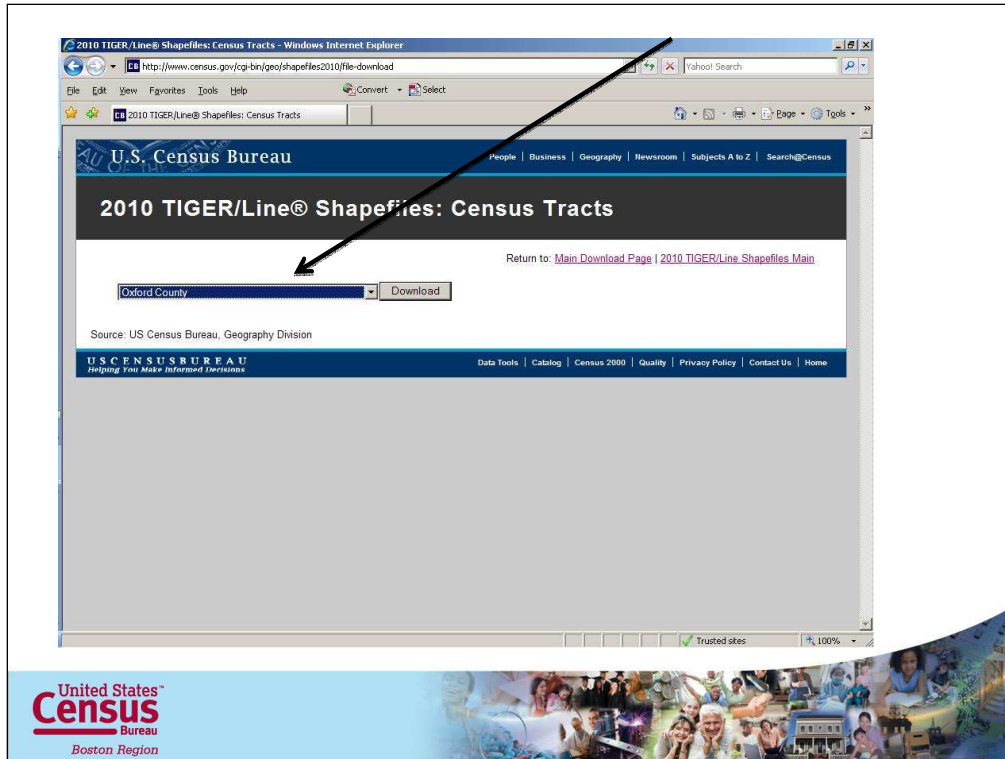
Click on the Download Shapefiles link on the left hand side of the page. Further down on this page you can choose the option of download entire state level shapefiles.



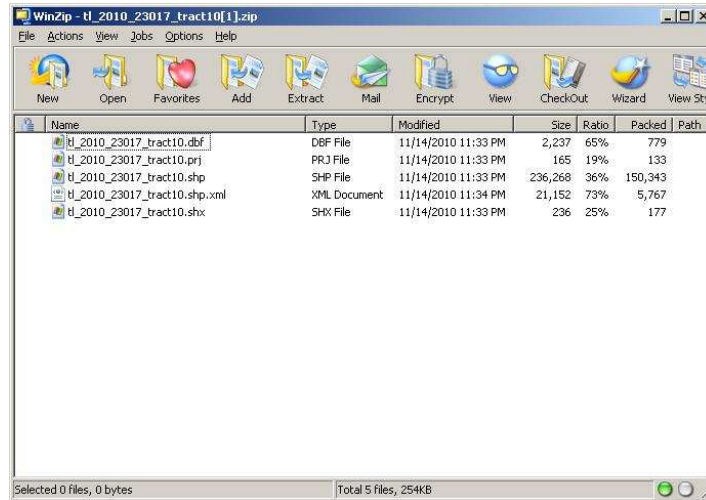
Choose the shapefile layer type that your interested in.



Be careful on this page because you have the options of downloading 2010 data or 2000 data.

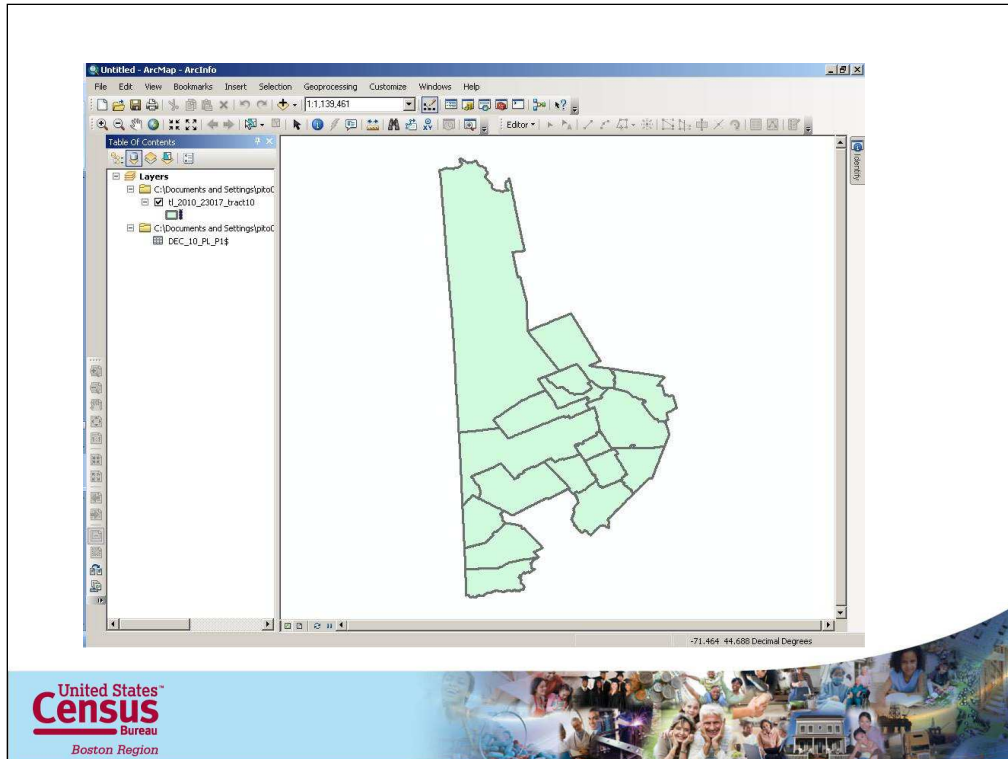


Choose your county and hit download.



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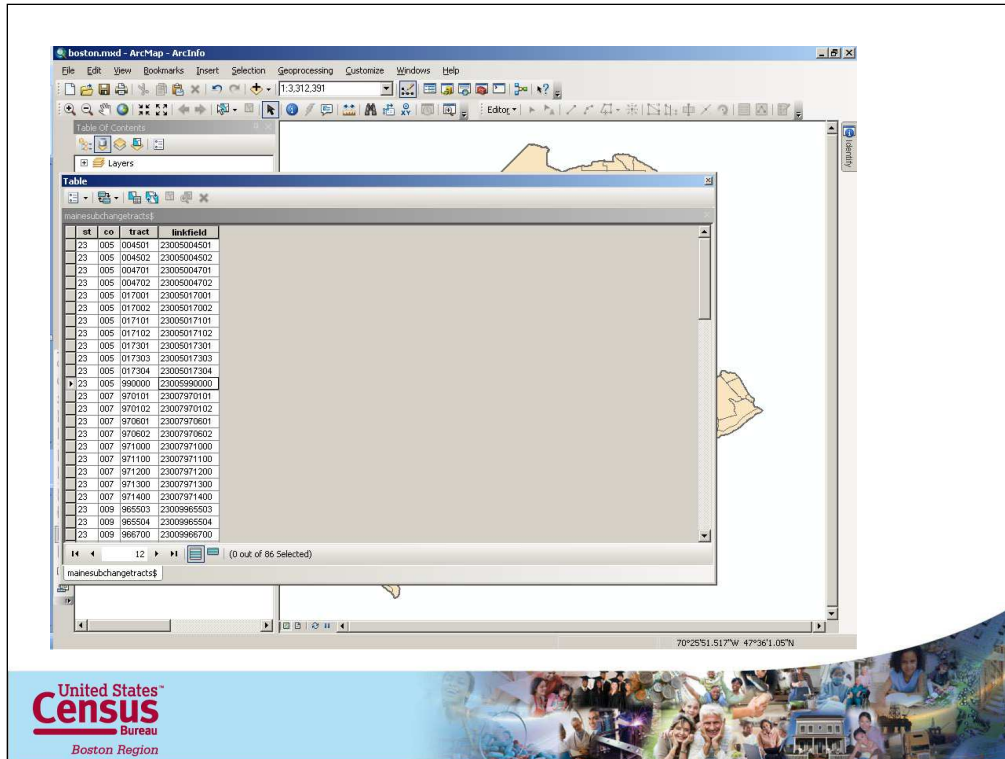
Here are the shapefiles. Save them to a folder on your computer.



Open the shapefiles in Arc

FID	Shape	STATEFP10	COUNTYFP10	TRACTCE10	GEOID10	NAME10	NAMELSAD10	MTFCC10	FURSTAT10	ALAND10	AREA10
0	Polygon	23	017	966100	23017966100	9661	Census Tract 9661	G5020	S	62783124	
1	Polygon	23	017	966900	23017966900	9669	Census Tract 9669	G5020	S	178827133	
2	Polygon	23	017	966200	23017966200	9662	Census Tract 9662	G5020	S	105601609	
3	Polygon	23	017	966300	23017966300	9663	Census Tract 9663	G5020	S	155236452	
4	Polygon	23	017	966500	23017966500	9665	Census Tract 9665	G5020	S	116655606	
5	Polygon	23	017	965600	23017965600	9656	Census Tract 9656	G5020	S	91255319	
6	Polygon	23	017	966400	23017966400	9664	Census Tract 9664	G5020	S	203680082	
7	Polygon	23	017	965800	23017965800	9658	Census Tract 9658	G5020	S	349178892	
8	Polygon	23	017	965900	23017965900	9659	Census Tract 9659	G5020	S	224148156	
9	Polygon	23	017	966600	23017966600	9666	Census Tract 9666	G5020	S	316522968	
10	Polygon	23	017	965500	23017965500	9655	Census Tract 9655	G5020	S	86276254	
11	Polygon	23	017	966800	23017966800	9668	Census Tract 9668	G5020	S	234633126	
12	Polygon	23	017	966000	23017966000	9660	Census Tract 9660	G5020	S	628036287	
13	Polygon	23	017	965700	23017965700	9657	Census Tract 9657	G5020	S	182310009	
14	Polygon	23	017	965100	23017965100	9651	Census Tract 9651	G5020	S	198693555	1
15	Polygon	23	017	966700	23017966700	9667	Census Tract 9667	G5020	S	151068513	
16	Polygon	23	017	965400	23017965400	9654	Census Tract 9654	G5020	S	305783898	

Open the attribute layers for the shapefile and the AFF data you downloaded from the website to confirm that you have two fields that you can use to link the data. In this case the attribute table for the tract shapefiles has a field titled GEOID10 that we will use to link the data.



Important save the excel file as a excel 97-2003 workbook. This file type can be opened in ArcMap 10. Bring your tract shape files also. Look at the attribute table for both of the fields to confirm the link field. Heres the maine substantially changed tract text file with the linkfield column.

Join Data [?] [X]

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

1. Choose the field in this layer that the join will be based on:

GEOID10

2. Choose the table to join to this layer, or load the table from disk:

mainesubchangetracts\$

☒ Show the attribute tables of layers in this list

3. Choose the field in the table to base the join on:

linkfield

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.

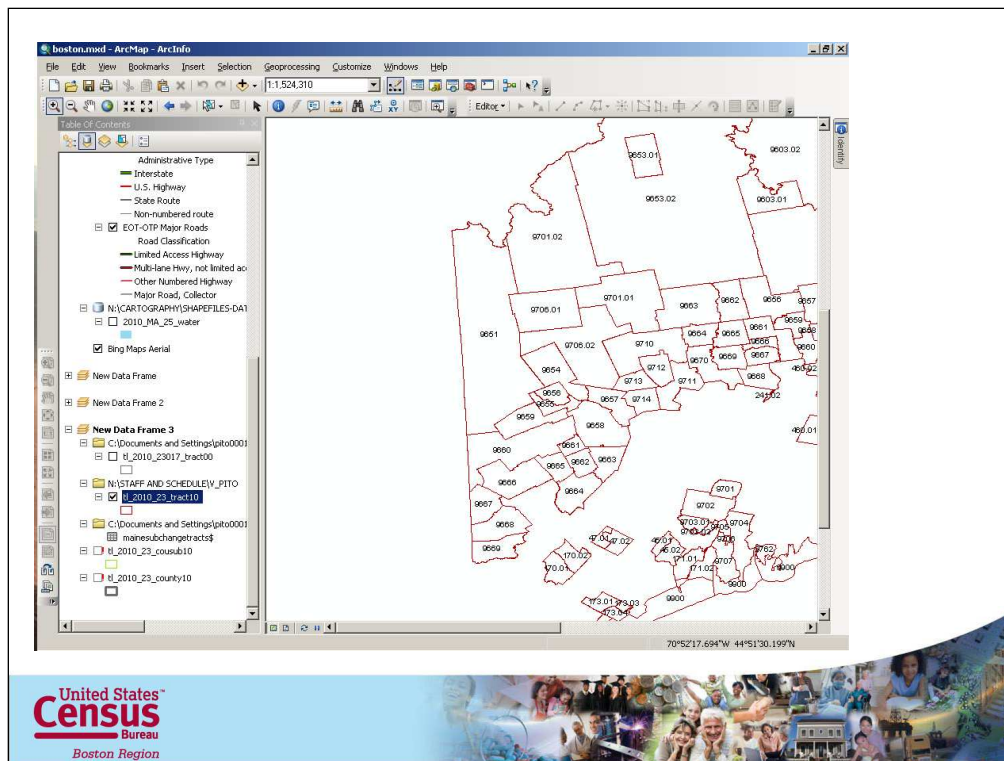
☒ Keep only matching records

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.

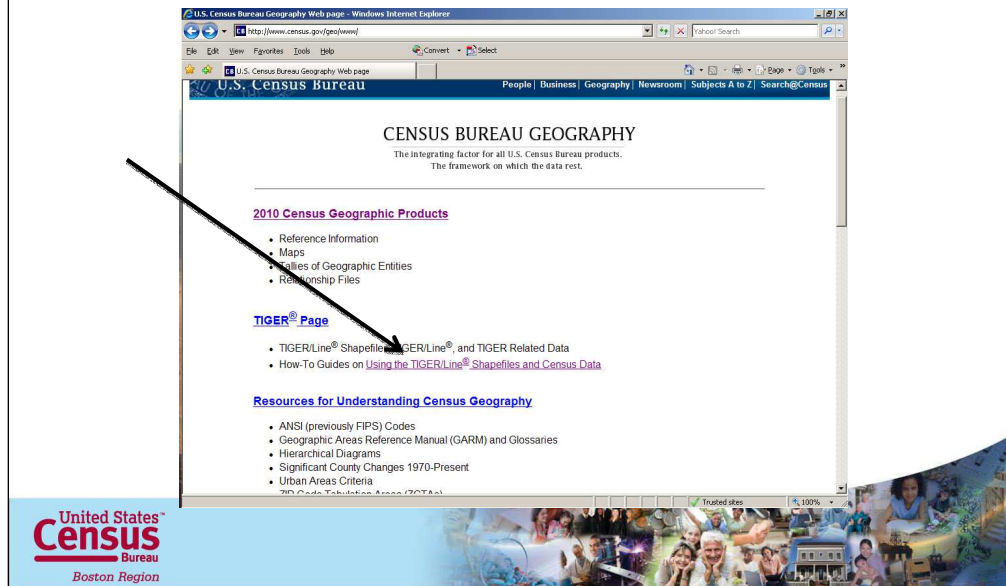
Validate Join

About Joining Data OK Cancel

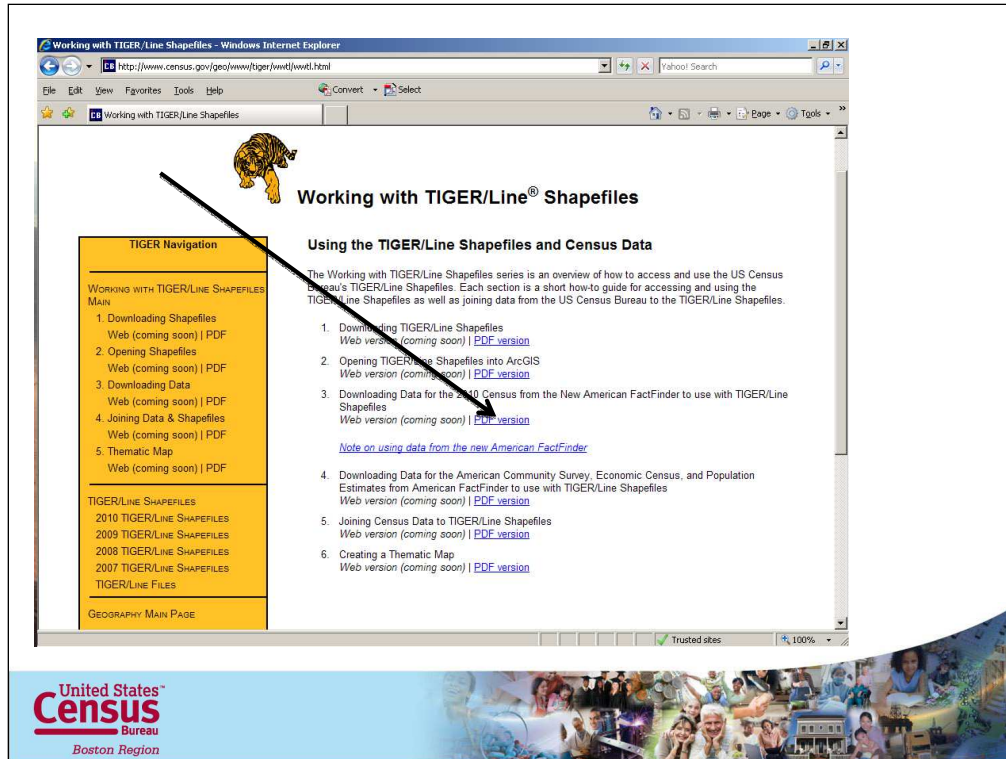




Link AFF data W/ TIGER Shapefiles



Go to the Census Bureau's Geography page and choose the How to guide link on this page.



Heres a list of how to guides. Choose the Downloading Data from the New American Fact Finder to use with TIGER/Line Shapefiles. Open Downloading PDF.

Table

DEC_10_PL_P1\$

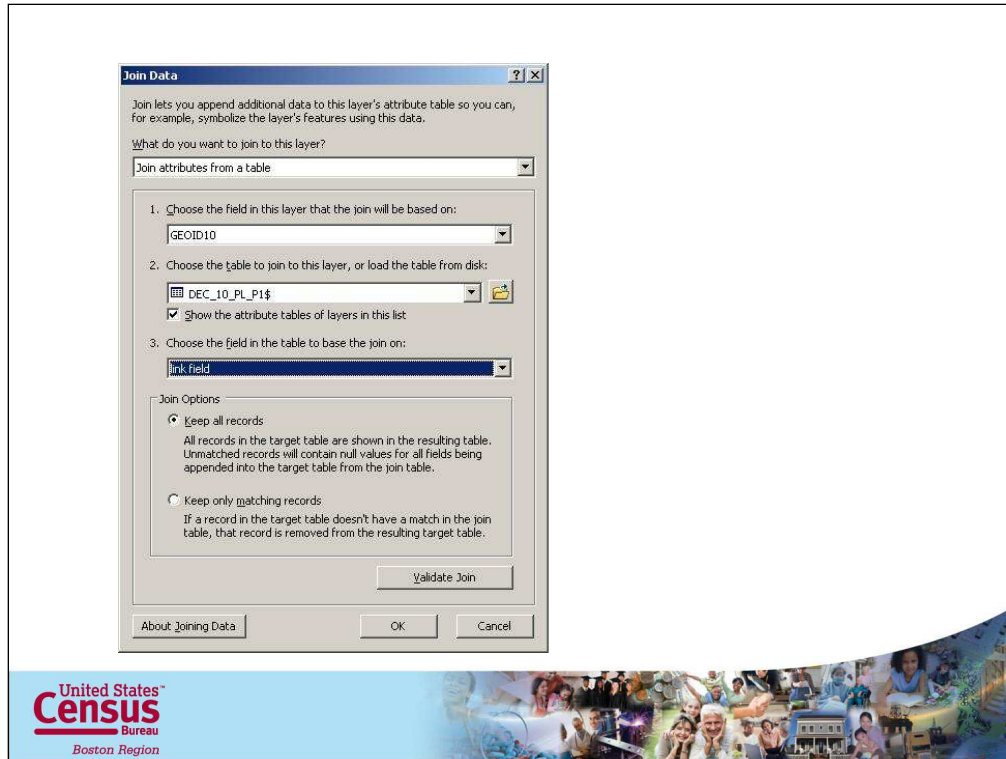
GEOid	link field	total pop
1400000US23017965100	23017965100	1587
1400000US23017965400	23017965400	3195
1400000US23017965500	23017965500	2215
1400000US23017965600	23017965600	3626
1400000US23017965700	23017965700	3510
1400000US23017965800	23017965800	3665
1400000US23017965900	23017965900	2988
1400000US23017966000	23017966000	3307
1400000US23017966100	23017966100	1812
1400000US23017966200	23017966200	5183
1400000US23017966300	23017966300	3425
1400000US23017966400	23017966400	5880
1400000US23017966500	23017966500	5014
1400000US23017966600	23017966600	3084
1400000US23017966700	23017966700	3449
1400000US23017966800	23017966800	2745
1400000US23017966900	23017966900	3118

(0 out of 17 Selected)

H:\2010_23017_tract10 DEC_10_PL_P1\$

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To make things simple I remove all of the extra fields to the right of the total population field and labelled our linking field “Link field.” The attribute data for the AFF comma delimited file has a field which we manipulated that also holds the geo id that we can use to link with the shapefile. We called it “Link Field.”

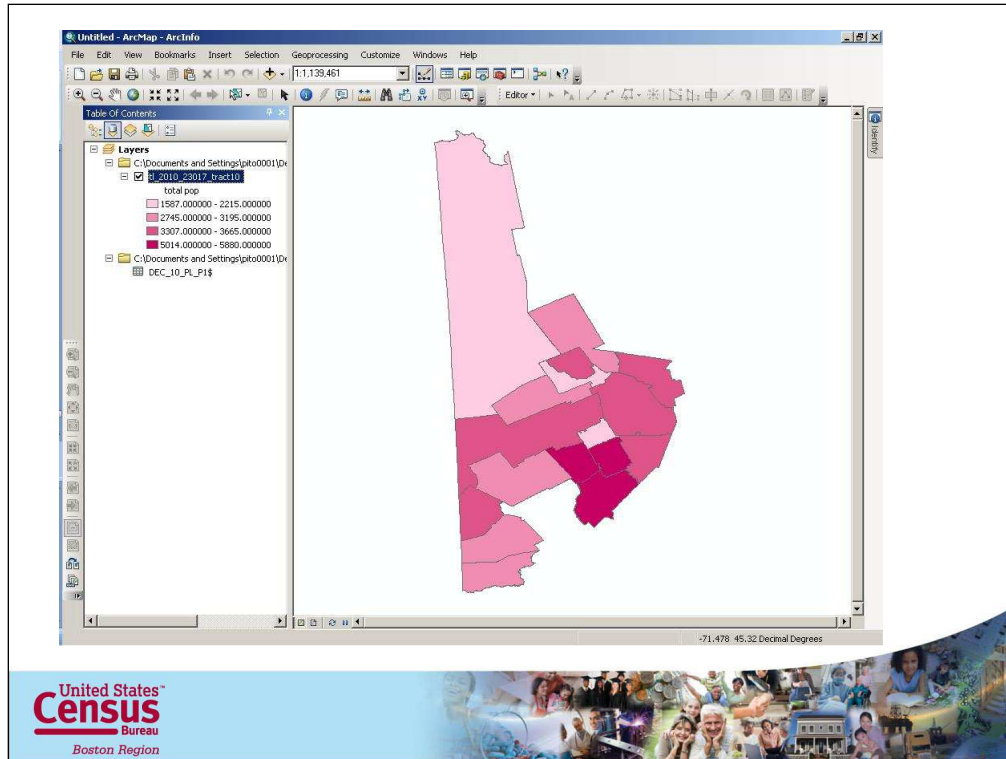


Now you've added your AFF data to ArcMap. Now in ArcMap right click on the tract10 shapefile layer and choose the command join. So because were joining the AFF to the shapefile we first choose the field in the shapefile that were basing the join on. In this case "GEOID10" field. The second command is to choose data file to join too. In this case our Microsoft 2007 excel file AFF data. And then choose the field in the excel file that will be linked too. In this case link field. Hit ok

Table					
tl_2010_23017_tract10					
INPTLAT10	INPTLOH10	GEOid	link field	total pop	
+44.3192775	-070.5226467	1400000US23017966100	23017966100	1812	
+43.8489131	-070.8315695	1400000US23017966900	23017966900	3118	
+44.2480012	-070.4908157	1400000US23017966200	23017966200	5183	
+44.2600454	-070.3903941	1400000US23017966300	23017966300	3425	
+44.2258673	-070.6100222	1400000US23017966500	23017966500	5014	
+44.5599538	-070.6253131	1400000US23017966600	23017966600	3626	
+44.1173349	-070.5274779	1400000US23017966400	23017966400	5880	
+44.4291820	-070.3822083	1400000US23017965800	23017965800	3665	
+44.4327705	-070.7240688	1400000US23017965900	23017965900	2988	
+44.1818346	-070.8076580	1400000US23017966600	23017966600	3084	
+44.5079476	-070.6100356	1400000US23017965500	23017965500	2215	
+43.9361738	-070.8704048	1400000US23017966800	23017966800	2745	
+44.3077233	-070.7982926	1400000US23017966000	23017966000	3307	
+44.5330835	-070.3459187	1400000US23017965700	23017965700	3540	
+44.8335850	-070.9342310	1400000US23017965100	23017965100	1587	
+44.0555107	-070.9445848	1400000US23017966700	23017966700	3449	
+44.6542105	-070.6349396	1400000US23017965400	23017965400	3195	

tl_2010_23017_tract10 DEC_10_PL_P1\$ (0 out of 17 Selected)

Confirm that the data was joined by returning to the shapefile attribute table and scrolling all the way to the right to confirm that the data has been joined.



Now that the data has been joined you can symbolize it in the layer properties field for the shapefile.

•Thank You

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So today we discussed

How you can use shapefiles

The limitations of shapefiles

Types of shapefiles available and where can you find them

Schedule

How to connect census data to shapefiles

How to compare 2000 and 2010 tracts

How to compare ACS data w/ 2010 data