

ECON 165
Lecture of April 27, 2010
Part 1

J. M. Pogodzinski

Overview

- **Download** Census TIGER **Boundary File**
- **Download** Census Demographic and Economic Data (as a **Table**)
- **Add Data** – TIGER Boundary Files
- **Add Data** – Demographic and Economic Table Data
- **Join** Table Data to Boundary File
- **Symbolize** quantitative data
- Quick and dirty **exporting of a map**

Download TIGER Boundary File

Go to <http://www.census.gov/>

Click on TIGER.

The rest of the steps are about maneuvering on the TIGER File website to get the boundary file for **California Counties**.

I cover every click you need to do this.

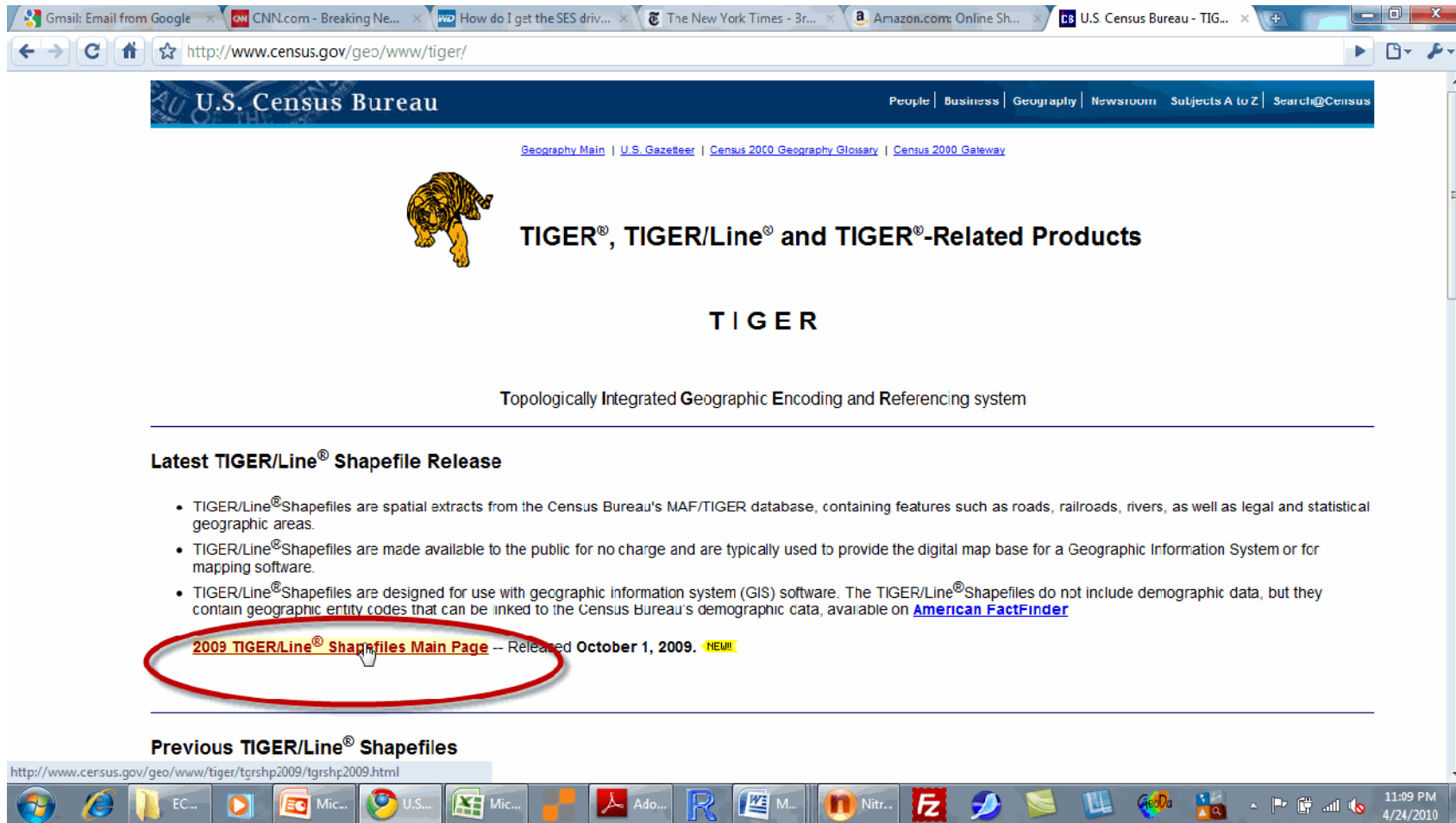
Download TIGER Boundary File

The screenshot shows the U.S. Census Bureau website with the following elements:

- Browser Tabs:** Gmail, CNN.com, How do I get the SES driv..., The New York Times, Amazon.com, and Census Bureau Home Page.
- Address Bar:** <http://www.census.gov/>
- U.S. Census Bureau Header:** Includes navigation links for [FAQs](#), [Subjects A to Z](#), [Help](#), and a search bar.
- Left Sidebar:** Contains sections for **Father's Day Facts For Features**, **New on the Site**, **Data Tools**, **American FactFinder**, **Jobs@Census**, **Catalog**, **Publications**, **Are You in a Survey?**, **About the Bureau**, **Regional Offices**, **Doing Business with Us**, and **Related Sites**. It also features a **View us on YouTube** button and a **Director's Blog** with a RSS icon.
- Main Content Area:**
 - United States Census 2010:** A banner with the slogan "We can't move forward until you give your answers back." and "Open your door to the Census Taker". It includes links for **Multimedia**, **News**, **Jobs**, **For Partners**, **Census in Schools**, **En Espanol**, **Road Tour**, and **Census on Campus**.
 - People & Households:** Links to [American Community Survey](#), [Estima.es](#), [Projections](#), [Housing](#), [Income](#), [State Median Income](#), [Poverty](#), [Health Insurance](#), [International](#), [Genealogy](#), [Census 2000](#), and [More](#).
 - Business & Industry:** Links to [Economic Census](#), [Get Help with Your Form](#), [Economic Indicators](#), [NAICS](#), [Survey of Business Owners](#), [Government](#), [E-Stats](#), [Foreign Trade](#), [Export Codes](#), [Local Employment Dynamics](#), and [More](#).
 - Geography:** Links to [Maps](#), [TIGER](#) (circled in red), [Gazetteer](#), and [More](#).
 - Newsroom:** Links to [Releases](#), [Facts For Features](#), [Minority Links](#), [Multimedia Gallery](#), [Embargo/News Release Subscription](#), and [More](#).
 - Special Topics:** Links to [Fraudulent Activity & Scams](#), [Census Bureau Data and Emergency Preparedness](#), [Events Calendar](#), [Training](#), [Statistical Abstract](#), [FedStats](#), [USA.gov](#), and [Recovery Act at the Census Bureau](#).
- Right Sidebar:**
 - United States Census 2010:** A box showing "Data displayed as of: April 23, 2010" and a "National Participation Rate" of **72%**.
 - Data Finders:** A section with a **Population Clocks** sub-section showing **U.S. 309,135,177** and **World 6,816,944,899** as of 06:03 UTC (EST+5) Apr 25, 2010. It includes a **Population Finder** with input fields for city/town/county/zip or state, and a **Find An Area Profile with QuickFacts** section with a state selection dropdown.
 - Latest Economic Indicators:** Links to [New Home Sales](#), [Advance Report on Durable Goods](#), and [Manufacturers' Shipments, Inventories, and Orders](#).

The taskbar at the bottom shows the Windows 7 taskbar with various application icons and a system tray displaying the time as 11:03 PM on 4/24/2010.

Download TIGER Boundary File



The screenshot shows a web browser window with the URL <http://www.census.gov/geo/www/tiger/>. The page header includes the U.S. Census Bureau logo and navigation links for People, Business, Geography, Newsroom, and Subjects A to Z. Below the header is a tiger logo and the text "TIGER®, TIGER/Line® and TIGER®-Related Products". The main heading is "TIGER" followed by the subtitle "Topologically Integrated Geographic Encoding and Referencing system".

Latest TIGER/Line® Shapefile Release

- TIGER/Line® Shapefiles are spatial extracts from the Census Bureau's MAF/TIGER database, containing features such as roads, railroads, rivers, as well as legal and statistical geographic areas.
- TIGER/Line® Shapefiles are made available to the public for no charge and are typically used to provide the digital map base for a Geographic Information System or for mapping software.
- TIGER/Line® Shapefiles are designed for use with geographic information system (GIS) software. The TIGER/Line® Shapefiles do not include demographic data, but they contain geographic entity codes that can be linked to the Census Bureau's demographic data, available on [American FactFinder](#)

[2009 TIGER/Line® Shapefiles Main Page](#) -- Released **October 1, 2009**. **NEW!**

Previous TIGER/Line® Shapefiles

The browser's address bar shows the URL <http://www.census.gov/geo/www/tiger/tgrshp2009/tgrshp2009.html>. The Windows taskbar at the bottom shows the system tray with the date 4/24/2010 and time 11:09 PM.

Download TIGER Boundary File

The screenshot shows a web browser window with the URL <http://www.census.gov/geo/www/tiger/tgrshp2009/tgrshp2009.html>. The page header includes the U.S. Census Bureau logo and navigation links for People, Business, Geography, Newsroom, and Subjects A to Z. A tiger logo is prominently displayed above the title "2009 TIGER/Line® Shapefiles".

TIGER Navigation

- 2009 TIGER/LINE SHAPEFILES MAIN
 - DOWNLOAD SHAPEFILES
 - TECHNICAL DOCUMENTATION
 - USER NOTES
 - ORGANIZATION OF FILES
- PREVIOUS VERSIONS
 - 2008 TIGER/LINE SHAPEFILES
 - 2007 TIGER/LINE SHAPEFILES
 - TIGER/LINE FILES
- GEOGRAPHY MAIN PAGE

What are the TIGER/Line Shapefiles?

- May 2009 extracts containing geographic and cartographic information from the Census Bureau's MAF/TIGER® (Master Address File/Topologically Integrated Geographic Encoding and Referencing) database.
- The files provide the digital map base for a Geographic Information System or mapping software. The files do not contain any mapping software.
- Contain the boundaries for legal entities as of January 1, 2009.
- They include spatial data for geographic features such as roads, railroads, rivers, and lakes, as well as legal and statistical geographic areas that correspond to the 2009 American Community Survey, 2009 Population Estimates, 2007 Economic Census, and Census 2000.
- The geographic entity codes needed to link the Census Bureau's demographic data to the geography are included in the files. The TIGER/Line Shapefiles do not contain any demographic or economic data; data must be downloaded separately.
- Metadata in Extensible Markup Language (XML) format is included with each compressed file.

Download

- [Download the 2009 TIGER/Line Shapefiles now.](#)

Technical Documentation

- [Access complete technical documentation, user notes, and a description of the organizational structure of the files.](#)

Frequently Asked Questions

- [Frequently asked questions about TIGER/Line Shapefiles.](#)

The browser's taskbar at the bottom shows the time as 11:11 PM on 4/24/2010 and includes icons for various applications like Internet Explorer, Microsoft Office, and Adobe Reader.

Download TIGER Boundary File

The screenshot shows a web browser window with the URL <http://www2.census.gov/cgi-bin/shapefiles2009/state-files?state=06>. The page is titled "2009 TIGER/Line® Shapefiles for: California" and is part of the U.S. Census Bureau website. The page is divided into two main sections: "California Shapefiles" on the left and "California County Files:" on the right.

In the "California Shapefiles" section, there are two buttons: "Select All" and "Clear Selection". Below these buttons is a list of shapefile categories, each with a checkbox. The "County and Equivalent (Current)" option is checked and circled in red. Other options include "American Indian/Alaska Native/Native Hawaiian Area (Current)", "Block (Current)", "Census Tract (Census 2000)", "Congressional District (111th)", "Congressional District (108th)", "County and Equivalent (Census 2000)", "County and Equivalent (Economic Census)", "County Subdivision (Current)", "County Subdivision (Census 2000)", "Combined Statistical Area", "Metropolitan Division", "Metropolitan/Micropolitan Statistical Area", "Place (Current)", "Place (Census 2000)", "Place (Economic Census)", "Super Public Use Microdata Area (Census 2000)", "Public Use Microdata Area (Census 2000)", and "Elementary School District (Current)".

In the "California County Files:" section, there is a dropdown menu showing "Alameda County" and a "submit" button. A link "Return to: [national files](#) | [2009 TIGER/Line Shapefiles Main](#)" is located at the top right of the page.

The Windows taskbar at the bottom shows the system clock as 11:14 PM on 4/24/2010. The taskbar includes icons for Internet Explorer, EC..., Mic..., 200..., Mic..., Ado..., R, M..., Nitr..., Fz, and other applications.

Download TIGER Boundary File

The screenshot shows a web browser window displaying the US Census Bureau's TIGER/Line shapefiles page for the state of Ohio. The URL in the address bar is <http://www2.census.gov/cgi-bin/shapefiles2009/state-files?state=06>. The page lists various geographic boundary types, each with a checkbox. Two items are circled in red: "County and Equivalent (Current)" and "County and Equivalent (Census 2000)". At the bottom of the list, a button labeled "Download Selected Files" is also circled in red. The footer of the page includes the US Census Bureau logo and the text "Helping You Make Informed Decisions". The browser's taskbar at the bottom shows several open applications and the system clock indicating 11:15 PM on 4/24/2010.

Source: US Census Bureau, Geography Division

U S C E N S U S B U R E A U
Helping You Make Informed Decisions

Data Tools | Catalog | Census 2000 | Quality | Privacy Policy | Contact Us | Home

11:15 PM
4/24/2010

Download TIGER Boundary File

What happens next depends on the internet browser you are using.

If you are using Microsoft Internet Explorer (IE) you may have to change the security settings on the browser to the lowest possible.

The default name of the file you download is multiple_tiger_files.

It is a **zip** file. You will need an unzipper (built into Windows Vista and Windows 7). Other unzippers are WinZip and Jzip.

There is a zip file embedded in the zip file, so you will have to unzip twice. There are five separate files when the files are finally unzipped. **DO NOT MANIPULATE THESE FILES USING WINDOWS EXPLORER.**

Download Census Demographic and Economic Data

Go to the U.S. Census “American Factfinder” website:

<http://www.factfinder.census.gov/home/saff/main.html? lang=en>

Select Data Sets, Decennial Census.

The rest of the steps are about maneuvering on the American Factfinder website to create a table of specific demographic and economic data for California Counties.

Download Census Demographic and Economic Data

The screenshot shows the American FactFinder website interface. The browser's address bar displays the URL: http://www.factfinder.census.gov/home/saff/main.html?_lang=en. The page header includes the U.S. Census Bureau logo and the 'American FactFinder' title. A navigation menu contains links for 'Main', 'Search', 'Feedback', 'FAQs', 'Glossary', 'Site Map', and 'Help'. Below the header, the main content area is titled 'Your source for population, housing, economic, and geographic data'. On the left side, there is a vertical navigation menu with categories such as 'POPULATION FINDER', 'FACT SHEET', 'PEOPLE', 'HOUSING', 'BUSINESS AND GOVERNMENT', 'ABOUT THE DATA', 'DATA SETS', 'DOWNLOAD CENTER', 'MAPS', and 'TOOLS AND REFERENCES'. The 'DATA SETS' category is highlighted with a red circle, and a dropdown menu is visible, listing several data sets: 'Decennial Censuses', 'American Community Survey', 'Puerto Rico Community Survey', 'Annual Population Estimates', 'Economic Census', and 'Annual Economic Surveys'. The main content area features a 'Fast Access to Information' section with a form to 'Get a Fact Sheet for your community...' and a 'U.S. Population Clock' showing a population of 309,135,345 as of April 25, 2010. There is also a 'What's New' section with news items about the 2010 Census Road Tour and population estimates.

Download Census Demographic and Economic Data

Select the Year 2000 Decennial (Every 10-year) Census.

Select the Sample File 1 (SF 1) category. This corresponds to answers to the “short form” of the Year 2000 Census and is based on a theoretical 100% sample of the population.

Select “Custom Table”

Download Census Demographic and Economic Data

Preview:

We will select data from Tables **P7** (Race), **H4** (Housing by Tenure), and **G001** (Geographic Identifiers). We select all variables from the first two tables, and only land area and water area from Geographic Identifiers.

Note there are many other tables that would give us *hundreds* of other variables.

If we had selected the Sample File 3 (SF 3) category, we would get responses to the “long form” of the Year 2000 Decennial Census. That would give us *thousands* of variables based on a sample of approximately 16.7% of the population.

Download Census Demographic and Economic Data

There are other variables similar to those in the tables we selected. There are other tables that include a racial classification (as defined by the Census Bureau), but some of these contains dozens of categories.

We picked table **P7** because it was sufficiently detailed for our present purposes. The Year 2000 Decennial Census classifies the population into more than 200 racial and ethnic categories, and also dozens of language categories.

Download Census Demographic and Economic Data

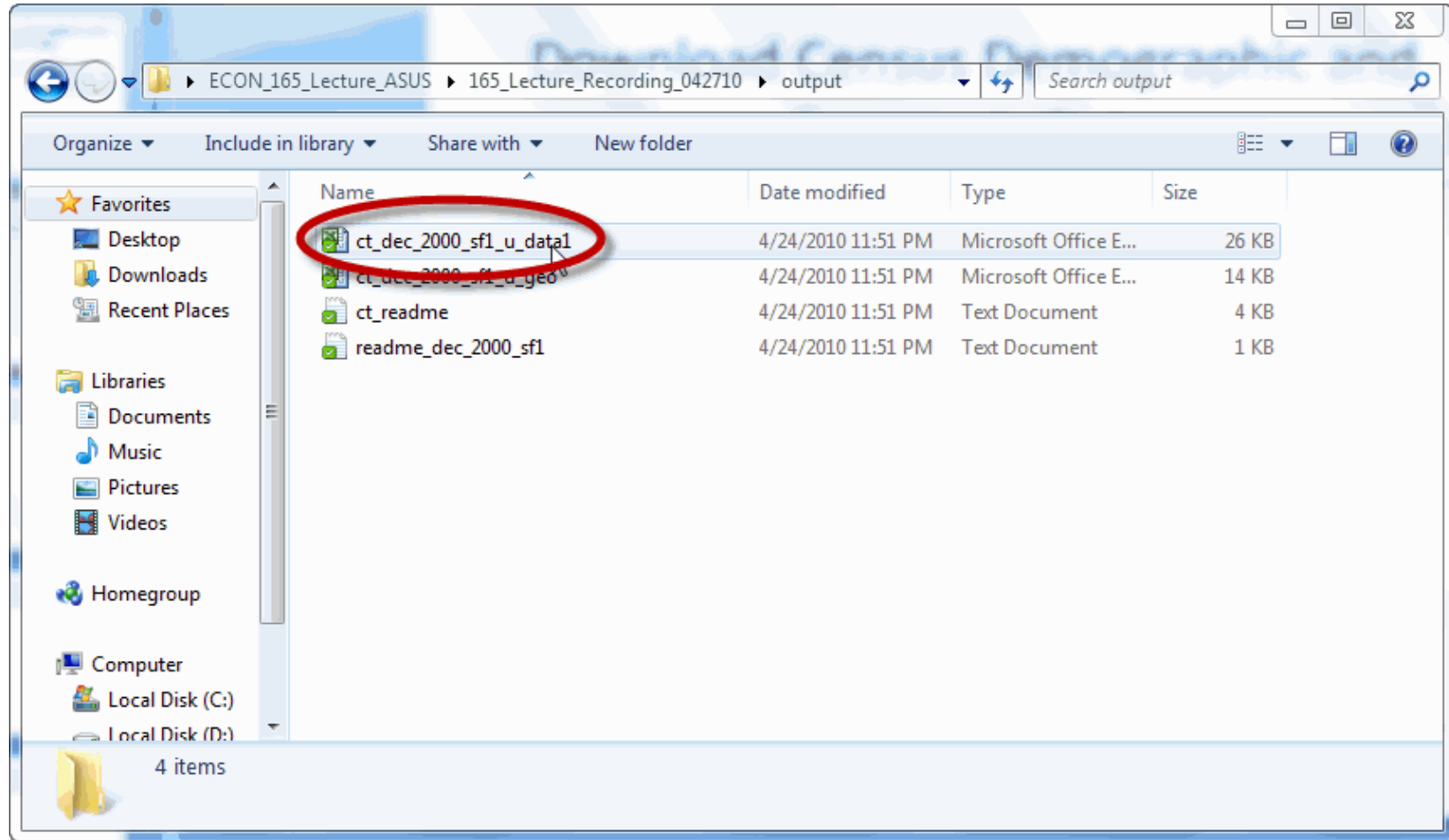
After unzipping the file (whose default name is output) you get several files.

One particular file – with the word “data” in the file name – is the one we are interested in: `ct_dec_2000_sf1_u_data1`.

We will open this file Excel File.

NOTE: I WILL ACTUALLY FIRST MAKE A COPY OF THE FILE (USING MICROSOFT WINDOWS COPY-AND-PASTE) AND RENAME THE COPY `ct_dec_2000_sf1_u_data1_working`. THIS IS BECAUSE I WILL MODIFY THIS FILE BY DELETING SOME ROWS AND COLUMNS, AND I ALWAYS WANT TO HAVE A COPY OF THE ORIGINAL DATA FOR COMPARISON IN CASE I MAKE A MISTAKE.)

Download Census Demographic and Economic Data



Download Census Demographic and Economic Data

Part of the ct_dec_2000_sf1_u_data1_working Excel file

Two Header Rows

GEO_ID	GEO_ID2	SUMLEVEL	GEO_NAME	P007001	P007002	P007003	P007004	P007005
Geography Identifier	Geography Identifier	Geographic Summary Level	Geography	Total population: Total	Total population: White alone	Total population: Black or African American alone	Total population: American Indian and Alaska Native alone	Total population: Asian alone
05000US06001	06001	050	California	1443741	704334	215598	9146	295218
05000US06003	06003	050	California	1208	890	7	228	4
05000US06005	06005	050	California	35100	30113	1359	626	350
05000US06007	06007	050	California	203171	171728	2816	3866	6752
05000US06009	06009	050	California	40554	36982	304	705	345
05000US06011	06011	050	California	18804	12090	103	439	228
05000US06013	06013	050	California	948816	621490	88813	5830	103993
05000US06015	06015	050	California	27507	21693	1184	1770	637
05000US06017	06017	050	California	156299	140209	813	1566	3328
05000US06019	06019	050	California	799407	434045	42337	12790	64362
05000US06021	06021	050	California	26453	18988	155	552	893
05000US06023	06023	050	California	126518	107179	1111	7241	2091
05000US06025	06025	050	California	142361	70290	5624	2666	2836
05000US06027	06027	050	Inyo County, California	17945	14367	29	1802	163
05000US06029	06029	050	Kern County, California	661645	407581	39798	9999	22268

Download Census Demographic and Economic Data

46	05000US06087	06087	050	California	255602	191931
47	05000US06089	06089	050	California	163256	145826
48	05000US06091	06091	050	California	3555	3348
49	05000US06093	06093	050	California	44301	38573
50	05000US06095	06095	050	California	394542	222387
51	05000US06097	06097	050	California	458614	374209
52	05000US06099	06099	050	California	446997	309901
53	05000US06101	06101	050	California	78930	53291
54	05000US06103	06103	050	California	56039	47518
55	05000US06105	06105	050	California	13022	11573
56	05000US06107	06107	050	California	368021	213751
57	05000US06109	06109	050	California	54501	48750
58	05000US06111	06111	050	California	753197	526721
59	05000US06113	06113	050	Yolo County, California	168660	114129
60	05000US06115	06115	050	California	60219	42537
61						
62						

60 rows – California has 58 counties and we have 2 header rows

Clean Up Census Demographic and Economic Data

We must modify the Excel file to make it readable by ArcMap.

Problems:

1. It has two header rows. A data base program will read data that has only one header row. We will delete the second header row. That is the one that has more meaningful descriptions for humans, but because the headers are long and have spaces, they would cause problems for a data base program.
2. The remaining header row is formatted differently from the other rows in the table. It has a greater “row height” (50 as Microsoft measures these things) while all the remaining rows have a height of 15). Also, the headers are all text (not numbers) and text is usually left-justified – starts at the extreme left side of the cell, while numbers are usually right-justified, pushed up against the right side of the cell. The text in the header row is centered in the cell, and we want to make it right-justified.

LIVE SOFTWARE DEMO

Clean Up Census Demographic and Economic
Data using
`ct_dec_2000_sf1_u_data1_working2`

LIVE SOFTWARE DEMO

Launch ArcMap

Select “A new empty map”

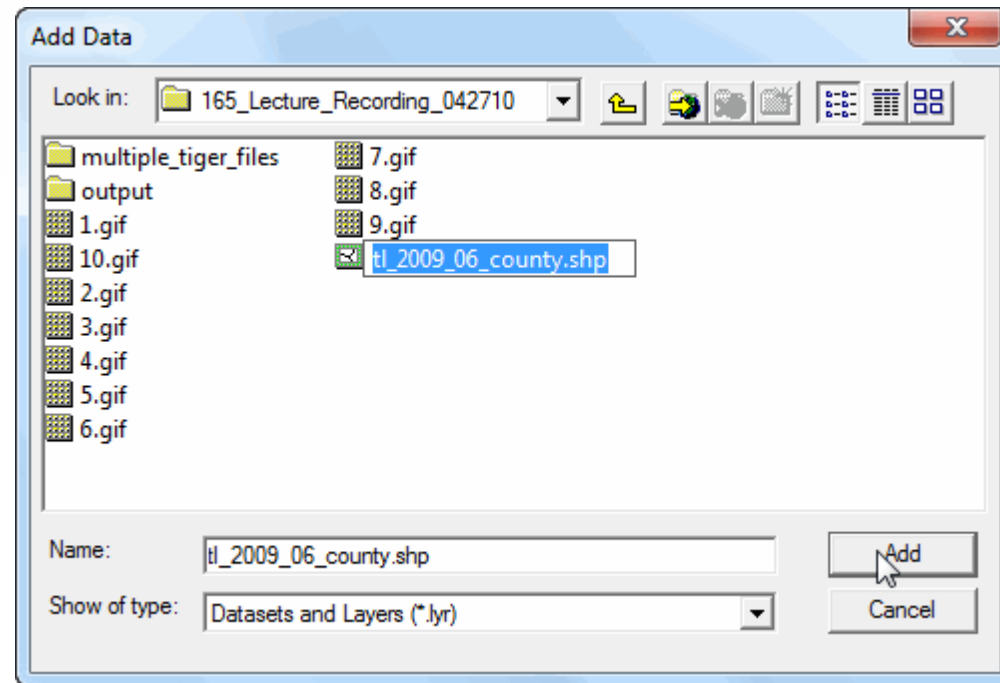
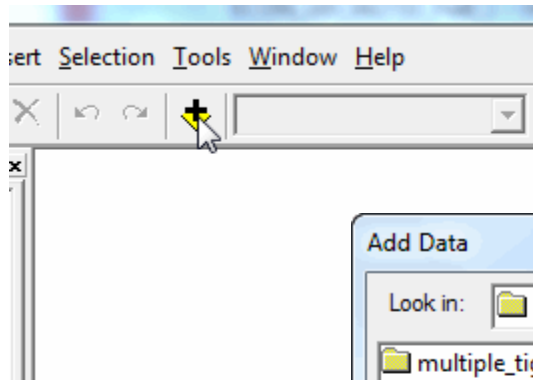
Add Data – TIGER shape (.shp) file

Add Data – Census Tabular Demographic and
Economic Data

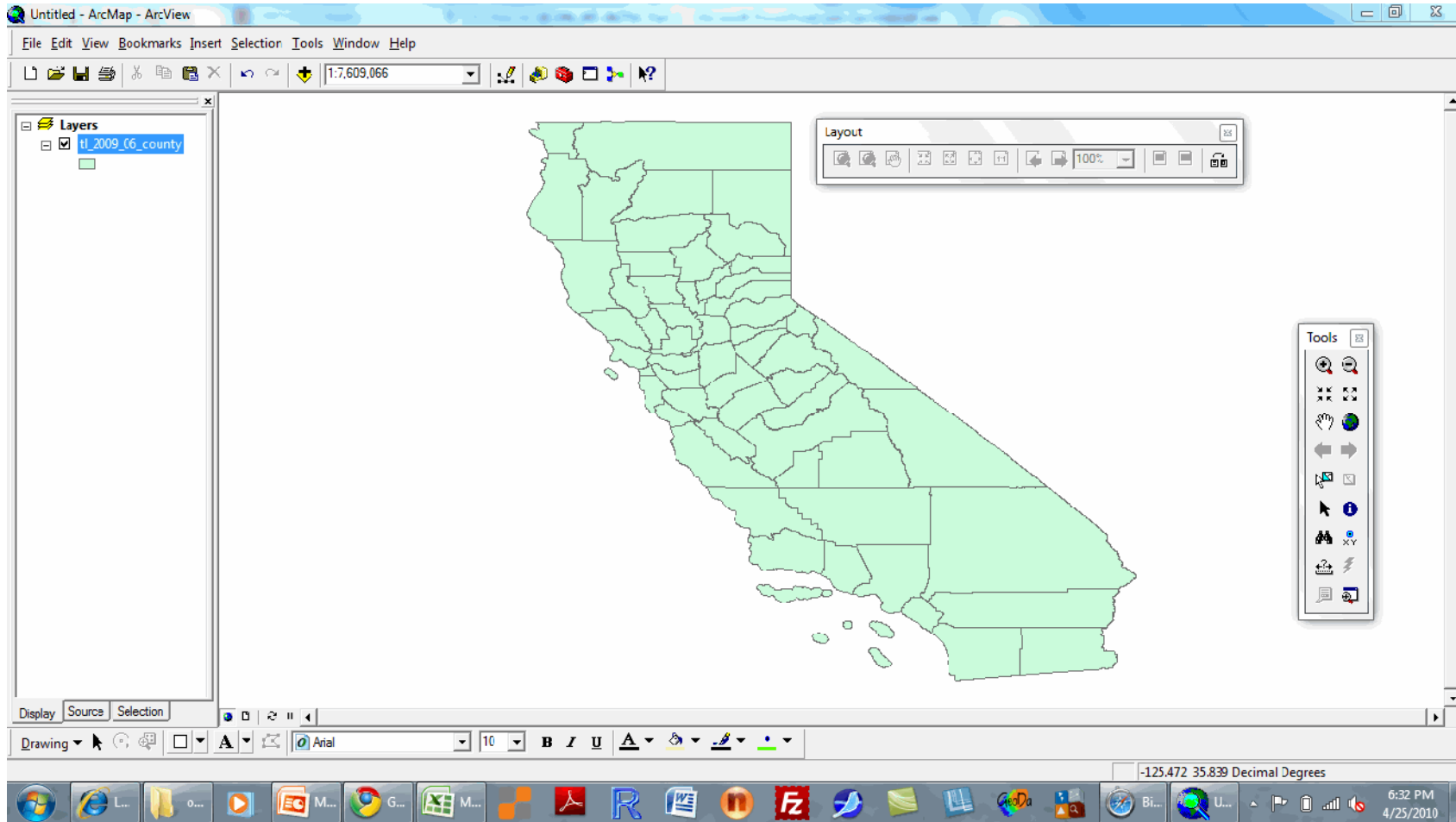
Join Tabular Data (data in table form – not map
data) to TIGER shape file

Click the Add Data Button

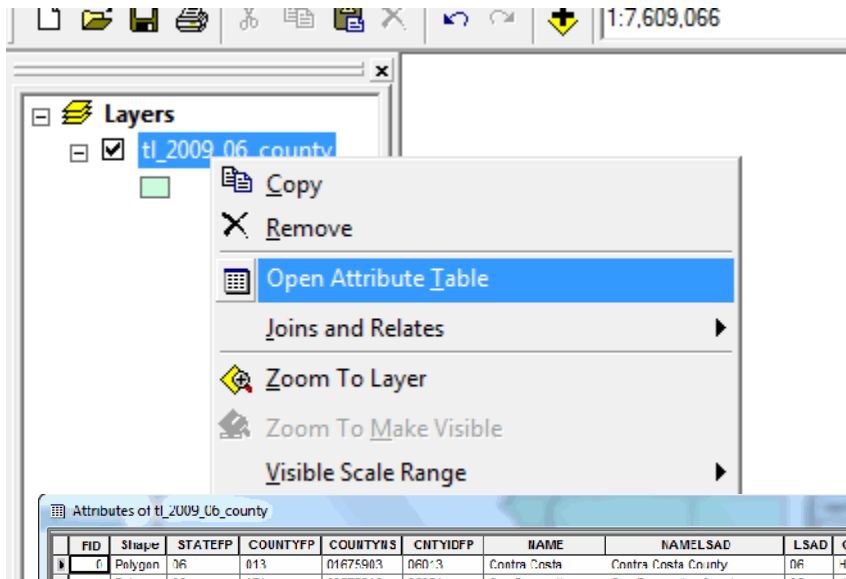
Then navigate to the California Counties shapefile in the Add Data Dialog Box



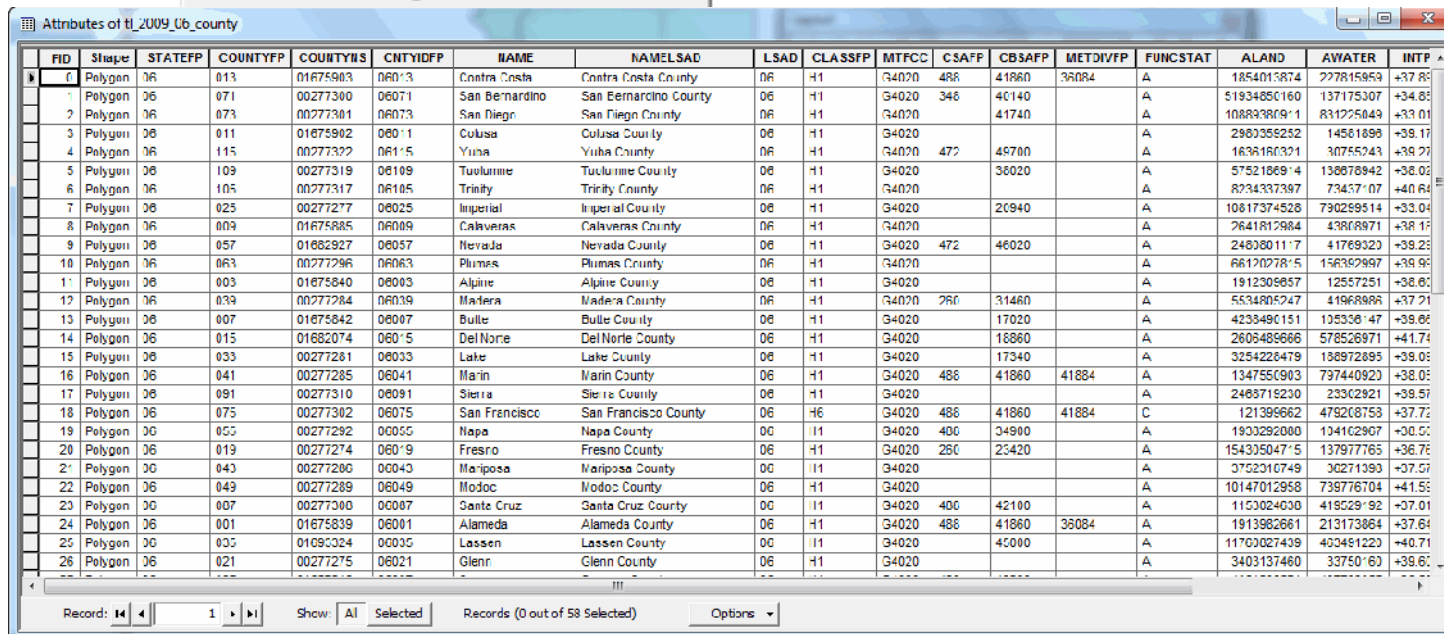
What You Get Your Screen Should Look Like This



Open Attribute Table



In the Table of Contents pane, highlight the county boundaries file and right click to bring up the context-sensitive menu. Highlight and click “Open Attribute Table”



FID	Shape	STATEFP	COUNTYFP	COUNTYNS	CNTYIDFP	NAME	NAMELSAD	LSAD	CLASSFP	MTFCC	CSAFP	CBSAFP	METDIVFP	FUNCSTAT	ALAND	AWATER	INTP
0	Polygon	06	013	01675903	06013	Contra Costa	Contra Costa County	06	H1	G4020	488	41860	36084	A	1854013874	227815959	+37.85
1	Polygon	06	071	00277300	06071	San Bernardino	San Bernardino County	06	H1	G4020	348	40140		A	51934850160	137175307	+34.85
2	Polygon	06	073	00277301	06073	San Diego	San Diego County	06	H1	G4020		41740		A	1088938091	831225043	+33.01
3	Polygon	06	011	01675902	06011	Colusa	Colusa County	06	H1	G4020				A	2980358252	14561898	+38.17
4	Polygon	06	115	00277322	06115	Yuba	Yuba County	06	H1	G4020	472	49700		A	1636180321	30755243	+38.27
5	Polygon	06	109	00277319	06109	Tuolumne	Tuolumne County	06	H1	G4020		36020		A	5752186914	138878942	+36.02
6	Polygon	06	105	00277317	06105	Trinity	Trinity County	06	H1	G4020				A	8234337397	73457107	+40.64
7	Polygon	06	025	00277277	06025	Imperial	Imperial County	06	H1	G4020		20940		A	10817374528	790259514	+33.04
8	Polygon	06	009	01675885	06009	Calaveras	Calaveras County	06	H1	G4020				A	2641812984	43808971	+38.15
9	Polygon	06	057	01682827	06057	Nevada	Nevada County	06	H1	G4020	472	46020		A	2480801117	41769320	+38.25
10	Polygon	06	063	00277296	06063	Plumas	Plumas County	06	H1	G4020				A	6612027815	156362997	+38.96
11	Polygon	06	003	01675840	06003	Alpine	Alpine County	06	H1	G4020				A	1912308857	12557251	+38.03
12	Polygon	06	039	00277284	06039	Madera	Madera County	06	H1	G4020	260	31460		A	5534805247	41968886	+37.21
13	Polygon	06	007	01675842	06007	Butte	Butte County	06	H1	G4020		17020		A	4233490151	105336147	+38.86
14	Polygon	06	015	01682074	06015	Del Norte	Del Norte County	06	H1	G4020	18860			A	2605489666	578526971	+41.74
15	Polygon	06	033	00277281	06033	Lake	Lake County	06	H1	G4020	17340			A	3254228479	188972895	+38.03
16	Polygon	06	041	00277285	06041	Marin	Marin County	06	H1	G4020	488	41860	41884	A	1347550903	797440920	+38.03
17	Polygon	06	091	00277310	06091	Sierra	Sierra County	06	H1	G4020				A	2468719230	23302821	+39.57
18	Polygon	06	075	00277302	06075	San Francisco	San Francisco County	06	H6	G4020	488	41860	41884	C	121396662	478208758	+37.73
19	Polygon	06	055	00277292	06055	Napa	Napa County	06	H1	G4020	400	34900		A	1903292000	104102907	+30.55
20	Polygon	06	019	00277274	06019	Fresno	Fresno County	06	H1	G4020	250	23420		A	15430504715	137977765	+36.75
21	Polygon	06	043	00277290	06043	Mariposa	Mariposa County	06	H1	G4020				A	37523016749	30271390	+37.57
22	Polygon	06	049	00277289	06049	Modoc	Modoc County	06	H1	G4020				A	10147012958	738776704	+41.55
23	Polygon	06	007	00277300	06007	Santa Cruz	Santa Cruz County	06	H1	G4020	400	42100		A	11530024030	418529192	+37.01
24	Polygon	06	001	01675839	06001	Alameda	Alameda County	06	H1	G4020	488	41860	36084	A	1913982661	213173864	+37.64
25	Polygon	06	035	01690324	06035	Lassen	Lassen County	06	H1	G4020		40000		A	11703027439	403451220	+40.71
26	Polygon	06	021	00277275	06021	Glenn	Glenn County	06	H1	G4020				A	3403137460	33750160	+39.67

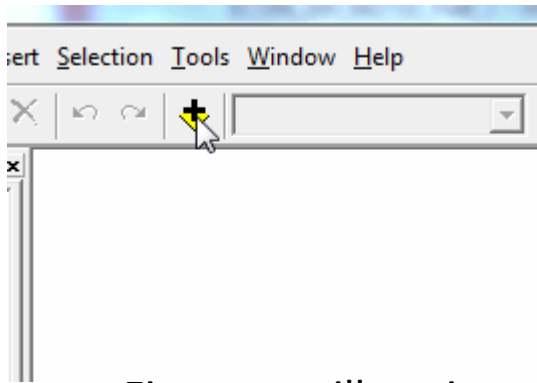
You get a table that looks like this. This is the database table behind the map of counties.

Open Attribute Table

UNTYFP	COUNTYNS	CNTYIDFP	NAME	NA
	01675903	06013	Contra Costa	Contra Cost
	00277300	06071	San Bernardino	San Bernarc
	00277301	06073	San Diego	San Diego C
	01675902	06011	Colusa	Colusa Cour
	00277322	06115	Yuba	Yuba Count
	00277319	06109	Tuolumne	Tuolumne Ci
	00277317	06105	Trinity	Trinity Coun
	00277277	06025	Imperial	Imperial Cou
	01675885	06009	Calaveras	Calaveras C
	01682927	06057	Nevada	Nevada Cou
	00277296	06063	Plumas	Plumas Coui
	01675840	06003	Alpine	Alpine Coun
	00277284	06039	Madera	Madera Cou
	01675842	06007	Butte	Butte Count
	01682074	06015	Del Norte	Del Norte Cc
	00277281	06033	Lake	Lake County
	00277285	06041	Marin	Marin Count
	00277310	06091	Sierra	Sierra Coun
	00277302	06075	San Francisco	San Francis

Note that one of the columns has code numbers (actually entered as text – they are right-justified). These code numbers have the colorful name CNTYIDFP.

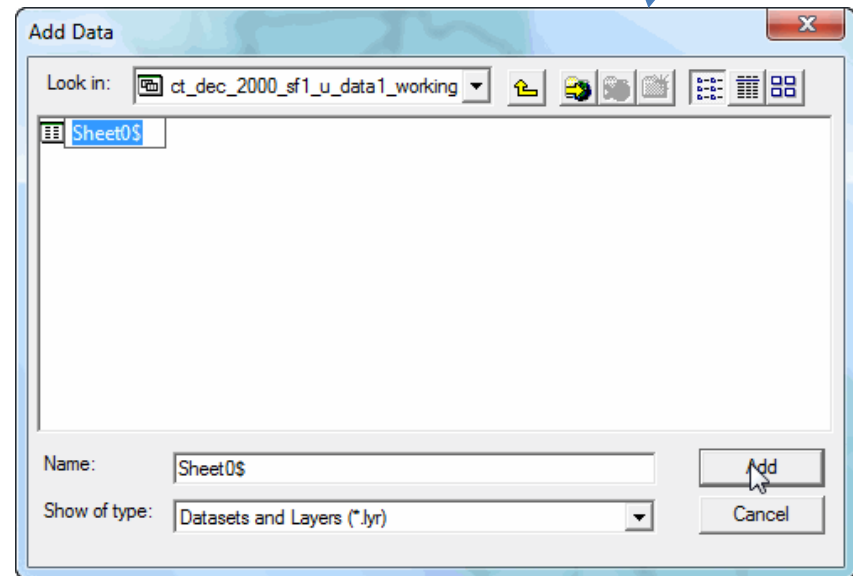
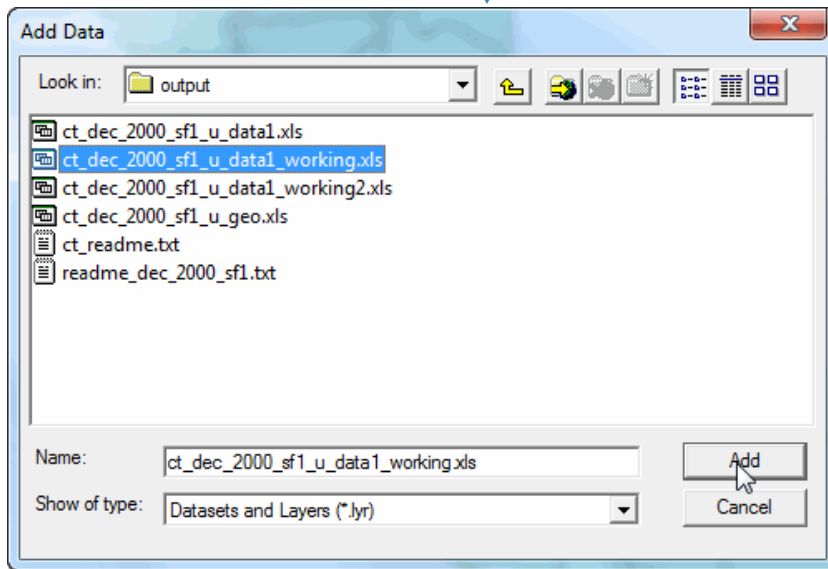
Add Tabular Data



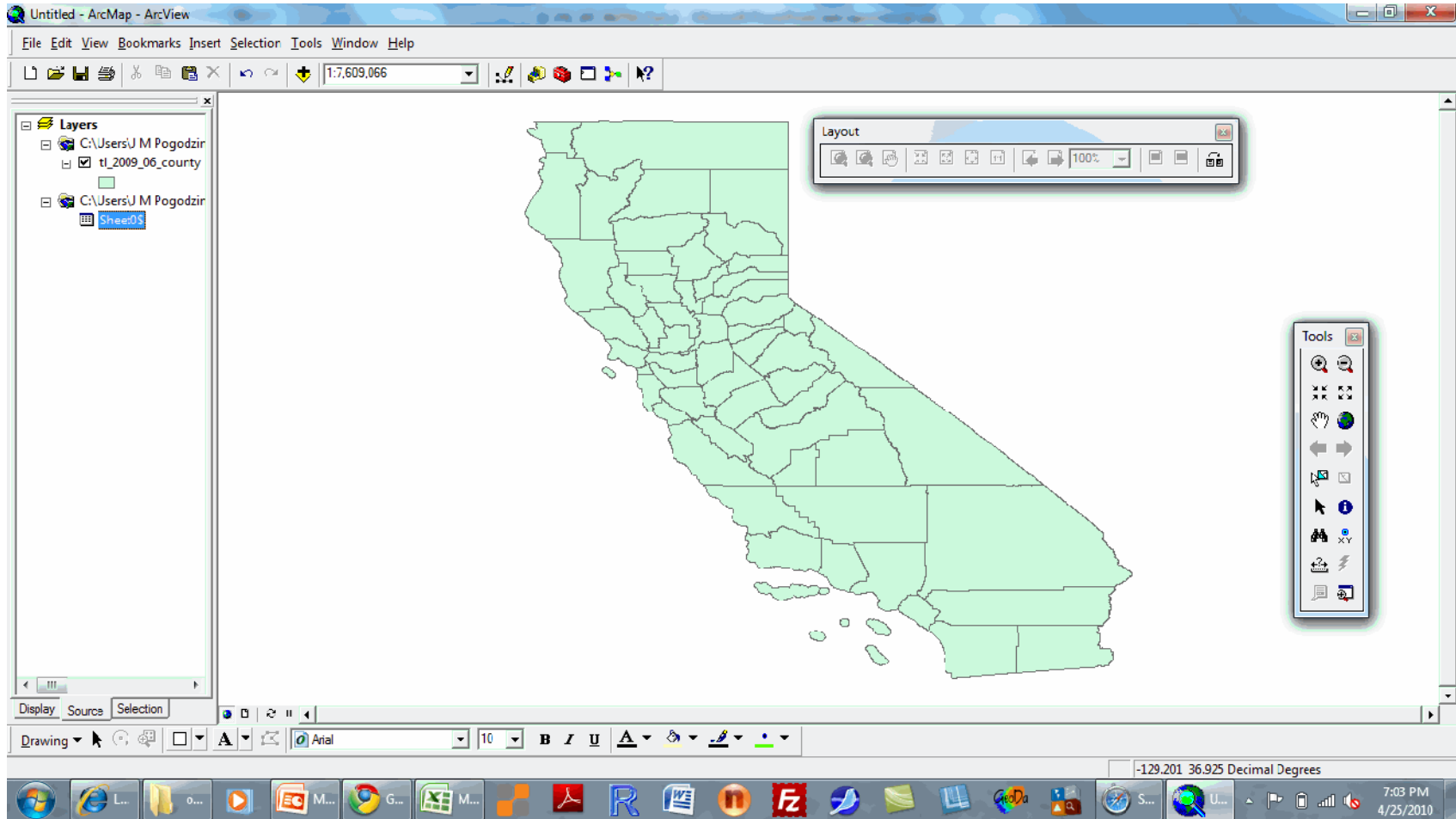
Navigate to the Census Demographic and Economic Data (as modified – the “working” version).

Then you will navigate to the worksheet within the Excel File – because Excel files can contain several worksheets – although this file contains only one – called Sheet0.

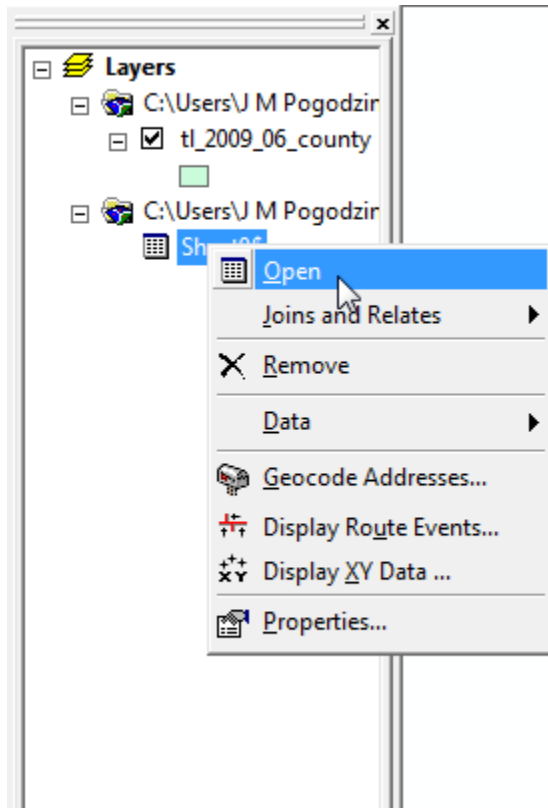
First you will navigate to the Excel File.



What You Get Your Screen Should Look Like This



Open the Demographic and Economic Data Table Sheet0\$



Highlight table in the Table of Contents pane, right-click to bring up the context-sensitive menu, click on "open"

This opens the data table. Highlighted is the GEO_ID2. These are numbers like CNTYIDFP.

The screenshot shows a data table titled 'Attributes of Sheet0\$'. The table has the following columns: GEO_ID, GEO_ID2, SUMLEVEL, GEO_NAME, and 15 numerical columns representing demographic and economic data. The data is organized by California counties. The GEO_ID2 column contains values like '0601', '0602', etc., which correspond to county FIPS codes. A blue arrow points from the text above to the GEO_ID2 column in the table.

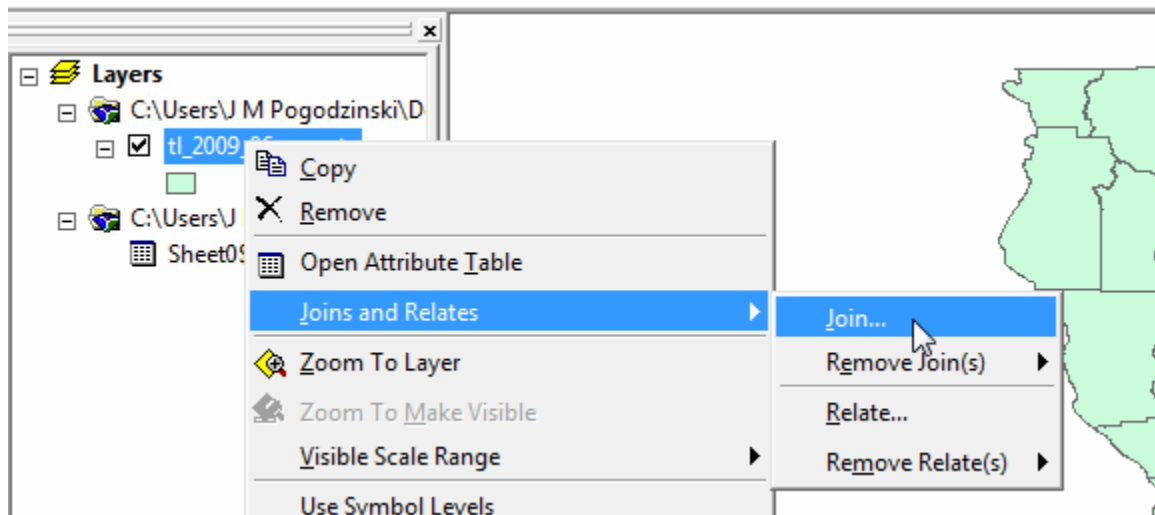
GEO_ID	GEO_ID2	SUMLEVEL	GEO_NAME	1990/001	1990/002	1990/003	1990/004	1990/005	1990/006	1990/007	1990/008	1990/009	1990/010	1990/011	1990/012	1990/013	1990/014	1990/015
06000JS0600	0601	050	Alameda County, California	113741	704334	21898	9146	295218	9142	129079	61224	523366	236277	237989	191030	191030	191030	191030
06000JS0601	0602	050	Alpine County, California	1260	760	7	220	4	1	17	61	470	370	170	191030	191030	191030	191030
06000JS0602	0603	050	Amador County, California	35100	30113	1359	525	350	36	1760	847	12150	1620	3130	191030	191030	191030	191030
06000JS0603	0604	050	Butte County, California	253171	171728	2818	3668	8752	298	9790	7923	79588	48336	31230	424825	424825	424825	424825
06000JS0604	0605	050	Colveras County, California	40564	30362	304	705	545	32	830	1341	18480	12997	3532	254136	254136	254136	254136
06000JS0605	0606	050	Colusa County, California	18504	12590	103	439	228	74	5017	853	6097	3853	2244	296023	296023	296023	296023
06000JS0606	0607	050	Contra Costa County, California	340310	221450	80010	5030	103890	3400	70510	40714	344126	230446	100600	100600	100600	100600	100600
06000JS0607	0608	050	Del Norte County, California	27507	21683	1184	1770	637	23	1079	121	870	5852	3318	261022	261022	261022	261022
06000JS0608	0609	050	El Dorado County, California	158269	140209	813	1568	3528	203	5547	4877	58936	44016	14920	445107	445107	445107	445107
06000JS0609	0610	050	Fresno County, California	709407	434346	42337	12190	64662	1000	210161	37812	252940	142706	110146	1544336	1544336	1544336	1544336
06000JS0610	0611	050	Glen County, California	28453	18968	155	552	893	38	4810	1020	972	5855	3317	340526	340526	340526	340526
06000JS0611	0612	050	Humboldt County, California	126518	107179	1111	7241	2001	241	3090	5568	51236	20534	21734	925270	925270	925270	925270
06000JS0612	0613	050	Imperial County, California	142361	70290	5824	3866	2836	119	59634	592	39384	22975	16439	1081250	1081250	1081250	1081250
06000JS0613	0614	050	Inyo County, California	17345	14367	29	1002	103	15	825	744	7730	5070	2627	2642390	2642390	2642390	2642390
06000JS0614	0615	050	Kern County, California	981845	107581	39798	9699	22668	972	153610	27417	208652	126606	69013	2106300	2106300	2106300	2106300
06000JS0615	0616	050	Kings County, California	128481	68469	10747	2178	3683	250	39811	8203	34418	19585	15185	390795	390795	390795	390795
06000JS0616	0617	050	Lake County, California	58309	50389	1233	1712	482	92	2396	2042	25074	16914	1090	32630	32630	32630	32630
06000JS0617	0618	050	Lassen County, California	33828	27358	2992	1104	249	148	1092	909	5625	6575	5050	130328	130328	130328	130328
06000JS0618	0619	050	Los Angeles County, California	9519338	4837362	200057	76083	1107600	27053	2230907	460781	3133774	1400744	1634030	1051760	1051760	1051760	1051760
06000JS0619	0620	050	Madera County, California	123109	76612	5072	3212	1666	210	28979	6458	3858	23894	1222	55338	55338	55338	55338
06000JS0620	0621	050	Marin County, California	247209	207000	7442	1061	1200	203	11145	1576	10620	40824	39626	134020	134020	134020	134020
06000JS0621	0622	050	Mariposa County, California	17130	15254	114	802	122	22	457	6613	1616	1998	375836	375836	375836	375836	375836
06000JS0622	0623	050	Merced County, California	68285	68971	538	4103	1038	128	7427	3364	35098	20385	12883	936815	936815	936815	936815
06000JS0623	0624	050	Merced County, California	210584	118350	8084	2510	14221	306	55013	11900	34450	26352	400320	400320	400320	400320	400320
06000JS0624	0625	050	Modoc County, California	9449	8120	85	398	58	7	538	283	3784	2875	1139	1021518	1021518	1021518	1021518
06000JS0625	0626	050	Monterey County, California	12030	10010	61	209	143	11	1222	208	5137	2034	2034	706490	706490	706490	706490
06000JS0626	0627	050	Monterey County, California	107762	221662	18050	4202	24245	1789	111782	20012	121236	66213	89023	89023	89023	89023	89023

Joining the Demographic and Economic Data to the Map Data (Table Join)

We want to add the demographic and economic data in the table Sheet0\$ to the data representing the California County boundaries (tl_2009_06_county).

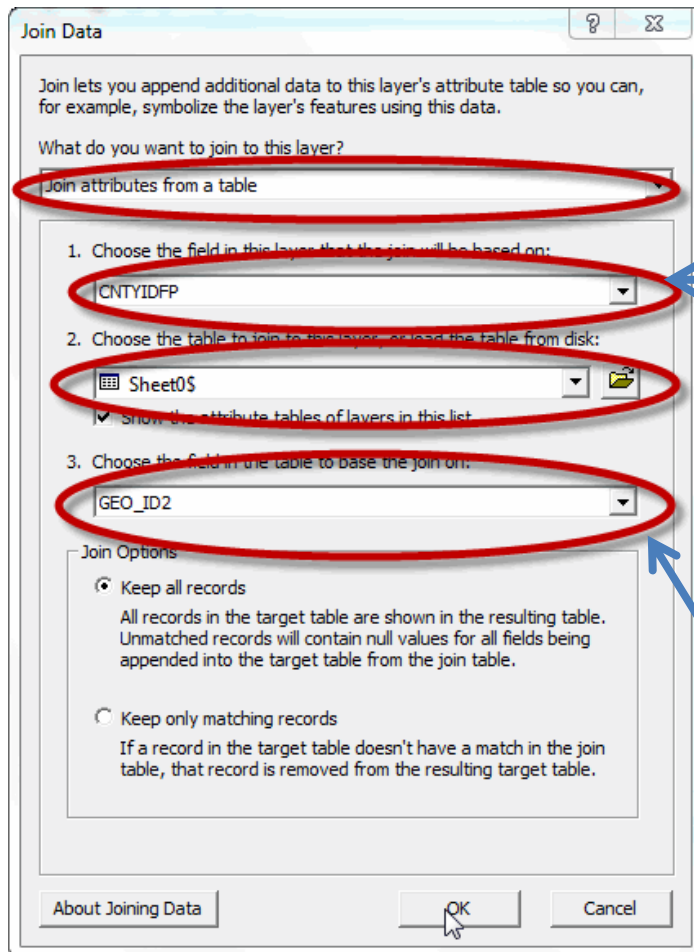
To do this we will use an operation called “Table Join.” To use Table Join each of the data sets must have a common basis for making the join. In our case we have sets of code numbers which go by different names in each of the data sets, but they correspond to the same thing – they are code numbers that uniquely identify a county, and the same code number identifies the same county in each data set.

Doing Table Join



Highlight the county boundary file, right-click, and select Joins and Relates, and then select Join

Doing Table Join



1. Select the right kind of join from the drop down menu. There is another kind of join called a spatial join which is unique to GIS programs

2. Select the right variable (field) from the highlighted data – the county boundaries from the drop down menu. Only those fields in the highlighted data set will appear. We know we want CNTYIDFP.

3. Select the right data set from the drop down menu. You can add many data sets to a layer. We only have one: Sheet0\$.

4. Select the right variable from the demographic and economic data we want to join – GEO_ID2.

Doing Table Join The Result

Attribute Table of the Map

Demographic and Economic Data from Sheet0\$

Attributes of tl_2009_06_county

INTPTLON	GEO_ID	GEO_ID2	SUMLEVEL	GEO_NAME	P007001	P007002	P007003	P007004	P007005	P007006	P007007	P007008	H004001	H004002	H004003	AREALAND	AREAWATR
-121.9281929	05000US0	06013	050	Contra Costa	948816	621490	88813	5830	103993	3466	76510	48714	344129	238449	105680	1864651611	212906588
-116.1811966	05000US0	06071	050	San Bernardi	1709434	1006998	155348	19915	80217	5110	355843	86041	528594	340933	187661	5193572375	136803389
-116.7697739	05000US0	06073	050	San Diego C	2813833	1871839	161480	24337	249802	13561	360847	131967	994677	551461	443216	1087766690	843363020
-122.2375629	05000US0	06011	050	Colusa Count	18804	12090	103	439	228	74	5017	853	6097	3853	2244	2980234877	14359155
-121.3442801	05000US0	06115	050	Yuba County	60219	42537	1904	1569	4519	123	5989	3578	20535	11105	9430	1633489210	33768609
-119.9647084	05000US0	06109	050	Tuolumne Co	54501	48750	1146	992	395	91	1577	1550	21004	14978	6026	5789697024	100823961
-123.1144042	05000US0	06105	050	Trinity Count	13022	11573	58	631	61	15	114	570	5587	3981	1606	8232554997	74937644
-115.3553945	05000US0	06025	050	Imperial Coun	142361	70290	5624	2666	2836	119	55634	5192	39384	22975	16409	1081250690	795121274
-120.5593996	05000US0	06009	050	Calaveras C	40554	36982	304	705	345	38	839	1341	16469	12967	3502	2641887224	43527582
-120.7734456	05000US0	06057	050	Nevada Cou	92033	85948	259	814	715	81	1782	2434	36894	27958	8936	2480205755	43715169
-120.8276875	05000US0	06063	050	Plumas Coun	20824	19113	130	530	110	20	377	544	9000	6301	2699	6614039250	154838986
-119.8208504	05000US0	06003	050	Alpine Count	1208	890	7	228	4	1	17	61	483	330	153	1913008753	11842922
-119.7493228	05000US0	06039	050	Madera Coun	123109	76612	5072	3212	1566	210	29979	6458	36155	23934	12221	5531855540	45223370
-121.5999550	05000US0	06007	050	Butte County	203171	171728	2816	3866	6752	296	9790	7923	79566	48336	31230	4246255361	97428420
-123.9809982	05000US0	06015	050	Del Norte Co	27507	21693	1184	1770	637	23	1079	1121	9170	5852	3318	2610221532	574823230
-122.7467569	05000US0	06033	050	Lake County,	58309	50289	1233	1772	482	93	2398	2042	23974	16914	7060	3258098255	185236984
-122.7459737	05000US0	06041	050	Marin County	247289	207800	7142	1061	11203	388	11116	8579	100650	64024	36626	1346283474	798731740
-120.5219926	05000US0	06091	050	Sierra Count	3555	3348	7	67	6	3	37	87	1520	1074	446	2469247836	22253781
-123.0322293	05000US0	06075	050	San Francisc	776733	385728	60515	3458	239565	3844	50368	33255	329700	115391	214309	120938107	479723545
-122.3258274	05000US0	06055	050	Napa County	124279	99396	1645	1045	3694	289	13604	4606	45402	29554	15848	1952160868	89443626
-119.6550192	05000US0	06019	050	Fresno Coun	799407	434045	42337	12790	64362	1000	207061	37812	252940	142795	110145	1544338724	141660122
-119.9128599	05000US0	06043	050	Mariposa Co	17130	15234	114	602	122	22	457	579	6613	4615	1998	3758384025	30217838
-120.7183703	05000US0	06049	050	Modoc Count	9449	8120	65	398	58	7	538	263	3784	2675	1109	1021516361	671524702
-122.0062067	05000US0	06087	050	Santa Cruz C	255602	191931	2477	2461	8789	382	38391	11171	91139	54681	36458	1153169845	419361484
-121.9133038	05000US0	06001	050	Alameda Cou	1443741	704334	215598	9146	295218	9142	129079	81224	523366	286277	237089	1910302974	216454242
-120.6184408	05000US0	06035	050	Lassen Coun	33828	27336	2992	1104	249	146	1092	909	9625	6575	3050	1180326761	422439110
-122.4016998	05000US0	06021	050	Glenn Count	26453	18988	155	552	893	35	4810	1020	9172	5855	3317	3405298392	32019600

Record: 0 | Show: All Selected | Records (0 out of 58 Selected) | Options

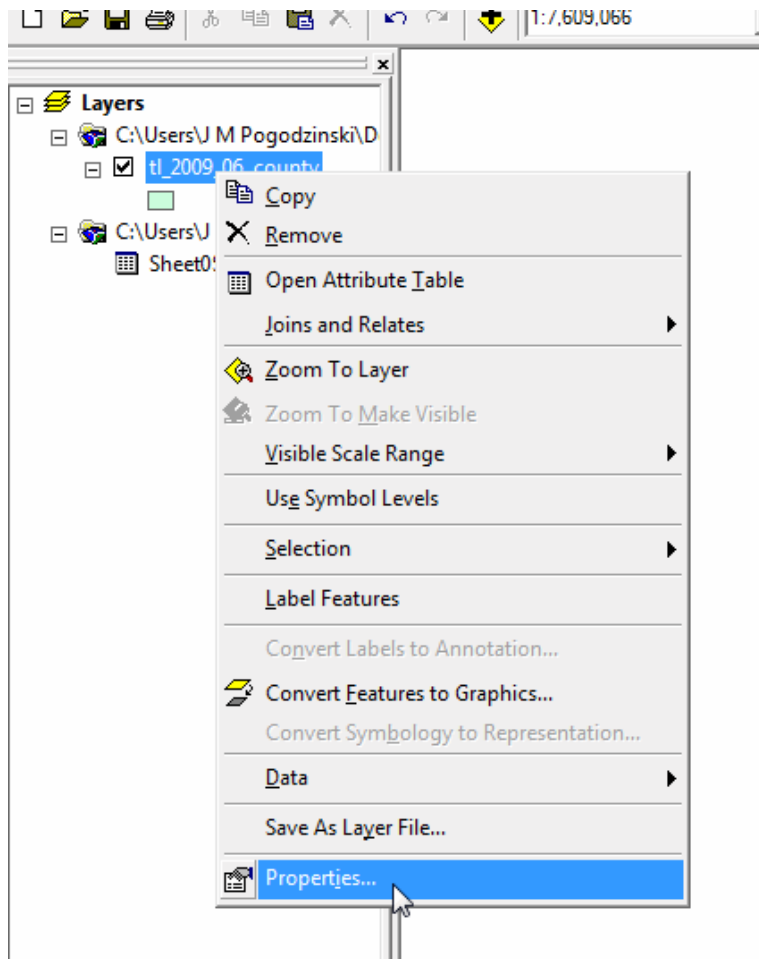
Why Bother?

We have now joined demographic and economic data to a map. What can we do with that?

One thing we can do is **symbolize** the map *using the data*.

BTW at this point you might want to save your map. If you close the file without saving, the “join” goes away. It is temporary.

Symbolizing Quantitative Data



Highlight map file, right-click, choose Properties in context-sensitive menu

Symbolizing Quantitative Data

Pick symbology tab

Pick quantities

Layer Properties

General | Source | Selection | Display | **Symbology** | Fields | Definition Query | Labels | Joins & Relates | HTML Popup

Show:

- Features
- Categories
- Quantities**
- Charts
- Multiple Attributes

Draw quantities using color to show values. Import...

Fields

Value: H004003

Classification

Natural Breaks (Jenks)

Classes: 5 Classify...

Color Ramp:

Symbol	Range	Label
	153.000000 - 36626.000000	153.000000 - 36626.000000
	36626.000001 - 110145.000000	36626.000001 - 110145.000000
	110145.000001 - 237089.000000	110145.000001 - 237089.000000
	237089.000001 - 443216.000000	237089.000001 - 443216.000000
	443216.000001 - 1634030.000000	443216.000001 - 1634030.000000

Show class ranges using feature values

Advanced

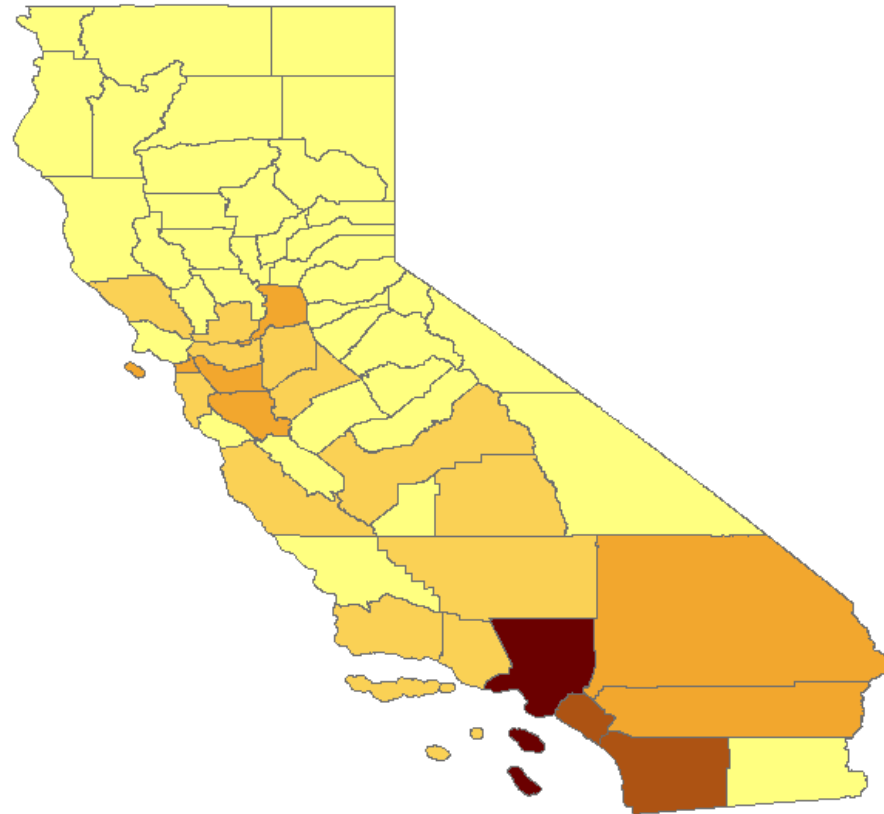
OK Cancel Apply

Pick the variable you are interested in. H004003 is stock of rental housing.

You can pick different "color ramps"

Symbolizing Quantitative Data

What You Get



Did You Get What You *Really* Wanted?

Looks like there is a lot of rental housing in Southern California – around LA.

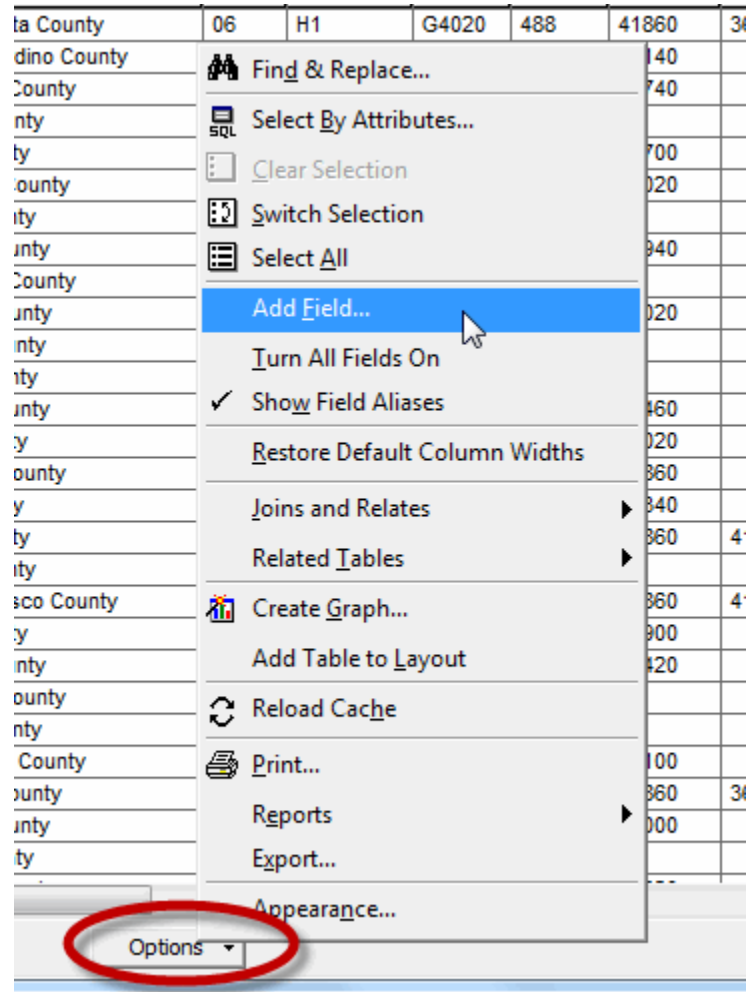
One reason for that is that there are a lot of people and therefore a lot of housing of all types in Southern California.

We used an **absolute measure** – the number of rental housing units. What happens if we use a **relative measure** – the fraction that rental housing is of total housing?

Using a Relative Measure

Creating a relative measure.

Open the attribute table of the map. Click “Options” at the bottom of the table, and select “Add Field”



Relative Measure

Add Field [?] [X]

Name:

Type:

Field Properties

Precision	0
Scale	0

Attributes of tl_2009_06_county

INTPTLAT	INTPTLON	tl_2009_06_county.RelRent	GEO_ID	G
+37.8975958	-121.9281929	0	05000US0	06
+34.8572197	-116.1811966	0	05000US0	06
+33.0193704	-116.7697739	0	05000US0	06
+39.1777385	-122.2375629	0	05000US0	06
+39.2700256	-121.3442801	0	05000US0	06
+38.0214510	-119.9647084	0	05000US0	06
+40.6477240	-123.1144042	0	05000US0	06
+33.0408155	-115.3553945	0	05000US0	06
+38.1846184	-120.5593996	0	05000US0	06
+39.2951906	-120.7734456	0	05000US0	06
+39.9958481	-120.8276875	0	05000US0	06
+38.6043716	-119.8208504	0	05000US0	06
+37.2121912	-119.7493228	0	05000US0	06
+39.6646178	-121.5999550	0	05000US0	06
+41.7400000	-122.0000000	0	05000US0	06

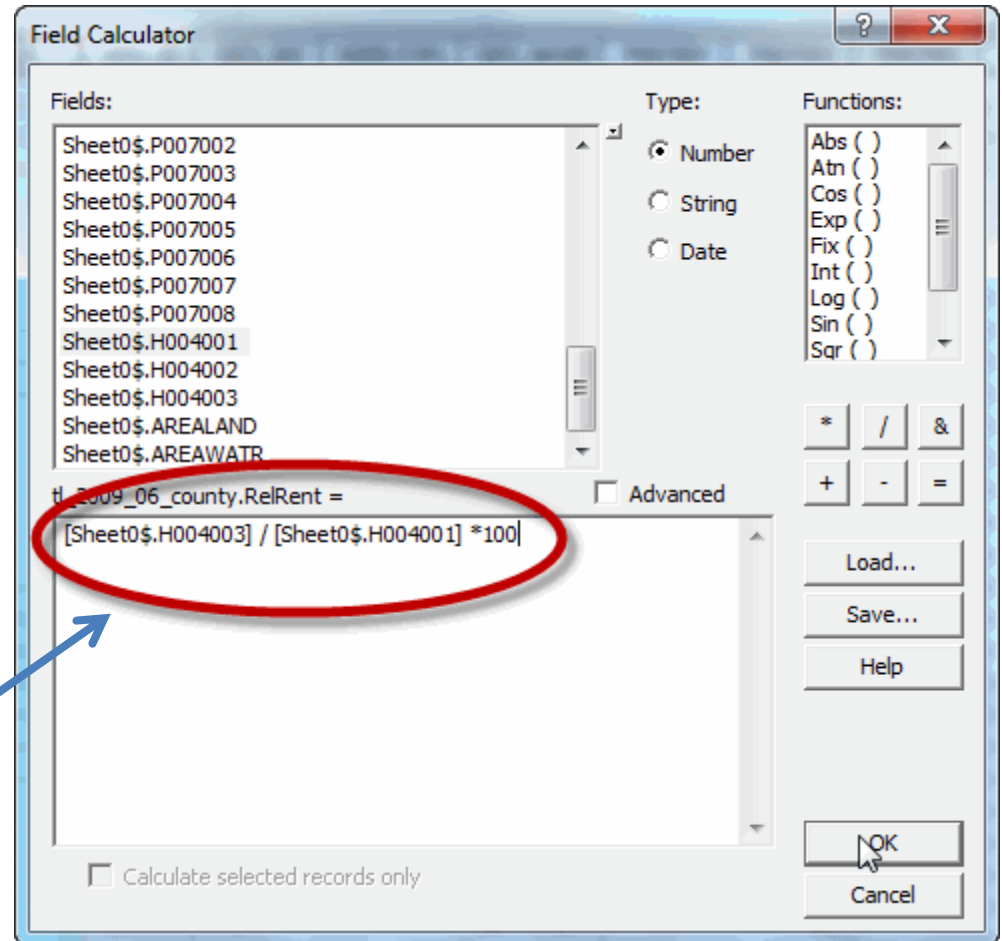
Relative Measure

$$(H004003/H004001)*100$$

5_county

LON	tl_2009	as_county	RelRent	CFO_ID	GEO_ID2
1929					06013
1966					06071
7739					06073
5629					06011
2801					06115
7084					06109
4042					06105
3945					06025
3996					06009
4456					06057
6875					06063
8504					06003
3228					06039
9550					06007
9982					06015
7569					06033
9737					06041
9926		0	05000US0		06091
2293		0	05000US0		06075

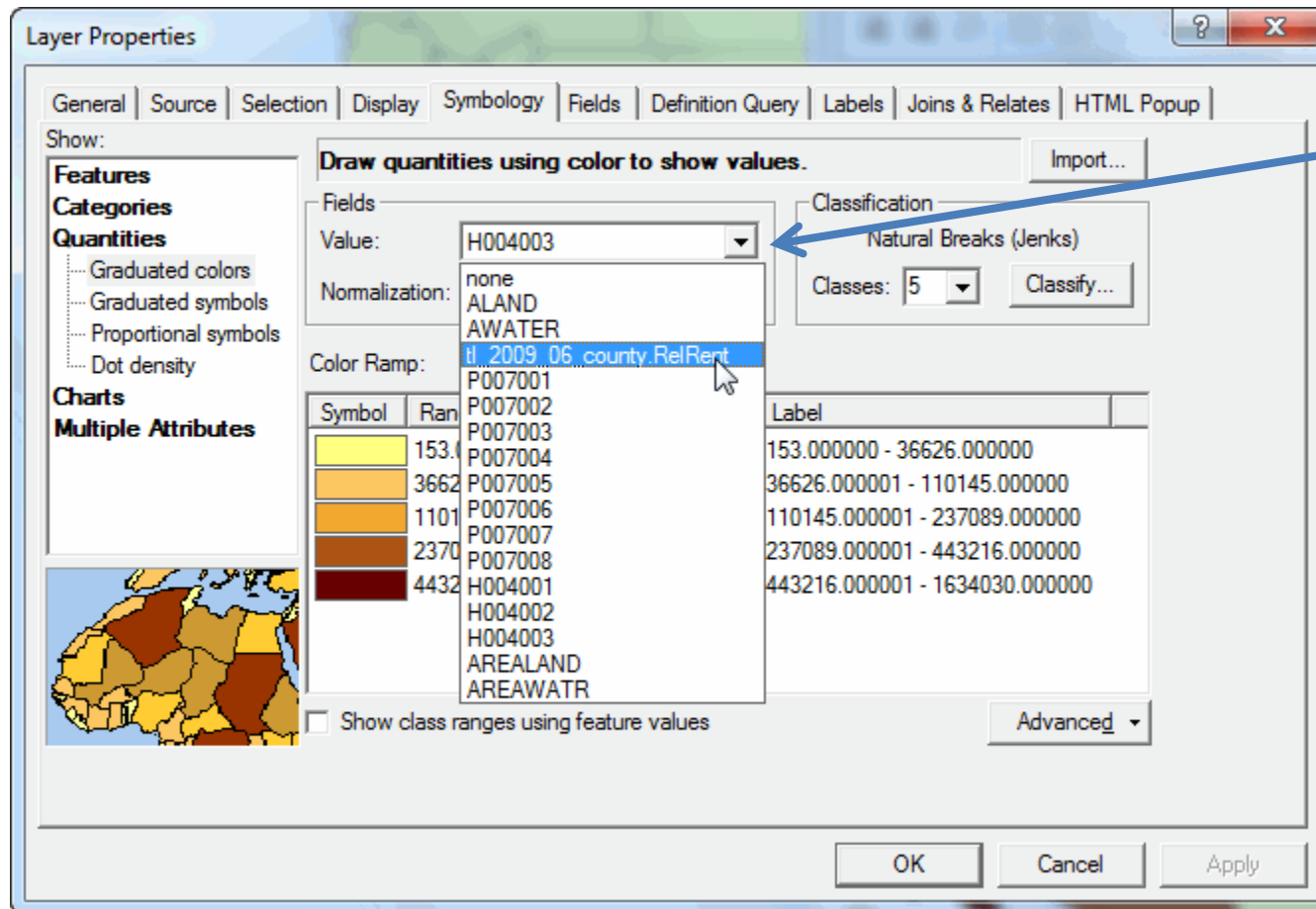
SQL Statement



You *Created* New Data

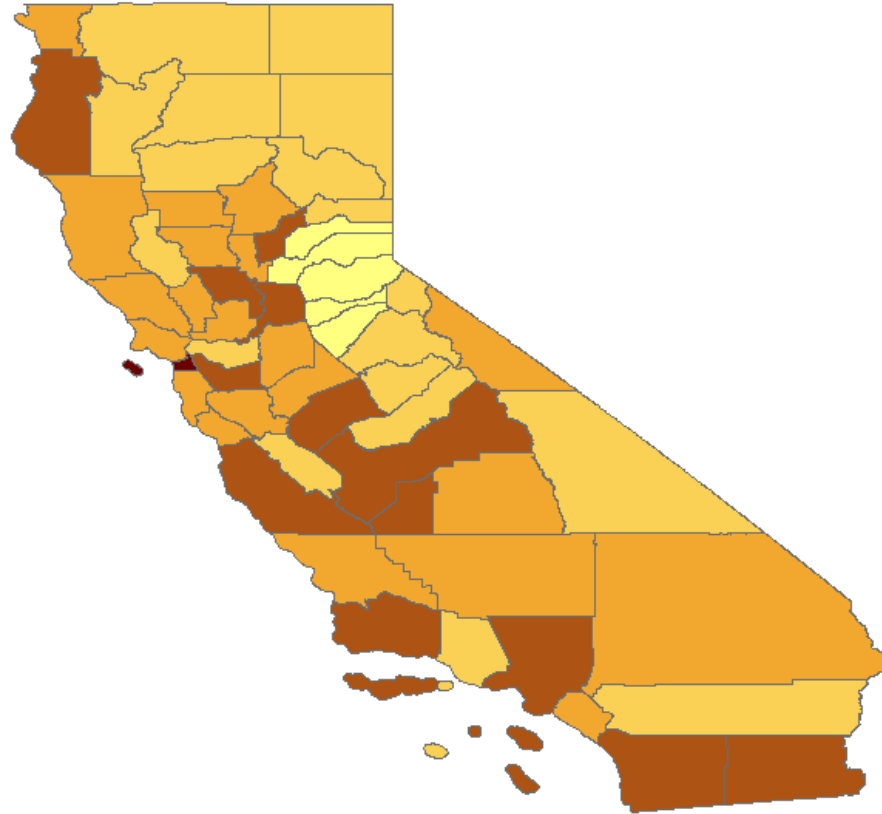
county		
ON	tl_2009_06_county,RelRent	GEO_ID
929	30.709414	05000US0
966	35.501916	05000US0
739	44.558786	05000US0
629	36.804986	05000US0
801	45.921597	05000US0
084	28.689773	05000US0
042	28.745302	05000US0
945	41.664128	05000US0
996	21.264193	05000US0
456	24.22074	05000US0
875	29.988889	05000US0
504	31.677019	05000US0
228	33.801687	05000US0
550	39.250434	05000US0
982	36.183206	05000US0
569	29.448569	05000US0
737	36.389468	05000US0
926	29.342105	05000US0
293	65.001213	05000US0
274	34.905951	05000US0
192	43.5459	05000US0
599	30.213216	05000US0
703	29.307611	05000US0
067	40.002633	05000US0

Use the New Data to Symbolize the Map

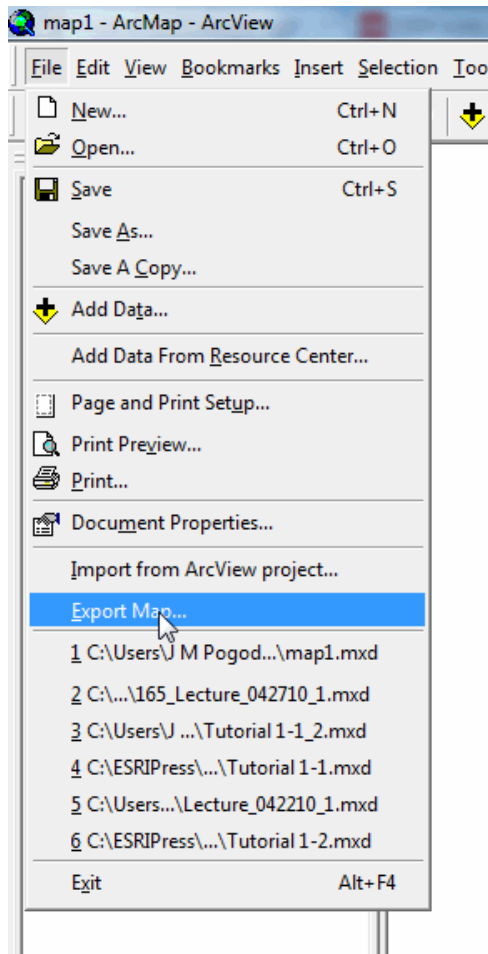


All you have to do is bring up the layer properties, symbology tab, and select a new variable from the drop down menu. **The variable you just created is now there.**

The New Map



Quick and Dirty Map Export



Exports what is in the display pane in a variety of formats including GIF and JPEG.

ArcGIS has a lot of fancy map generating capabilities. This is just the “quick and dirty” way.