

Step-by-step to map geo-coded data using QGIS

Prepared by Erin Lilli for URBST 200
Fall 2022 Queens College

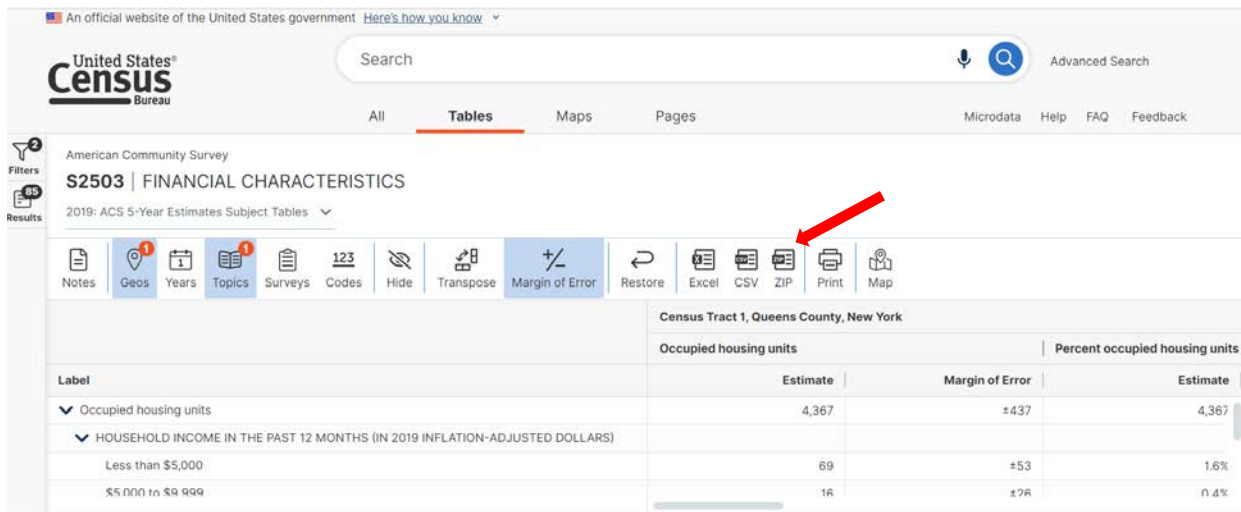
1. DOWNLOAD QGIS:

- If you haven't already downloaded QGIS, do so following using this [site](#).
- This [video](#) provides more download details if you need it.

2. GET GEO-CODED DATA TO MAP:

- You need data that is geocoded a GEOID, latitude/longitude, or x/y coordinate.
- There are several places you can find this kind of data, in this class we'll consider two sources: [The CENSUS](#) and [NYC OpenData](#). (If you want detailed building/lot information, you can explore [PLUTO](#) data).
 - **NOTE:** Not all NYC OpenData is of the kind that can be mapped, in other words it may not include geo-coding.
 - **TIP:** In the census, choose the tracts level for all of your county instead of individually selecting your neighborhood's census tracts—this is because you can simply map it all and zoom into your neighborhood and see your neighborhood in comparison to others.

To use Census data: once you identify the dataset you are interested in working with, be sure to download the [ZIP file](#) of data as this will have .csv files that include geo-coded data (just downloading excel will not include the geo-codes).



The screenshot shows the United States Census Bureau website interface. At the top, there is a search bar and navigation tabs for 'All', 'Tables', 'Maps', and 'Pages'. The main content area displays 'American Community Survey' and 'S2503 | FINANCIAL CHARACTERISTICS'. Below this, there is a toolbar with various icons for 'Notes', 'Geos', 'Years', 'Topics', 'Surveys', 'Codes', 'Hide', 'Transpose', 'Margin of Error', 'Restore', 'Excel', 'CSV', 'ZIP', 'Print', and 'Map'. A red arrow points to the 'ZIP' button. Below the toolbar, a table is visible with the following data:

Census Tract 1, Queens County, New York			
Label	Occupied housing units		Percent occupied housing units
	Estimate	Margin of Error	Estimate
Occupied housing units	4,367	±437	4,367
HOUSEHOLD INCOME IN THE PAST 12 MONTHS (IN 2019 INFLATION-ADJUSTED DOLLARS)			
Less than \$5,000	69	±53	1.6%
\$5,000 to \$9,999	1A	±76	0.4%

You will then be asked what years you want of all those available – if you want to compare maps from two different times you can select another year here.

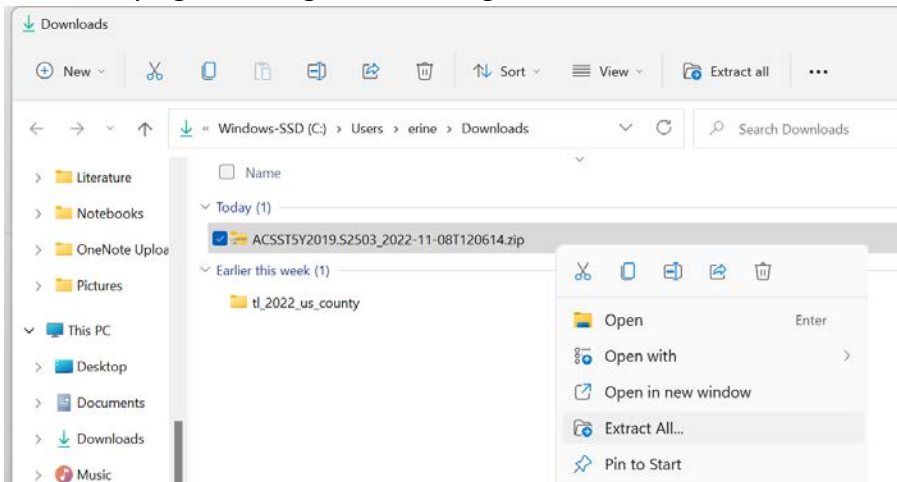
Select Table Vintages to Download X

S2503	All	2019	2016	2015	2014	2013	2012	2011	2010
ACS 5-Year Estimates Subject Tables	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Compressed Size Estimate: **17.0 kB**

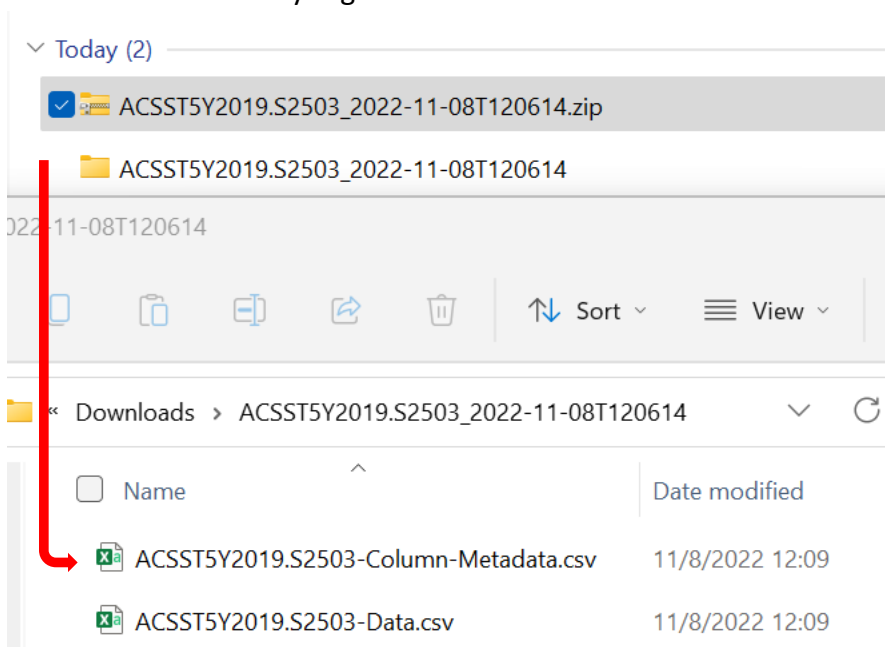
[DOWNLOAD .CSV](#)

Save the **ZIP file** (for example: ACSST5Y2019.S2503_2022-11-08T120614.zip) to your computer then extract the files by right clicking and selecting Extract All...



You can choose a location to extract/save the files to (I tend to just keep it where the Zip file is stored). An unzipped folder is created with the files you need.

- **NOTE:** It's a good idea to start a folder for you to keep all of your QGIS data and projects so to can stay organized.



The file you'll use is the **-Data.csv**. Open the file and you'll see the GEOID column. The example below is at the census tract level.

- NOTE: You'll want to work with data that has multiple regions to map. In other words, multiple tracts, multiple blocks etc. If you just use the zip code, you may only have one or two mappable regions, so it won't make for a very informative map.

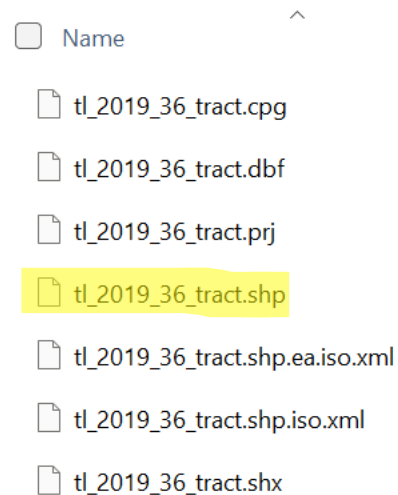
	A	B	C	D
1	GEO_ID	NAME	S2503_CO:S2503_C	
2	Geography	Geographic Area Name	Estimate!! Margin	
3	1400000US36081000100	Census Tract 1, Queens County, New York	4367	43
4				

Save an excel (.xls) version of the .csv file so you have it if you need it. QGIS uses .csv files.

3. DOWNLOAD AND SAVE THE SHAPEFILE

- You'll need the appropriate shapefile geometry to be able to "join" your .csv data in QGIS.
- The shapefile is the underlying geometry (i.e., counties, tracts, etc.) that your data gets mapped onto.
- Navigate to the [Resources tab](#) on the course website and download and save the shapefile ZIP file for the scale of geography in your .csv dataset (e.g., tract, zip code, block). Extract the files and save the unzipped folder.
 - **NOTE:** In QGIS you will only import the .shp file, but all those other files need to be in the same folder with the .shp file for it to work.
- The shapefiles to the left are census tracts for all of New York state (FIPS #= 36)

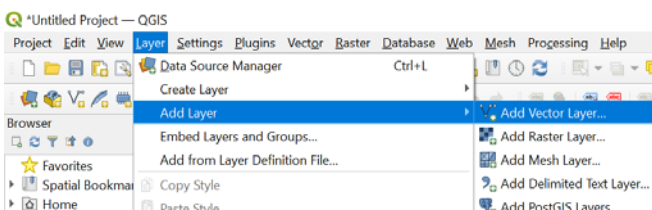
« _URBST 200_F2022 > QGIS > tl_2019_36_tract (1)



4. IMPORTING THE SHAPEFILE INTO QGIS

- The first thing you need to do is import your shapefile into QGIS. You can't do any mapping without the shapefile.

Open QGIS: Then go to Layer > Add Layer > Add Vector Layer...

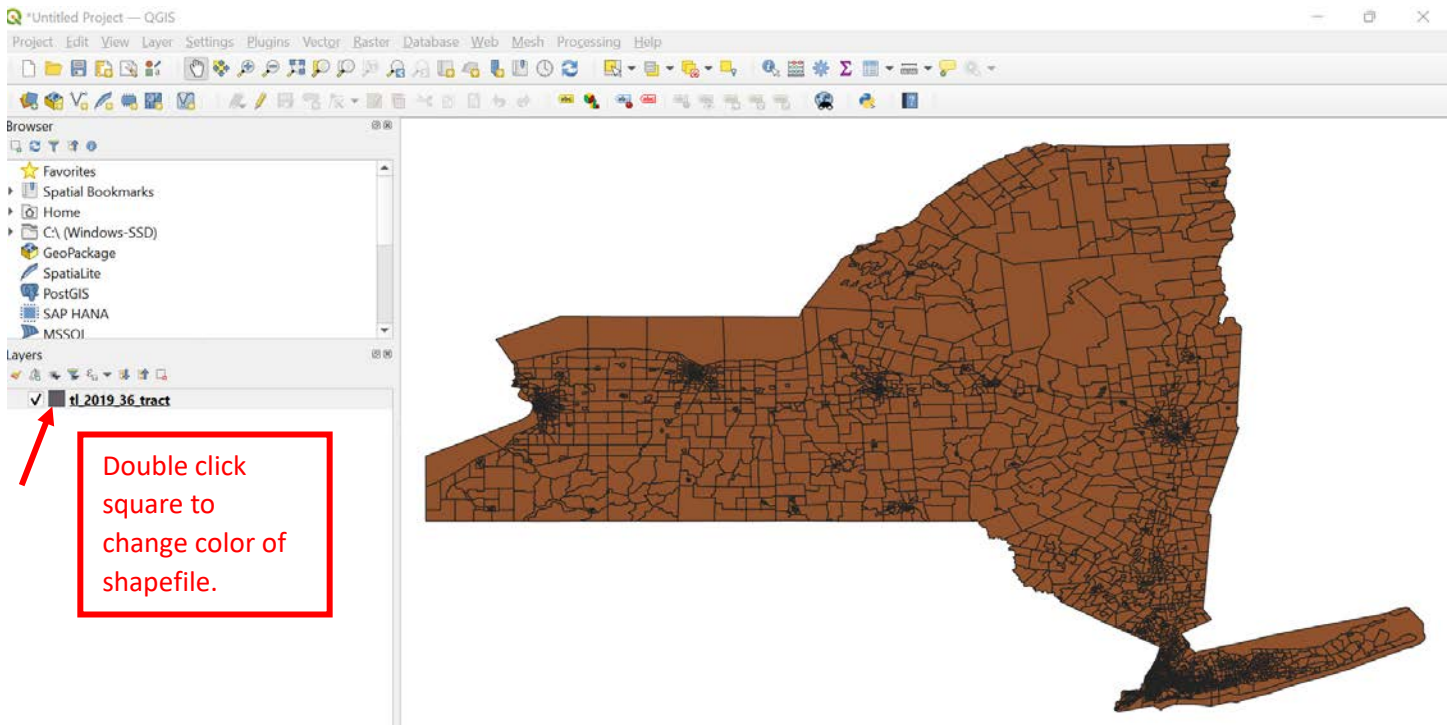
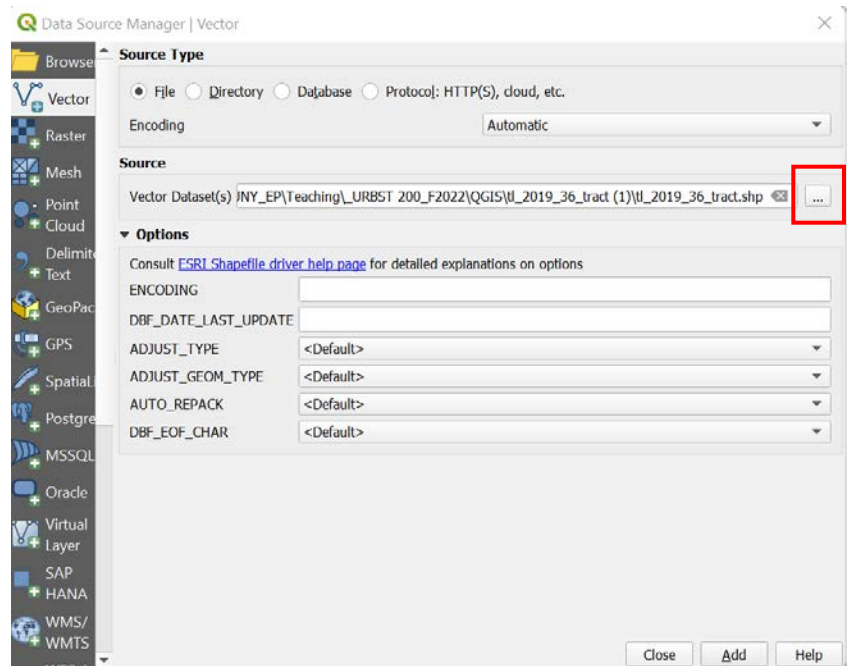


In the dialogue box, under Source Type, make sure File is bulleted and Encoding is Automatic. Under Source, click the [...] button to the right of Vector Dataset(s) and navigate to your shapefile folder and select the .shp file.

Leave everything else as Default and click the Add button.

Now you have the shapefile layer imported and are ready to join your dataset.

- **NOTE:** The tract file we are using (tl_2019_36_tract (1)) has the census tracts for ALL of New York state. Your .csv data would only map on to your specific tracts—you can either zoom into your tracts using the magnifying tool OR extract your county as its own layer (to do this watch the tutorial video [here](#))



5. PREPARING THE GEO-CODED DATA

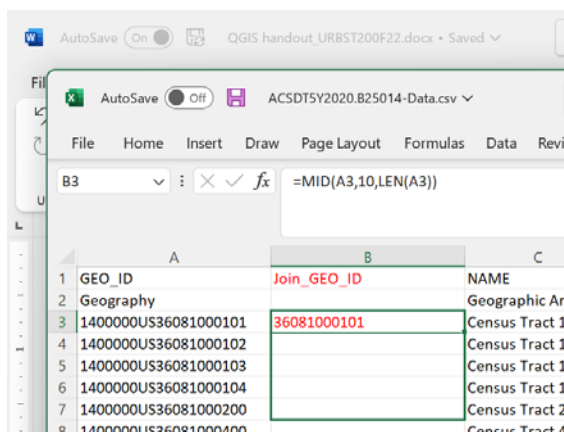
- Before you can import your data set and “join” it to your shapefile, you need to remake the GEO_ID column so it contains only the numbers to the right of US.
- Be sure all the data cells that look like numbers are formatted as numbers.
- Make sure the data is in the format you want to map. For example, if you want to map percentages, you’ll need to calculate percentages.
- It is also a good idea to clean up this dataset, so it is easier to work with in QGIS. I recommend:
 - Deleting any data column you don’t want to map.
 - Renaming the column headings so they are shorter and easier to comprehend (these should be row 1 so they show up when you join in QGIS).

Remake your GEOID column:

- a. Open your .csv file in excel.
- b. Insert a column to the right of the GEO_ID column and label it Join_GEO_ID. This will be your new column B.
- c. Enter the formula =MID(A3,10,LEN(A3)) (instructions also [here](#)) into the cell of your new Join column so it is next to the cell with the GEO_ID Geography number (e.g., 1400000US36081000101). This should be cell B3.

	A	B	C
1	GEO_ID	Join_GEO_ID	NAME
2	Geography		Geographic
3	1400000US36081000101	=MID(A3,10,LEN(A3))	Census Trac
4	1400000US36081000102		Census Trac
5	1400000US36081000103		Census Trac

- d. Hit enter and this will give you a new GEO_ID. Copy it down the column by dragging or double clicking the little box on the bottom right of the cell.

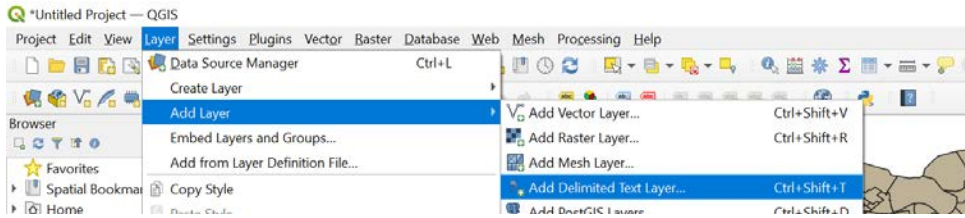


	A	B	C
1	GEO_ID	Join_GEO_ID	NAMI
2	Geography		Geogr
3	1400000US36081000101	36081000101	Censt
4	1400000US36081000102	36081000102	Censt
5	1400000US36081000103	36081000103	Censt
6	1400000US36081000104	36081000104	Censt
7	1400000US36081000200	36081000200	Censt
8	1400000US36081000400	36081000400	Censt
9	1400000US36081000600	36081000600	Censt
10	1400000US36081000701	36081000701	Censt

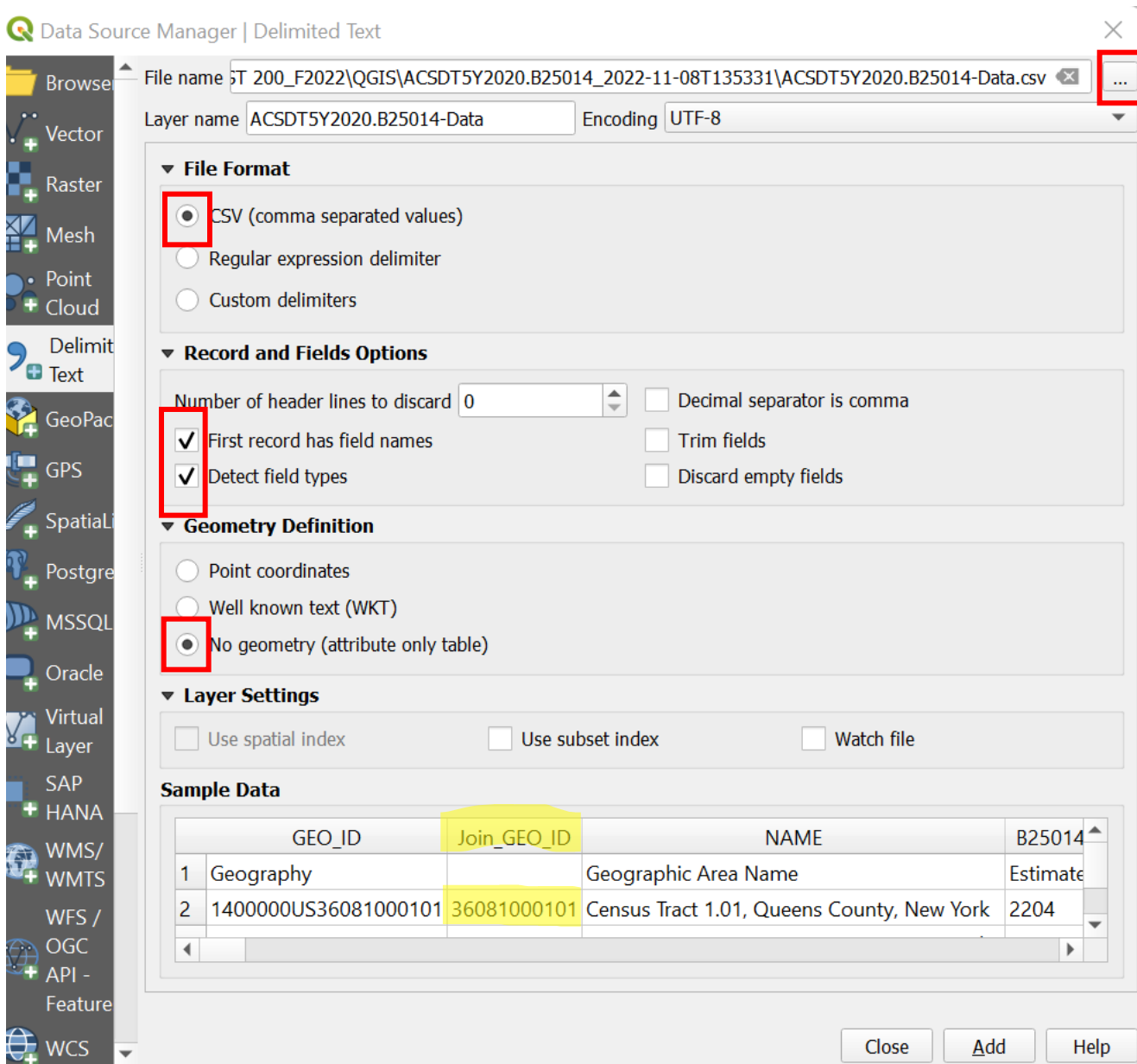
- e. Save the file (keeping it as a .csv).

6. IMPORTING THE .CSV FILE INTO QGIS

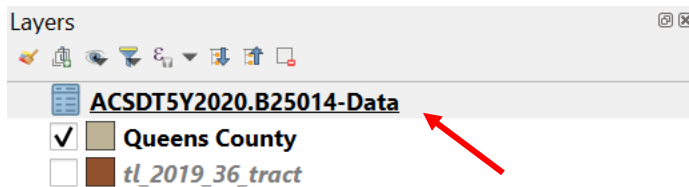
Import updated .csv file: Go to Layer > Add Layer > Add Delimited Text Layer...



In the dialogue box click the [...] button to the right of File name and locate your .csv file. Leave all other settings as shown below and click Add.

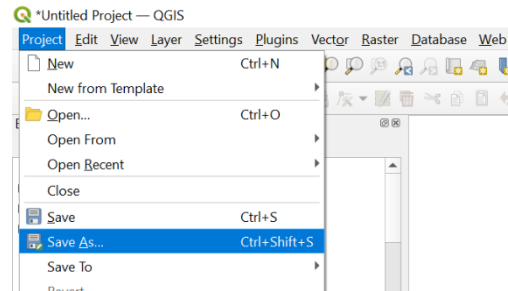


Now the layer is added to your project.

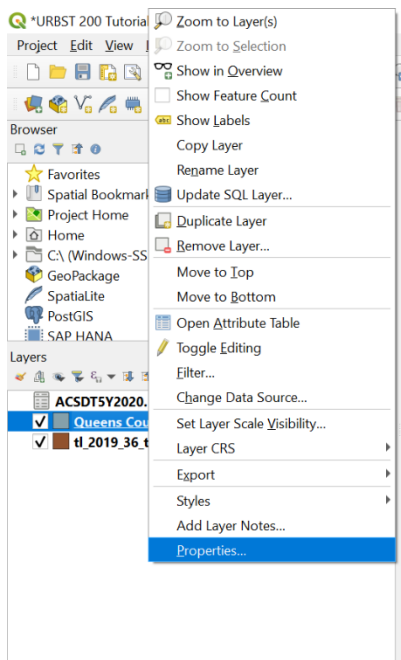


7. SAVE YOUR PROJECT!

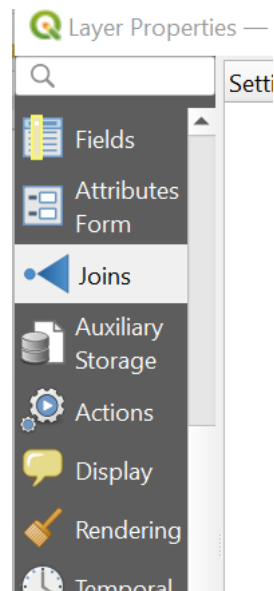
- Now is a good time to save your project.
- Go to Project > Save As....
- Give it a logical name.



8. JOINING YOUR DATA TO THE SHAPEFILE

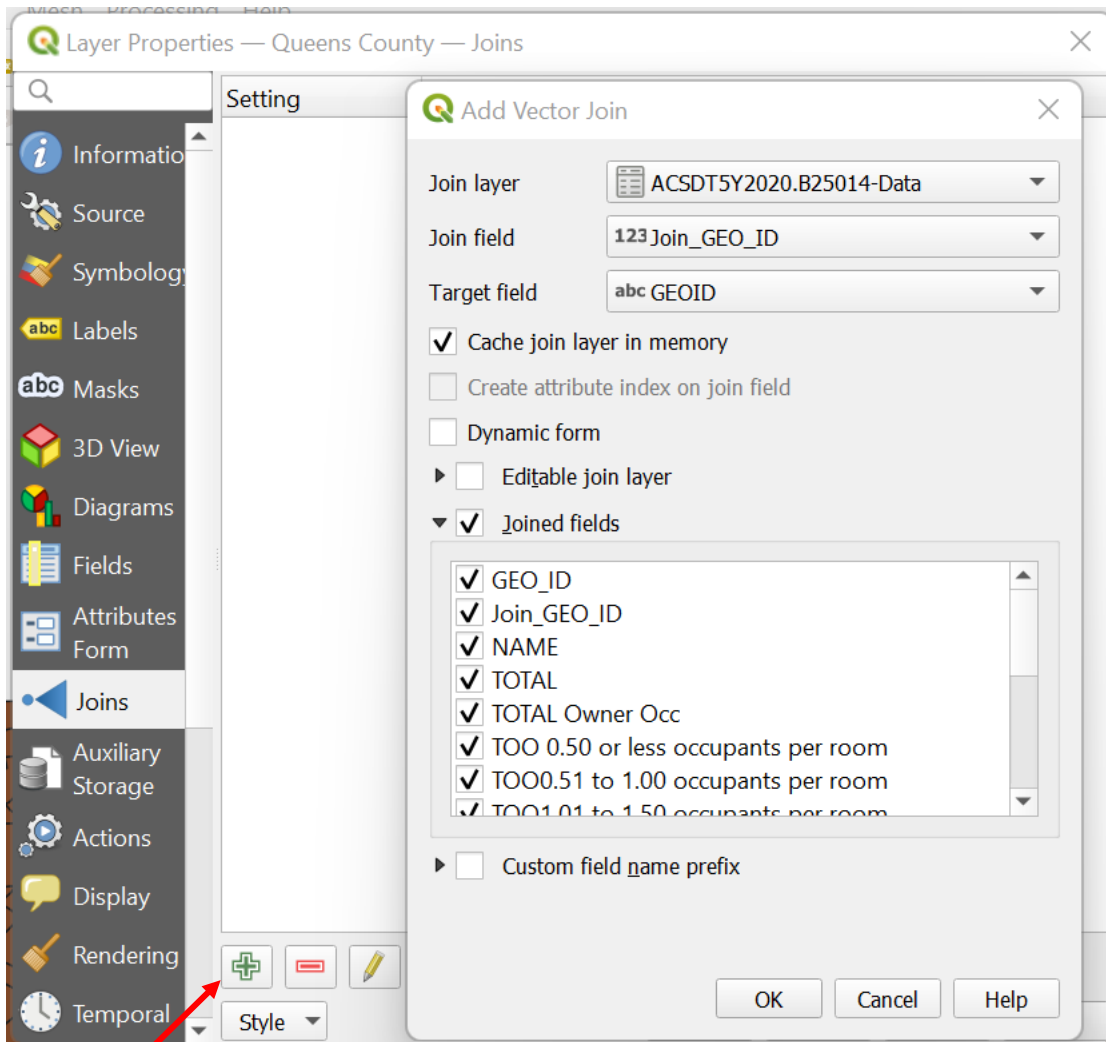


- In QGIS, right click on your shapefile in the Layers window and go to Properties.
- In the Properties dialogue box, click Joins (you may need to scroll the left panel to see it).

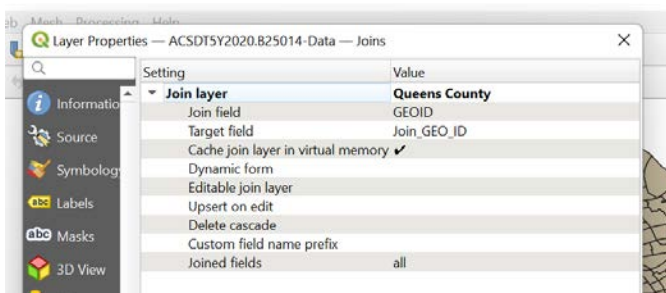


- Click the green plus button to join the .csv file to the shapefile (bottom left).
- In the dialogue box select your .csv datafile from the Join layer drop down menu.
- In the Join field select the Join_GEO_ID column you made.
- In the target field select GEO_ID (referencing the shapefile).
- Make sure Cache join layer in memory is checked

h. Check the Joined fields box and click the box for the data you want to join (NOTE: this is where renaming your column titles comes in handy).



i. Click OK and see the Join listed, then click OK in the other dialogue box.



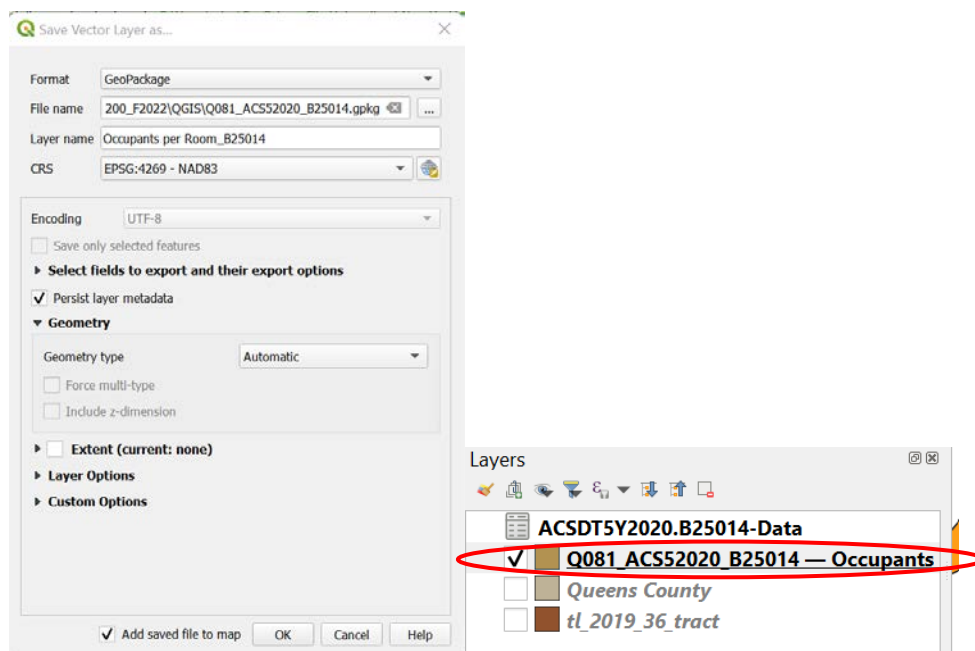
j. To confirm the join, right click on the shapefile in the Layers window then click Open Attribute Table. You should see your .csv file data in the attribute table.

Queens County — Features Total: 669, Filtered: 669, Selected: 0

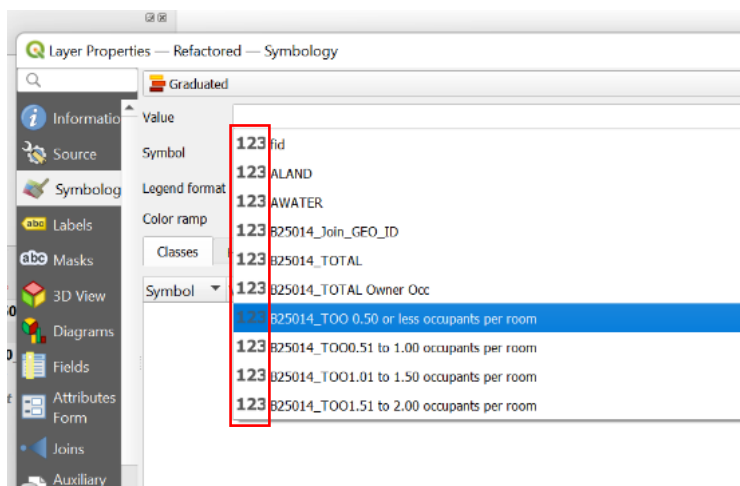
ON	2020.B25014-Data_20.B25014-Data_J	2020.B25014-Data	ACSDT5Y2020.B25014-Data_TOTAL	ACSDT5Y2020.B25014-Data_TOTAL Owner Occ	ACSDT5Y2020.B25014-Data_TOO 0.50 or less occupants per room	Data_TOC	
1	344	1400000US360...	36081044800 Census Tract 44...	841	287	148	88
2	261	1400000US360...	36081045800 Census Tract 45...	665	302	187	111

k. Save your newly joined-up shapefile by right-clicking and selecting Export > Save Features As...; Keep the settings shown below, save it with a descriptive name and in the same location as your working QGIS project file.

You can right-click and Remove layer all of the other layers if you want to you only have joined-up shapefile you just saved.

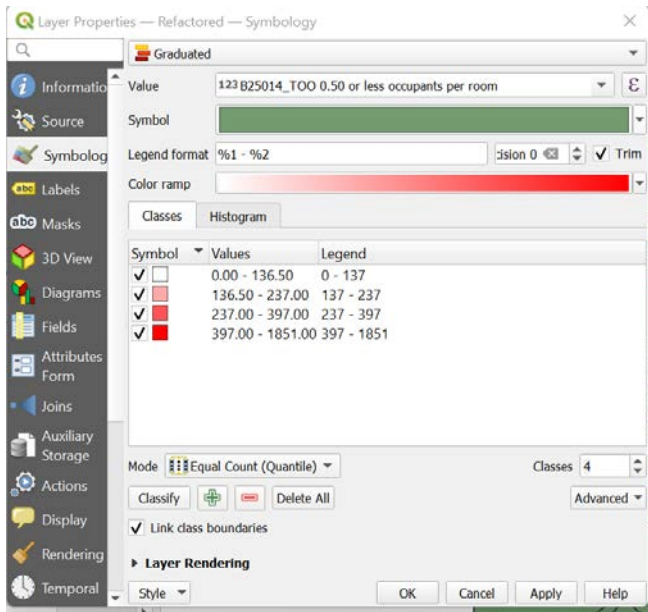


9. MAPPING YOUR DATA!



- To visualize the data in your shapefile, right-click and select properties, then from the properties dialogue box select Symbology (you may need to scroll in the left column).
- Select Graduated from the top dropdown
- In the Value dropdown select the data you want to map

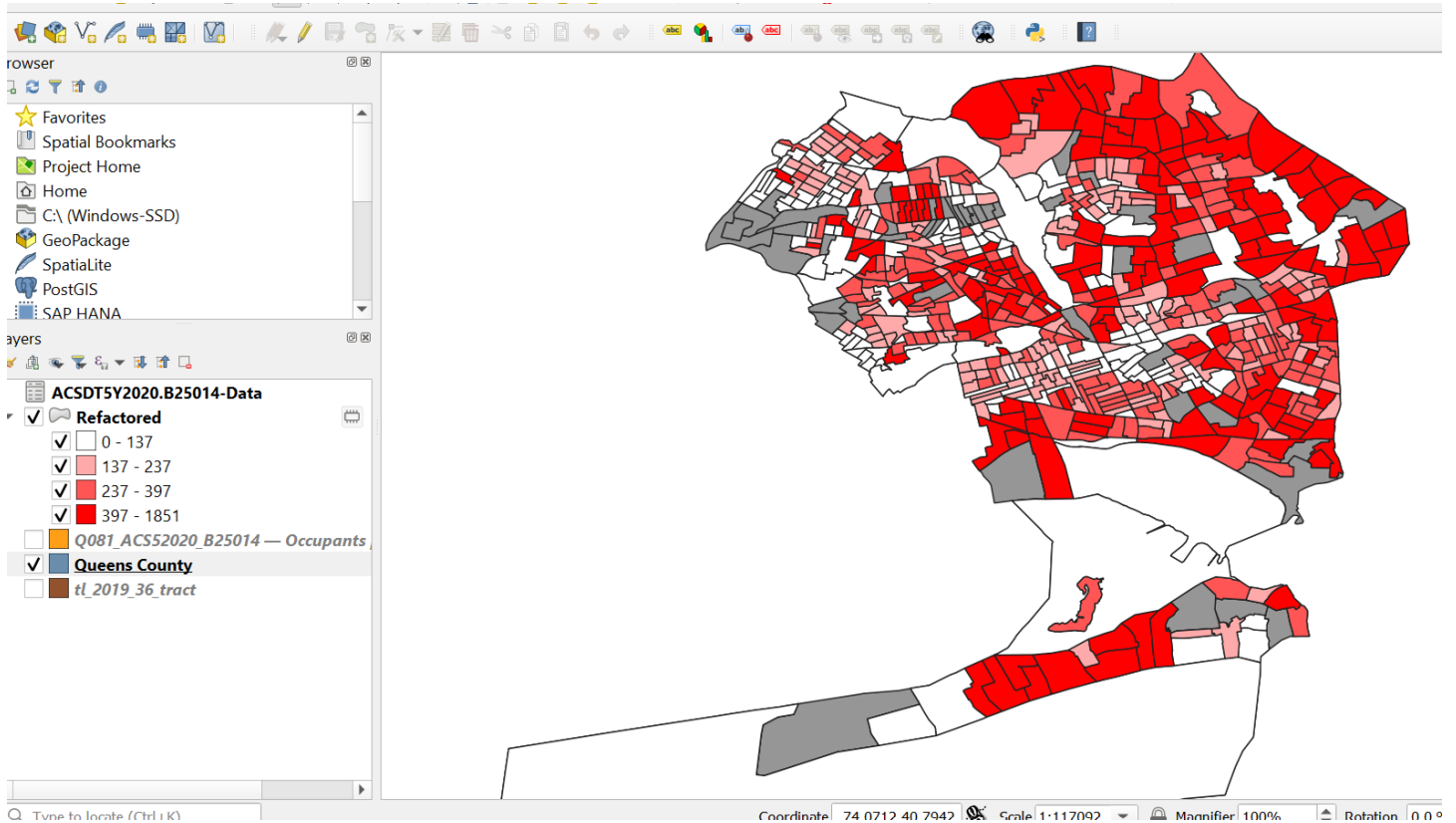
➤ **NOTE:** if you don't see any of your data categories in the dropdown, that means datatype is not stored as an Integer. Watch this [video](#) to fix this. You know it's stored as Integer if you see the **123** before the column name.



- d. Set the precision set to 0
- e. Set mode to Quantile and Classes to 4
- f. Click OK

➤ NOTE: As you get more used to the program you can play around with these settings to see what works best for displaying your data.


Now you have a map!

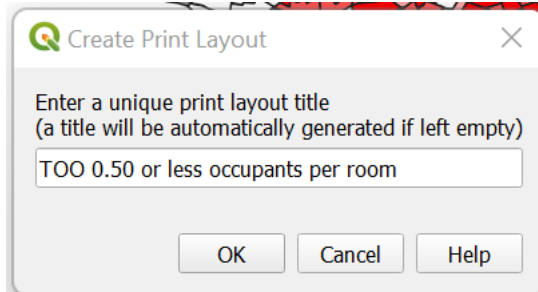


10. EXPORTING YOUR MAP!

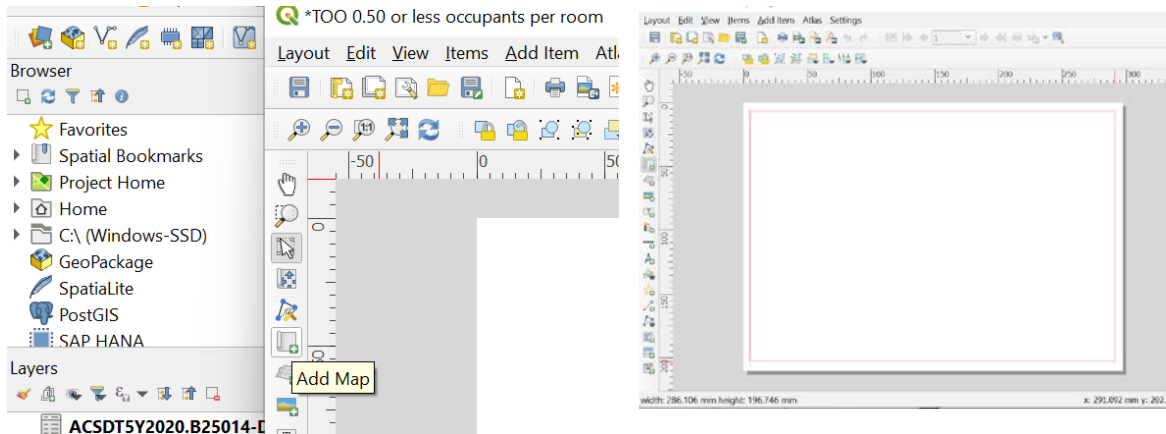
- a. Fit the area you want to export in the viewing window using the zoom and pan tools.





- b. Click the print composer to start the export process, name it something appropriate—the example below is T(otal)O(wner)O(ccupied) 0.50 or less occupants per room. 



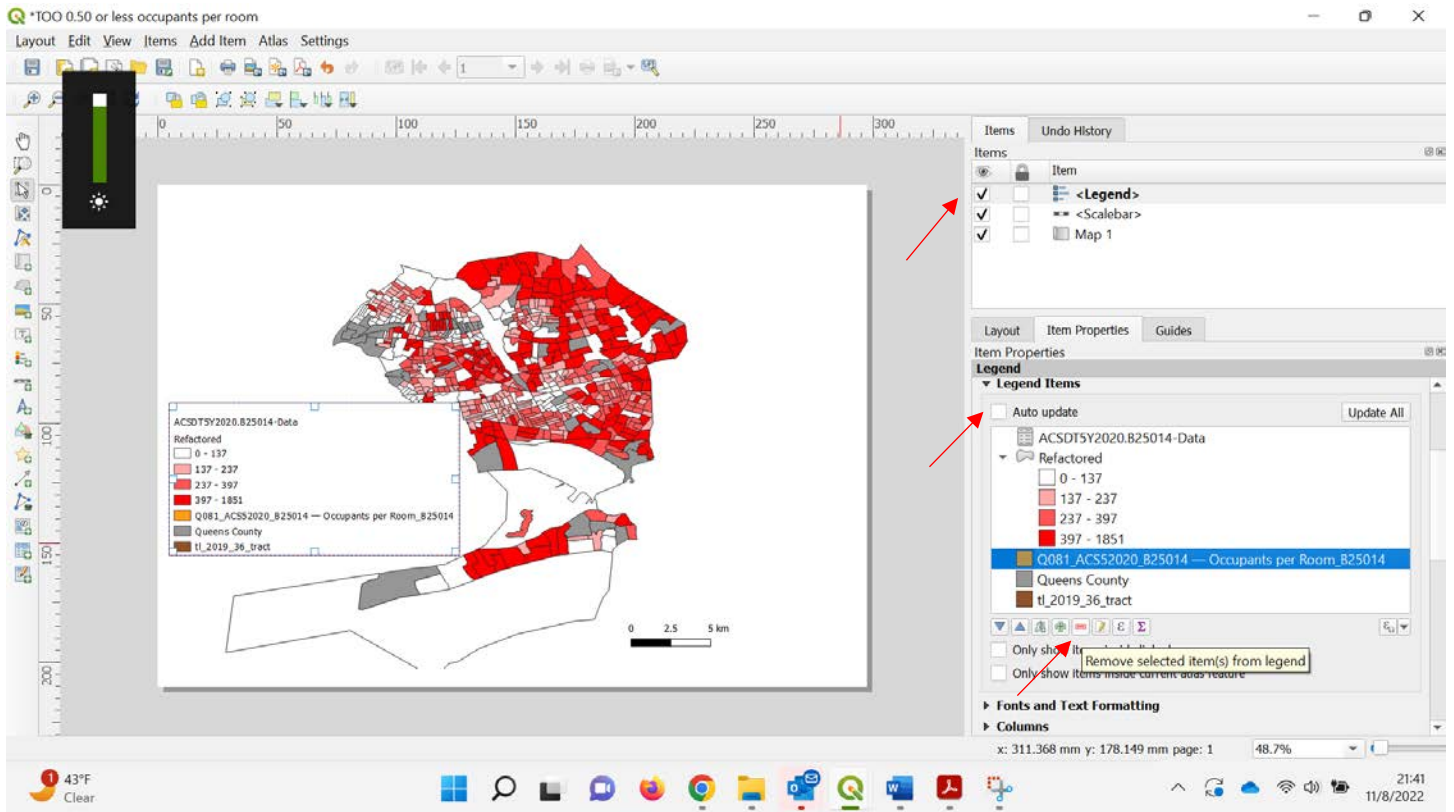
- c. Click the Add Map icon in the lefthand layout panel then drag a drafting area into the blank canvas.




- d. Using the same lefthand layout panel add a scale bar  and legend . Click these buttons then click into the map area to locate it.

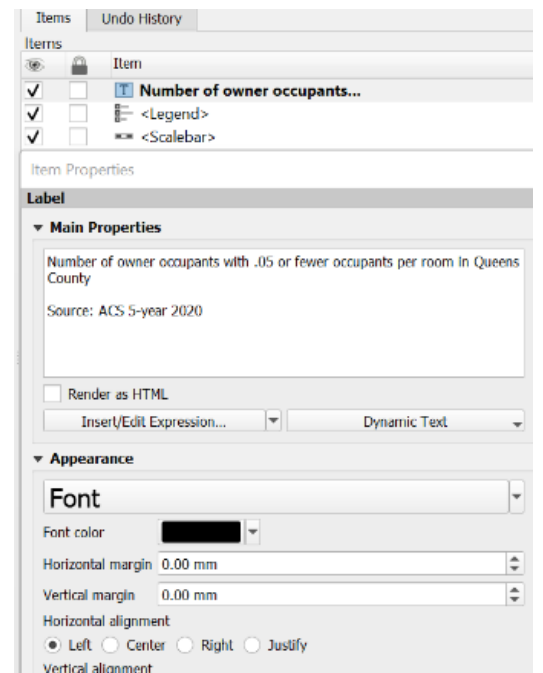
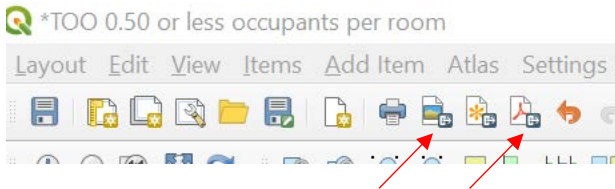
- e. To edit the legend:

- highlight legend in the righthand Item tab
- uncheck Auto update in the Item Properties tab (you can rename layers by right clicking the layer in the regular workspace and Auto update the legend)
- click the layer you want to remove from the legend and click the red minus button



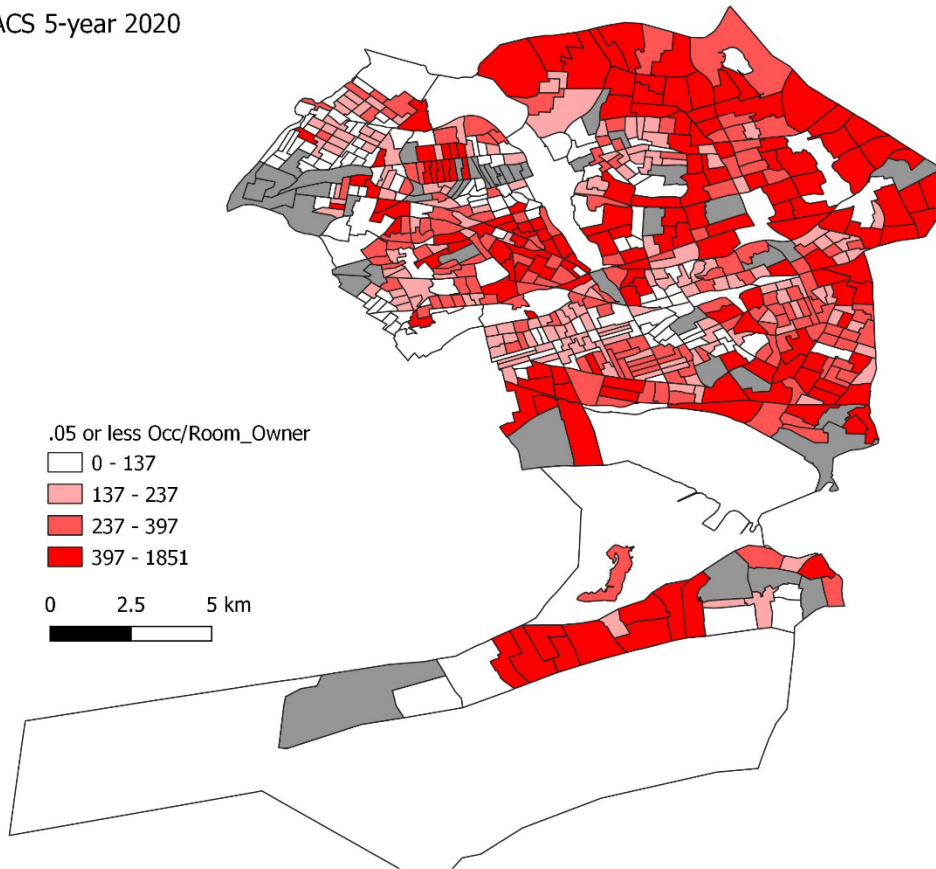
f. From the layout panel add a label  into the map area and give it an appropriate title using the righthand properties panel.

g. Export the map as a JPEG or PDF



Number of owner occupants with .05 or fewer occupants per room in Queens County

Source: ACS 5-year 2020



Tutorial Videos

Importing shapefile & .csv file into QGIS

<https://share.vidyard.com/watch/7USaL4ptHjvzYzzkLnyRRr?>

Extracting Queens County from NYS shapefile

<https://share.vidyard.com/watch/CU1yCi6VrrRrzZpipUjD6R?>

TROUBLE SHOOT: Refactor fields: when you can't find your data to map

<https://share.vidyard.com/watch/pfPJDeDdxkuvTBL34YapcC?>

Visualizing the Map and Exporting

<https://share.vidyard.com/watch/wP8skcpEhznEbmCjmzJHrd?>