THATCamp PHILLY
The Humanities and Technology Camp

GIS for Digital Humanities

Tutorial: Desktop GIS with QGIS

Overview

This tutorial will take you through the process of conducting a spatial analysis of Philadelphia Registered Historic Places. This guide assumes you have already installed QGIS. You can install the free QGIS software for mac or windows here: http://www.qgis.org/en/site/.

Let's Get Started!

Etherpad

ph.ly/thatcampmaps Important links will be available on the etherpad.

Why QGIS?

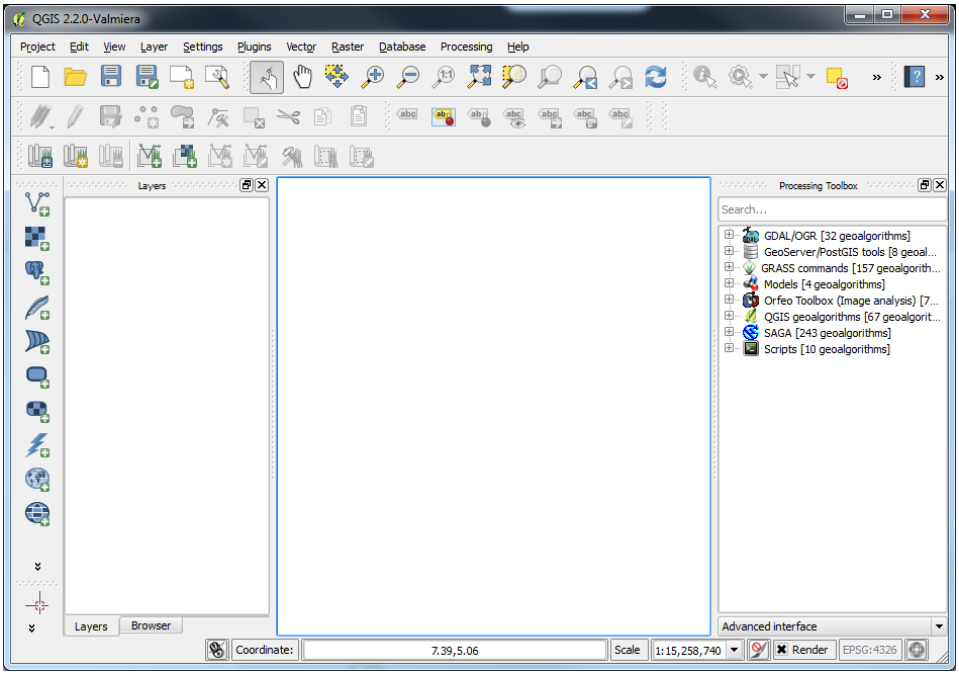
QGIS is a free and open source desktop GIS software program. Of the FOSS GIS programs, it's the best. If you have the option to choose from proprietary desktop GIS software programs, Esri's ArcMap software might be better, but it is pretty expensive. (Discounts for students and nonprofits do exist).

Formulate a Spatial Question

How many Registered Historic Places are located in each Philadelphia City Council District? We'll conduct spatial analysis of this data and use it for outreach and engagement with Council Members to promote activism around historic sites.

Make your first map!

Open up QGIS Desktop. It will look like this:

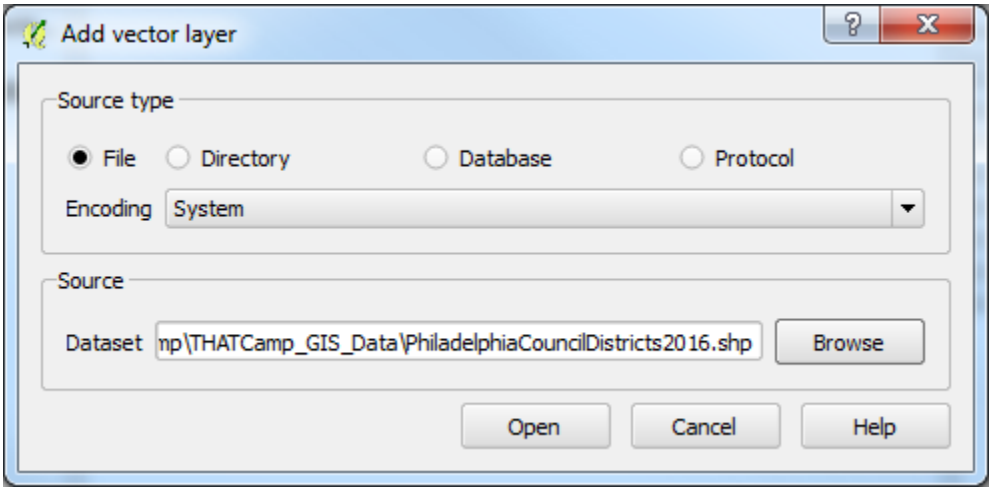


On the left will be the table of contents. In the middle will be your map. On the right will be your toolbox. Desktop GIS software is not unlike Adobe Illustrator, the table of contents features layers that are "stacked" and tools are available to manipulate the layers. In addition to the spatial properties each layer has, it also has attribute properties that describe the element. These can be used for analysis purposes.

Add Data to your Map

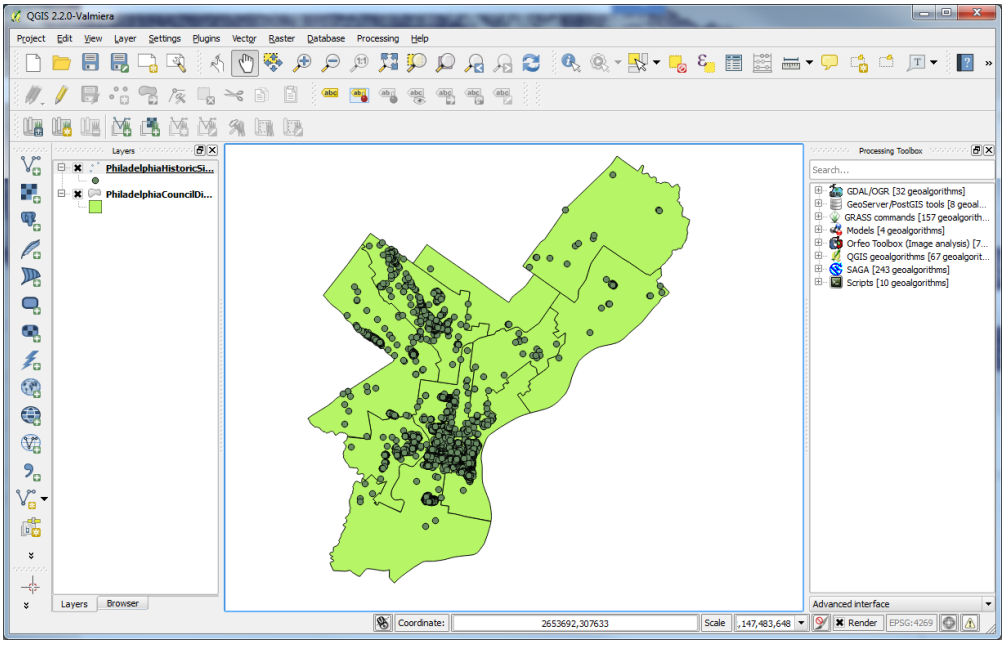
Use the Add vector data button to add new datasets to your map.

In the add vector layer window, select browse. Browse to your working folder and selected the **.shp file** from your Council District shapefile. You can use Control+Click to select the Historic Sites shapefile as well. Note: as we discovered earlier, shapefiles (the most common vector spatial data format) are comprised of multiple files that work together to display the geographic data on the map. When sharing a shapefile with a friend, be sure to zip up the entire collection of files and share them, they are all important! For the purposes of adding data to QGIS, you always select the .shp file when adding a shapefile to a map.

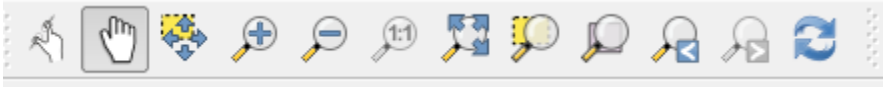


Explore Your Data

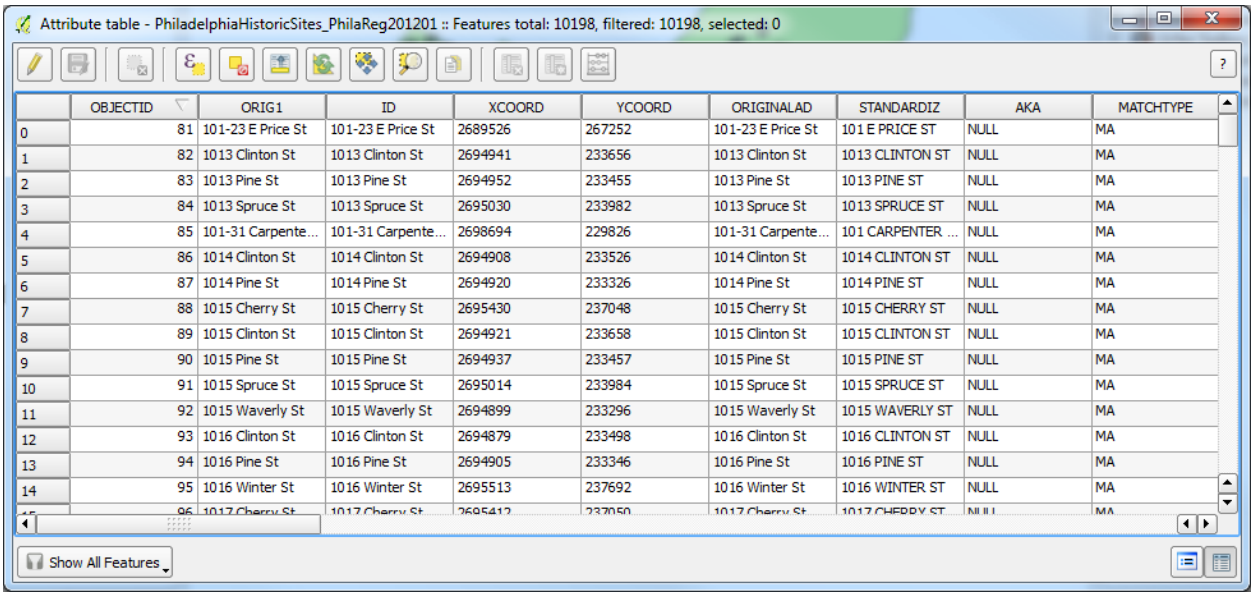
Look at your data on the map. Does it line up?



Use the navigation tool mar to practice zooming in and out of your data.



Right click on a layer in the table of contents and select *Open Attribute Table*. This will show you the tabular (or attribute) data for your spatial data. This is like an excel file linked to your spatial data. These attributes can be used for analysis purposes.



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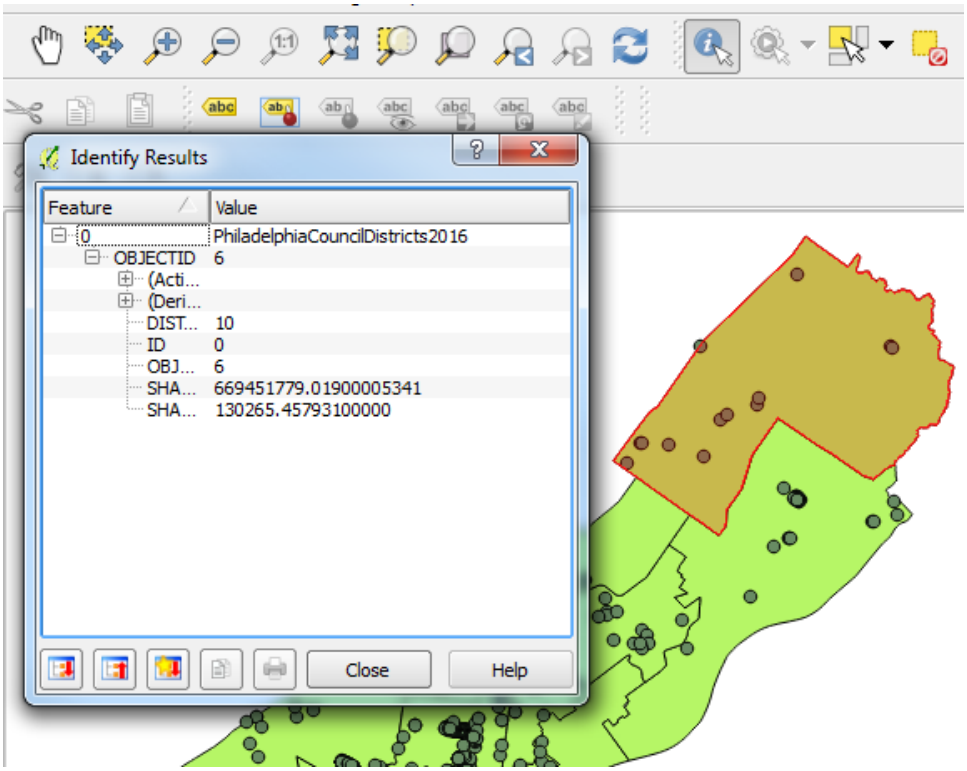
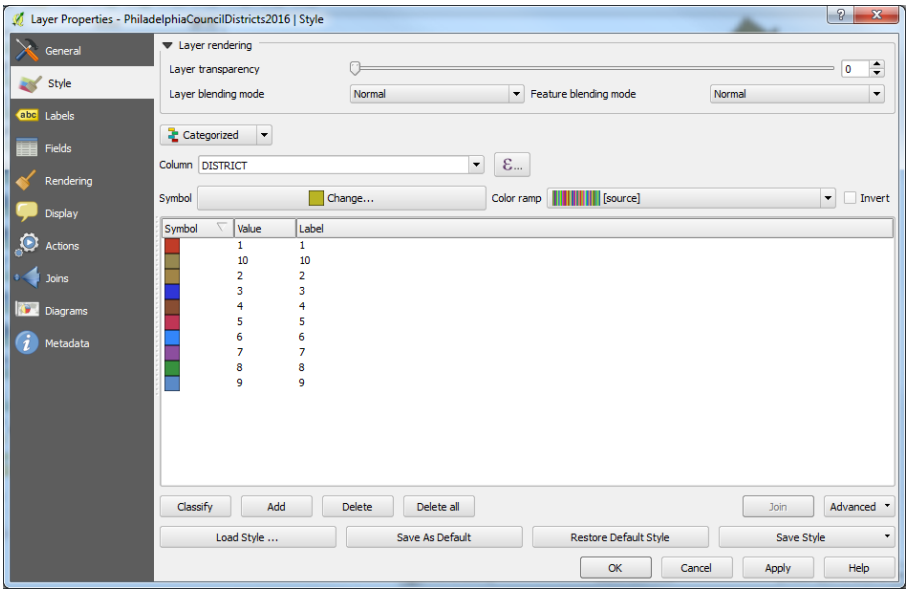
0	81	101-23 E Price St	101-23 E Price St	2689526	267252	101-23 E Price St	101 E PRICE ST	NULL	MA
1	82	1013 Clinton St	1013 Clinton St	2694941	233656	1013 Clinton St	1013 CLINTON ST	NULL	MA
2	83	1013 Pine St	1013 Pine St	2694952	233455	1013 Pine St	1013 PINE ST	NULL	MA
3	84	1013 Spruce St	1013 Spruce St	2695030	233982	1013 Spruce St	1013 SPRUCE ST	NULL	MA
4	85	101-31 Carpente...	101-31 Carpente...	2698694	229826	101-31 Carpente...	101 CARPENTER ...	NULL	MA
5	86	1014 Clinton St	1014 Clinton St	2694908	233526	1014 Clinton St	1014 CLINTON ST	NULL	MA
6	87	1014 Pine St	1014 Pine St	2694920	233326	1014 Pine St	1014 PINE ST	NULL	MA
7	88	1015 Cherry St	1015 Cherry St	2695430	237048	1015 Cherry St	1015 CHERRY ST	NULL	MA
8	89	1015 Clinton St	1015 Clinton St	2694921	233658	1015 Clinton St	1015 CLINTON ST	NULL	MA
9	90	1015 Pine St	1015 Pine St	2694937	233457	1015 Pine St	1015 PINE ST	NULL	MA
10	91	1015 Spruce St	1015 Spruce St	2695014	233984	1015 Spruce St	1015 SPRUCE ST	NULL	MA
11	92	1015 Waverly St	1015 Waverly St	2694899	233296	1015 Waverly St	1015 WAVERLY ST	NULL	MA
12	93	1016 Clinton St	1016 Clinton St	2694879	233498	1016 Clinton St	1016 CLINTON ST	NULL	MA
13	94	1016 Pine St	1016 Pine St	2694905	233346	1016 Pine St	1016 PINE ST	NULL	MA
14	95	1016 Winter St	1016 Winter St	2695513	237692	1016 Winter St	1016 WINTER ST	NULL	MA

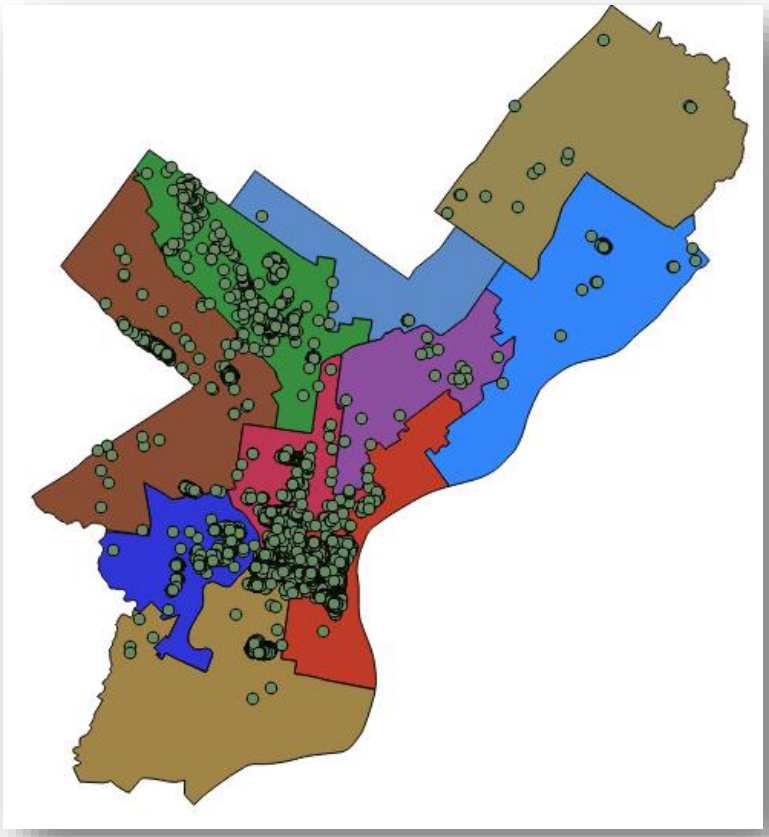
Use the Identify tool to inspect a feature on the map.



Symbolize your Map

Double click the small symbol beneath the Council Districts layer in your table of contents. This will open the *layer properties*. Select *Style*. In the Style tab, select *Categorized* and select *DISTRICT* for the column. Click the classify button at the bottom to add all values from your Council District.





We just assigned a unique color for each different district ID. This is a nice way to show different categorical values in your dataset. Your map now looks like this. It looks pretty cool! Great job!

Time for Spatial Analysis!

Now we are ready to analyze our data. We want to count up the historic places that fall into each council district. This way, we'll have a way to communicate to our council person about the importance of historic places for their district. Try manually counting all historic places on the map that fall within one district. It's hard! And it's not exact. Imagine if instead of historic places, there were crimes. There would be a lot

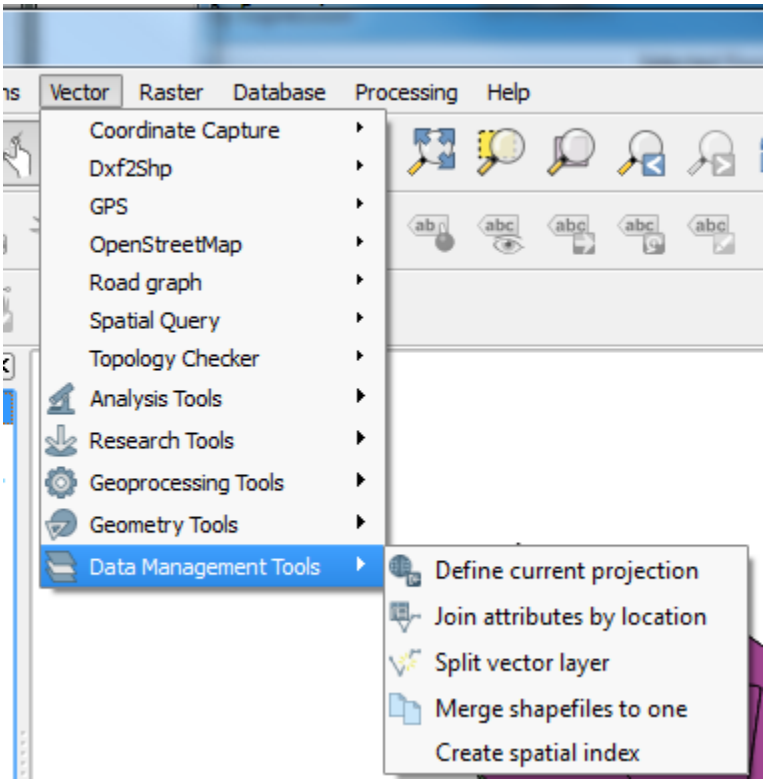
more and it would be impossible to count each individually. Without GIS, conducting these calculations would be impossible. Imagine having a excel table and trying to guess which historic place fell within which council district. Not possible! GIS solves this problem because it allows you to make spatial connections between different datasets! Wow! GIS is cool!!!

A Spatial Join

The tool we will use for this is called Spatial Join. A common GIS task is to join the attributes from one spatial data layer to another. In this example we will join attributes from the points (sites) layer to the polygon layer (districts), based on which polygon contains the points. This task will also count up all the points that fall within each polygon which makes it easy for us to communicate the frequency of a phenomenon by geographic boundary, In this scenario: the frequency of historic places by council district. Task: list 3 scenarios where counting features by a geographic boundary will help you solve a problem or communicate spatial data.

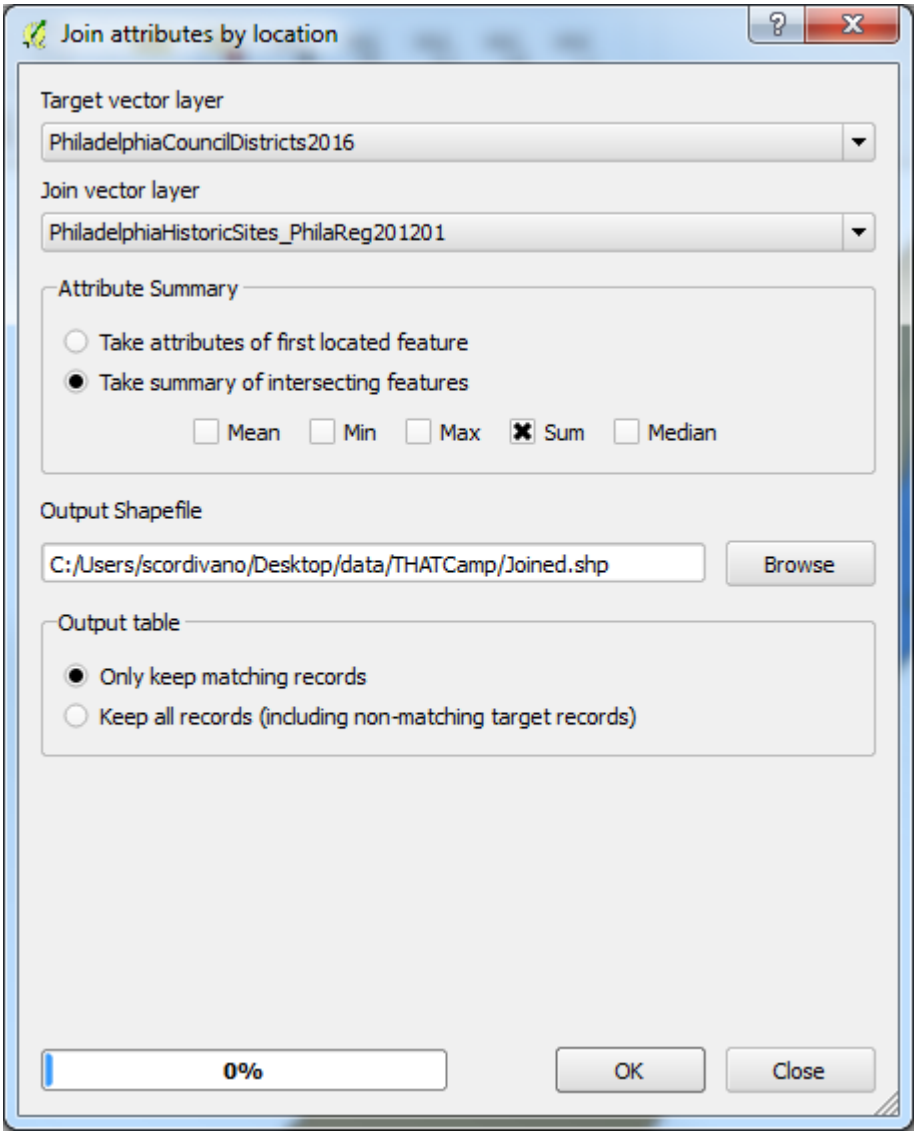
Tool: **Join Attributes by Spatial Location**

From the top bar, select Vector > Data Management > Join Attributes by Spatial Location.



Once you have selected the tool….

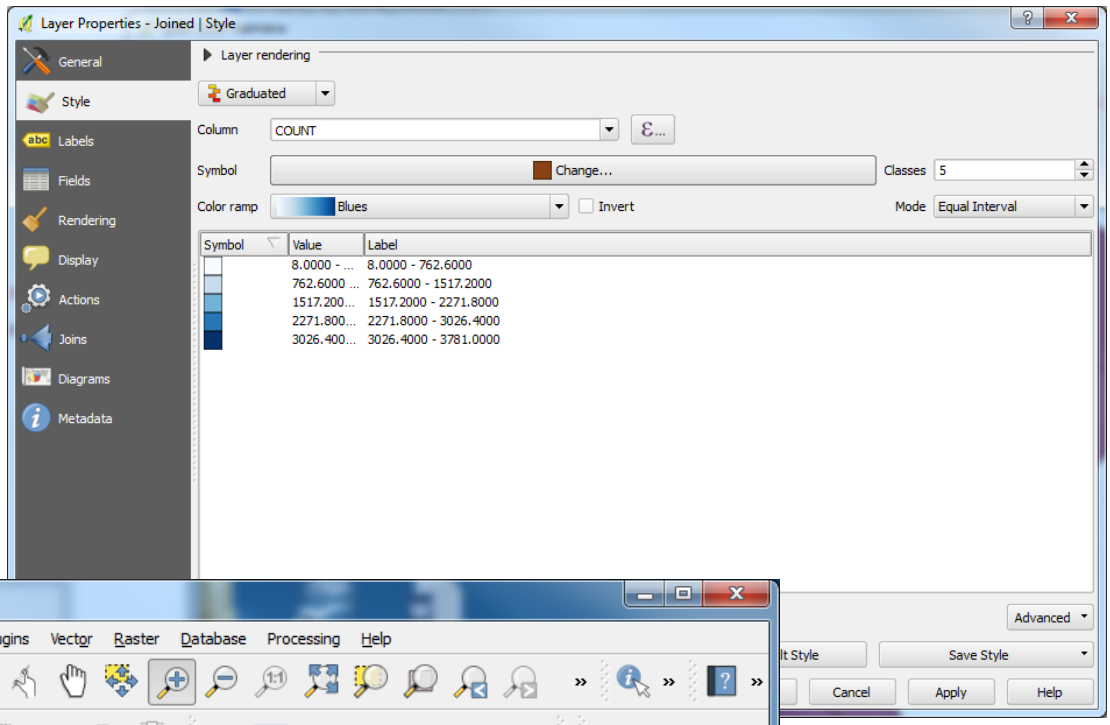
Identify the Council Districts as your **Target Vector** Layer and the Historic Sites as your **Join Vector Layer**. Select the second option to *Take Summary of Intersecting Features* and select *Sum.* Identify an output location in your working folder.

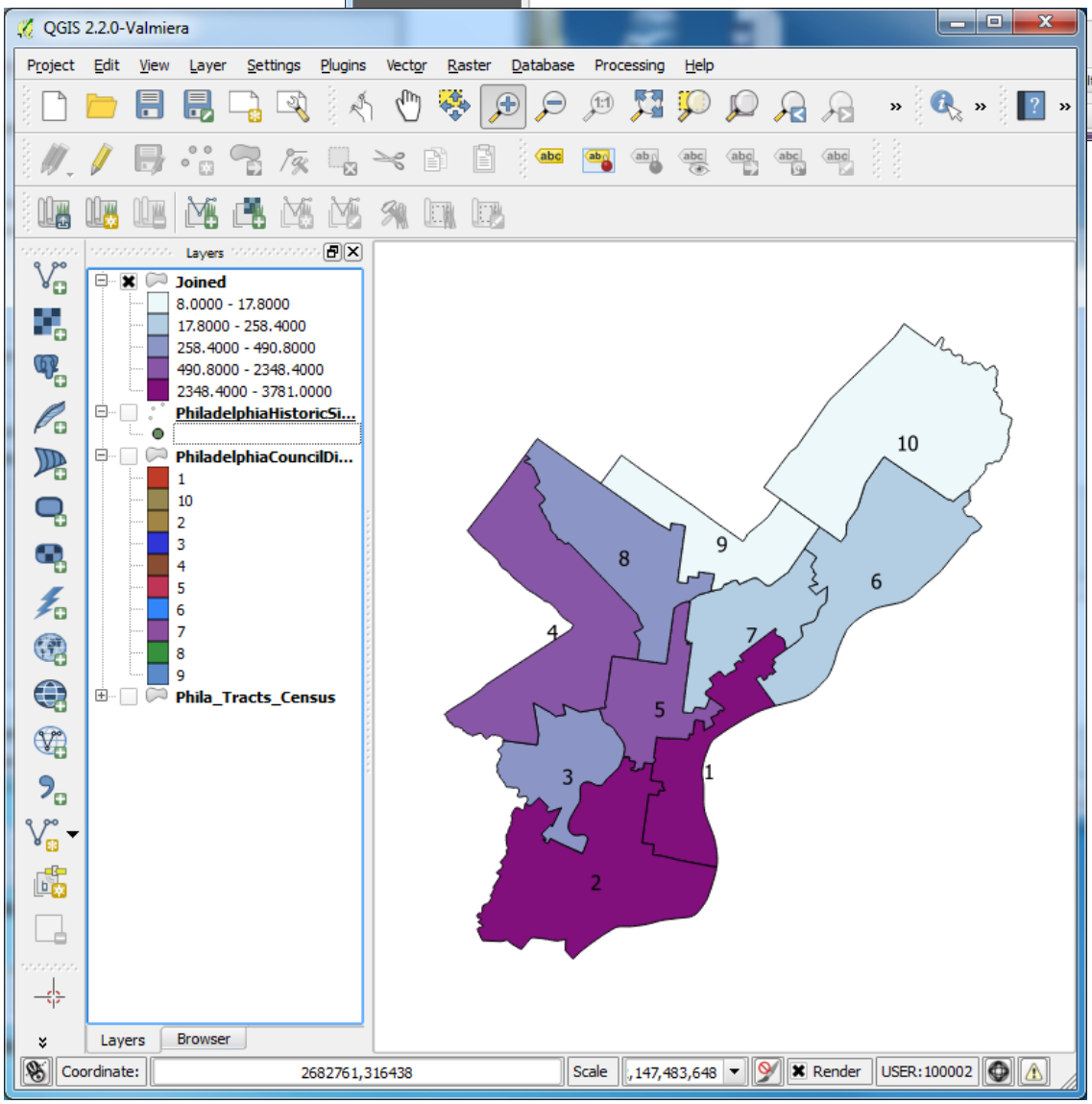


When you select OK, a new shapefile will be generated and you can add this to your map document. The shapefile looks the same, but if you open the attribute table (r click on layer in table of contents and select Open Attribute Table), you'll see a new field "Count" which contains the count of sites falling in each district! Cool!

Symbolize

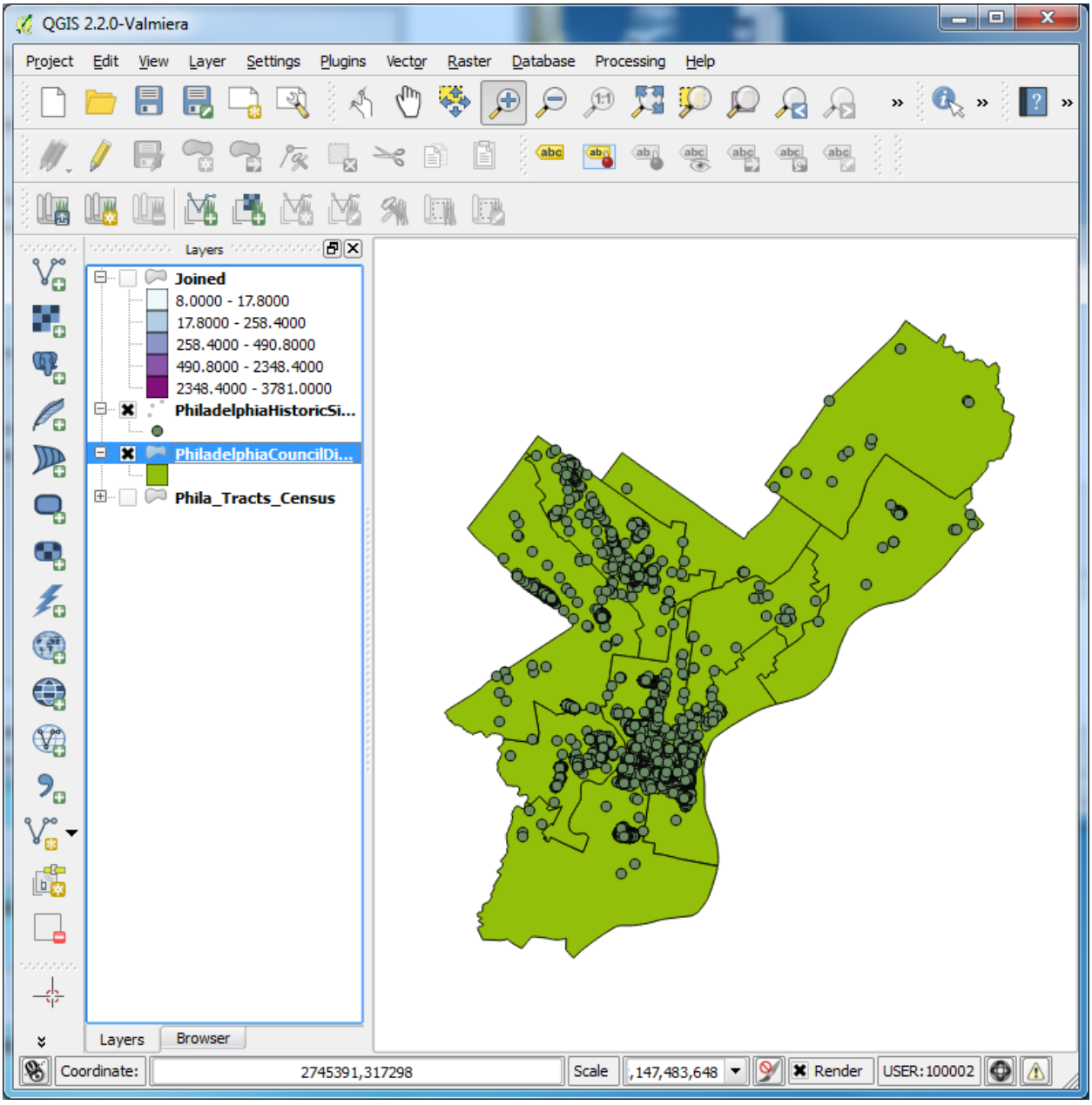
We'll use the similar technique as above to symbolize this data to show the number of historic sites by Council District. This time, we'll use *Graduated*. *You can add labels as well.





Your final map looks like this!

Is that easier to interpret than this?



Now Choose your Own Adventure!

Because QGIS is free and open source, there are great free tutorials to learn the ins and outs of this software product for free. This guide has great modules for extensively learning the software: http://docs.qgis.org/2.2/en/docs/training_manual/index.html

Additionally, because this is a free and open source product, many individuals have decided to donate their free time and build additional tools to improve the scope of the software.

You can also trying adding the Philadelphia Census Tracts and conducting analysis on the demographic data contained within.