


# Chapter 7

## Spatial Joins in QGIS



**Summary:** As we learned in Chapter 7, one of the most useful kinds of analysis journalists can perform with mapping software is a spatial join, a concept we also learned in Chapter 5's discussion of database programs such as Access and MySQL. However, in a mapping software, instead of joining two tables based on a common field, as we learned in the "Joining Maps to Other Datasets" tutorial, you join them based on geographic location. The two tables will be the federal contaminated sites and the updated federal electoral boundaries.

Before we begin the tasks of importing and adding the shape and csv files, you may wish to review the tutorial **A Quick Tour of QGIS Desktop**.

### Skills you will learn:

1. How to find and download the federal electoral boundaries.
2. How to set your projection
3. How to import the shape file and csv file.
4. How to use the "save as" tool save csv file into a shape file with geographic coordinates similar to those of our federal contaminated shape file.
5. How to complete a spatial join in QGIS and save the new layer.

### Task 1: How to find and download the federal electoral boundaries.

The updated federal ridings shape file can be found here:

[http://geogratis.gc.ca/api/en/nrcan-rncan/ess-sst/-/\(urn:iso:series\)geobase-federal-](http://geogratis.gc.ca/api/en/nrcan-rncan/ess-sst/-/(urn:iso:series)geobase-federal-)

[electoral-districts?sort-field=relevance](#)

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- [GeoBase - Federal Electoral Districts - Canada 2015](#)

Canada is divided into 338 electoral districts. A representative or member of Parliament is elected for each electoral district. Following the release of population counts from each decennial census, the Chief Electoral Officer determines the number of seats in the House of Commons and publishes the information in the Canada Gazette. Electoral... [show more](#)

Series GeoBase - Federal Electoral Districts

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Alternate Formats

- JSON
- KML

The file format we want is the first one, SHP. Click on the GeoBase title for more information.

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### GeoBase - Federal Electoral Districts - Canada 2015

Download

Canada is divided into 338 electoral districts. A representative or member of Parliament is elected for each electoral district. Following the release of population counts from each decennial census, the Chief Electoral Officer determines the number of seats in the House of Commons and publishes the information in the Canada Gazette. Electoral boundaries commissions then determine the adjustments to the constituency boundaries. The federal electoral boundaries commissions are independent bodies that make all decisions regarding the proposed and final federal electoral boundaries. Elections Canada provides support services to the boundaries commission in each province. Based on reports from these commissions, the Chief Electoral Officer prepares a representation order that describes the boundaries and specifies the name and the population of each FED. The representation order is in force on the first dissolution of Parliament that occurs at least seven months after its proclamation. [show more](#)

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Alternate Formats

After taking the time to read the information about the updated federal electoral districts ( something that is important to do when downloading data from open-data websites ), select the “Download” tab.

Browse to a location on your hard drive you’ll be using for this exercise and save the zipped file. After extracting the files from the zipped folder this is what you should see.

Name	Date modified	Type	Size
8f59e503-b267-4fd0-9d43-a03db366f11...	03/06/2016 9:01 A...	XML File	111 KB
FED_CA_2_2_ENG.cpg	21/10/2015 9:56 A...	CPG File	1 KB
FED_CA_2_2_ENG.dbf	28/10/2015 1:25 PM	DBF File	310 KB
FED_CA_2_2_ENG.prj	21/10/2015 9:45 A...	PRJ File	1 KB
FED_CA_2_2_ENG.sbn	21/10/2015 9:45 A...	SBN File	4 KB
FED_CA_2_2_ENG.sbx	21/10/2015 9:45 A...	Adobe Illustrator T...	1 KB
FED_CA_2_2_ENG.shp	21/10/2015 9:51 A...	SHP File	10,683 KB
FED_CA_2_2_ENG.shp.xml	21/10/2015 9:51 A...	XML File	1 KB
FED_CA_2_2_ENG.shx	21/10/2015 9:51 A...	SHX File	3 KB
FED_CA_2_2_ENG.zip	21/10/2015 1:21 PM	ZIP File	5,987 KB
fed_cf_CA_2_2_shp_en.zip	29/10/2016 6:57 PM	ZIP File	11,480 KB

As we learned in Chapter 7, shape files come with a number of accompanying or helper files which contain information the mapping software needs in order to display the boundaries. Here, the file the file QGIS needs is the one with the “.shp” extension. Open a new QGIS file.

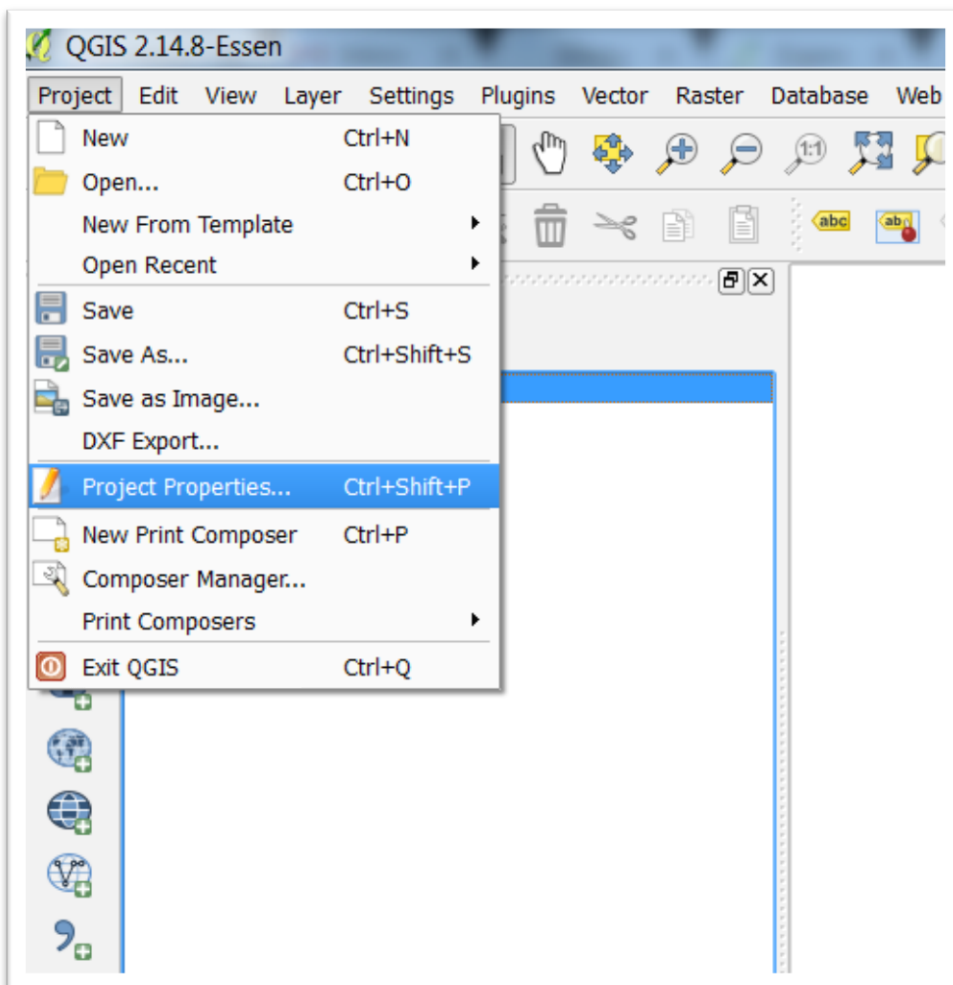
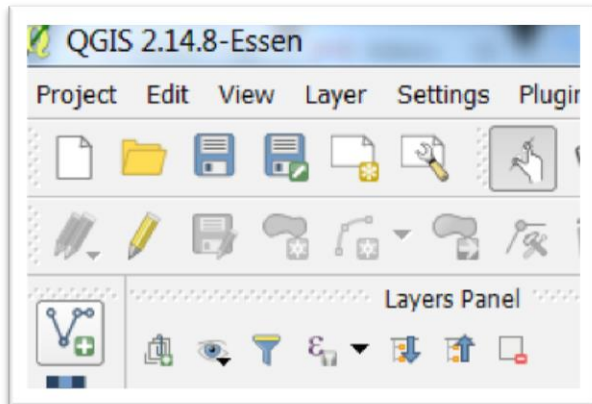
## Task 2: How to set your projection

Before we go any further, it’s important to briefly discuss projected coordinate systems. As we learned in Chapter seven it’s important for your layers to have the same projected coordinate system.

In the corresponding ArcMap tutorial, we learned about its ability to automatically line up the projection systems of the layers that it is importing. That is, when the first layer is displayed, ArcMap displays it according to the coordinate values of its features, which are either geographic or projected. ArcMap then automatically matches the coordinate system that of the first layer, using a process calleed “on-the-fly projection.”

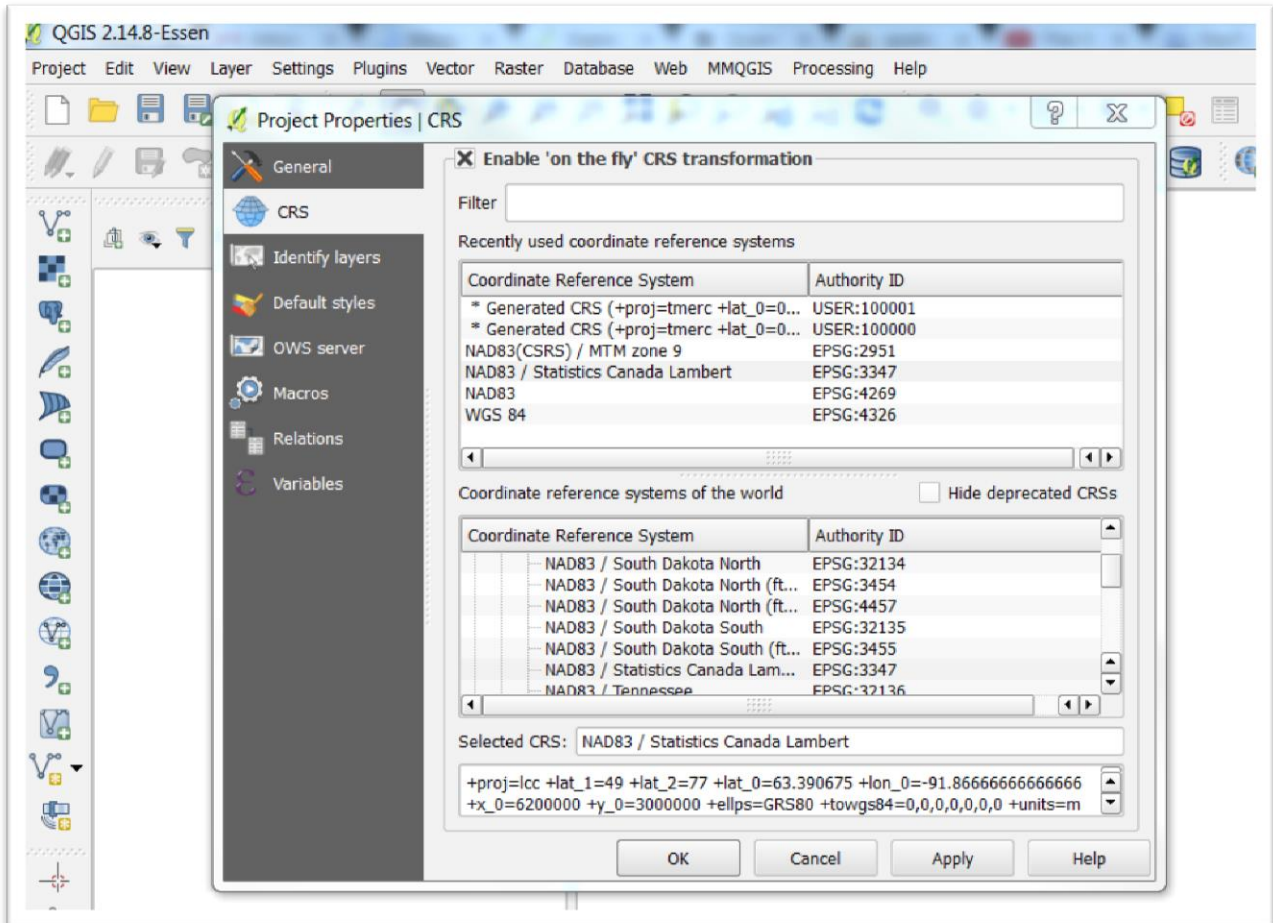
QGIS does the same thing. The difference is that you have to give it a specific prompt. It's important to note that while the mapping software changes the data's display position is being changed, and not the data itself.

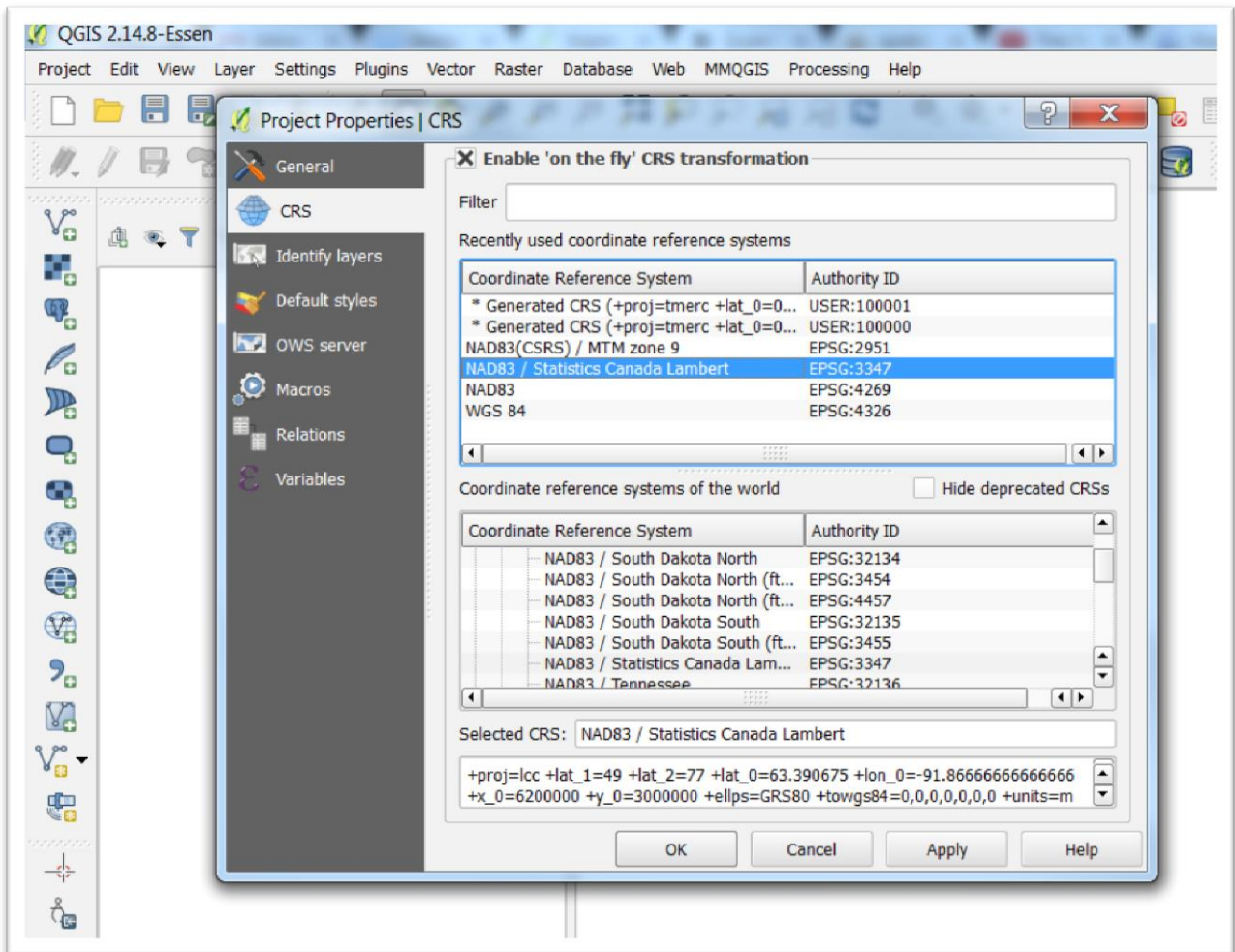
Now that we have that out of the way, let's open QGIS, and click on "Project" in the menu.



Select “Project Properties.

Check the box to the left of “Enable ‘on the fly’ CRS transformation and select the “Apply” tab.



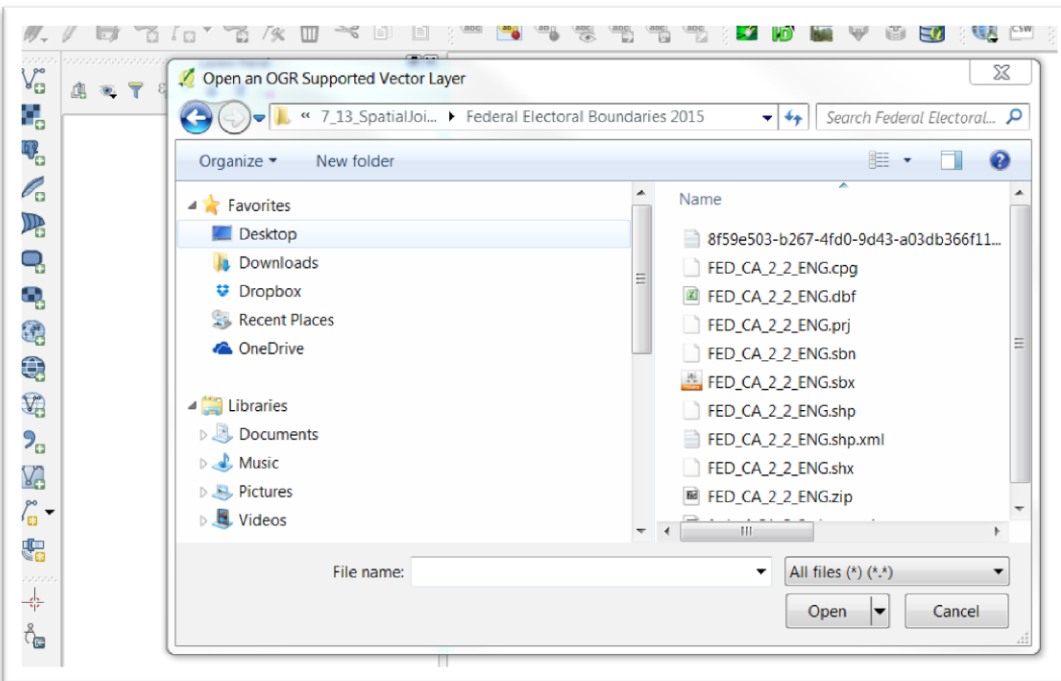
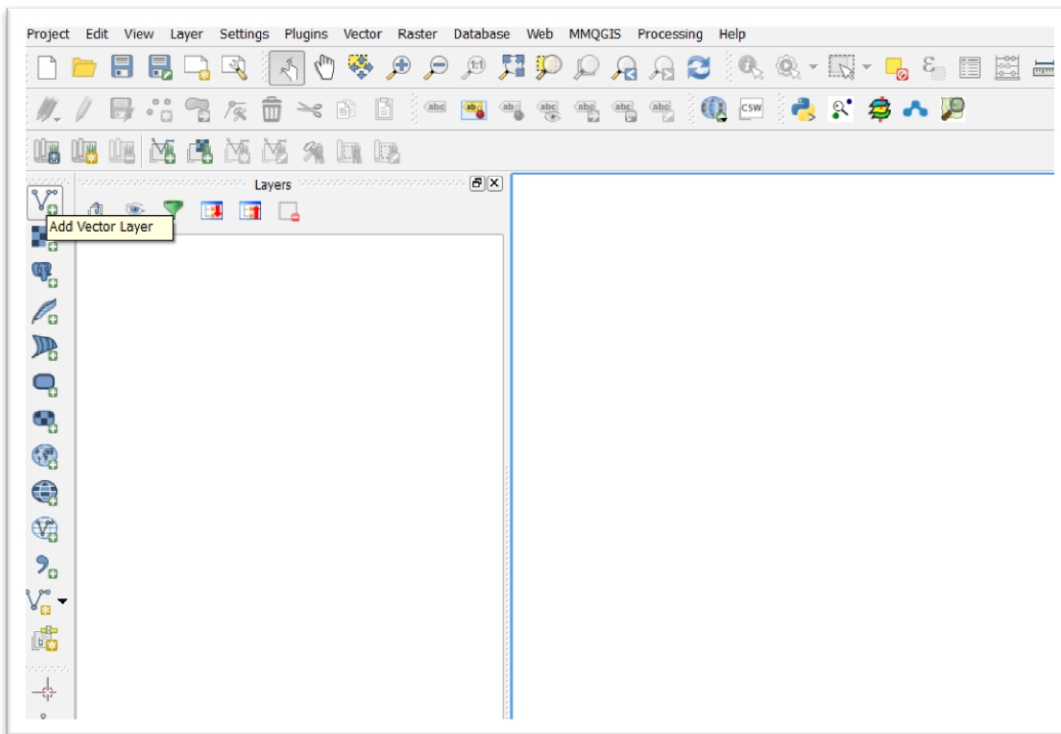


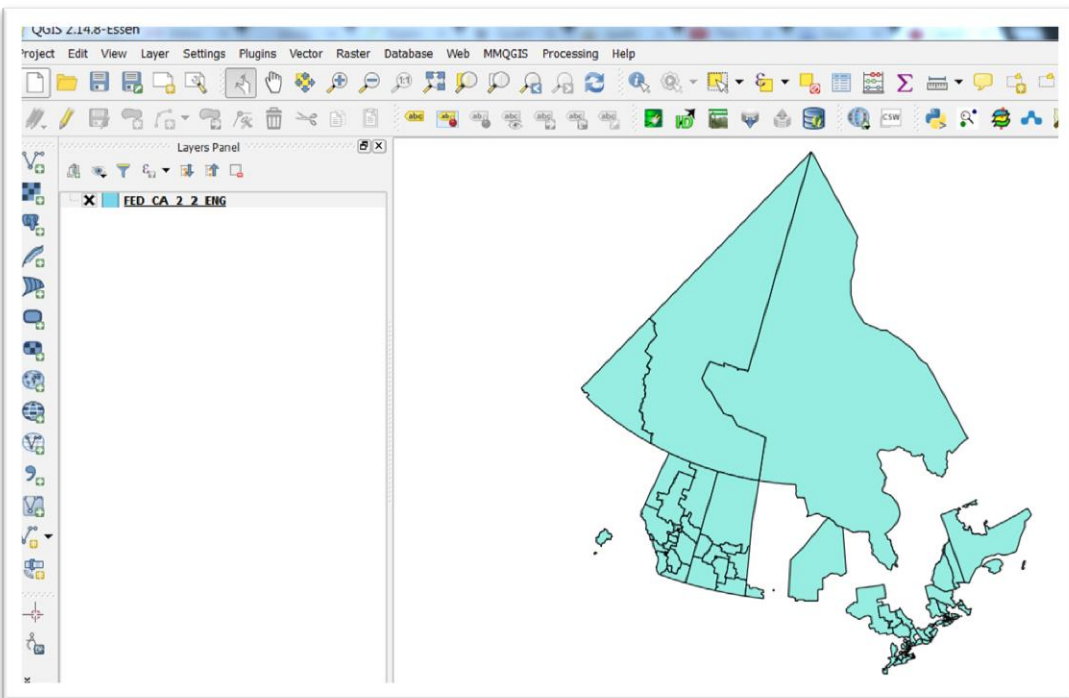
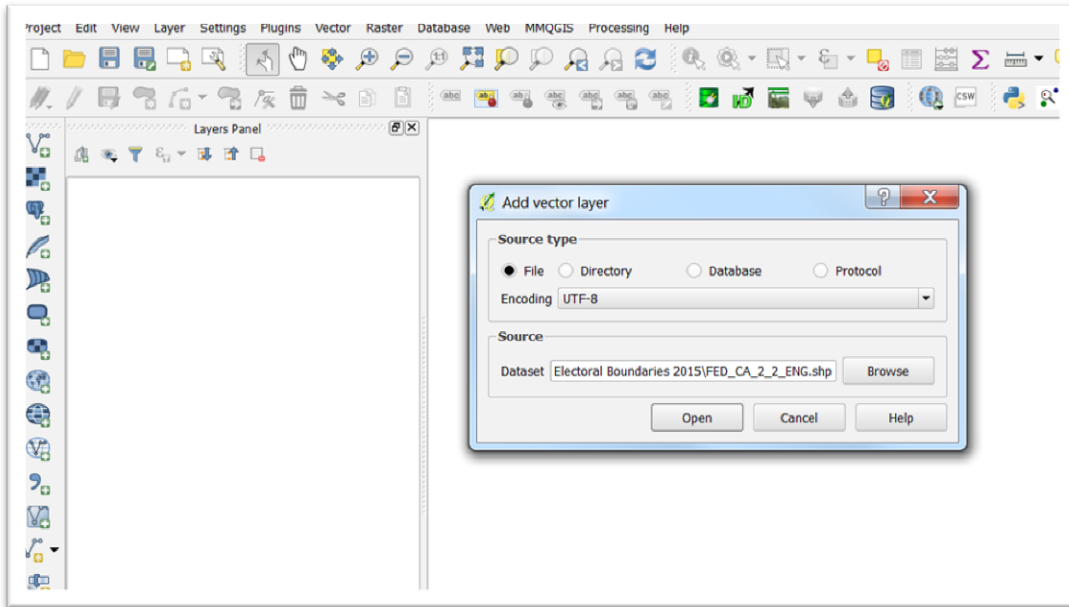
Select “NAD83/Statistics Canada Lambert” coordinate, which is the system the federal electoral boundary file uses. Hit the “Apply” tab. (NOTE: Information about the file’s coordinate system should be contained in the institution’s readme, data dictionary or meta data. If you can’t find it, then it’s worth calling or emailing the institution to find out.)

Now we’re ready to begin.

### Task 3: How to import the shape file and csv file.

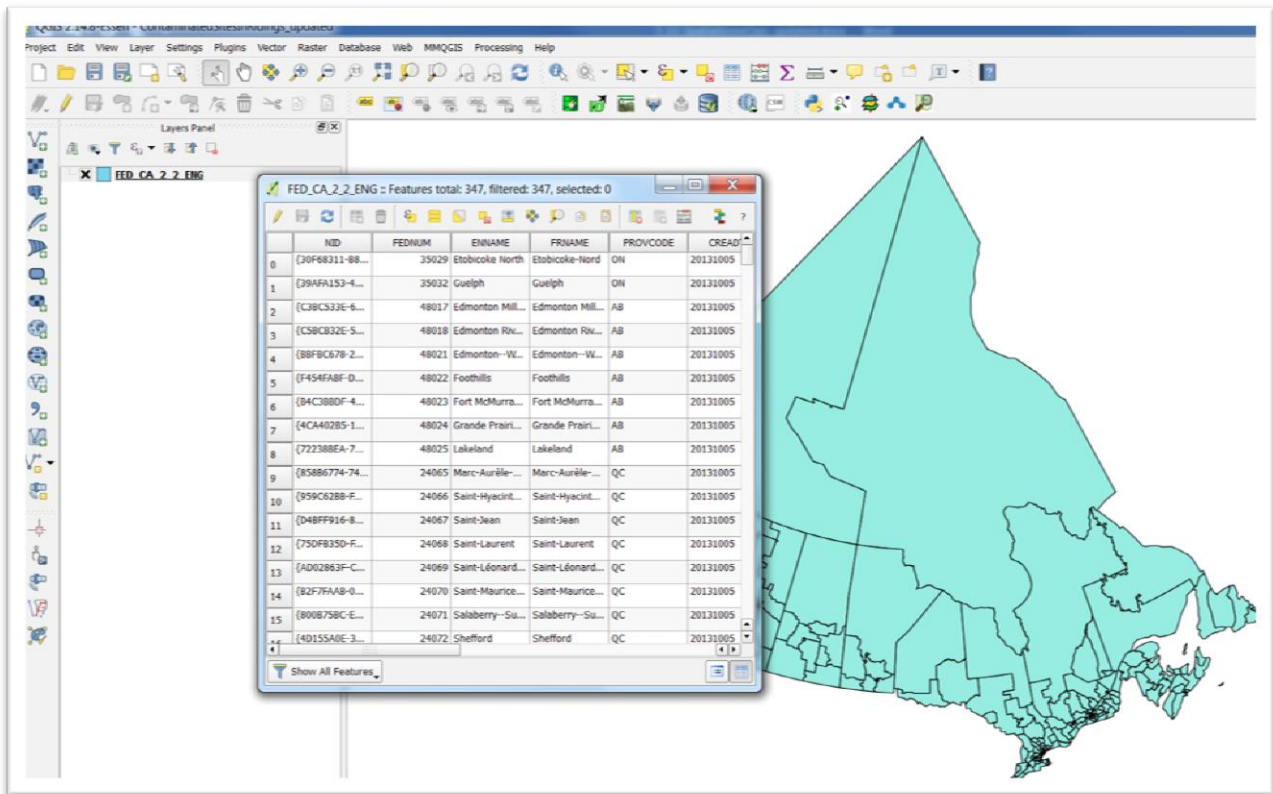
Using the “Add Vector Layer” icon.





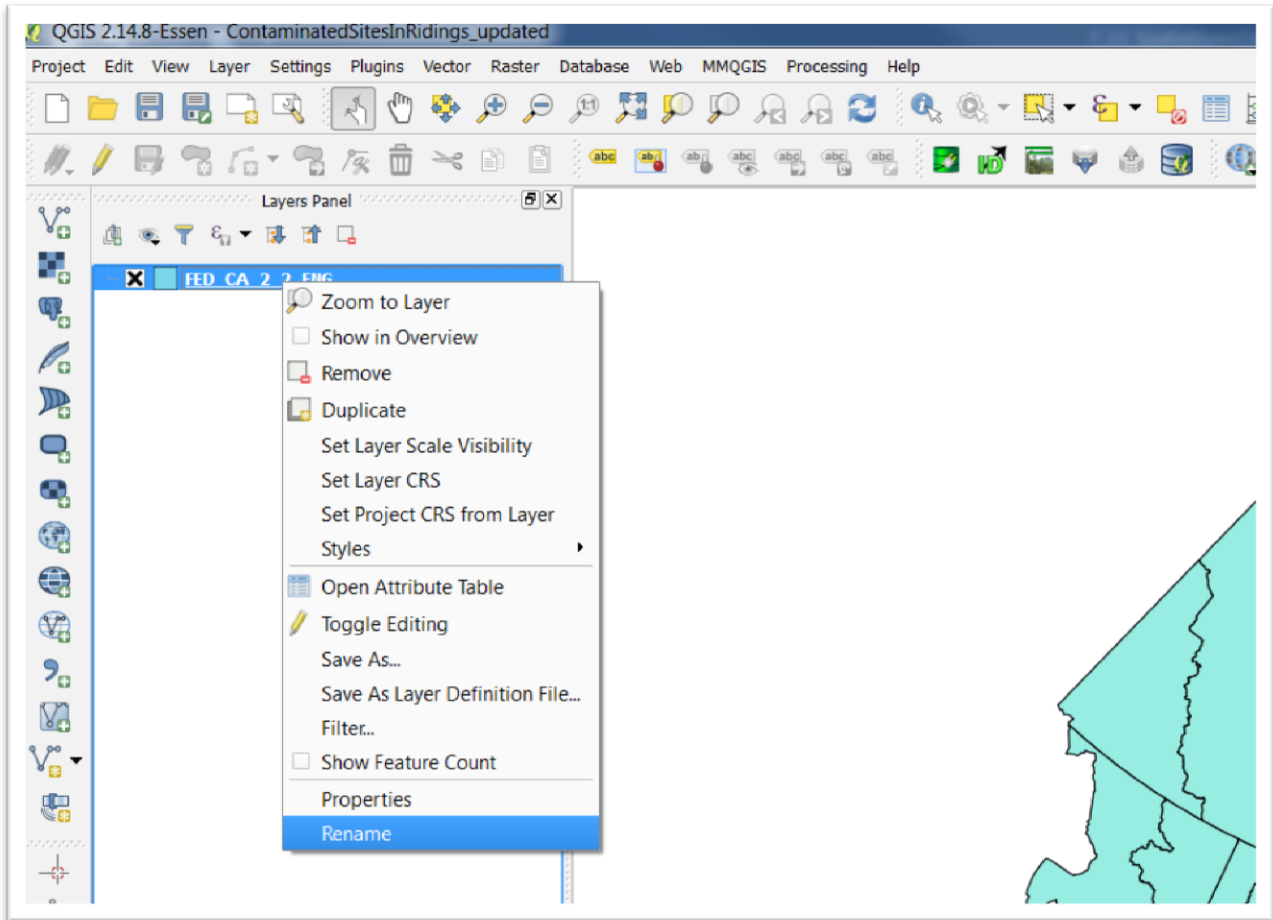


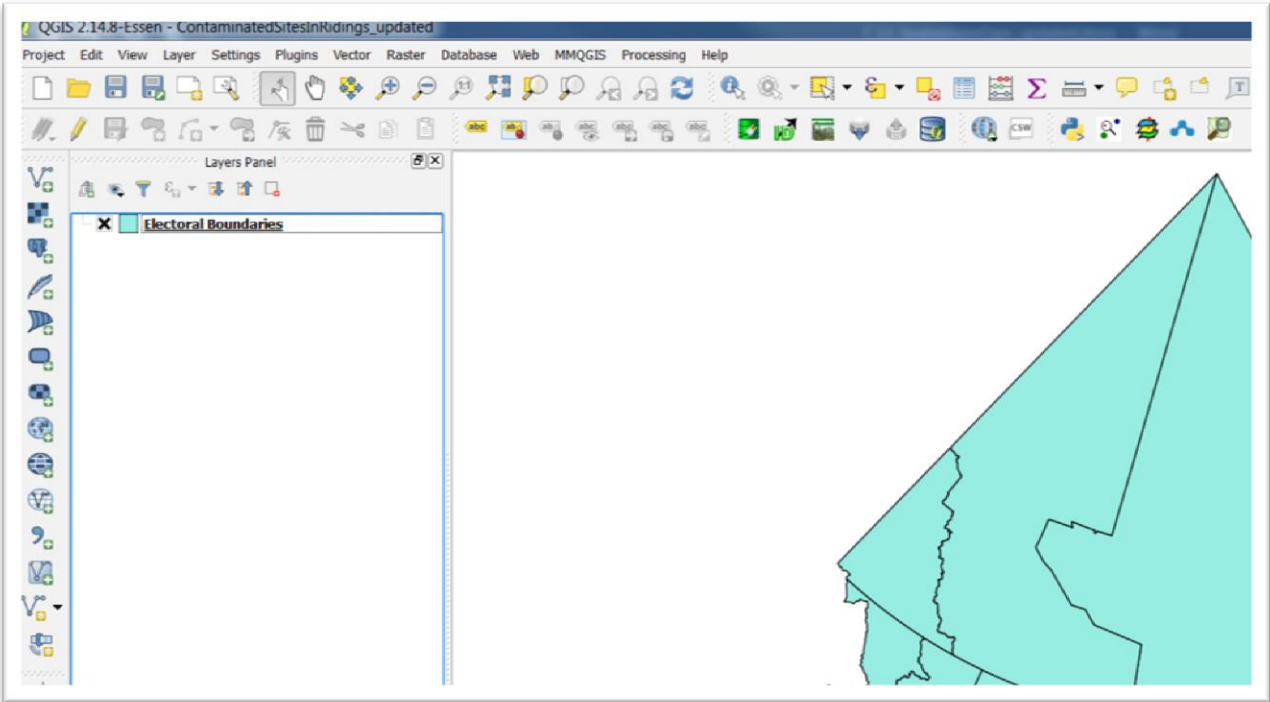
Right-click on the layer in the “Layer Panel” menu to the left and select the “Open Attribute Table” option to see some of the data QGIS is using to display the map.



In subsequent tutorials, we’ll use the information in these attribute tables to select subsets such as ridings for a particular province, which can then be saved as new layers. But for now, it’s important to stress the good habit of opening a layer’s attribute table after importing it.

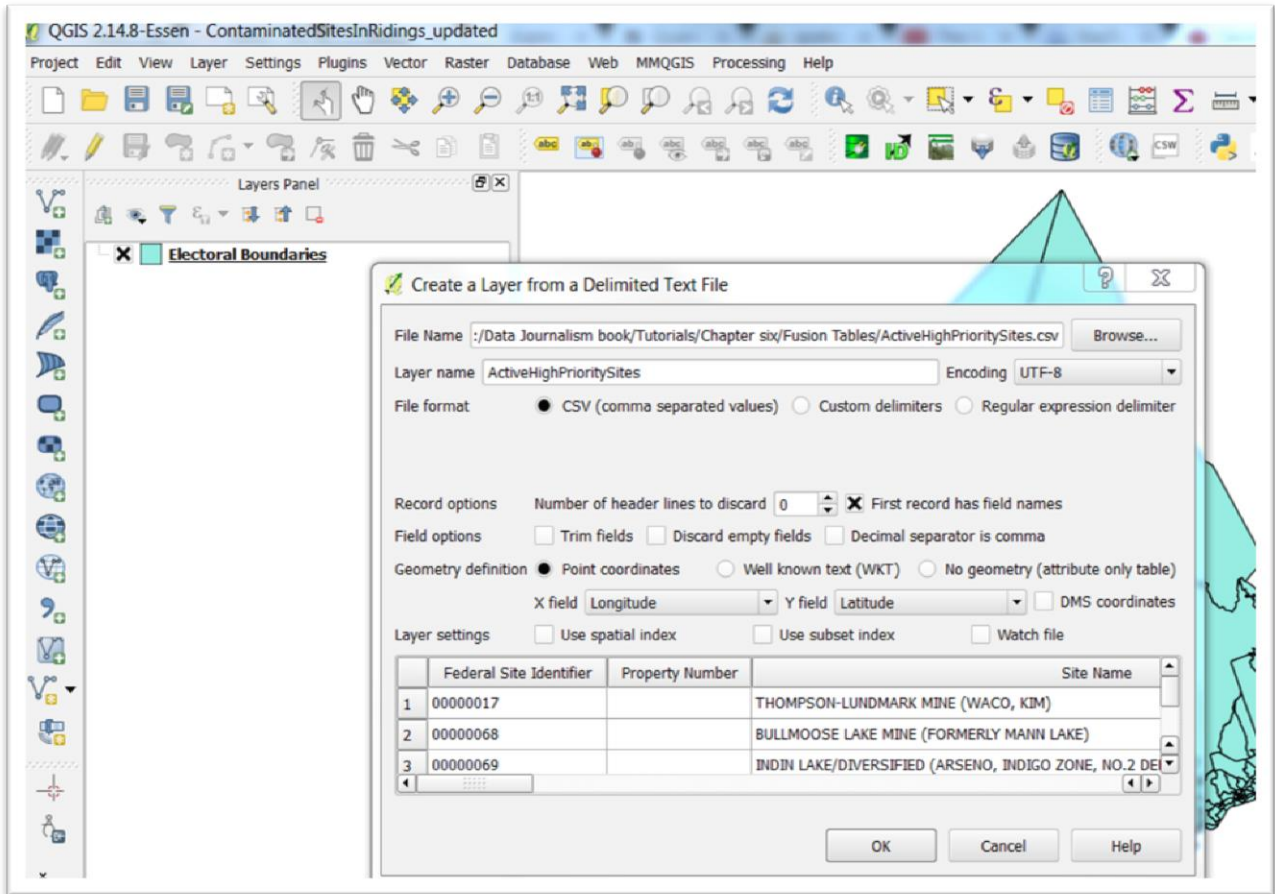
To rename the layer with a label that makes more sense, right-click on the layer and choose the “Rename” option from the short-cut menu.





Now let`s use the “Add Delimited Text Layer” icon to add the [csv file](#) that contains the federal contaminated sites file that we used in the Fusion Table and ArcGIS Online tutorials.

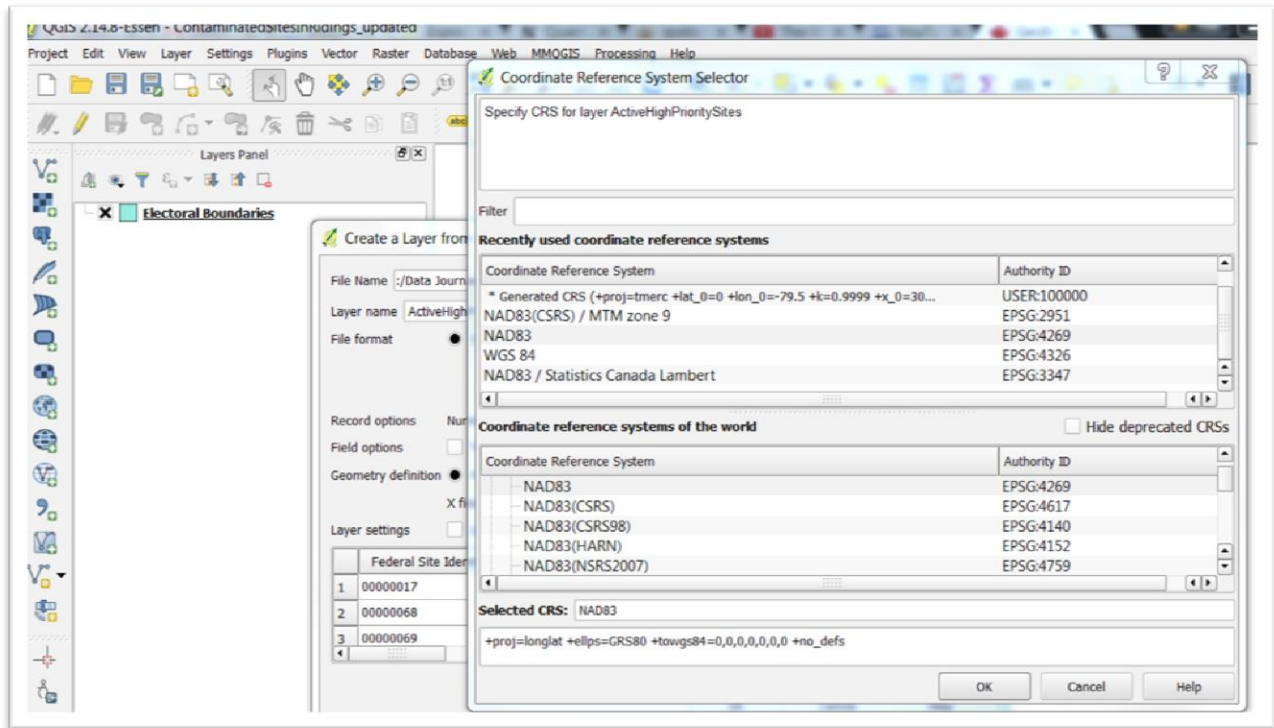




QGIS has correctly determined that the table is contained in a csv file, and it has assigned map units or decimal degrees of the Longitude and Latitude coordinate value system into X and Y coordinates in meters or feet.

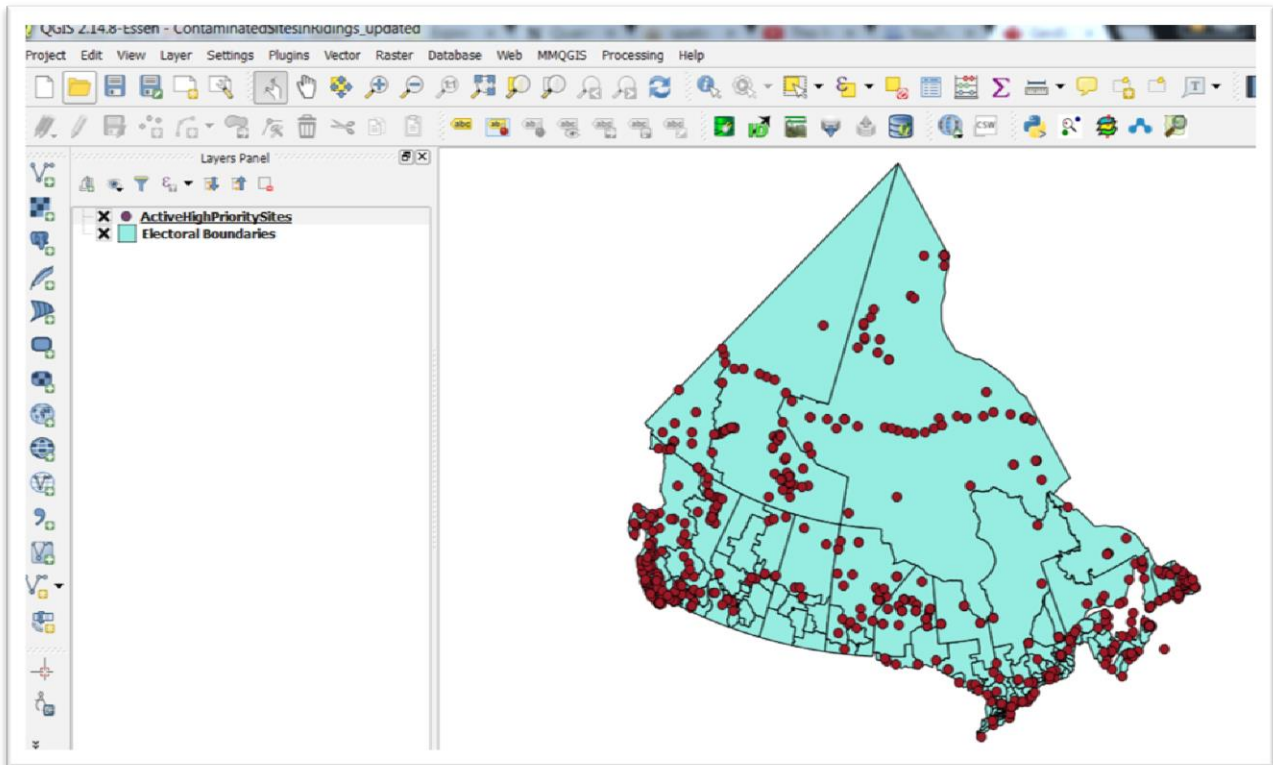
You can use the horizontal scroll bar at the bottom of the displayed table to ensure that all the information is there.

Once you're satisfied, select the "OK" tab.

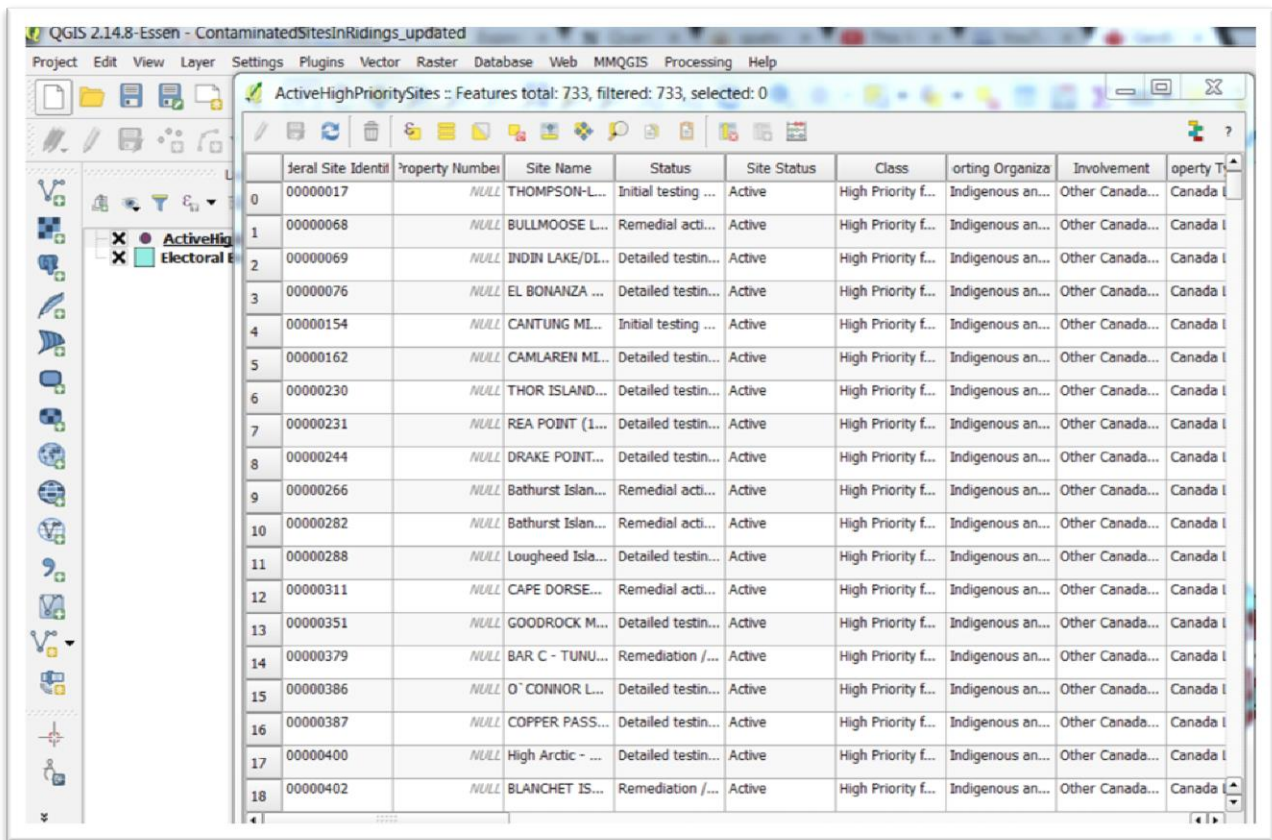


In the area to the right of the "Selected CRS" label, you can see that this file has a different Coordinate Reference System, NAD83 (EPSG4269). However, because QGIS is projecting "on-the-fly", we'll be able to see the points superimposed on the federal electoral map.

Select the OK tab.



Open this layer's attribute table.



	Jeral Site Identif	Property Number	Site Name	Status	Site Status	Class	orting Organiza	Involvement	operty T
0	00000017	NULL	THOMPSON-L...	Initial testing ...	Active	High Priority f...	Indigenous an...	Other Canada...	Canada l
1	00000068	NULL	BULLMOOSE L...	Remedial acti...	Active	High Priority f...	Indigenous an...	Other Canada...	Canada l
2	00000069	NULL	INDIN LAKE/DL...	Detailed testin...	Active	High Priority f...	Indigenous an...	Other Canada...	Canada l
3	00000076	NULL	EL BONANZA ...	Detailed testin...	Active	High Priority f...	Indigenous an...	Other Canada...	Canada l
4	00000154	NULL	CANTUNG ML...	Initial testing ...	Active	High Priority f...	Indigenous an...	Other Canada...	Canada l
5	00000162	NULL	CAMLAREN ML...	Detailed testin...	Active	High Priority f...	Indigenous an...	Other Canada...	Canada l
6	00000230	NULL	THOR ISLAND...	Detailed testin...	Active	High Priority f...	Indigenous an...	Other Canada...	Canada l
7	00000231	NULL	REA POINT (1...	Detailed testin...	Active	High Priority f...	Indigenous an...	Other Canada...	Canada l
8	00000244	NULL	DRAKE POINT...	Detailed testin...	Active	High Priority f...	Indigenous an...	Other Canada...	Canada l
9	00000266	NULL	Bathurst Islan...	Remedial acti...	Active	High Priority f...	Indigenous an...	Other Canada...	Canada l
10	00000282	NULL	Bathurst Islan...	Remedial acti...	Active	High Priority f...	Indigenous an...	Other Canada...	Canada l
11	00000288	NULL	Lougheed Isla...	Detailed testin...	Active	High Priority f...	Indigenous an...	Other Canada...	Canada l
12	00000311	NULL	CAPE DORSE...	Remedial acti...	Active	High Priority f...	Indigenous an...	Other Canada...	Canada l
13	00000351	NULL	GOODROCK M...	Detailed testin...	Active	High Priority f...	Indigenous an...	Other Canada...	Canada l
14	00000379	NULL	BAR C - TUNU...	Remediation /...	Active	High Priority f...	Indigenous an...	Other Canada...	Canada l
15	00000386	NULL	O'CONNOR L...	Detailed testin...	Active	High Priority f...	Indigenous an...	Other Canada...	Canada l
16	00000387	NULL	COPPER PASS...	Detailed testin...	Active	High Priority f...	Indigenous an...	Other Canada...	Canada l
17	00000400	NULL	High Arctic - ...	Detailed testin...	Active	High Priority f...	Indigenous an...	Other Canada...	Canada l
18	00000402	NULL	BLANCHET IS...	Remediation /...	Active	High Priority f...	Indigenous an...	Other Canada...	Canada l

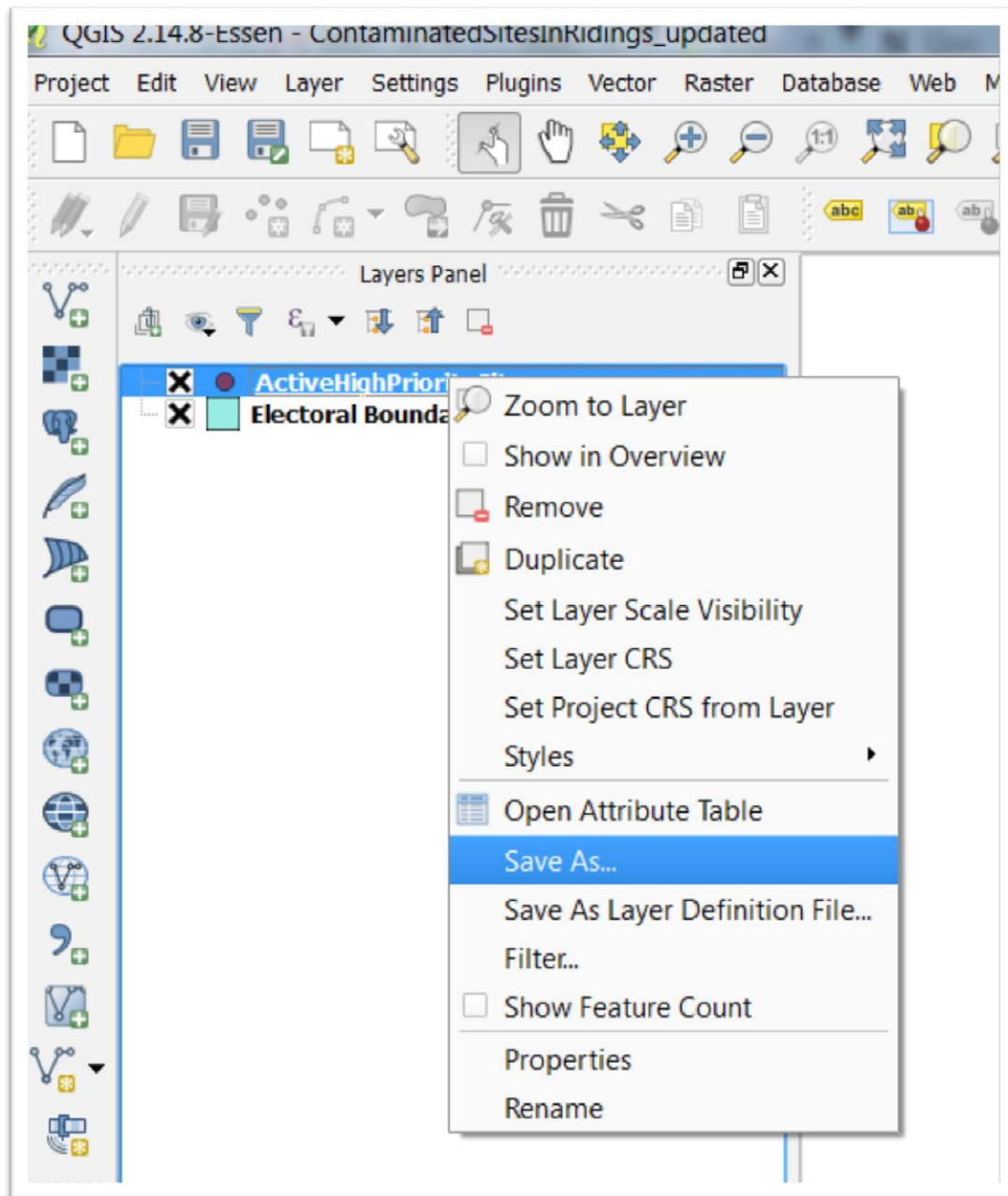
We can see the table contains the same number of records as the [csv file](#) that can also be downloaded from the federal contaminated sites [website](#).

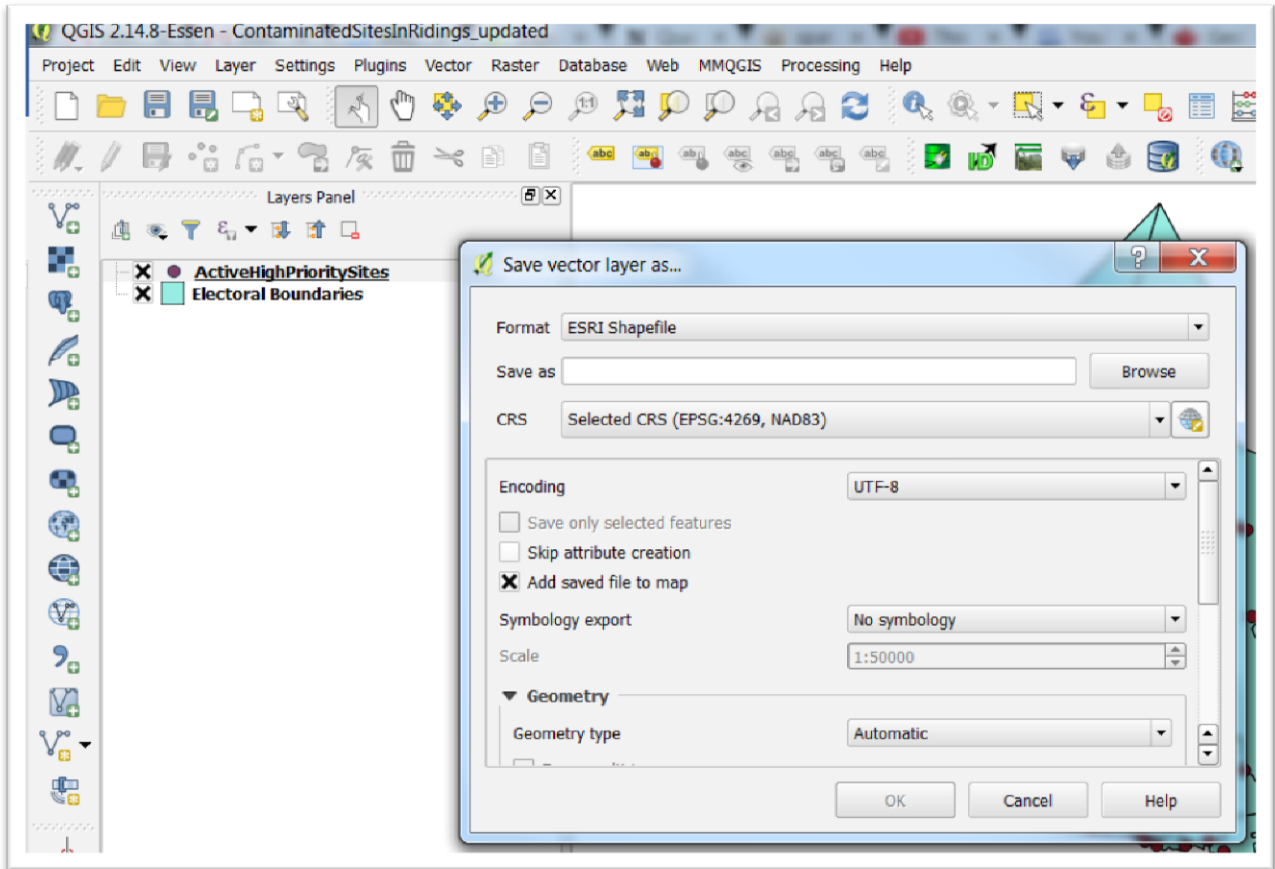
**Task 4: How to use the “save as” tool save csv file into a shape file with geographic coordinates similar to those of our federal contaminated shape file.**

As we've learned in previous tutorials in this chapter, layers must be saved as shape files before we can perform any analysis.



So right-click on the csv layer, and select the “Save as” option.

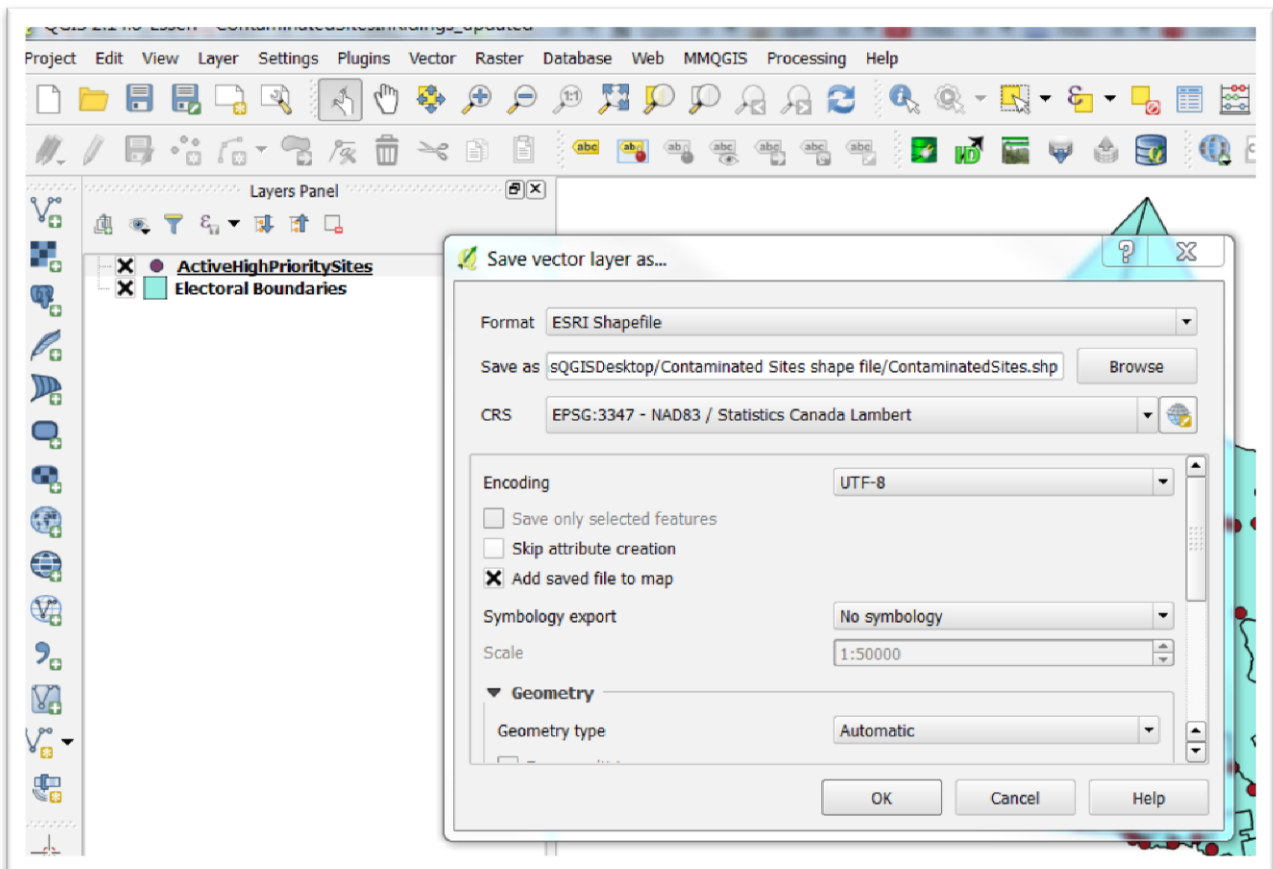




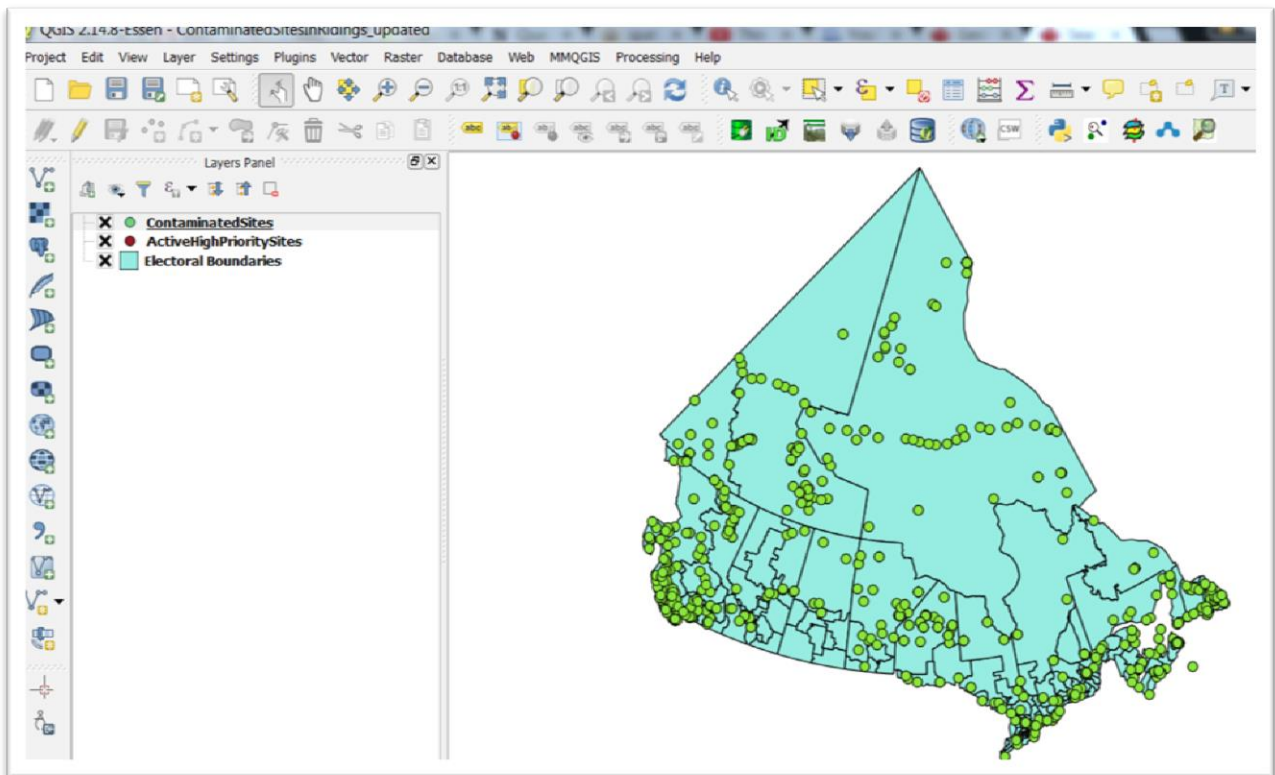
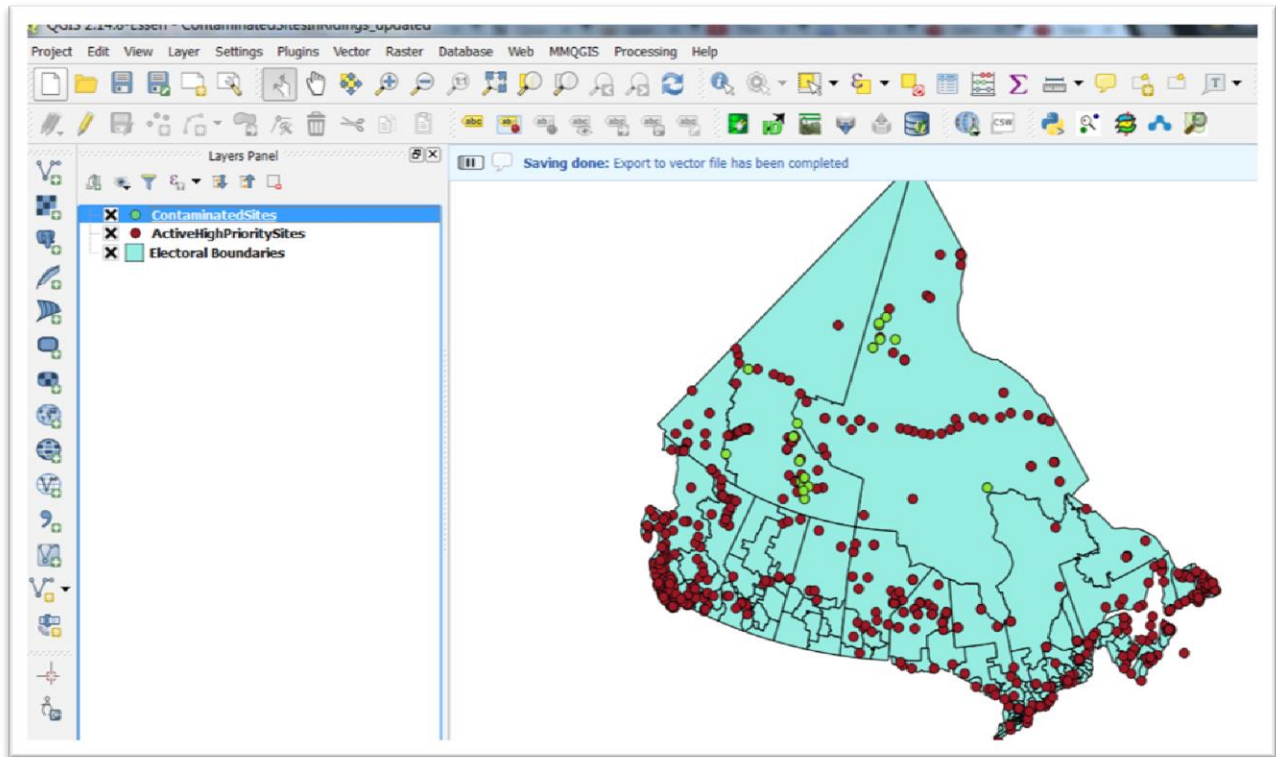
Name, and then browse to location on your hard drive where you want to store the files.

In the area to the right of the “CRS” label, select the one that corresponds to the federal electoral districts, which is “EPSG:3347 – NAD83/Satistics Canada Lambert”.

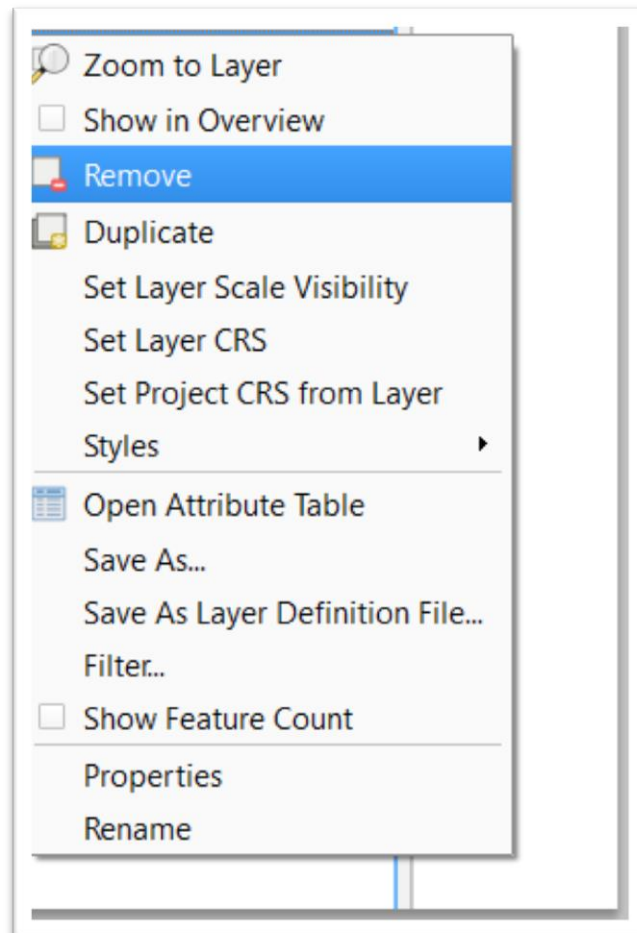
QGIS has already selected the box to the left of the “Add saved file to map” label.

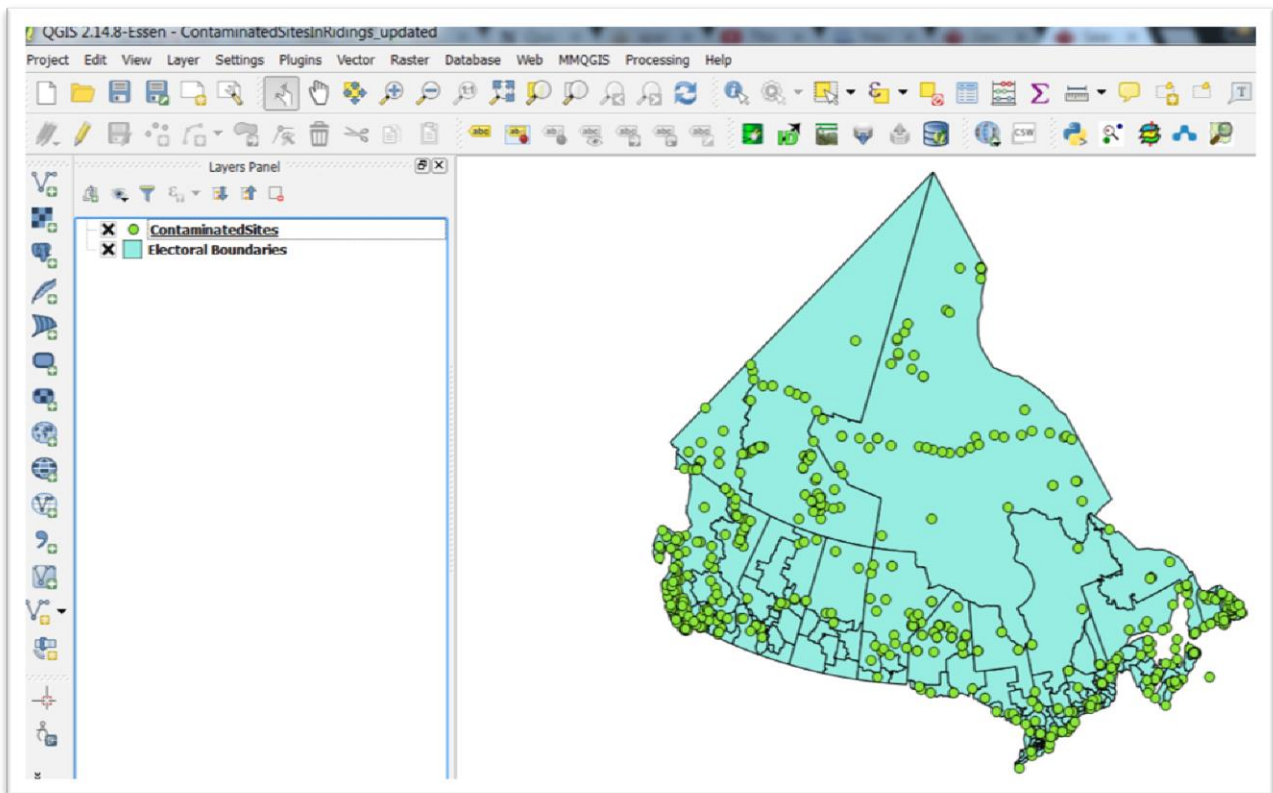


Select "OK."



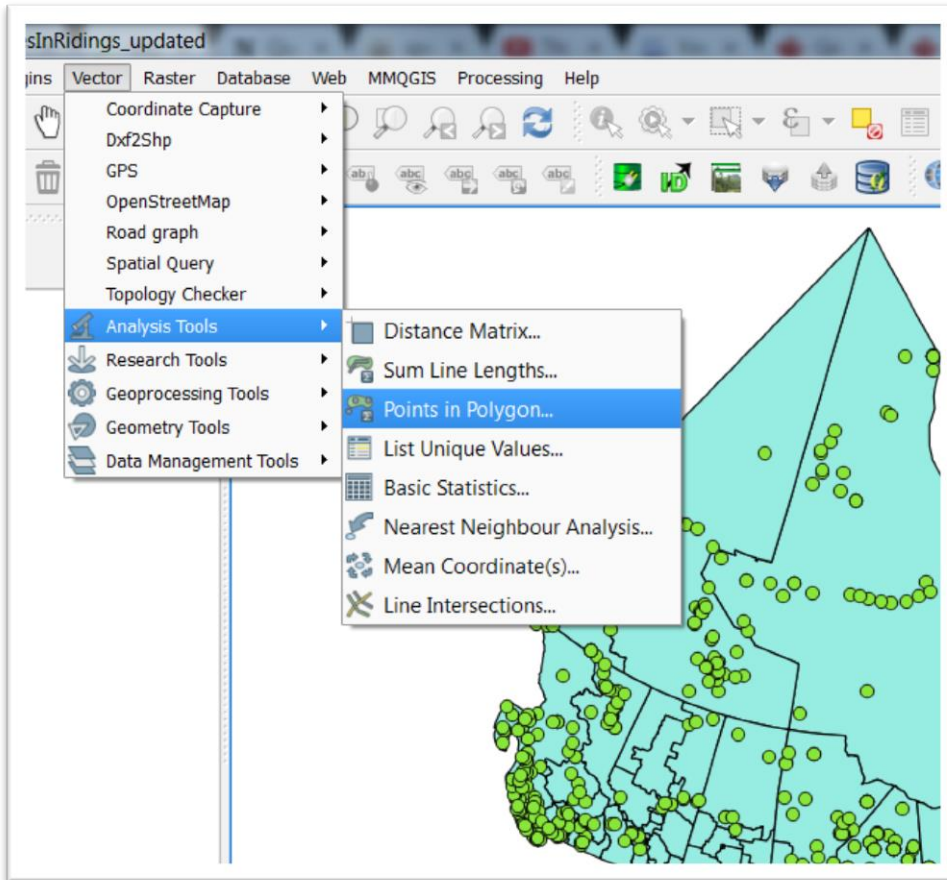
QGIS has added the new layer, which is why the locations are now a different colour. We no longer need the original csv file, and can right click to select the “Remove” option.

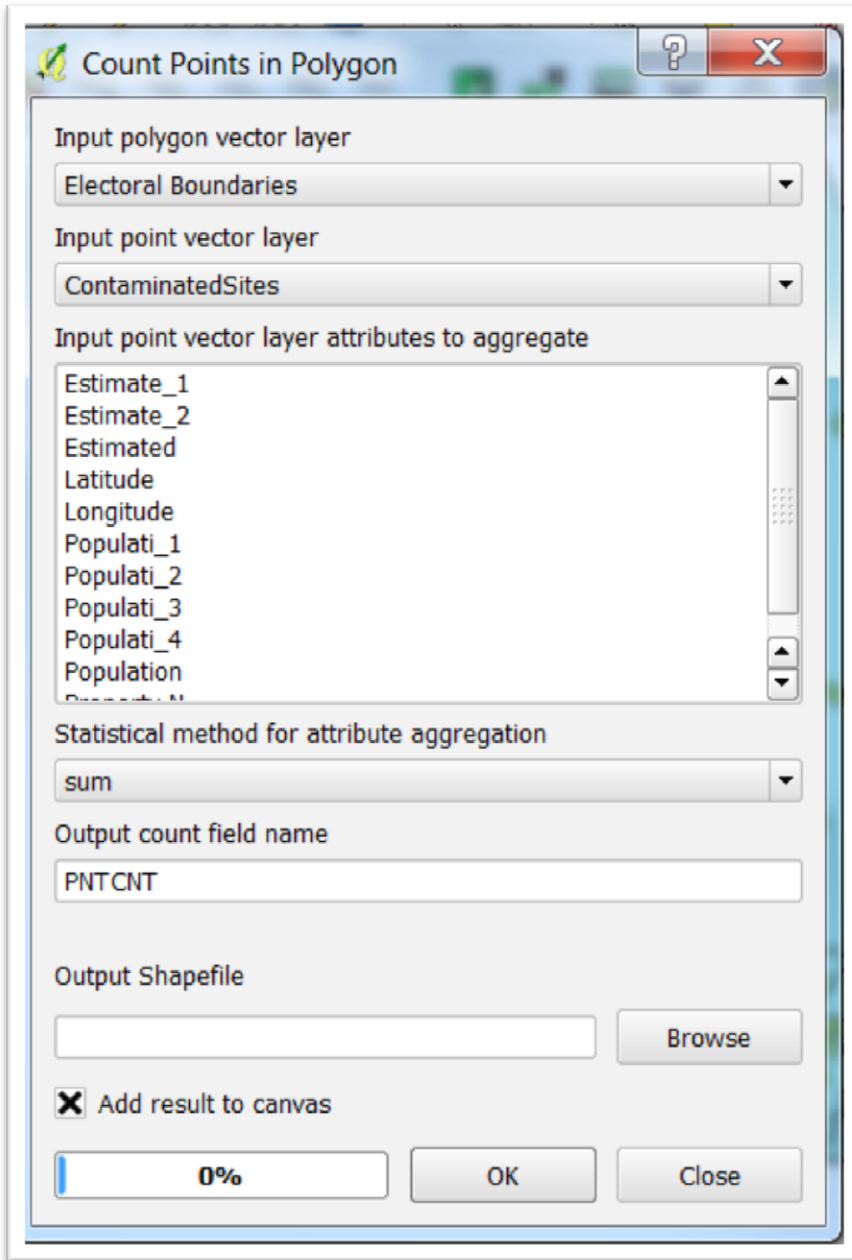




**Task 5: How to complete a spatial join in QGIS and save the new layer.**

Now we'd like to count the number of contaminated sites in the ridings. To perform this task, we must join the two layers, and then count the number of sites in each riding or polygons. There are two ways we can go about this. Either by selecting "Vector".



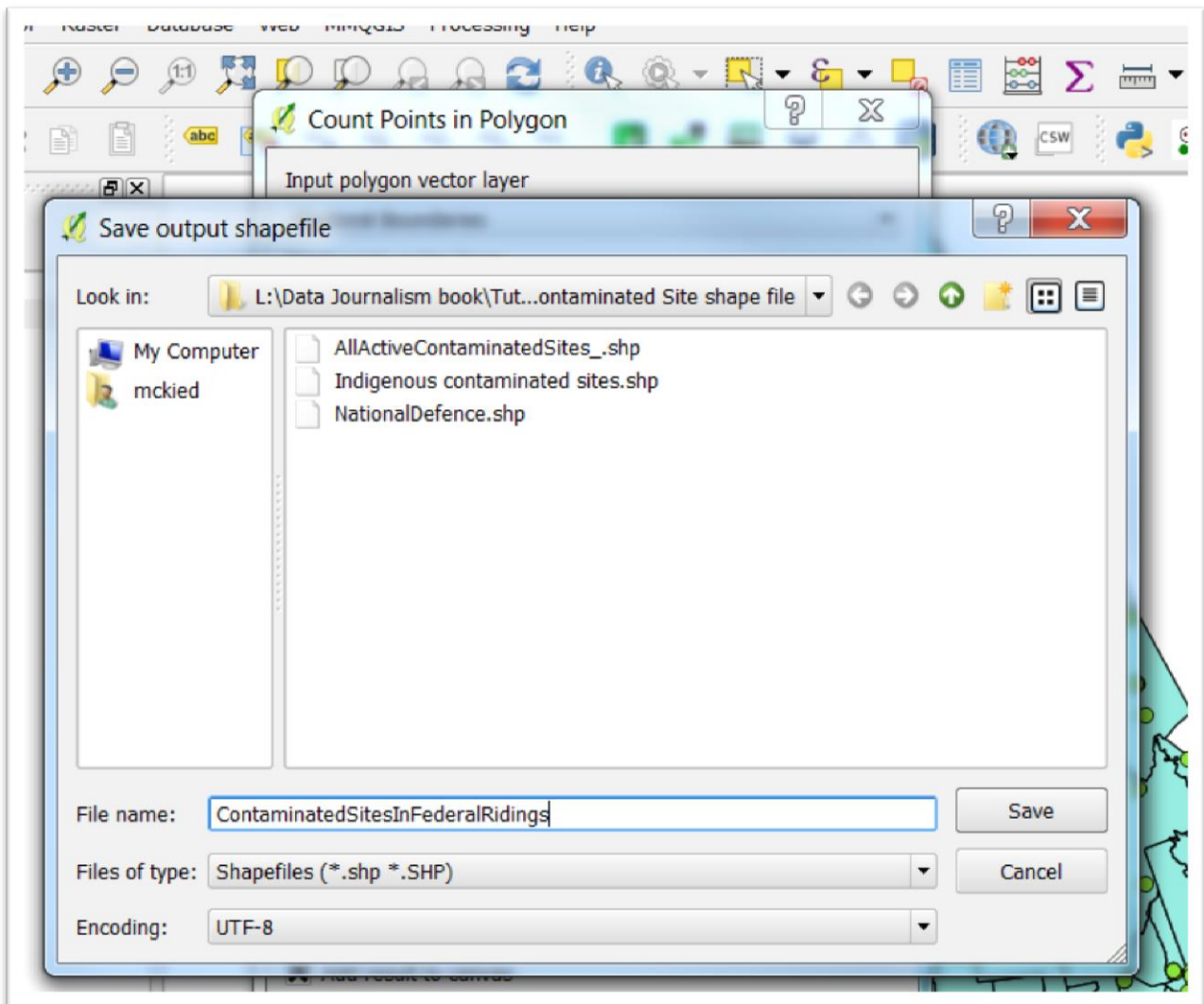


The “Input polygon vector layer” is the one we’ve selected from the menu, Electoral Boundaries. The “Input point vector layer” is “Contaminated Sites”.

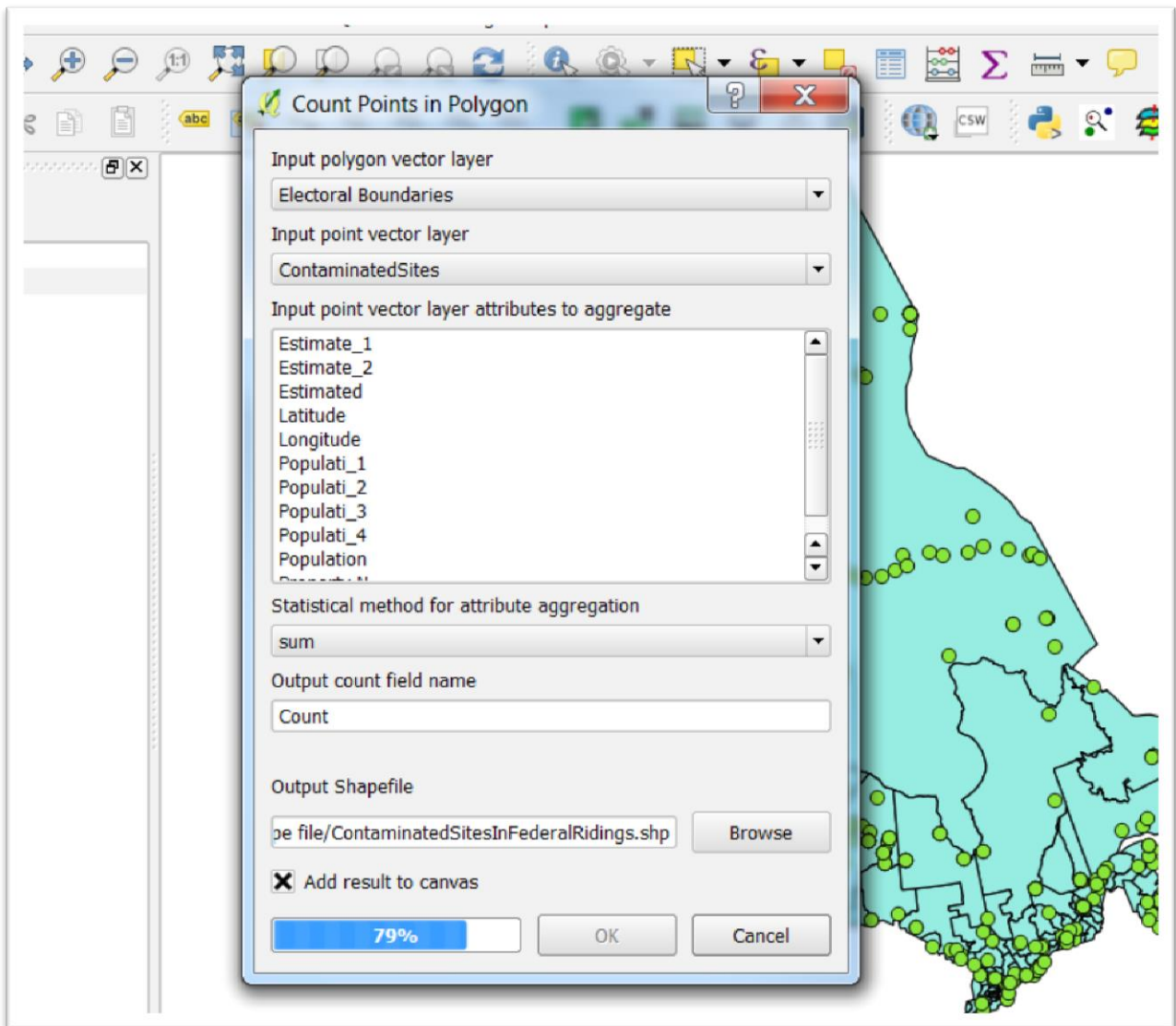
QGIS uses a default “PNTCNT” (short for point count) for the name of the new field that will be created with the contaminated site counts in each riding. You can give it another name such as “Count”.

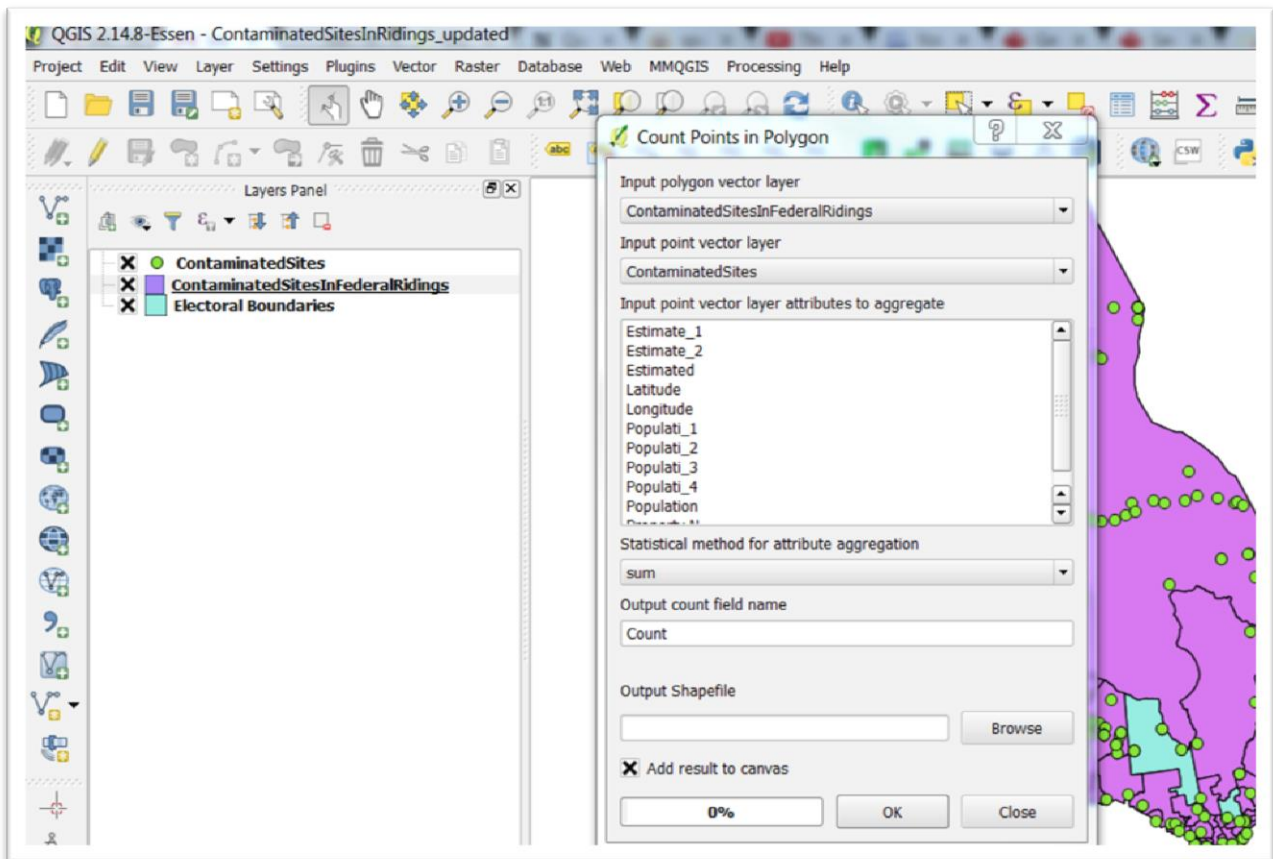


Browse to a location on your hard drive and give the layer a new name.

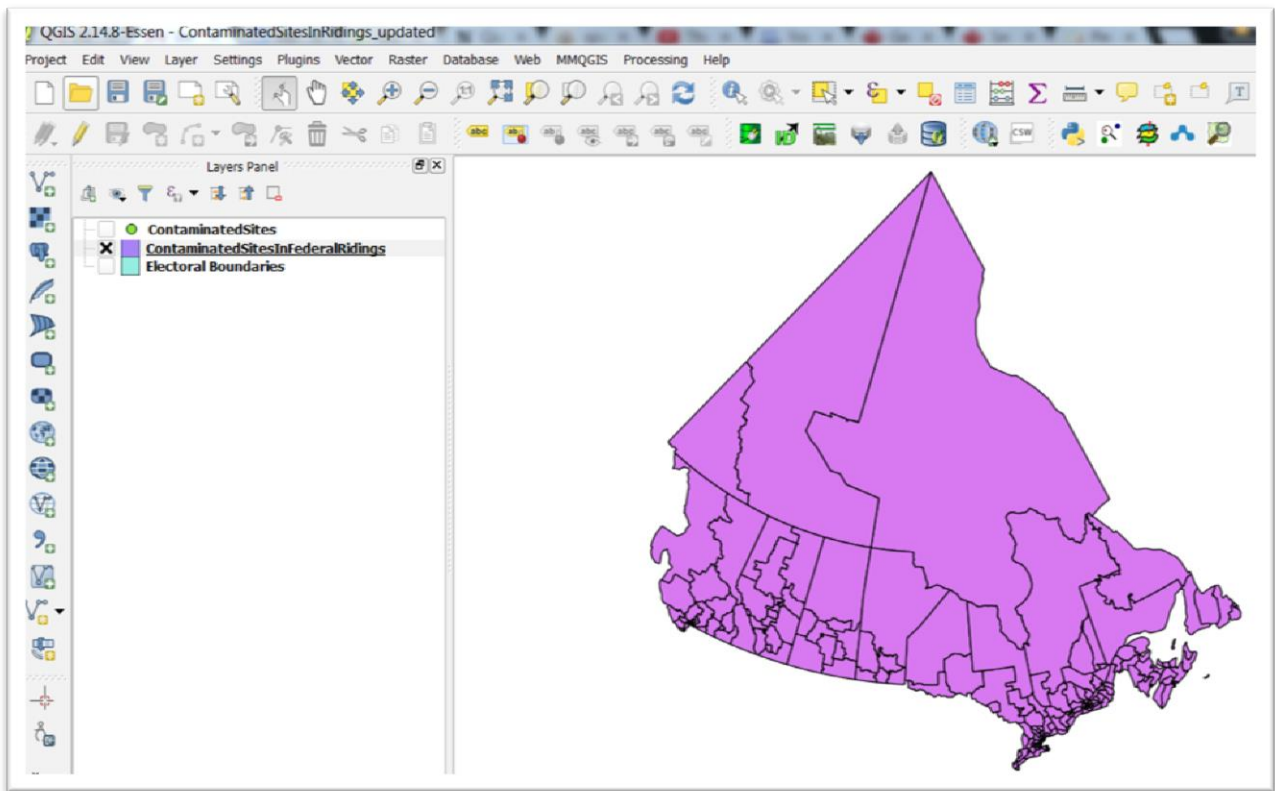


Save the result.





Close the dialogue box. And de-select the other two layers.



It looks like nothing has happened. But in fact something has. Open the attribute table. Scroll to the far right, and click on the new “Count” column to sort the values in descending order.

ContaminatedSitesInFederalRidings :: Features total: 347, filtered: 347, selected: 0

	ENNAME	FRNAME	PROVCODE	CREADT	REVDT	REORDER	DECP0CNT	QUIPOCNT	ENLEGALDSC	FRLEGALDSC	Count
48	Nunavut	Nunavut	NU	20131005	NULL	2013	31906	0	http://www.el...	http://www.el...	64
49	Northwest Ter...	Territoires du ...	NT	20131005	20140619	2013	41462	0	http://www.el...	http://www.el...	62
308	Skeena--Bulld...	Skeena--Bulld...	BC	20131005	NULL	2013	90586	0	http://www.el...	http://www.el...	45
79	Kenora	Kenora	ON	20131005	NULL	2013	55977	0	http://www.el...	http://www.el...	42
172	Churchill--Kee...	Churchill--Kee...	MB	20131005	NULL	2013	85148	0	http://www.el...	http://www.el...	32
338	North Island--...	North Island--...	BC	20131005	20140619	2013	103458	0	http://www.el...	http://www.el...	29
304	Prince George...	Prince George...	BC	20131005	NULL	2013	107382	0	http://www.el...	http://www.el...	27
46	Yukon	Yukon	YT	20131005	NULL	2013	33897	0	http://www.el...	http://www.el...	24
200	Bonavista--Bu...	Bonavista--Bu...	NL	20131005	NULL	2013	76704	0	http://www.el...	http://www.el...	21
222	Sydney--Victo...	Sydney--Victo...	NS	20131005	NULL	2013	73328	0	http://www.el...	http://www.el...	15
242	Courtenay--Al...	Courtenay--Al...	BC	20131005	NULL	2013	110391	0	http://www.el...	http://www.el...	15
282	Mission--Mats...	Mission--Mats...	BC	20131005	NULL	2013	90871	0	http://www.el...	http://www.el...	14
203	Long Range M...	Long Range M...	NL	20131005	NULL	2013	87592	0	http://www.el...	http://www.el...	13
306	Esquimalt--Sa...	Esquimalt--Sa...	BC	20131005	20140619	2013	113004	0	http://www.el...	http://www.el...	13
215	Dartmouth--C...	Dartmouth--C...	NS	20131005	NULL	2013	91212	0	http://www.el...	http://www.el...	12
201	Coast of Bays...	Coast of Bays...	NL	20131005	NULL	2013	78092	0	http://www.el...	http://www.el...	10
202	Labrador	Labrador	NL	20131005	NULL	2013	26728	0	http://www.el...	http://www.el...	10
199	Avalon	Avalon	NL	20131005	NULL	2013	81540	0	http://www.el...	http://www.el...	9
300	Timmins--Jam...	Timmins--Bal...	ON	20131005	NULL	2013	83104	0	http://www.el...	http://www.el...	9

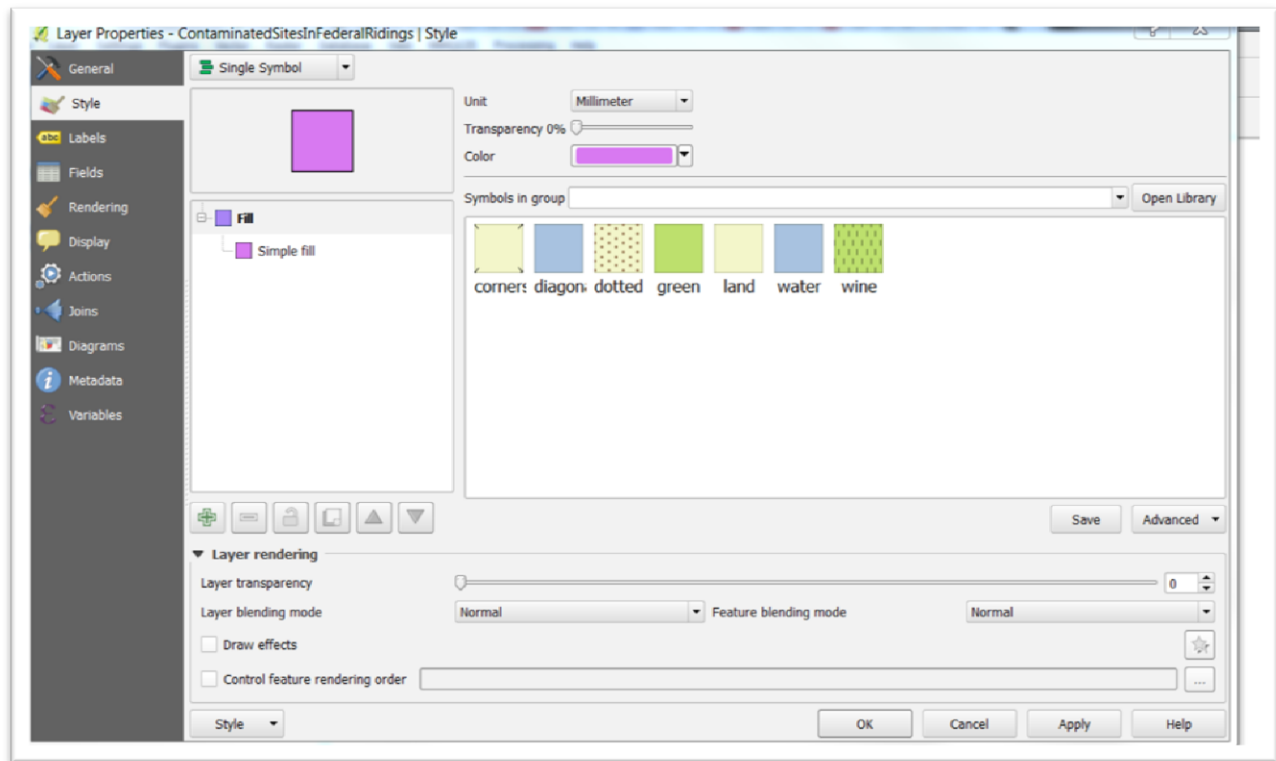
Show All Features

The territory of Nunavut has the highest number of active contaminated sites.

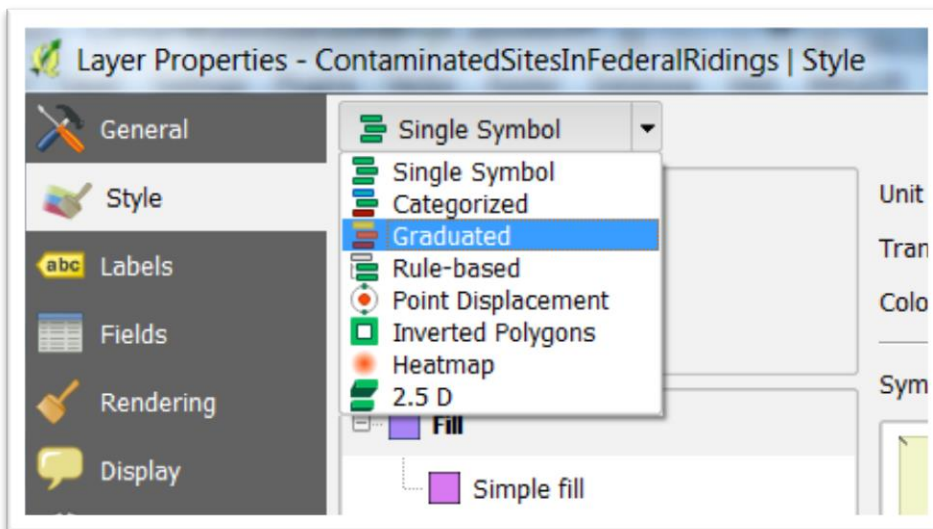
Close the attribute table.

As we did during the tutorial on mapping census data, we must assigned different colours to these values.

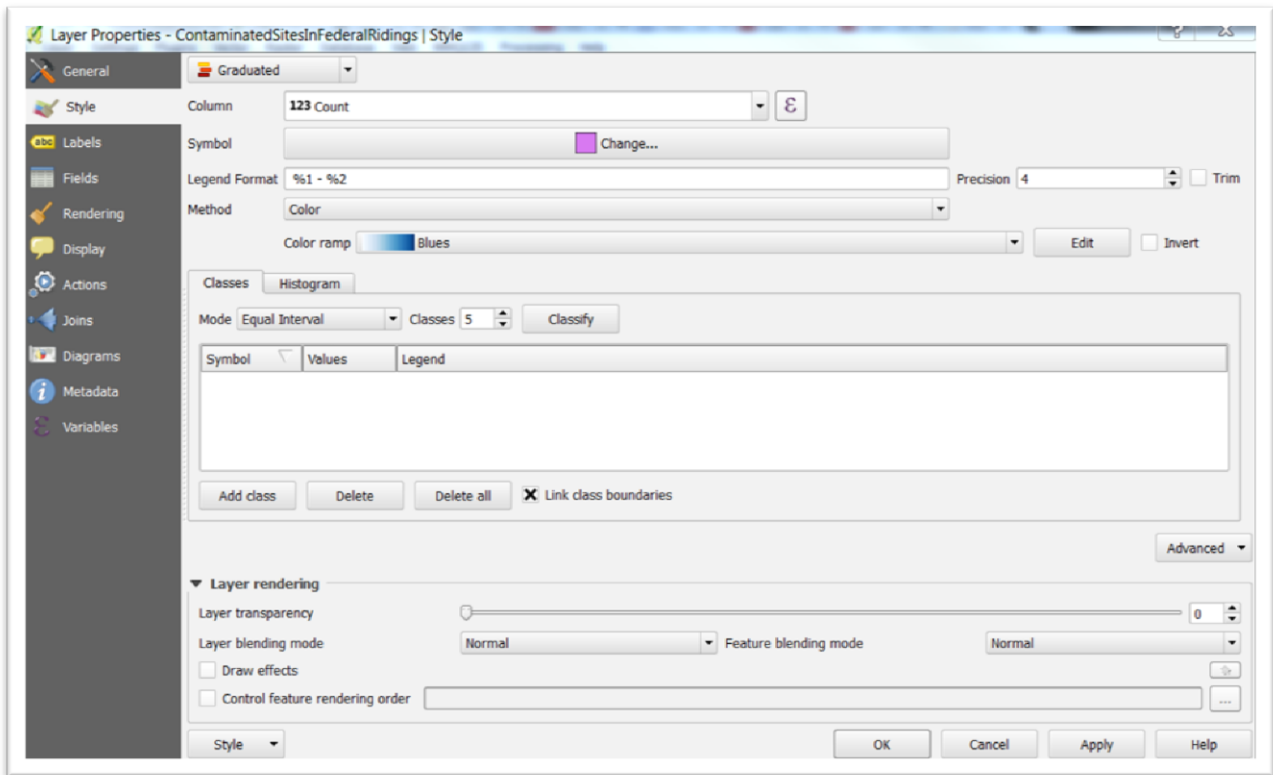
Right click on the layer to get the “Properties” option, and go to the “Style” section.



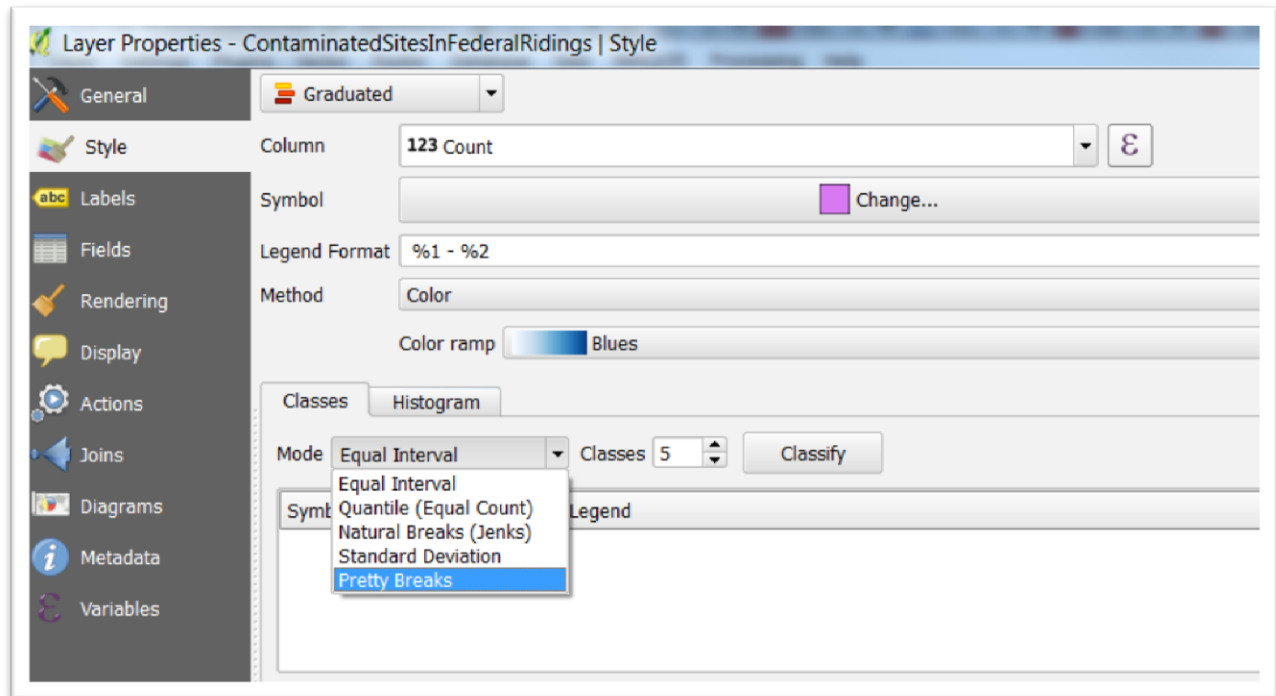
Select the arrow to the right of “Single Symbol”, and chose the “Graduated” option from the drop-down menu.



Then select the “Count” field from the drop-down menu that you can obtain by clicking on the downward arrow to the right of the space next to “Column.”



By default, QGIS divides up the class in five equal intervals. This might not make sense, depending on your dataset. You may want more or fewer categories.

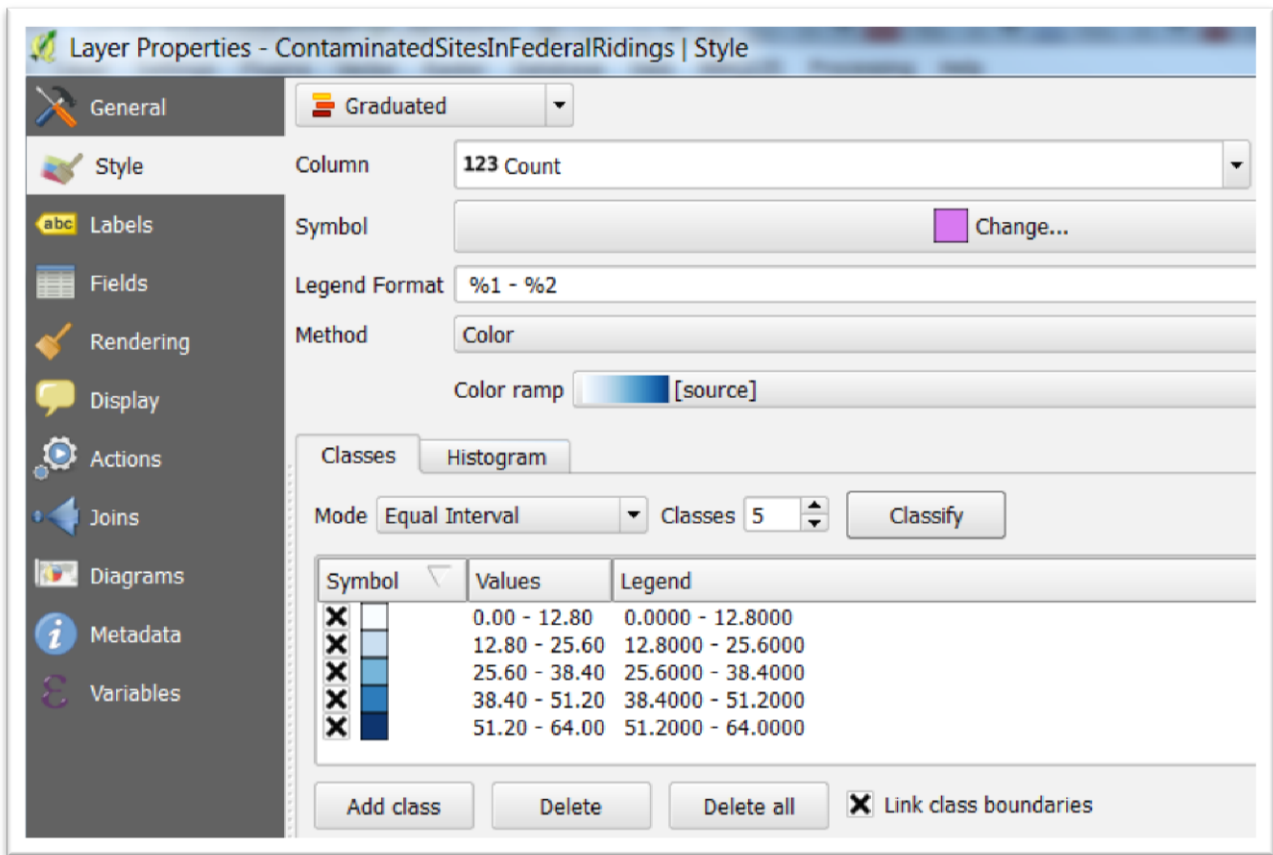


You'll find more options from the drop-down menu to the right of "Mode."

For the sake of this exercise, let's stick with the default number, as well as the default colour, blues. Different colour ramps are available on the "Color ramp" menu that can be obtained by clicking the arrow to the right.

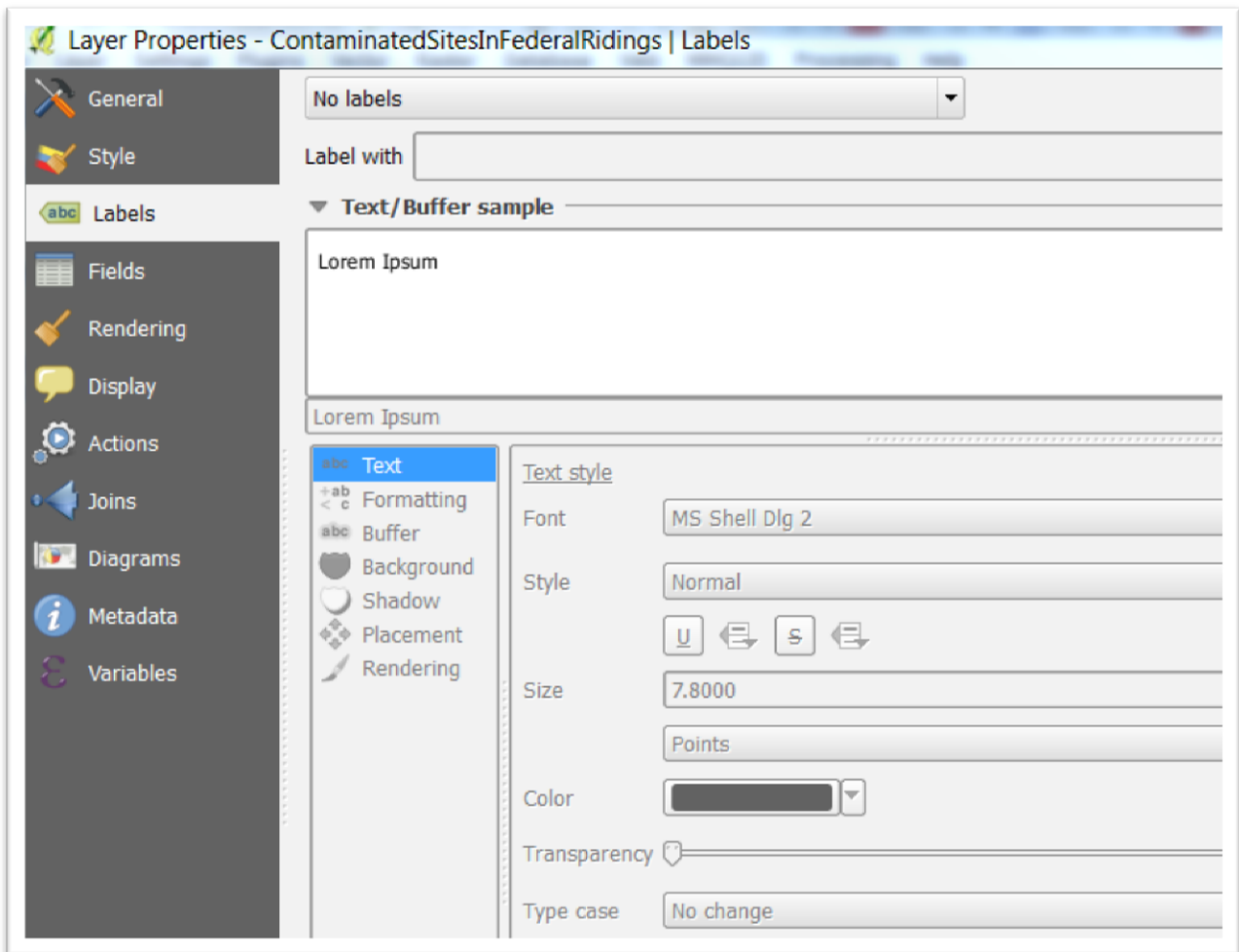


To add the “classes”, select the “Classify” tab.

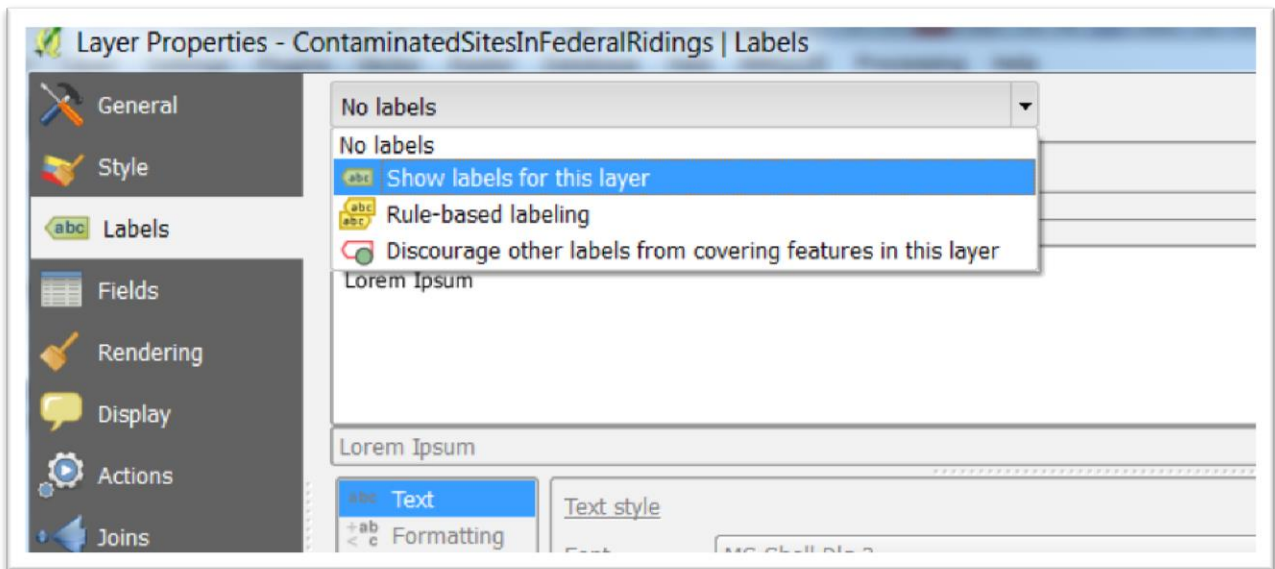


Before we apply the result, we may want to label the ridings to give folks a sense of place.

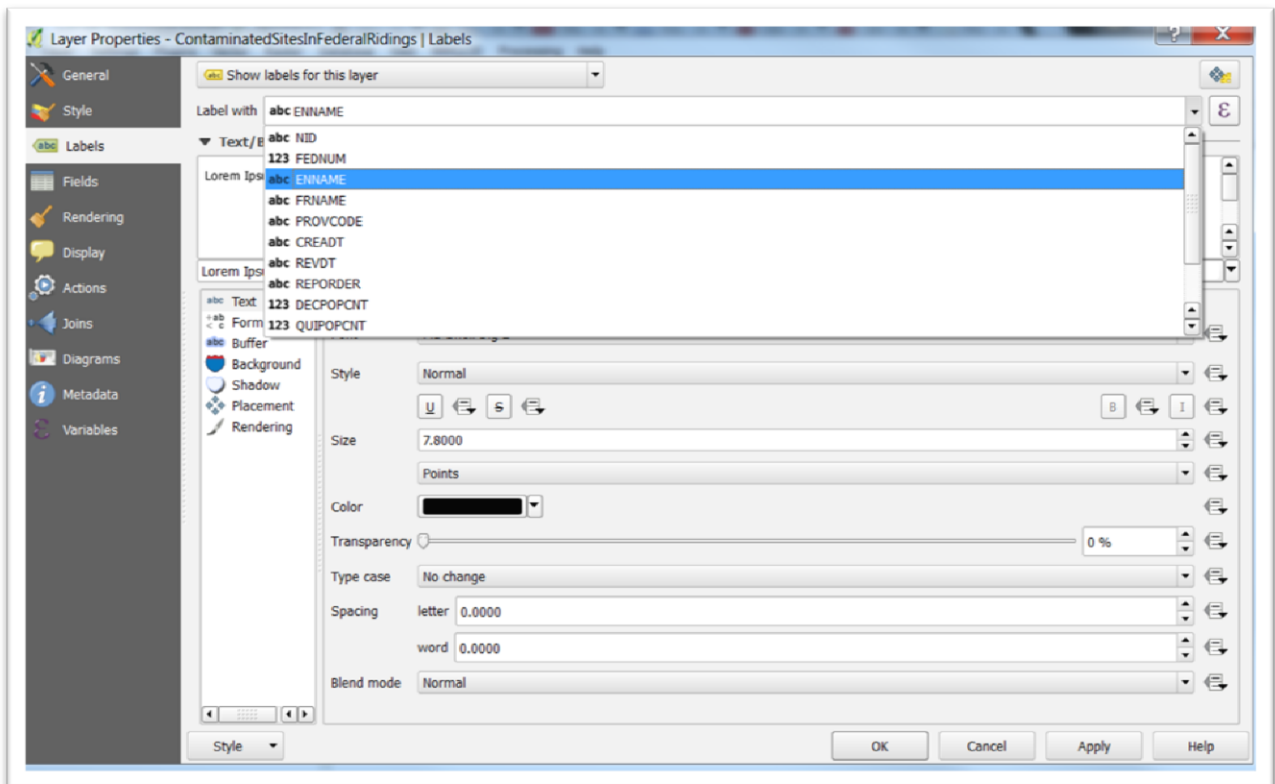
Select the “Labels” option from the menu on the left.



Select the First option from the drop-down menu.

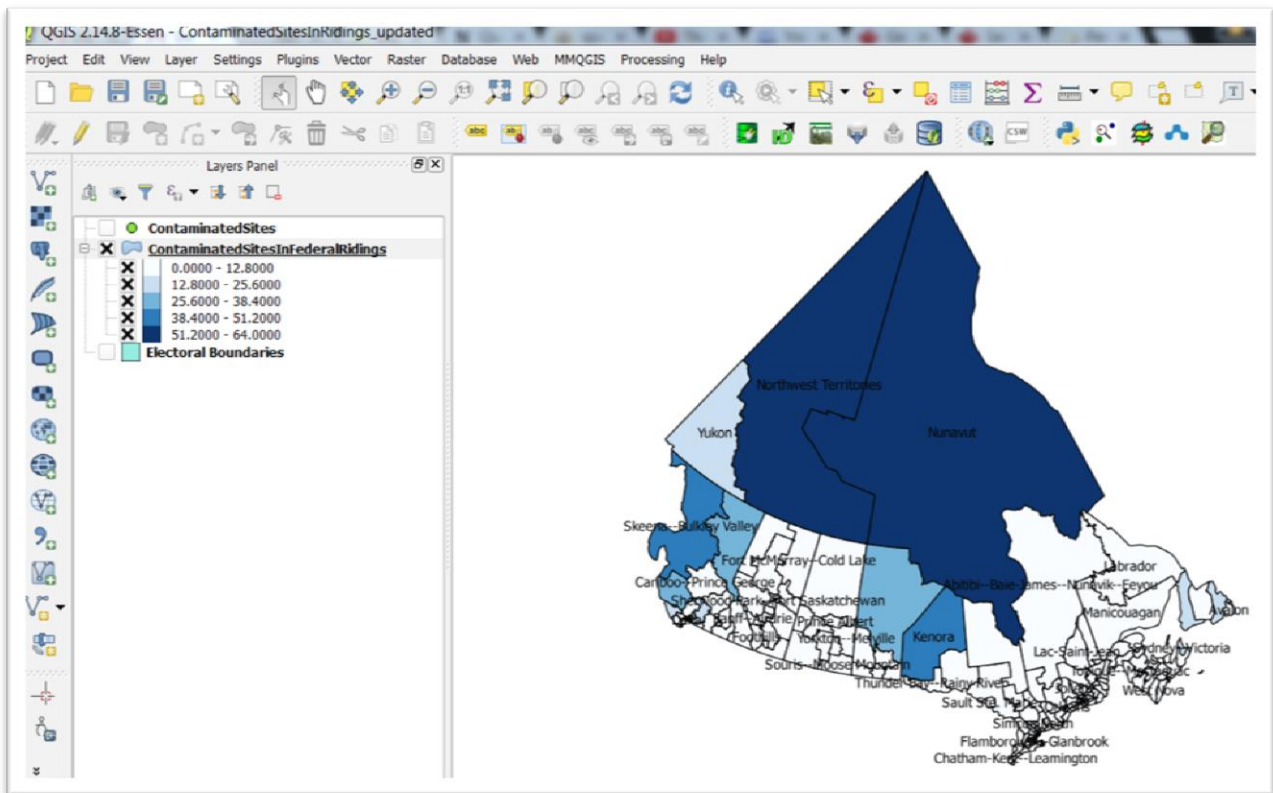


And then the column name from the “Label with” drop-down menu.



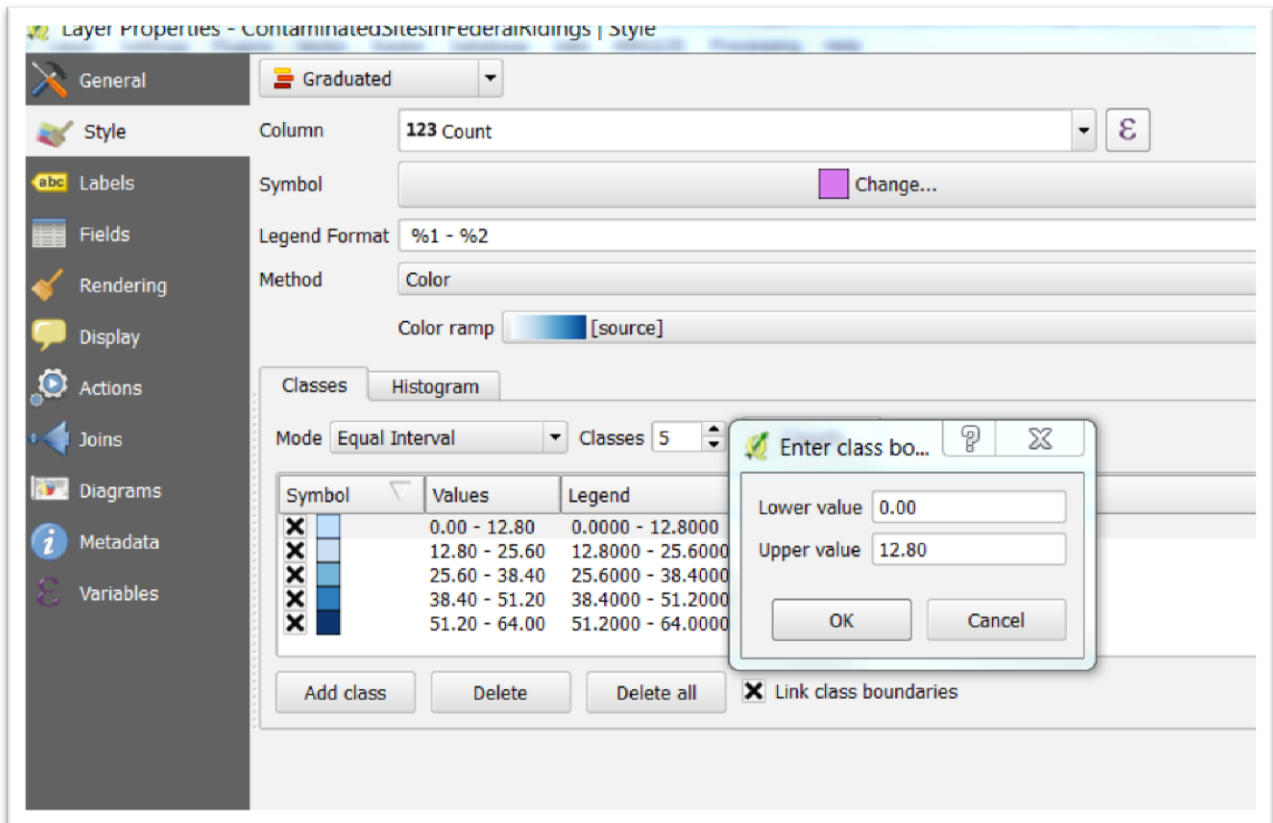
You can also select options such as different colours and point sizes.

Select “Apply” and then “OK.”



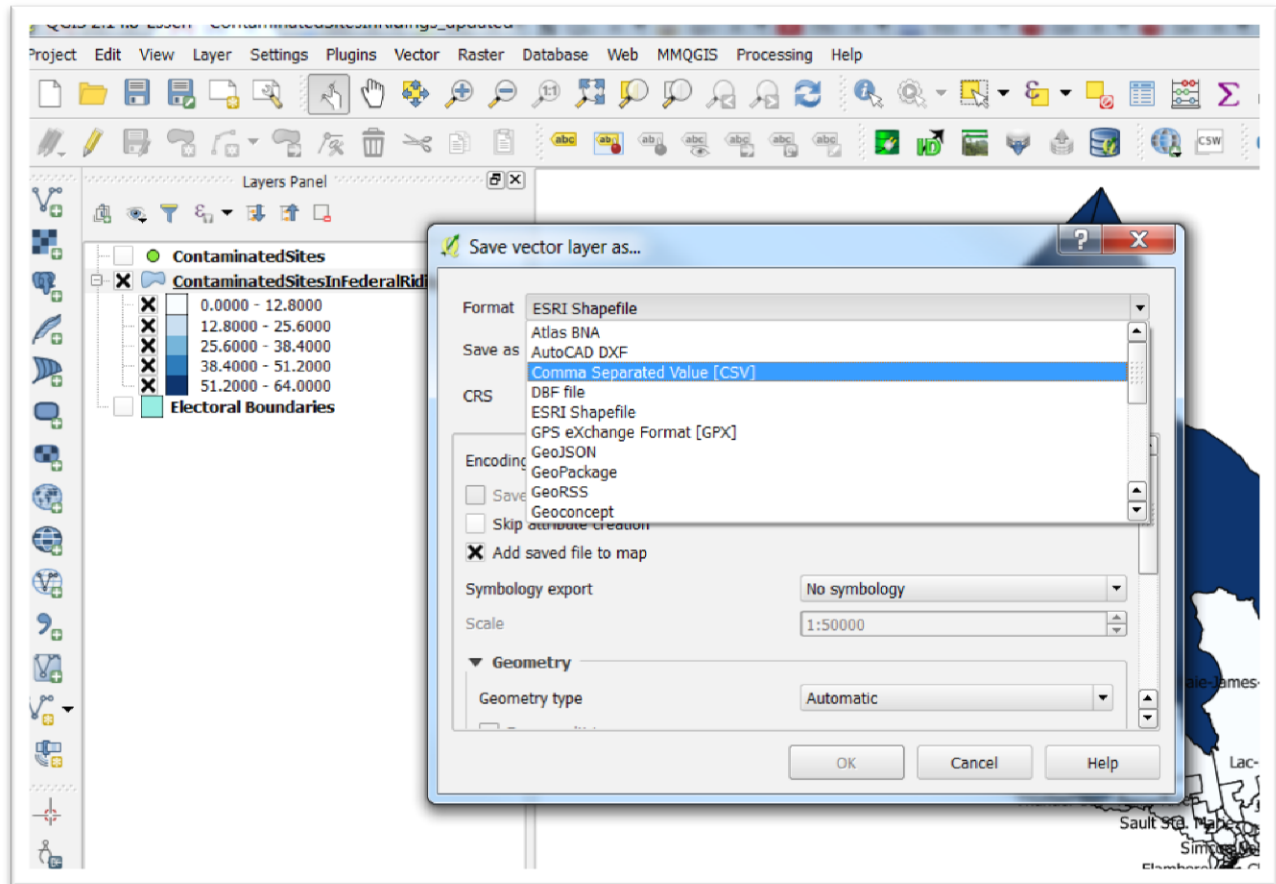
QGIS has created a legend to correspond with the colours on the map.

You can get rid of decimals by returning to style section of “Properties”, and double-clicking on each class.



Now we can export this layer as a shape file, which can be zipped and uploaded to ArcGIS Online, for now, a more user-friendly alternative than QGIS’s cloud option. Or you can export it as a KML file and upload it to Fusion Tables, where you’ll have to symbolize it again.

Or if you're only interested in the analysis, you can save the layer as a csv file.



So, QGIS has allowed us to do a sophisticated piece of analysis using a spatial join, and then permitted us to see the results. As we have pointed out many times, this just scratches the surface, but represents one of the key ways that journalists use mapping to tell stories about contaminated sites in federal ridings, the number of infrastructure projects in federal ridings, break-and-enters within certain police districts, the outbreak of a certain illness or disease in parts of the country, or the locations of some of the heaviest industrial polluters.