

# INTRO TO GIS

**AND MAPS, AND GEOSPATIAL DATA**

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# PREPARATION

- Please download the following (contains 2 csv files): <https://bit.ly/2W9dagF>
-

# AGENDA

- A little about maps
  - A little about geospatial data
  - What is QGIS?
  - The interface
  - Where to find data for use
  - How to add data to QGIS
  - How to work with data in QGIS
  - How to create and export a map
-



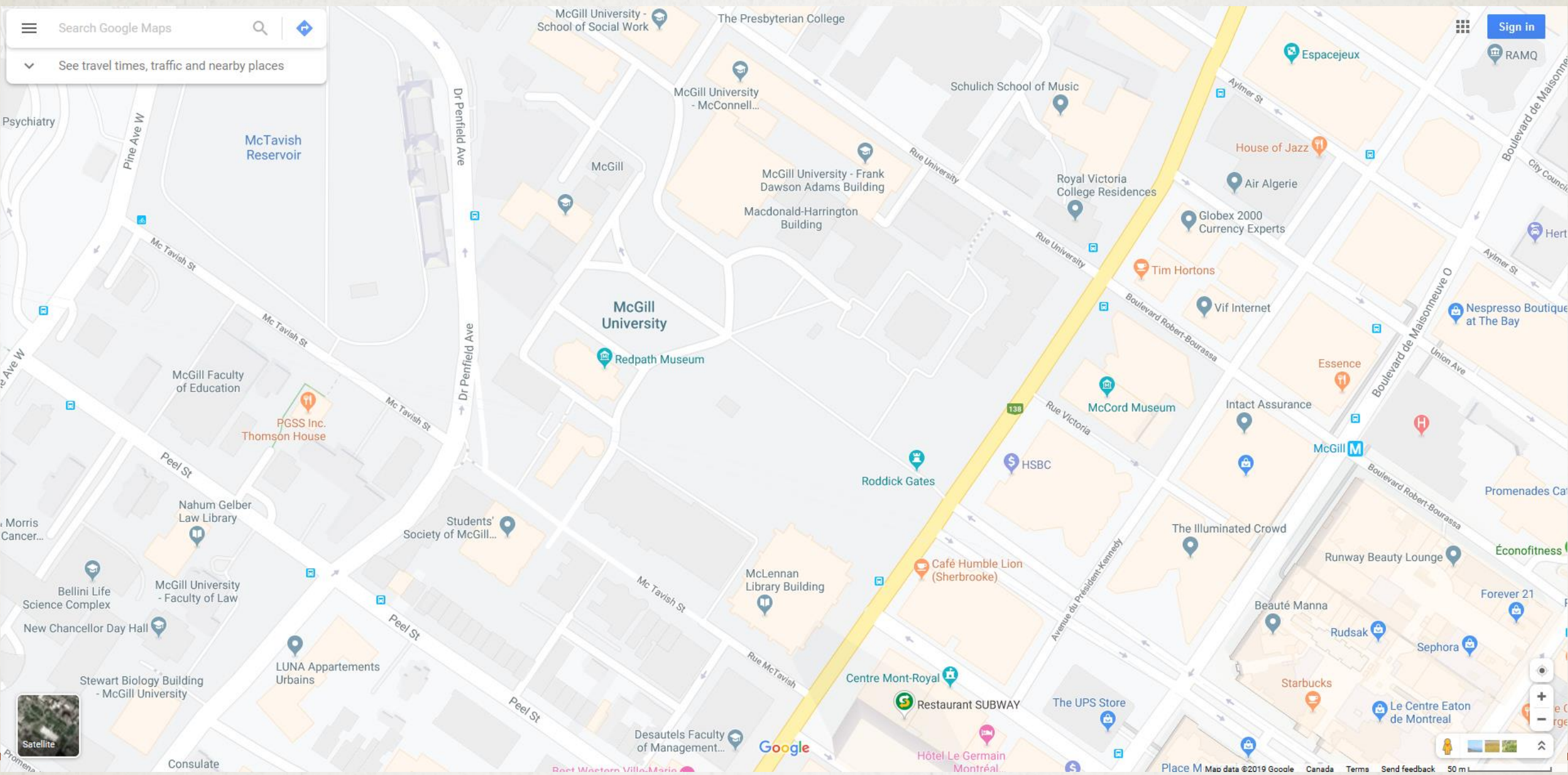
# ABOUT MAPS

- First, let's talk about the parts of a map







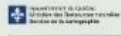


# WHAT DO YOU NEED TO KNOW?

- Parts of a map! Such as:
    - Title
    - North Arrow
    - Scale bar
    - Legend
    - Citation(s)
    - Projection (more on this in a moment)
    - Author
    - Neat Line
    - Collar
-



Citation/  
Author

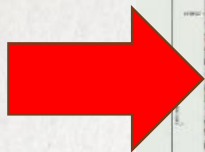


MONTREAL-NORD

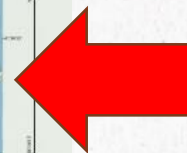
Title

Québec

Neat  
Line



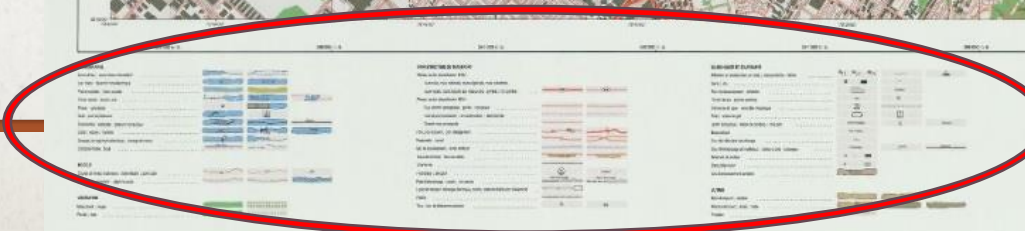
Collar



North Arrow



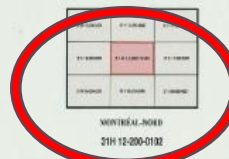
Legend



Scale



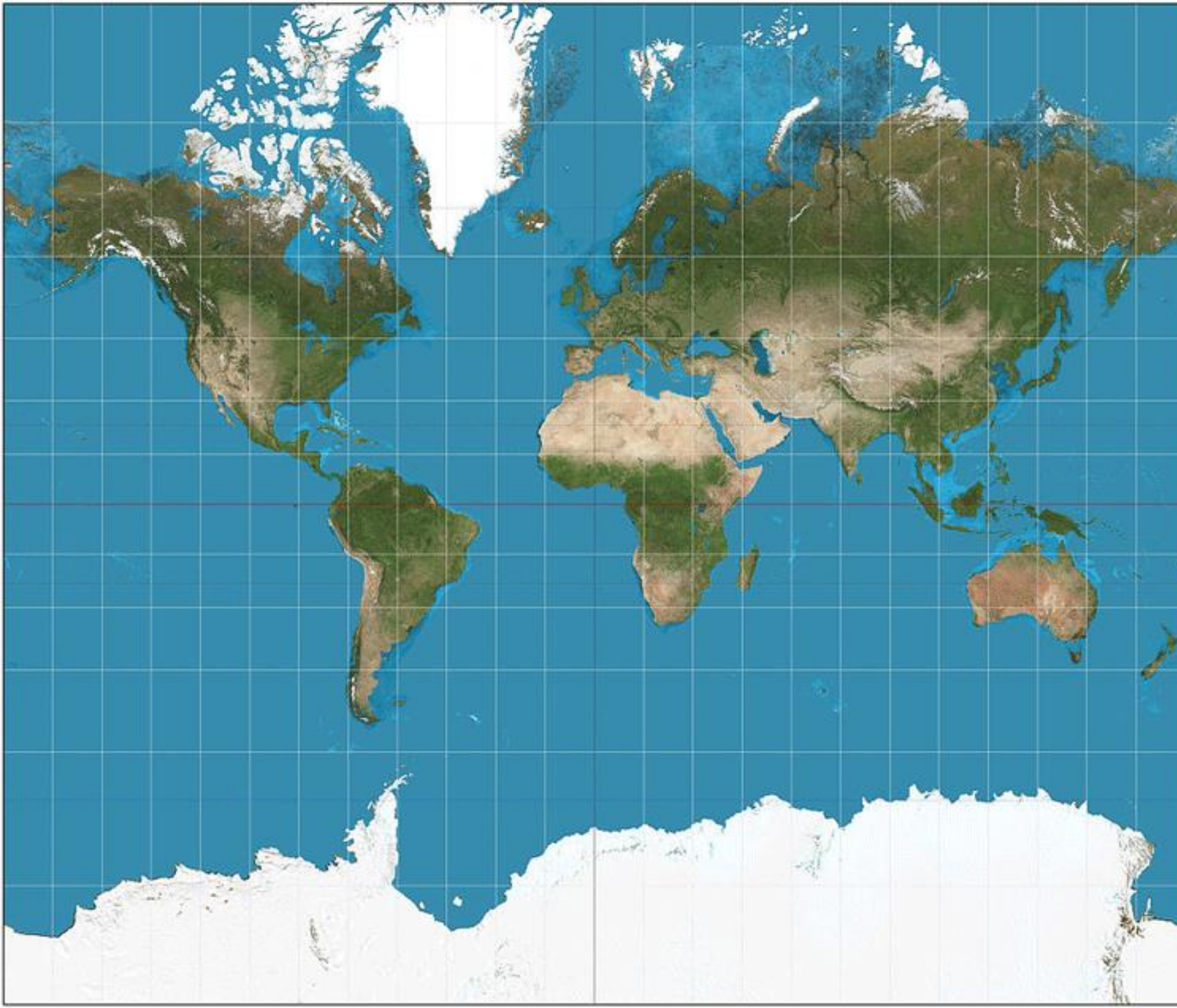
Series  
Title





# GOOD VS BAD MAPS

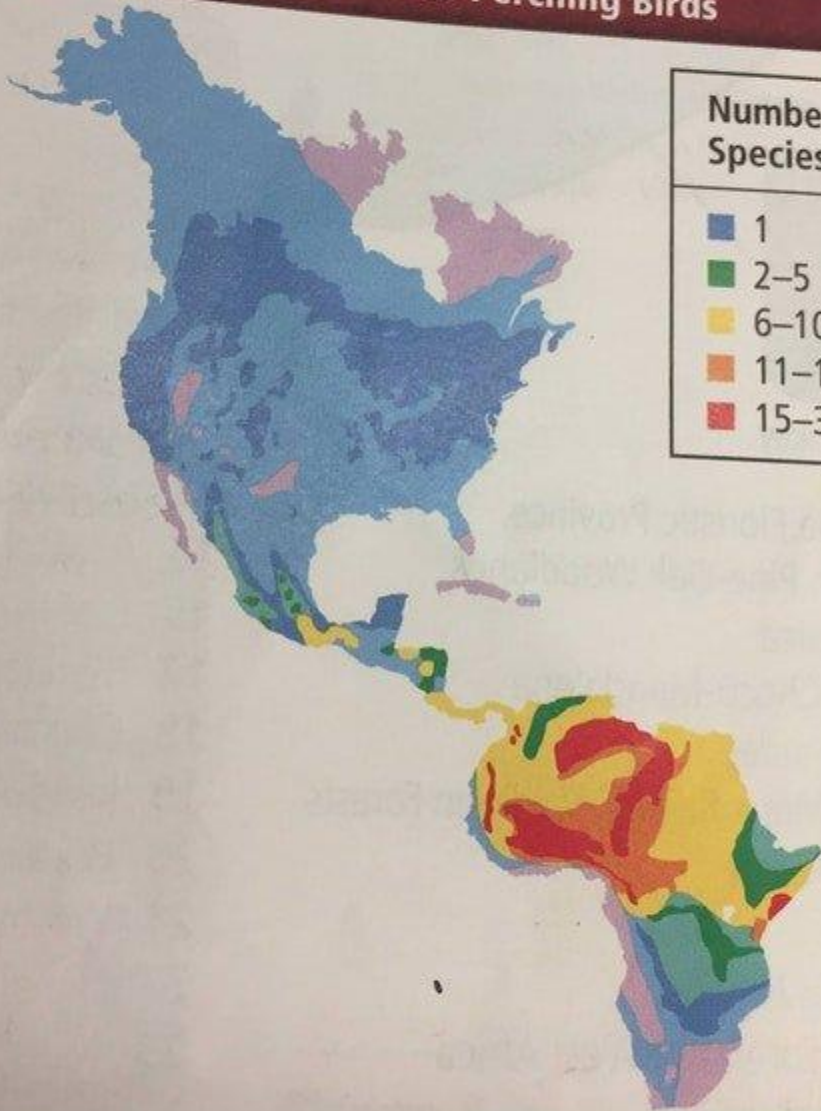
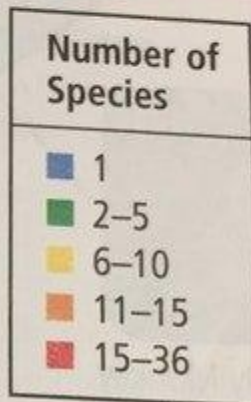
- Are there really bad maps?
  - Yes. Yes there are.
-



Borneman, Elizabeth. "Types of Map Projections". GeoLounge. 5 Jan 2015. Web. Accessed on 16 Jan 2019 from <https://www.geolounge.com/types-map-projections/>



### Distribution of Perching Birds



- Here's a map. From a textbook. A Biology textbook.
- Please take a moment to appreciate everything about this map.





Sources on endnote



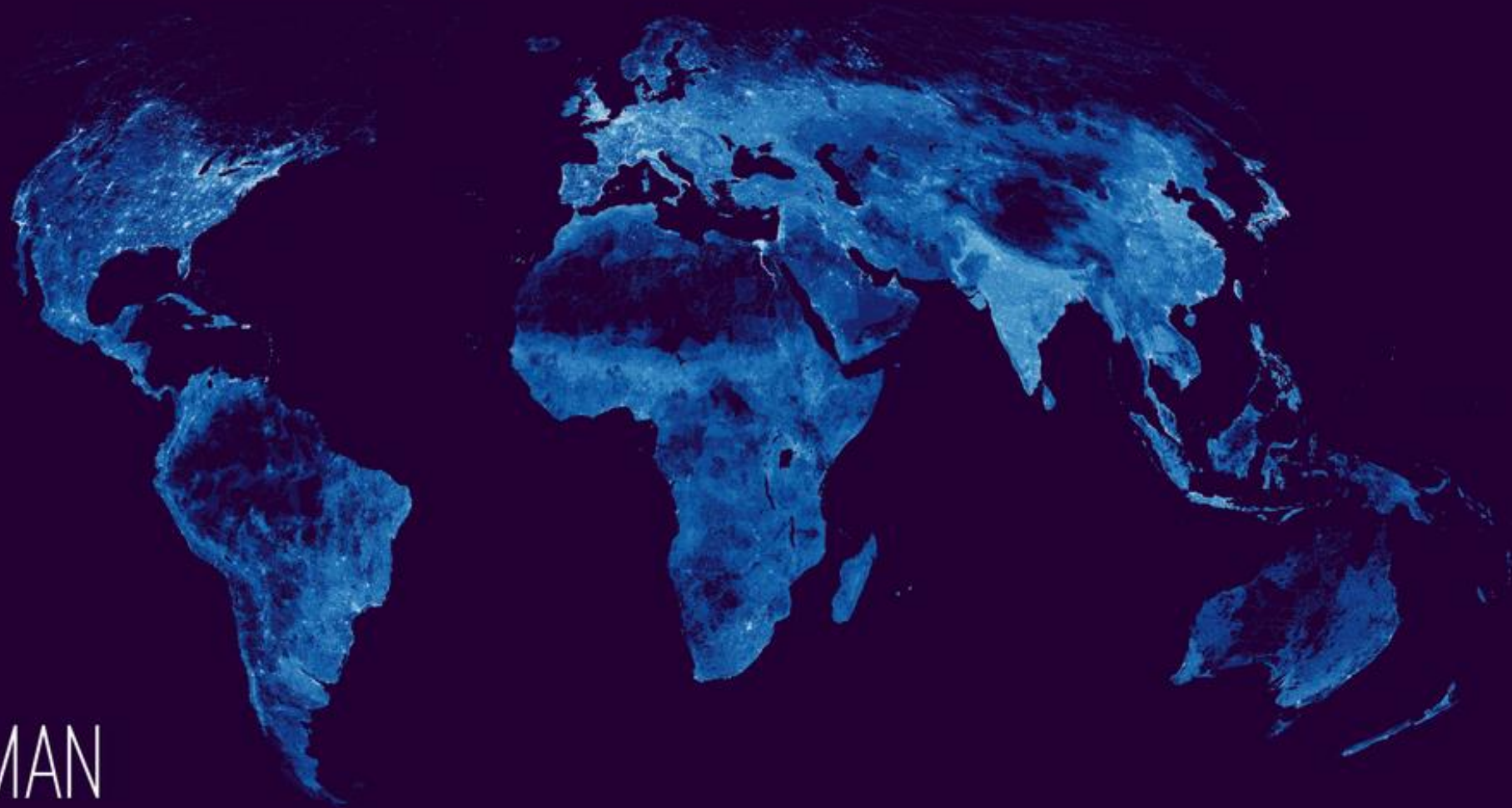


## BEAR LOCATION MAP, NORTH AMERICA

- Now check out this. Thoughts?

Thecasualcaribou. "Bear location map North America". Reddit, Inc. 15 Jan 2019, 08:56:35 GMT.  
Web. Accessed on 16 January 2019 from  
[https://www.reddit.com/r/MapPorn/comments/ag8qc4/bear\\_location\\_map\\_north\\_america](https://www.reddit.com/r/MapPorn/comments/ag8qc4/bear_location_map_north_america)





# HUMAN FOOTPRINT

@TJUKANOV

ORIGINATOR: VENTER, O. E. W. SANDERSON, A. MAGRACH, J. R. ALLAN, J. BEHER, K. R. JONES, H. P. POSSINGHAM, W. F. LAURANCE, P. WOOD, B. M. FEKETE, M. A. LEVY, AND J. E. WATSON  
PUBLICATION DATE: 2018  
LAST OF THE WILD PROJECT, VERSION 3 (LWP-3) 2008 HUMAN FOOTPRINT, 2018 RELEASE

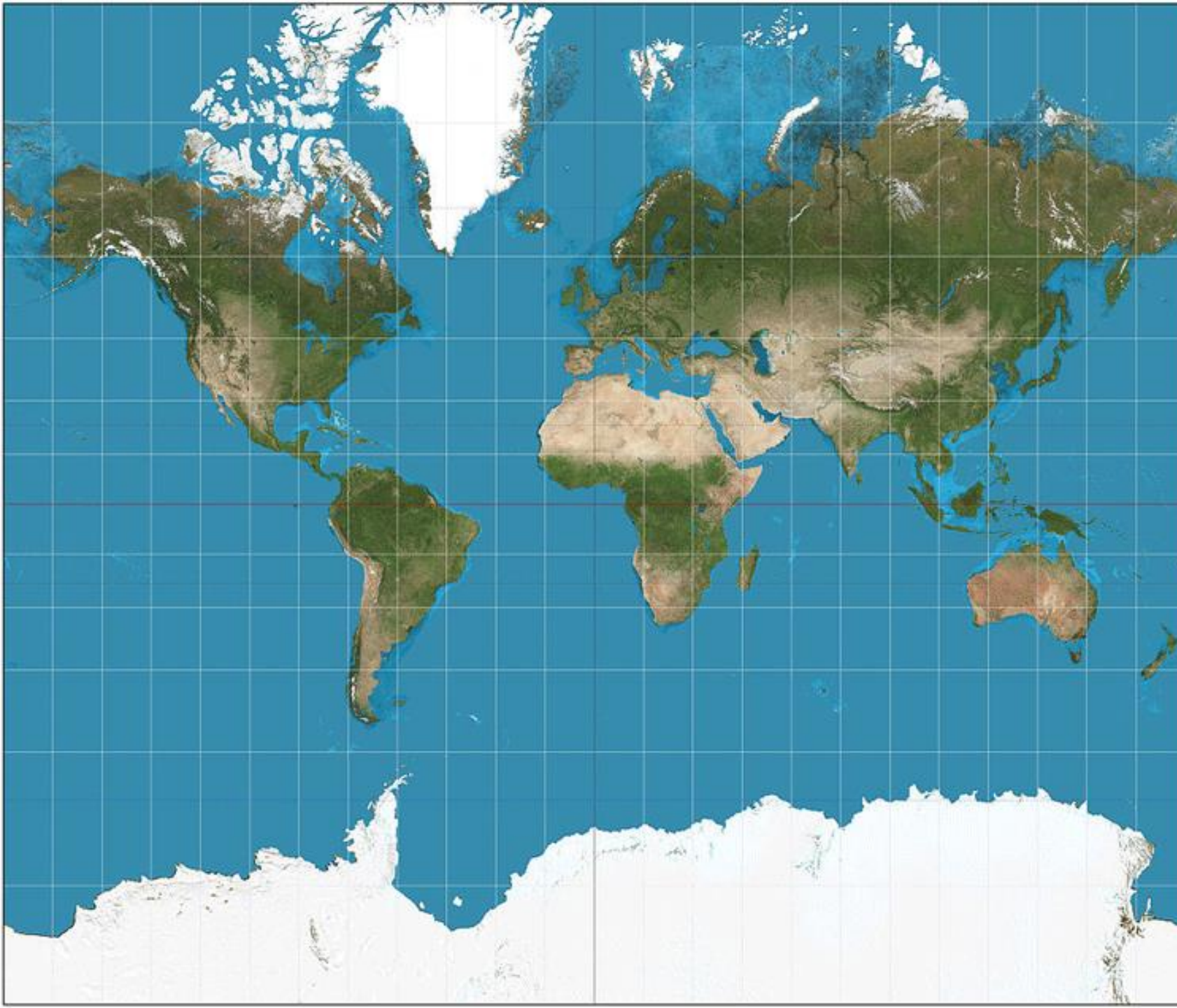
Yeet69Lasagna. "Where on the planet we can see the human footprint and which areas are still untouched? Brighter values represent higher pressure on the environment.". Reddit, Inc. 15 Jan 2019, 09:36:53 GMT. Web. Accessed on 16 Jan 2019 from [https://www.reddit.com/r/MapPorn/comments/ag93ws/where\\_on\\_the\\_planet\\_we\\_can\\_see\\_the\\_human/](https://www.reddit.com/r/MapPorn/comments/ag93ws/where_on_the_planet_we_can_see_the_human/)

# PROJECTIONS

- NEWSFLASH! The earth is a sphere, not flat.
- Do not believe the people that say it is flat.







Borneman, Elizabeth. "Types of Map Projections". GeoLounge. 5 Jan 2015. Web. Accessed on 16 Jan 2019 from <https://www.geolounge.com/types-map-projections/>

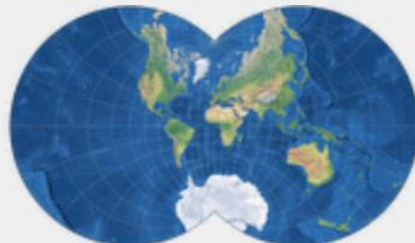




☐ Kharchenko-Shabanova



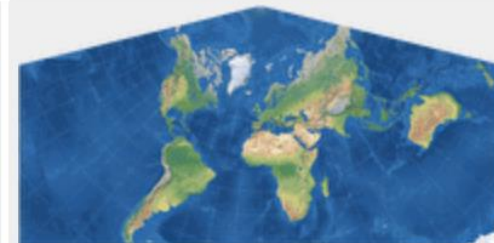
☐ Lagrange



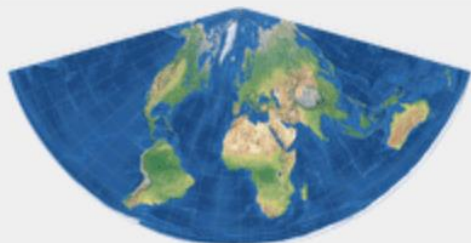
☐ Lagrange (120°)



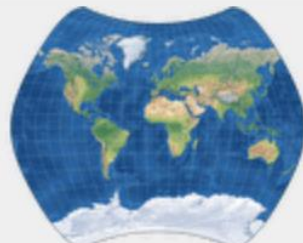
☐ Lambert Cylindrical



☒ Lambert CC



☐ Lambert Equal-Area Conic



☐ Larrivée



☐ Laskowski Tri-Optimal



☐ McBryde P3



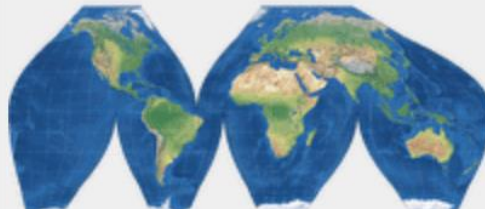
☐ McBryde Q3



☐ McBryde S2



☐ McBryde S3



☒ McBryde S3 (i.)



☐ McBryde-Thomas #1



☐ McBryde-Thomas #2



☐ McBryde-Thomas FPP



☐ McBryde-Thomas FPQ



☐ McBryde-Thomas FPS



☐ McBryde-Th. FPQ (i.)



☐ Mercator



- The earth is a sphere
  - Paper and screens are (usually) not spherical
  - Putting a 3D thing into 2 dimensions means that something's gotta give
  - Example: peel an orange. You cannot keep it circular, and see the entirety of the peel
  - The same thing with the earth
  - Every type of projection is trying to represent the earth on a flat surface in a different manner, and with a different purpose
-



# IMPORTANT CONSIDERATIONS

- Remember your audience. Who are you showing this to? What do they know? What are you trying to say? Will they get it?
  - Advice from the acting world: Assume your audience is at least as intelligent as you are.
  - But don't assume they know everything you do.
-



# ABOUT GEOSPATIAL DATA

- Geospatial data is any data that has any element of geography
    - Ex: has a postal code, a city name, or a latitude/longitude, built in to the data
  - Kinds of geospatial data:
    - Vector
    - Raster – flat images, like a scanned map, that can be referenced to a set of coordinates (called “geo-referenced”)
    - Tabular data
-



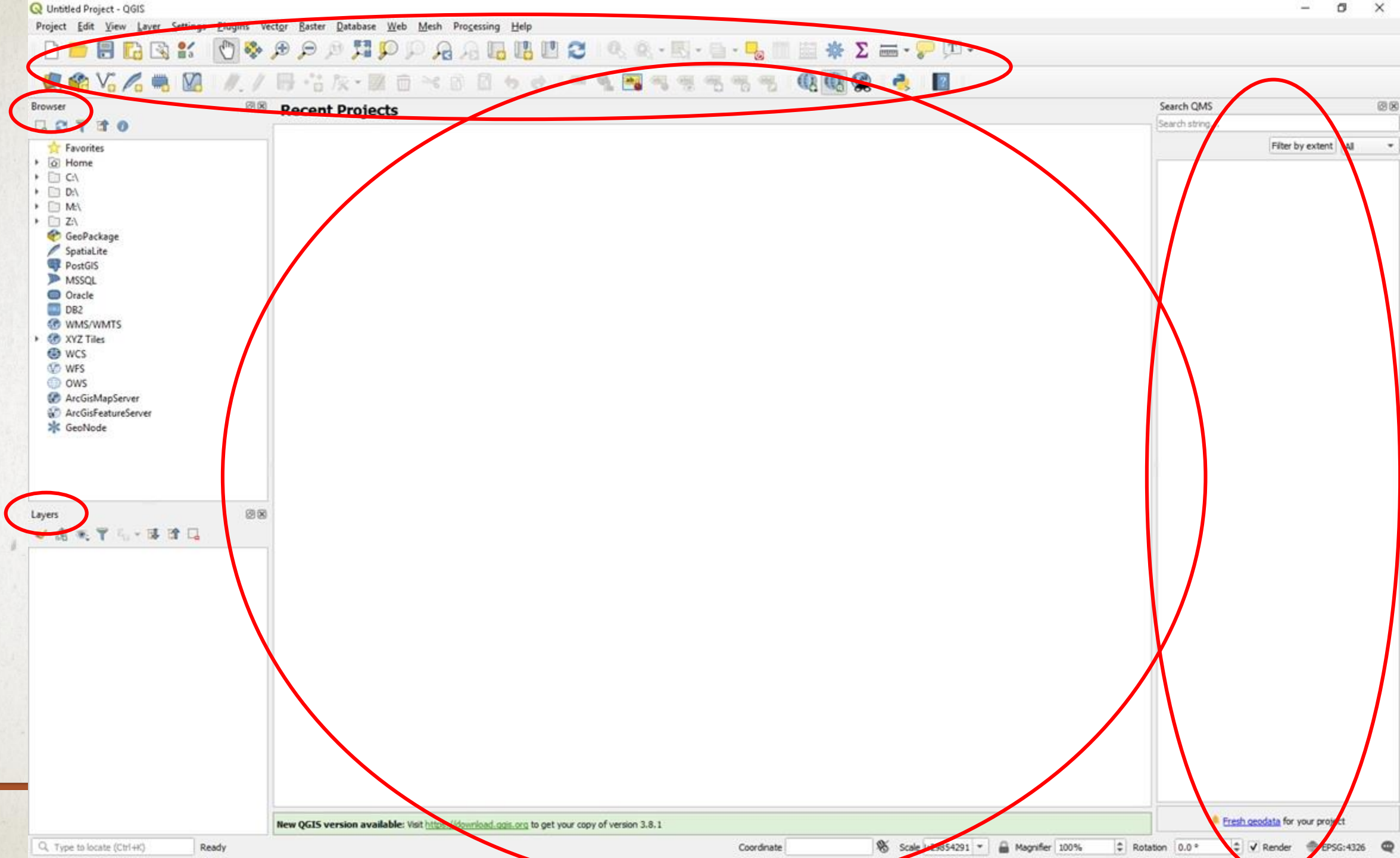
# ABOUT QGIS

- “Quantum Geographic Information System”
- Free and open source GIS software
- Runs on Linux, Apple, Windows, and Android (currently in beta)
- Has both community and commercial support
- Has nifty logo ----->



# THE INTERFACE





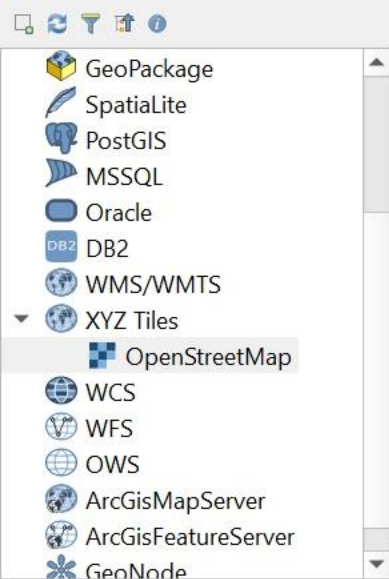
# INTERFACE

- Right now, we just have a blank canvas
  - Let's get started by adding a basemap!
  - The easy way: on the left "Browser" bar, click "XYZ Tiles", then double click (or click and drag) "OpenStreetMap".
-

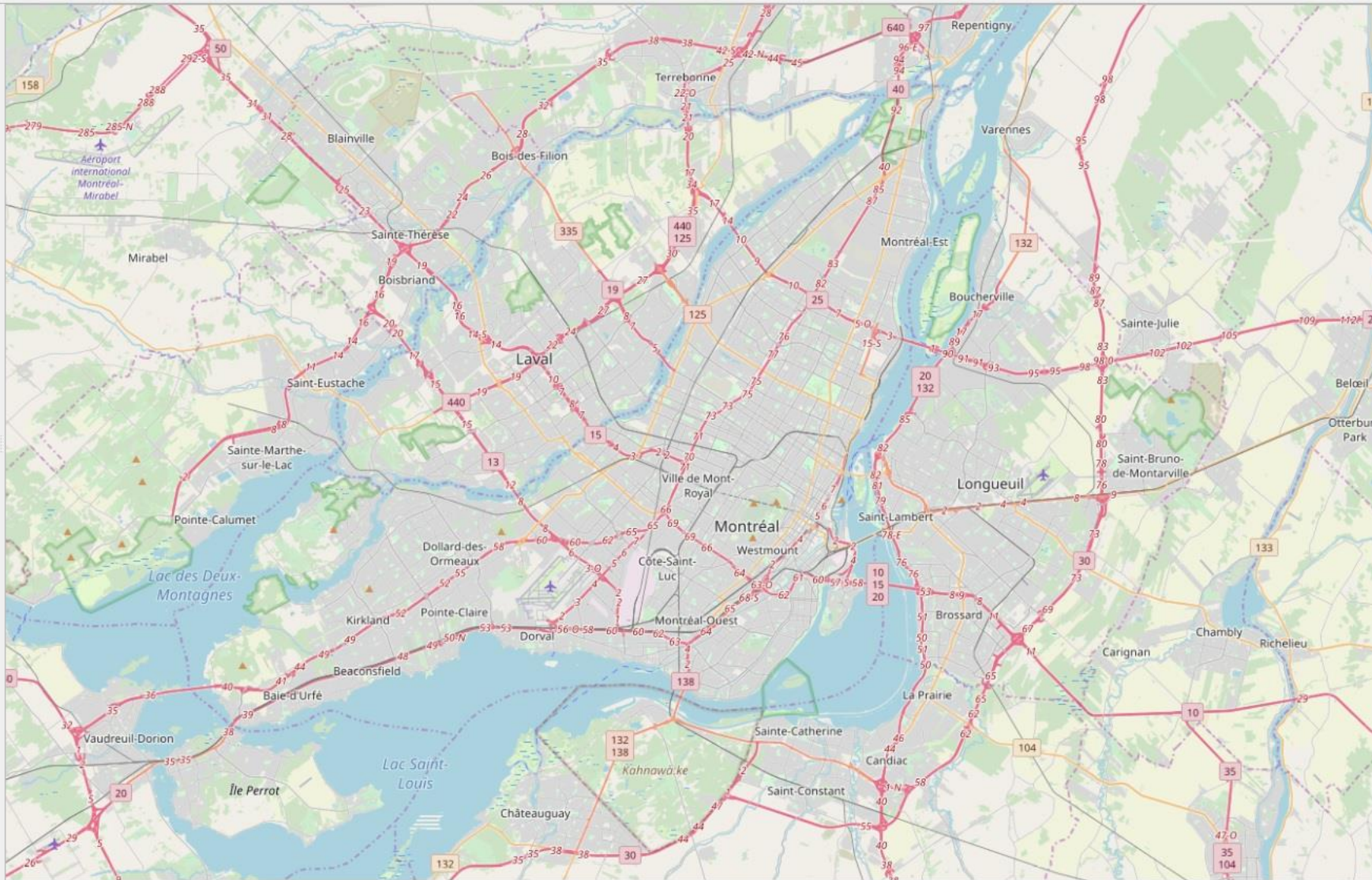
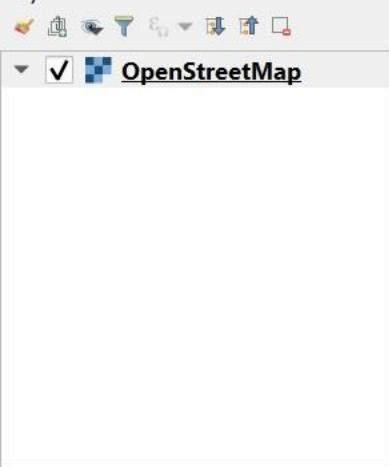




# Browser



# Layers








# Processing Toolbox





# INTERFACE

- Pan by clicking and dragging (make sure the pan icon is selected )
- Zoom in and out using mouse wheel, or zoom buttons (   )
- Zoom to full extent (  )
- Zoom to a selected layer (  )
- Play around with the controls

# PLUGINS FOR QGIS

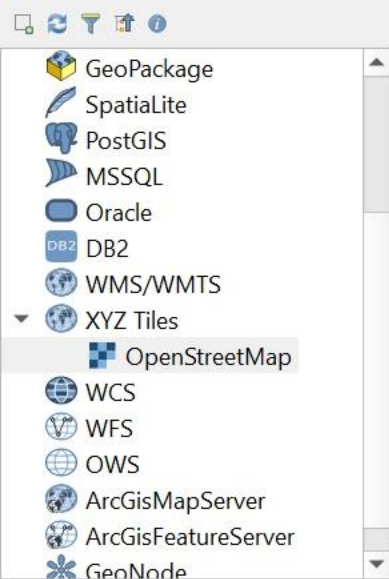
- QGIS has an active development community, who have been creating plugins to add functions that weren't previously in the program, or where under-served
- An alternate – and more robust – method for adding a basemap is using a plugin
- Click “Plugins”, then “Manage and Install Plugins”
- Search “QuickMapServices” and click “Install Plugin”
- A new icon will appear in the ribbon



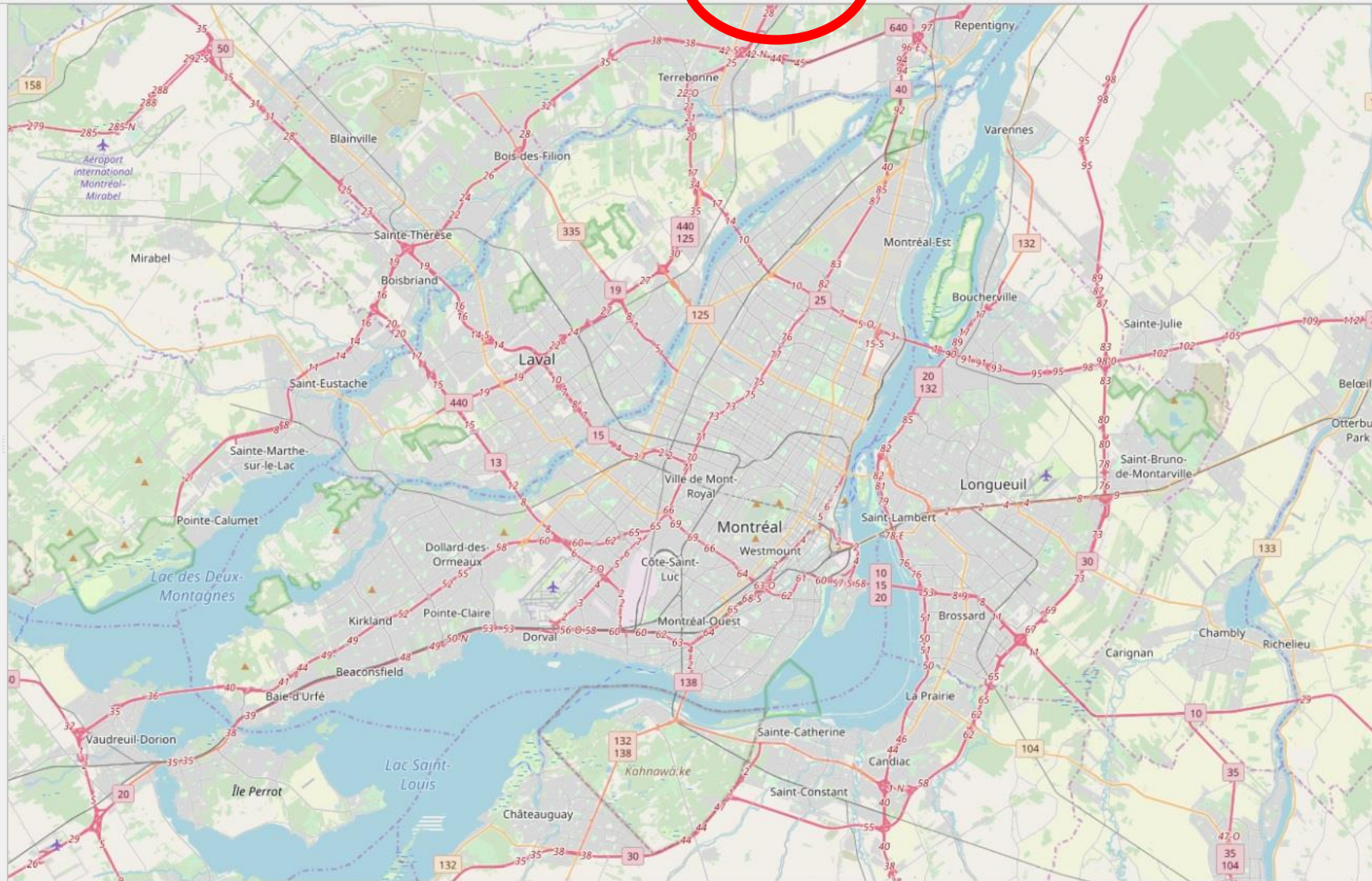
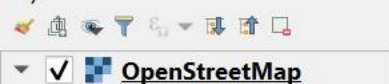




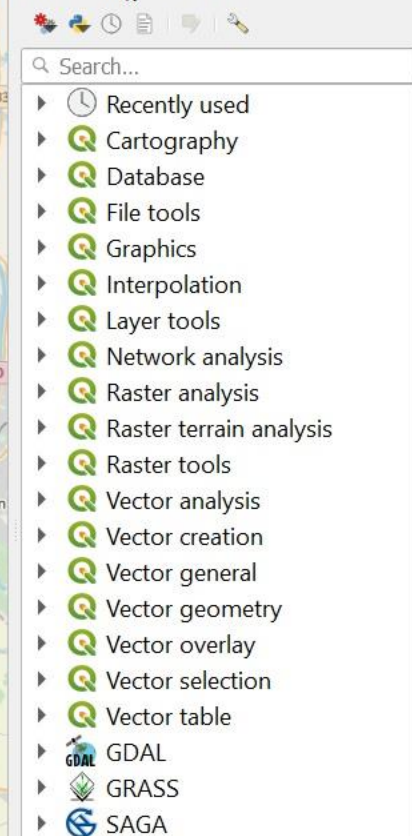
## Browser



## Layers



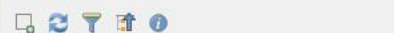
## Processing Toolbox







Browser

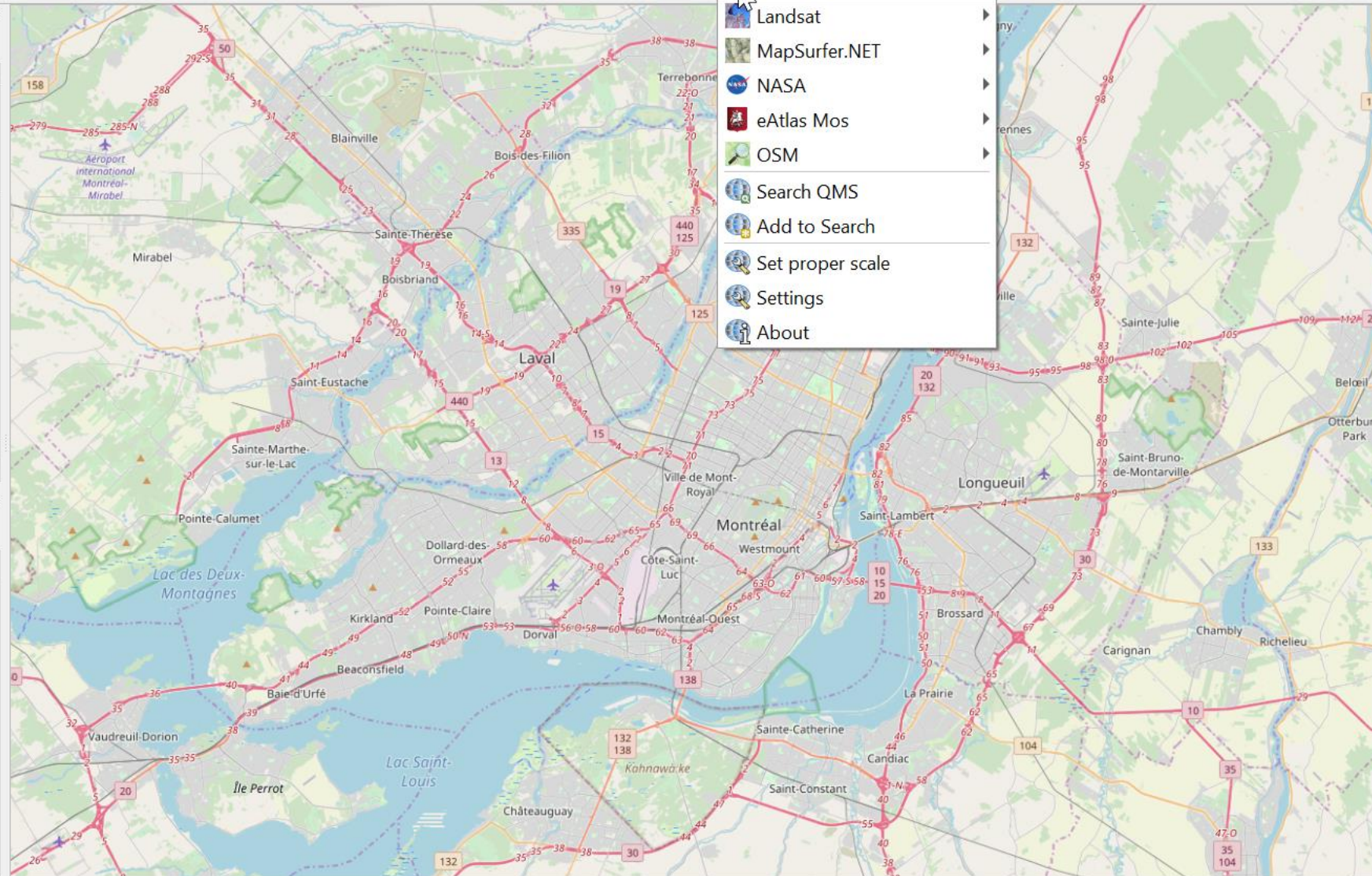


- GeoPackage
- Spatialite
- PostGIS
- MSSQL
- Oracle
- DB2
- WMS/WMTS
- XYZ Tiles
  - OpenStreetMap
- WCS
- WFS
- OWS
- ArcGisMapServer
- ArcGisFeatureServer
- GeoNode

Layers



- OpenStreetMap



- Landsat
- MapSurfer.NET
- NASA
- eAtlas Mos
- OSM
- Search QMS
- Add to Search
- Set proper scale
- Settings
- About

Processing Toolbox

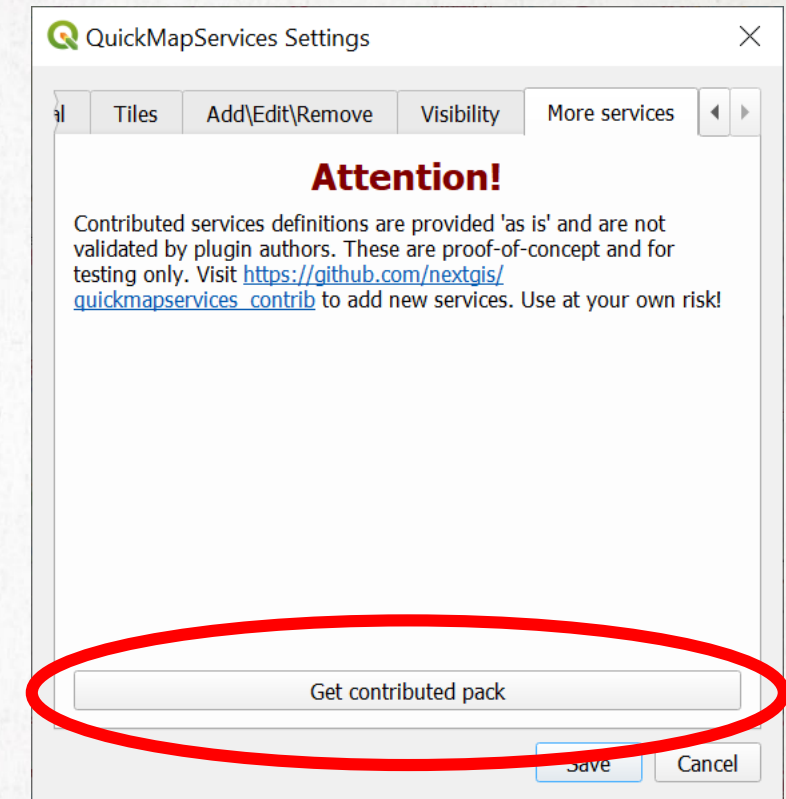


- Search...
- Recently used
  - Cartography
  - Database
  - File tools
  - Graphics
  - Interpolation
  - Layer tools
  - Network analysis
  - Raster analysis
  - Raster terrain analysis
  - Raster tools
  - Vector analysis
  - Vector creation
  - Vector general
  - Vector geometry
  - Vector overlay
  - Vector selection
  - Vector table
  - GDAL
  - GRASS
  - SAGA



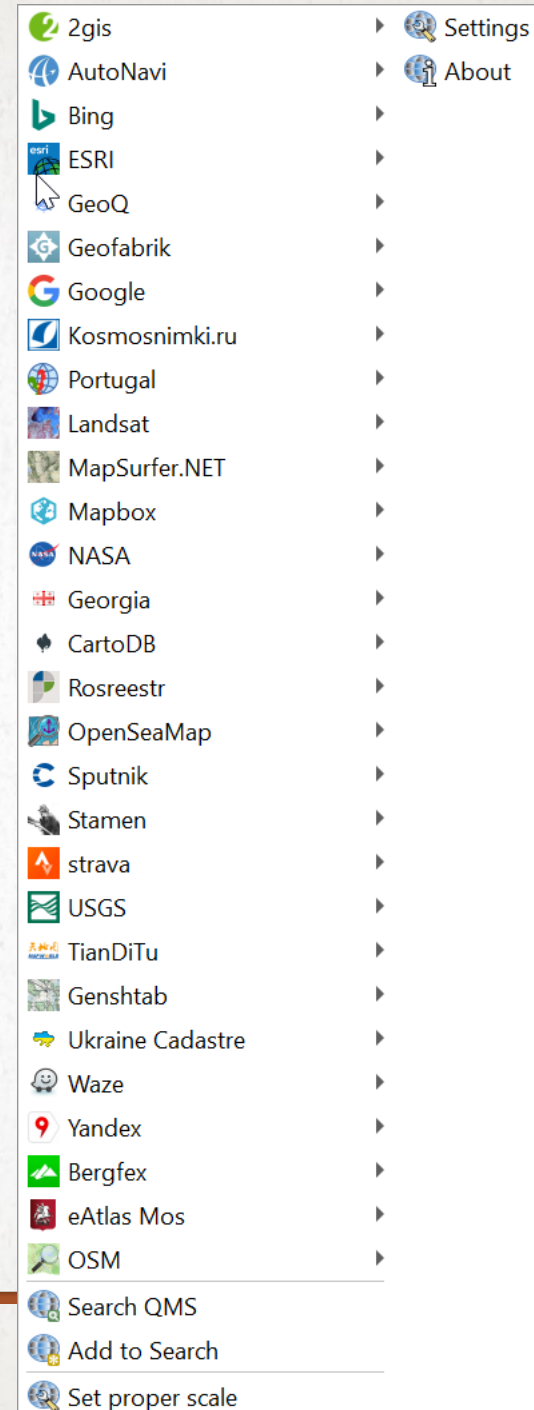
# PLUGINS FOR QGIS

- Not many basemaps there. We want more options!
- Under the QuickMapsServices button, click “Settings”
- Click “More services”, then click “Get contributed pack”

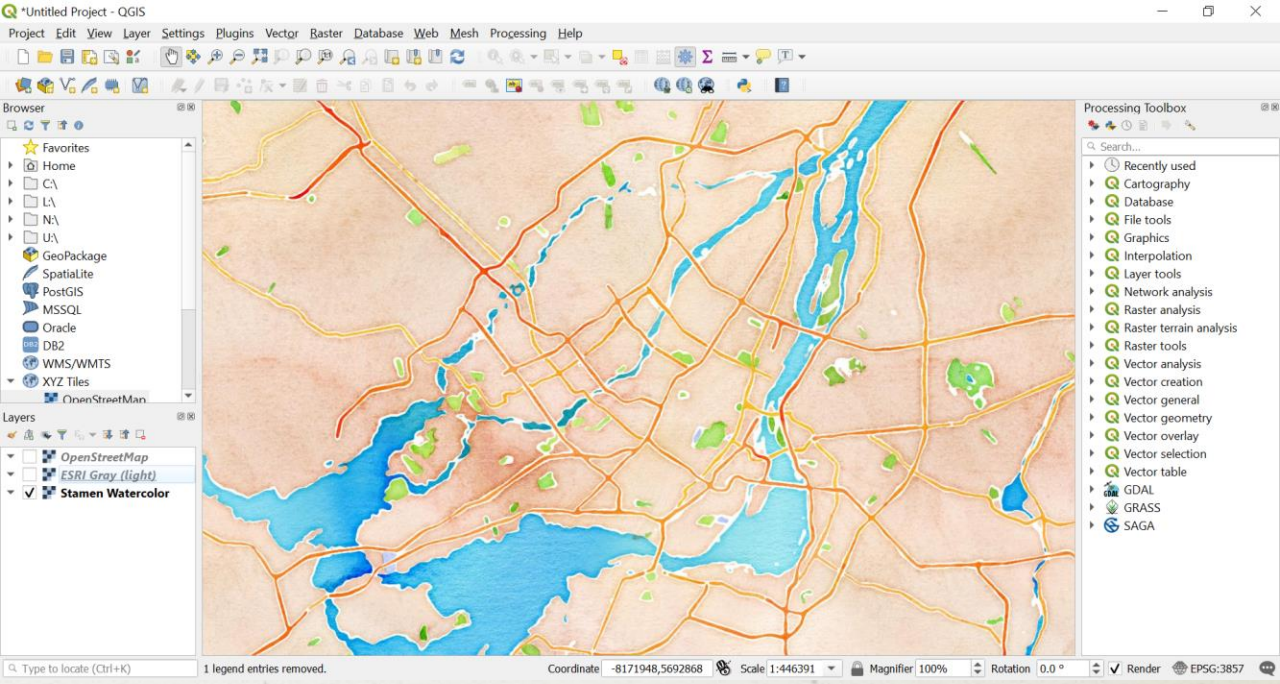
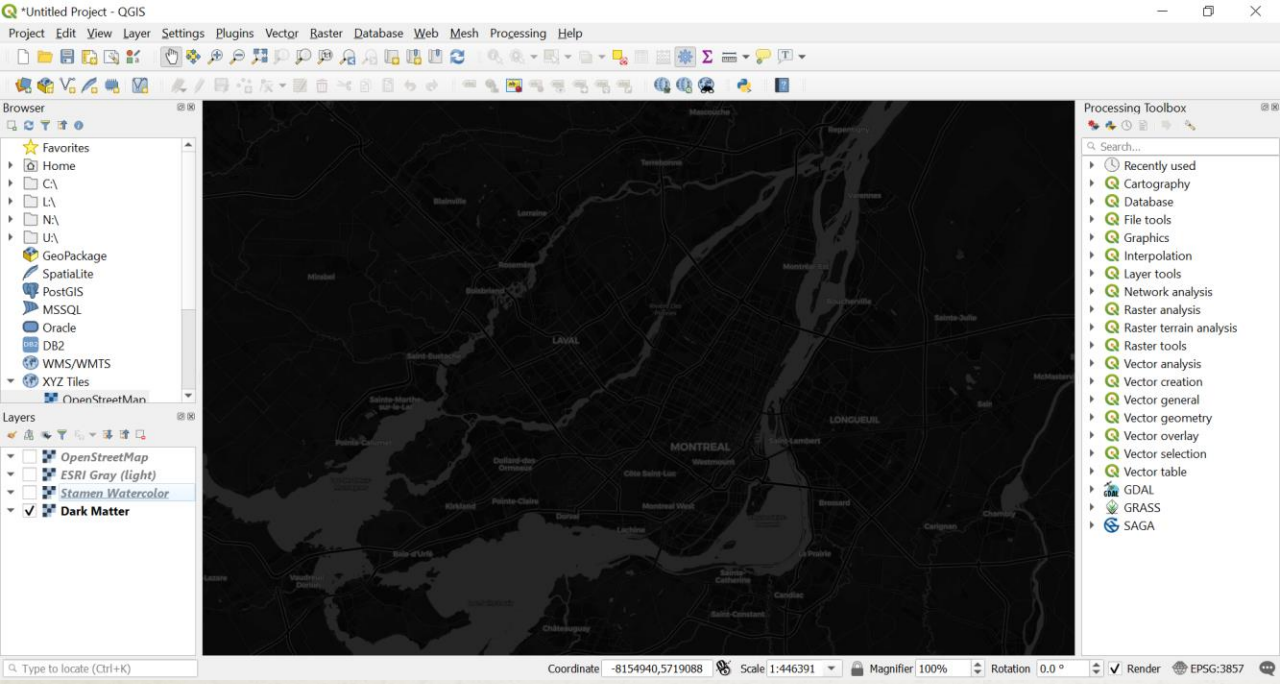
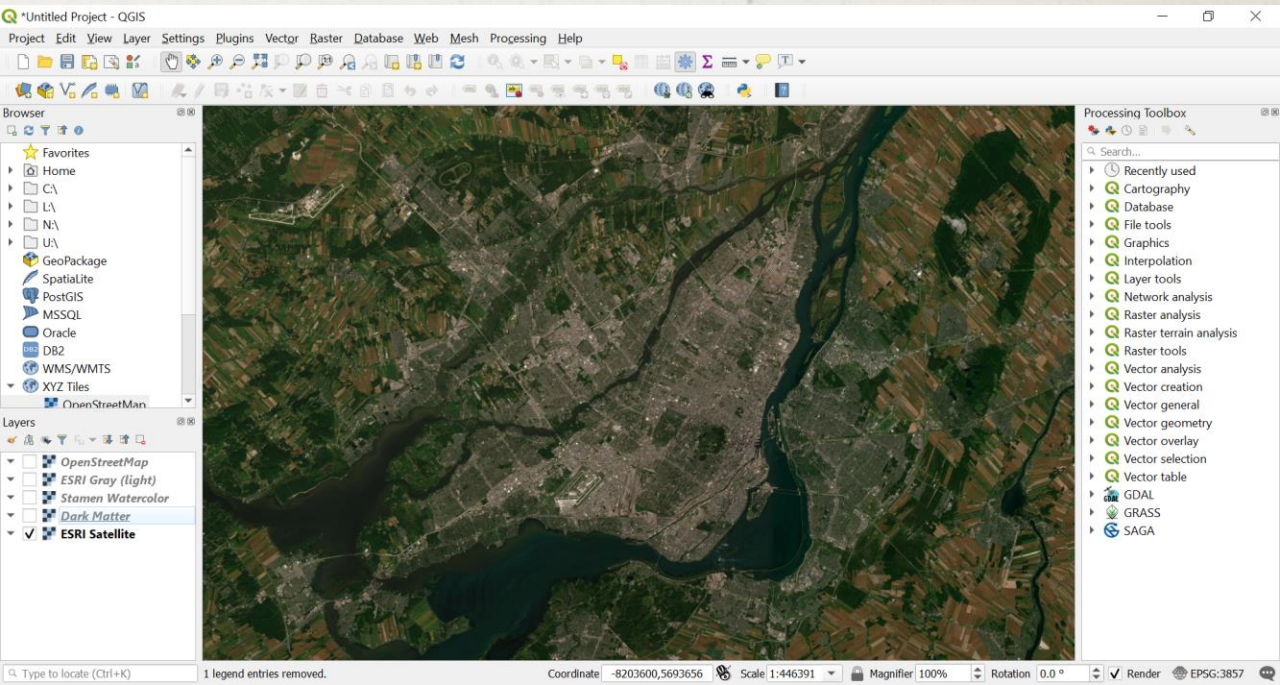
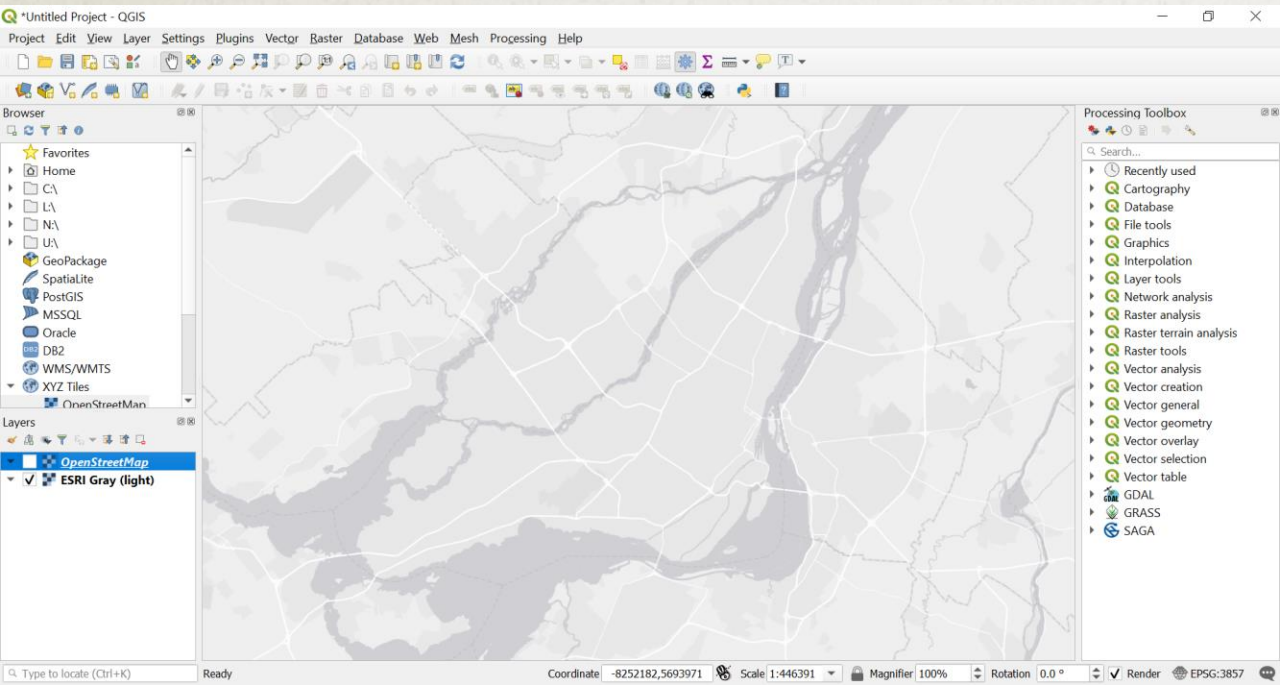


# PLUGINS FOR QGIS

- Many more options!
- May not all work...
- But many do







# WHERE TO FIND DATA



# WHERE TO FIND DATA

- Prepared data
    - Geospatial: [https://libraryguides.mcgill.ca/gis\\_guides](https://libraryguides.mcgill.ca/gis_guides) or <https://www.mcgill.ca/library/find/maps>
    - Numeric: <https://libraryguides.mcgill.ca/data>
    - Other: ???
  - Collected data
    - In a format that allows ingestion into a tool - .csv (like a spreadsheet) is the most versatile, but not the only one
-

# ADDING DATA TO QGIS



# LEARNING SCENARIO:

- To demonstrate some of the features of QGIS, and how to use it generally, we're going to use a fictional scenario:
- A research has collected data on use of the words "derpy" and "bouffon" as descriptors for dogs in Quebec. They are particularly interested in the urban/rural divide of "derpiness", and a correlation with electoral districts.
- We're going to map the data to see the differences of electoral derpiness.




# DATA

- We currently have a dataset, as a .csv, that shows usage of the words “Derpy”, and “Bouffon” by electoral district, as well as respondents who were simply confused by the question. (The data we downloaded from <https://bit.ly/2W9dagF>)
  - We need: data that shows electoral districts
  - We’re only looking at Quebec, so we’ll want to cut away the excess stuff (GIS lets you do that!)
-



# DATA

- First, go to <http://open.canada.ca>
  - Search “electoral”, then use the “Format” filter (on the left) to choose “SHP”.
  - In the results, click “Federal Electoral Districts 2015”.
  - Scroll down until you find a format “SHP”.
  - Click on “Access” for that, either in English or French (this presentation will use English)
  - Save the file, then extract it.
  - The extracted folder has several files; click and drag the .shp file into the “layers” section of QGIS.
-



►  Project Home

► C:\

►  N:\

 GeoPackage PostGIS

☒ Oracle

 WMS/WMTS

Layers 


☒ ☐ FED CA 2 2 ENG

**LEARN MORE**

Q Type to locate (Ctrl+K)

The map illustrates the distribution of the Canada goose across North America. A solid black outline defines the primary range, which covers almost the entire landmass of Canada and extends into the northern United States. A dashed line follows the southern edge of this range, generally corresponding to the 49th parallel and the Great Lakes. Key locations marked include Seattle, Chicago, New York, and Boston. Major geographical features labeled include the Gulf of Alaska, Great Plains, Rocky Mountains, and the Atlantic Ocean. The map also shows the distribution of the Canada goose in the United States, with a solid black outline indicating the range and a dashed line showing the southern limit.

Scale: 57138069 ▼

 Magnifier


11

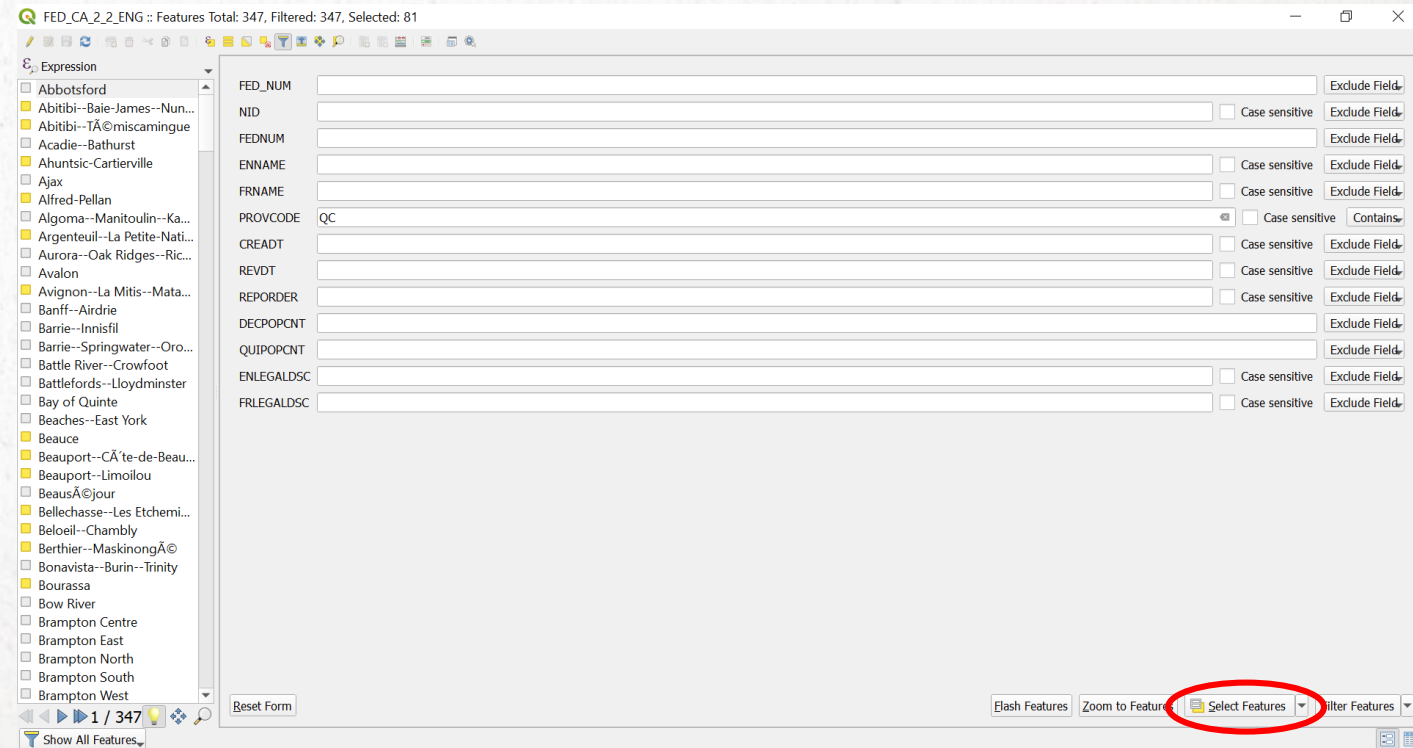
0.0 °

☒ Re



# DATA

- We don't want all of Canada, though, only Quebec!
- Right click on the new layer, and select "Open Attribute Table"
- Click the "filter" button 
- Under "PROVCODE" type "QC"
- Click "Select Features"
- Close the window





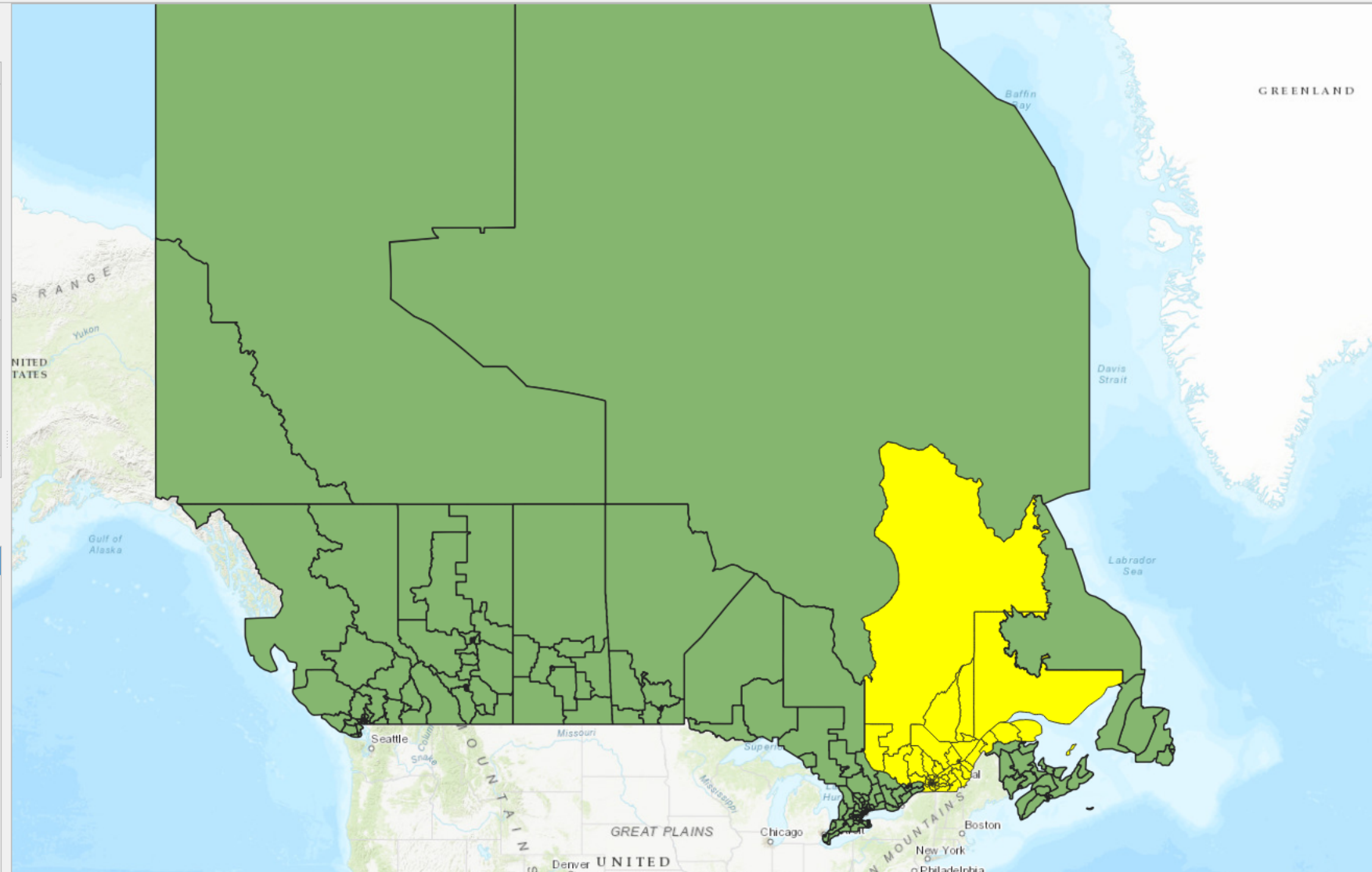
Browser

★ Favorites

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- L:\
- N:\
- U:\
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- Spatialite
- PostGIS
- MSSQL
- Oracle
- DB2
- WMS/WMTS
- XYZ Tiles

Layers

- ☒ FED CA 2 2 ENG
- ☒ ESRI World Topo




Processing Toolbox

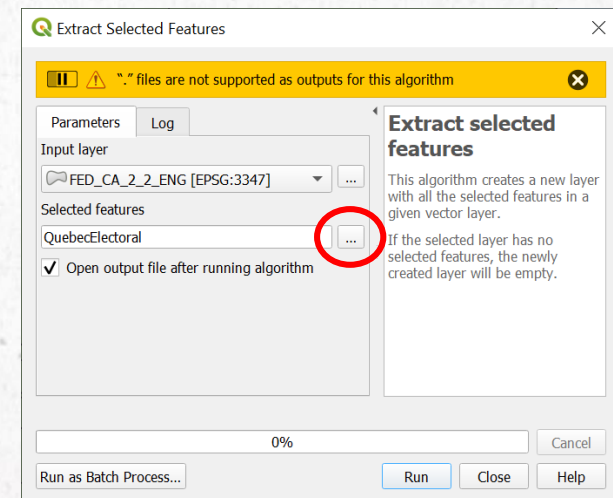
Search...

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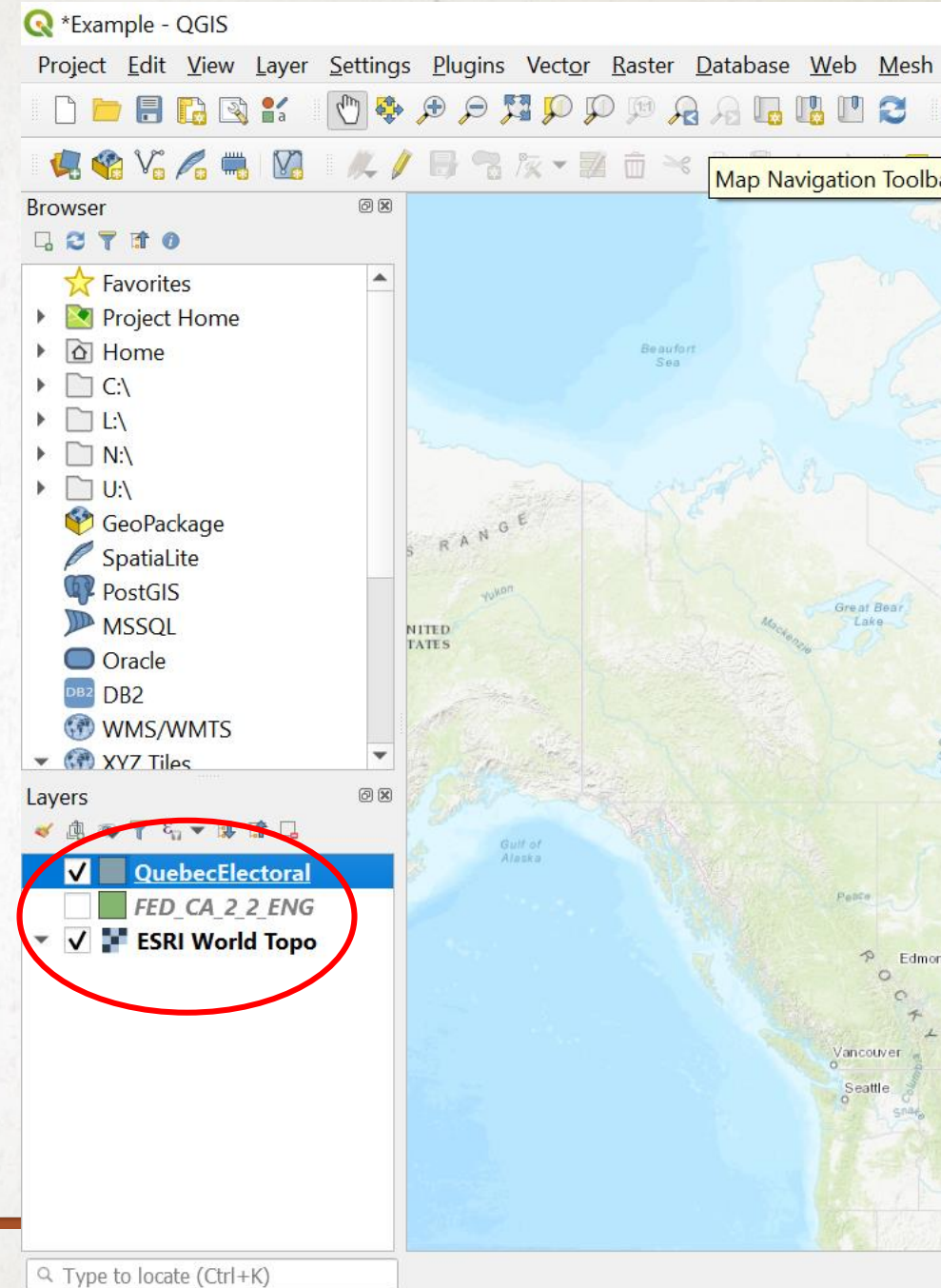
# DATA

- If your toolbox isn't already open on the right side, click the gear  to open it
- In the search box, search for “extract”, and choose “Extract selected features”
- You will be given a pop-up box, where you can name the layer of the features you are extracting.
- You get an error!
- QGIS can't accept a layer without it having a place
- Click the ellipsis (“...”) and choose “Save to file”
- Name the file, and save it somewhere sensible
- (ie usually best to have a folder with all data for a project)

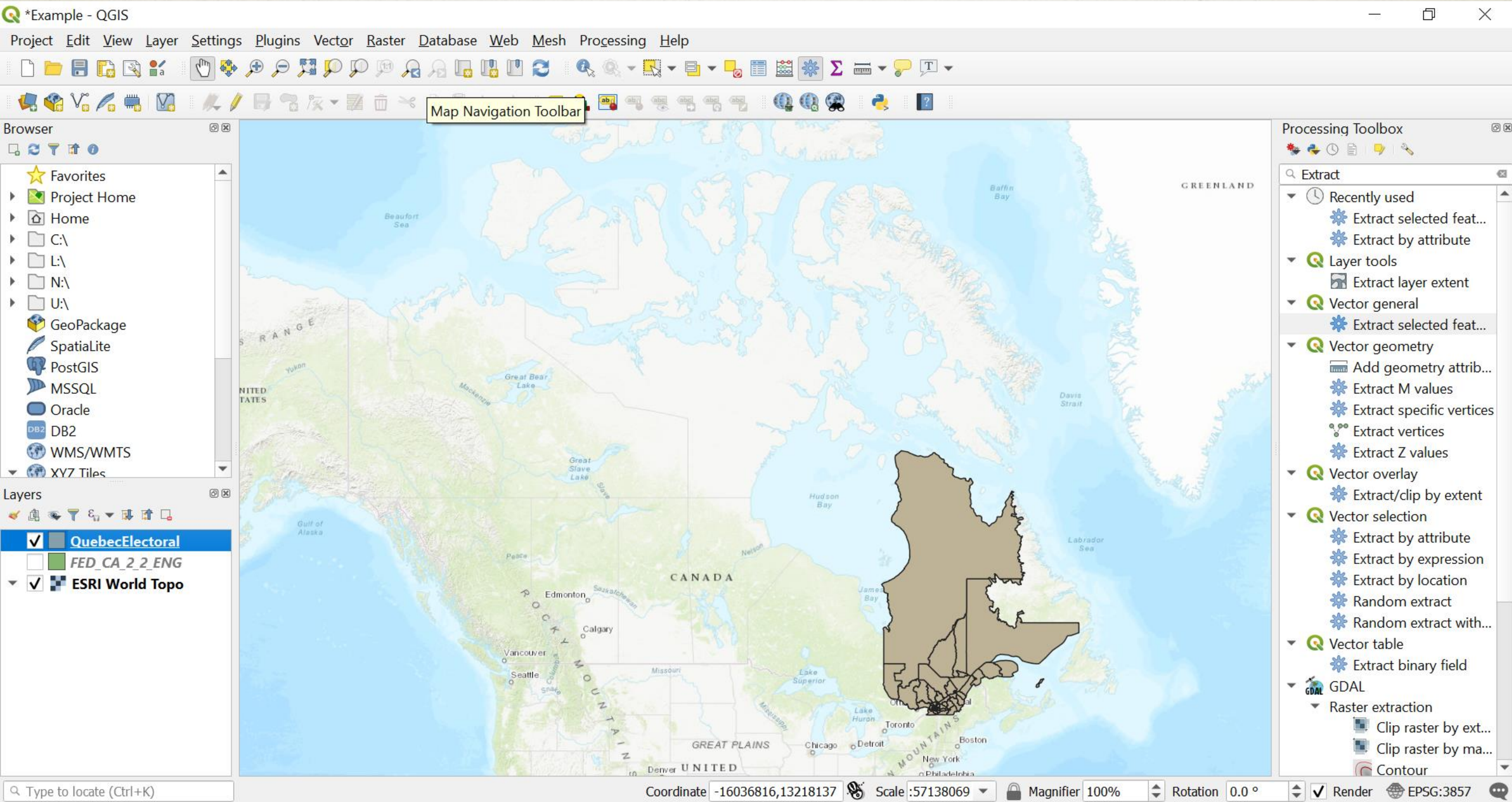


# DATA

- We have the new layer, without a good name
- And we still see the other data
- Click the check box to make all the rest of Canadian electoral districts disappear
- Right click on “Selected feature” and choose “Rename layer”
- Name it something sensible









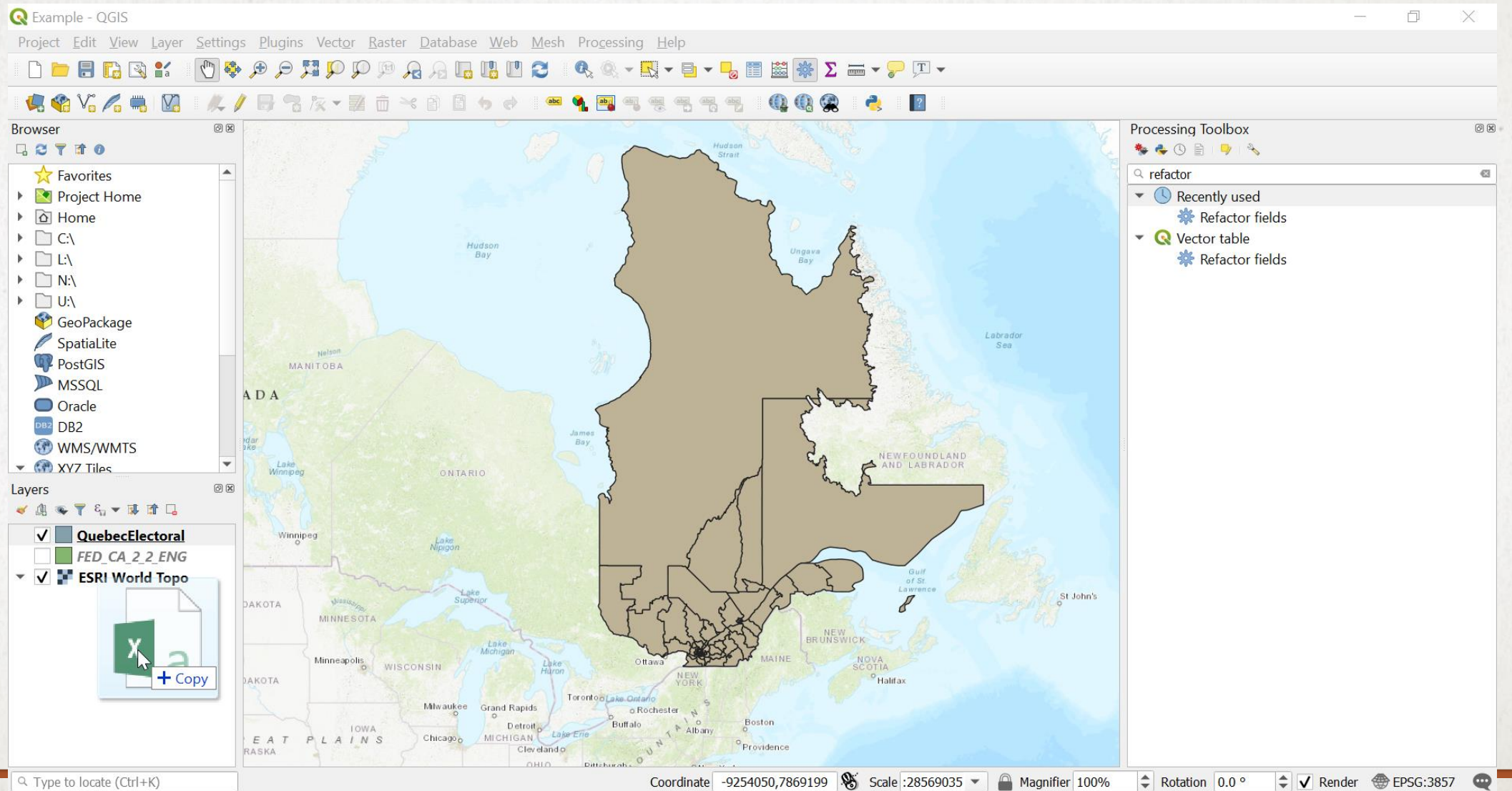
# DATA

- Open the “QCDerpy” csv.
- It has numerous pieces of data, including, the electoral region name, the number of respondents who use each word, and the number of respondents confused.
- We’re going to join this to the data we just extracted, and map word usage by district.



	A	B	C	D	E	F	G	H	I	J
1	FED_NUM	NID	FEDNUM	ENNAME	FRNAME	PROVCO	DECPOPCNT	USESDE	USESBOUFFON	WTF
2	24001	{AB0EAE3}	24001	Abitibi--B	Abitibi--Baie-Jar	QC	85475	138	630	60
3	24002	{6C60176A}	24002	Abitibi--T	Abitibi--TÃ©mis	QC	102794	156	872	540
4	24003	{66747292}	24003	Ahuntsic--	Ahuntsic--Cartier	QC	110473	881	73	77
5	24004	{94538187}	24004	Alfred-Pe	Alfred-Pellan	QC	98045	846	470	133
6	24005	{D97AF803}	24005	Argenteui	Argenteuil--La P	QC	94208	167	939	46
7	24006	{7E5624C1}	24006	Avignon--	Avignon--La Miti	QC	74547	206	745	0
8	24007	{F4A433CE}	24007	Beauce	Beauce	QC	106337	281	978	114
9	24008	{754BB4E4}	24008	Beauport-	Beauport--Limoi	QC	92944	869	141	131
10	24009	{5E243D4C}	24009	BÃ©canc	BÃ©cancour--Ni	QC	93779	150	623	807
11	24010	{D1F455B0}	24010	Bellechas	Bellechasse--Les	QC	112385	415	598	143
12	24011	{5737F403}	24011	Beloeil--C	Beloeil--Chamb	QC	109955	649	516	100
13	24012	{9FEF06FB}	24012	Berthier--	Berthier--Maskir	QC	98590	16	704	126
14	24013	{BF246EF7}	24013	ThÃ©rÃ©s	ThÃ©rÃ©se-De B	QC	98499	861	61	44
15	24014	{1711BCE7}	24014	Pierre-Bo	Pierre-Boucher--	QC	95326	473	355	73
16	24015	{644A53FD}	24015	Bourassa	Bourassa	QC	100286	649	347	104
17	24016	{19AECA71}	24016	Brome--M	Brome--Missisqu	QC	98616	37	823	507
18	24017	{0C426B17}	24017	Brossard--	Brossard--Saint-l	QC	100828	727	504	3
19	24018	{0A31B4B3}	24018	Rimouski-	Rimouski-Neige	QC	84809	233	638	142
20	24019	{4EA91580}	24019	Charlesbo	Charlesbourg--H	QC	103331	646	80	68
21	24020	{57ABE396}	24020	Beauport-	Beauport--CÃ¢te	QC	92496	460	648	41
22	24021	{30BC4AF1}	24021	ChÃ¢teau	ChÃ¢teauguay--l	QC	92169	457	564	113
23	24022	{400EF08D}	24022	Chicoutim	Chicoutimi--Le F	QC	81501	201	722	41
24	24023	{05F8541F}	24023	Compton-	Compton--Stans	QC	101946	30	872	111
25	24024	{091A4423}	24024	Dorval--L	Dorval--Lachine-	QC	106886	632	66	135
26	24025	{042D5695}	24025	Drummon	Drummond	QC	98681	307	634	933
27	24026	{CF02F254}	24026	GaspÃ©si	GaspÃ©sie--Les	QC	78833	480	549	194
28	24026	{CF02F254}	24026	GaspÃ©si	GaspÃ©sie--Les	QC	78833	1000	628	107
29	24027	{38323016}	24027	Gatineau	Gatineau	QC	106424	440	757	120
30	24028	{F4D357A4}	24028	Hochelaga	Hochelaga	QC	103436	734	54	428
31	24029	{377DCF6F}	24029	HonorÃ©	HonorÃ©-Merci	QC	102587	748	16	454
32	24030	{B3BF7B25}	24030	Hull--Ayl	Hull--Aylmer	QC	103447	703	800	579
33	24031	{58D9D461}	24031	Joliette	Joliette	QC	100683	230	942	70
34	24032	{920F1566}	24032	JonquiÃ©r	JonquiÃ©re	QC	87596	681	538	36
35	24033	{ACB50135}	24033	La Pointe-	La Pointe-de-l'Ã¢	QC	103512	618	287	17
36	24034	{26E9BB15}	24034	La Prairie	La Prairie	QC	99811	471	328	104
37	24035	{5FEFFFD6}	24035	Lac-Saint-	Lac-Saint-Jean	QC	105783	42	607	74
38	24036	{32E22417}	24036	Lac-Saint-	Lac-Saint-Louis	QC	108795	965	267	60
39	24037	{D13AB7B}	24037	LaSalle--Ã	LaSalle--Ã©mar	QC	105317	772	28	101
40	24038	{B8913284}	24038	Laurentid	Laurentides--Lab	QC	111357	90	672	735



- Drag and drop the csv into the layers box



# JOINING DATA

- You can do the join with QGIS as is:
  - Double click the “QuebecElectoral” layer, then click the “Joins” tab 
  - Click the  at the bottom
  - For “Join layer”, choose the “QCDerpy” csv
  - For “Join field” and “Target field” choose “FEDNUM”
  - Check and expand the “Joined Fields”, and select the last 3
  - (Also a good idea to alter the Custom Field Name Prefix, if too long – in our case, add “Word\_”)
  - Click “Apply” and “OK”
  - Right click the “QuebecElectoral” layer, then choose “Open Attribute Table”. If you scroll to the right, you should now see the attributes from the “DerpFactor” csv added to the “Clipped” attribute table.





# JOINING DATA (ALTERNATIVE)

- You can access the various tools in the Toolbox
  - Search for a tool using the search function – in this case, search “join”, and choose “Join attributes by field value” under “Vector general”
  - For “Input layer” choose the clipped layer created
  - For “Input layer 2”, select the csv file
  - In both cases, select “NID” in the “Table field” drop downs – this will match the information using that field
  - “Layer 2 fields to copy” lets you choose the specific fields to copy over and work with
  - Under “Joined layer” you can give the layer a name; use the ellipsis to save the new file.
-

Parameters

Log

## Input layer

QuebecElectoral [EPSG:3347]

☐ Selected features only

## Table field

abc NID

## Input layer 2

QCDerpy

☐ Selected features only

## Table field 2

abc FED\_NUM

## Layer 2 fields to copy (leave empty to copy all fields) [optional]

0 elements selected

## Join type

Take attributes of the first matching feature only (one-to-one)

☐ Discard records which could not be joined

## Joined field prefix [optional]

## Joined layer

[Create temporary layer]

☒ Open output file after running algorithm

## Unjoinable features from first layer

[Skip output]

☐ Open output file after running algorithm

## Join attributes by field value

This algorithm takes an input vector layer and creates a new vector layer that is an extended version of the input one, with additional attributes in its attribute table.

The additional attributes and their values are taken from a second vector layer. An attribute is selected in each of them to define the join criteria.

0%

Cancel

Run as Batch Process...


Run

Close

Help



# DATA

- Right click on the new layer, and select “Open Attribute Table”
  - On the far right, you’ll see the two new fields, of “Number of Dogs” and “Derp Factor”
  - Now right click on the layer again, and choose properties
  - Click the “Source fields” tab
- 
- Notice that added variables were created as String types; the software understands them as strings of text, not real numbers. We need to change them to “real”
  - Close the Properties box, and go to the Toolbox. Type “Refactor”, and open “Refactor fields”
  - Expand the box, and under “Type” for the variables, change “String” to “Double” (“Integer” or “Integer64” also work). Click “Run”, and a new layer will be created.

Parameters

Log

Input layer

QuebecElectoral [EPSG:3347]

☐ Selected features only

Fields mapping

	Source expression		Field name	Type	Length	Precisi
6	abc CREADT	⌘	CREADT	String	8	
7	abc REVDT	⌘	REVDT	String	8	
8	abc REPORDER	⌘	REPORDER	String	8	
9	123 DECPOPCNT	⌘	DECPOPCNT	Integer64	10	
10	123 QUIPOPCNT	⌘	QUIPOPCNT	Integer64	10	
11	abc ENLEGALDSC	⌘	ENLEGALDSC	String	200	
12	abc FRLEGALDSC	⌘	FRLEGALDSC	String	200	
13	abc QCDerpy_USESDERPYPY	⌘	QCDerpy_USESDERPYPY	Double	0	
14	abc QCDerpy_USESBOUFFON	⌘	QCDerpy_USESBOUFFON	Date	0	
15	abc QCDerpy_WTF	⌘	QCDerpy_WTF	DateTime	0	

Load fields from layer FED\_CA\_2\_2\_ENG

Refactored

[Create temporary layer]

☒ Open output file after running algorithm

## Refactor fields

This algorithm allows editing the structure of the attributes table of a vector layer. Fields can be modified in their type and name, using a fields mapping.

The original layer is not modified. A new layer is generated, which contains a modified attribute table, according to the provided fields mapping.

0%

Run as Batch Process...

Run

Close

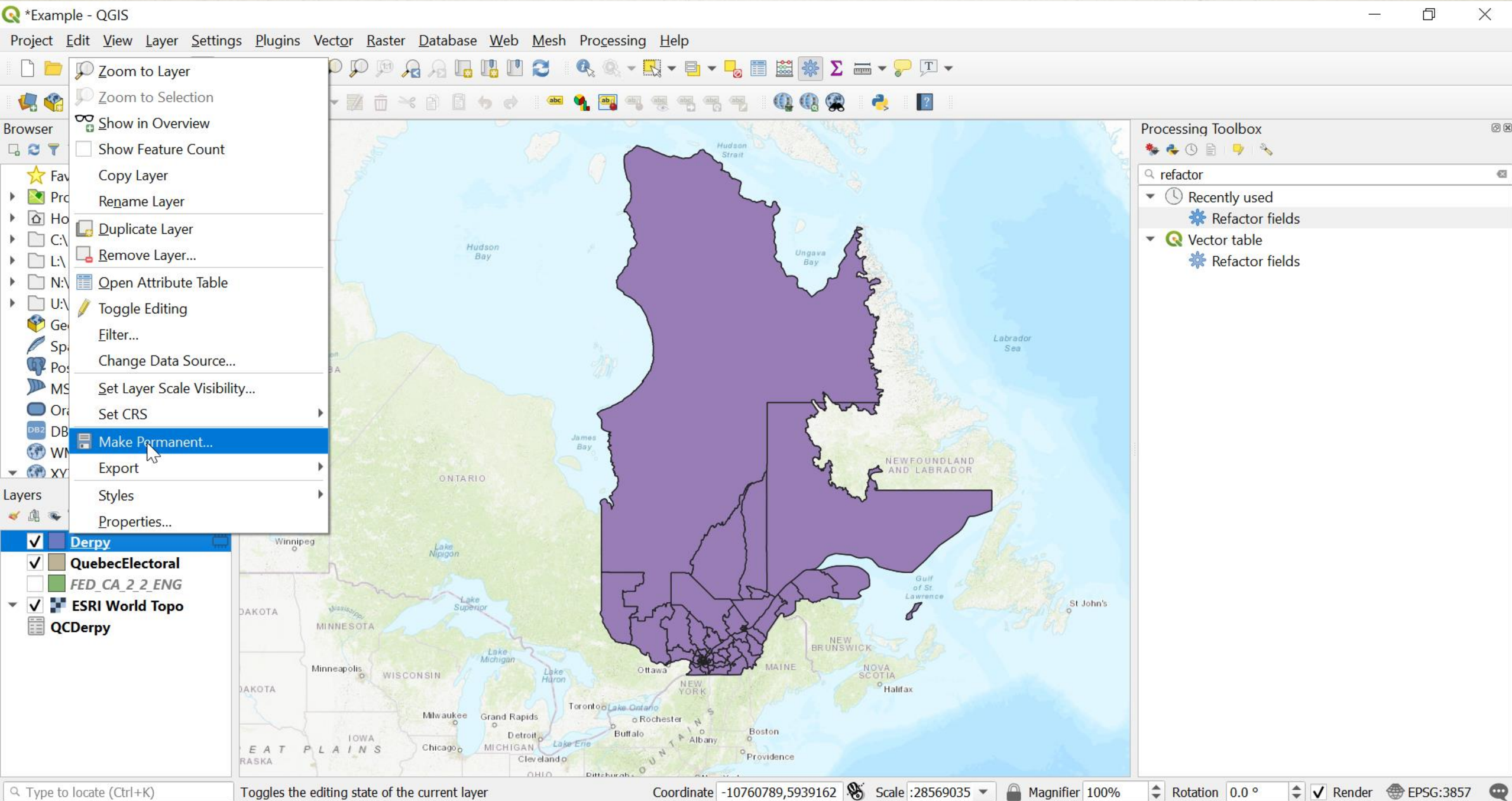
Help

Cancel




# DATA

- The “Refactor” function only creates a temporary layer
  - Right click the new “Refactored” layer, and choose “Make Permanent”
  - Under format, choose either Geopackage or Esri Shapefile
  - (You can also choose “Export” to do effectively the same thing)
  - Name the new layer, and click OK
-





# ANALYSIS

- We're now going to display the differences in use of words for each electoral district, as well as any individuals who were confused by the question
- Right click on the new layer, and choose "Rename layer" to change the name
- Right click again, and open the Properties. Click the "Symbology" tab 
- At the top, change "Single Symbol" to "Graduated"
- Under "Column" choose the "UsesDerpy" variable (name will be a little different, because of the join)
- Choose your preferred Colour ramp. Leave everything else the same for now, and click "Classify", then click "OK".

Layer Properties - Derpy | Symbology

Information

Source

Symbology

Labels

Diagrams

3D View

Source Fields

Attributes Form

Joins

Auxiliary Storage

Actions

Display

Rendering

Variables

Metadata

Dependencies

Legend

QGIS Server

Digitizing

Graduated

Column1.2 Word\_USESD

Symbol

Change...

Legend format%1 - %2

Precision 0

Trim

MethodColor

Color ramp

Classes

Histogram

Symbol	Values	Legend
<input checked="" type="checkbox"/> <div></div>	16.00 - 212.80	16.0000 - 212.8000
<input checked="" type="checkbox"/> <div></div>	212.80 - 409.60	212.8000 - 409.6000
<input checked="" type="checkbox"/> <div></div>	409.60 - 606.40	409.6000 - 606.4000
<input checked="" type="checkbox"/> <div></div>	606.40 - 803.20	606.4000 - 803.2000
<input checked="" type="checkbox"/> <div></div>	803.20 - 1000.00	803.2000 - 1000.0000

ModeEqual Interval

Classes5

☐ Symmetric Classification

Classify

Delete All

Advanced

☒ Link class boundaries

Layer Rendering

Style

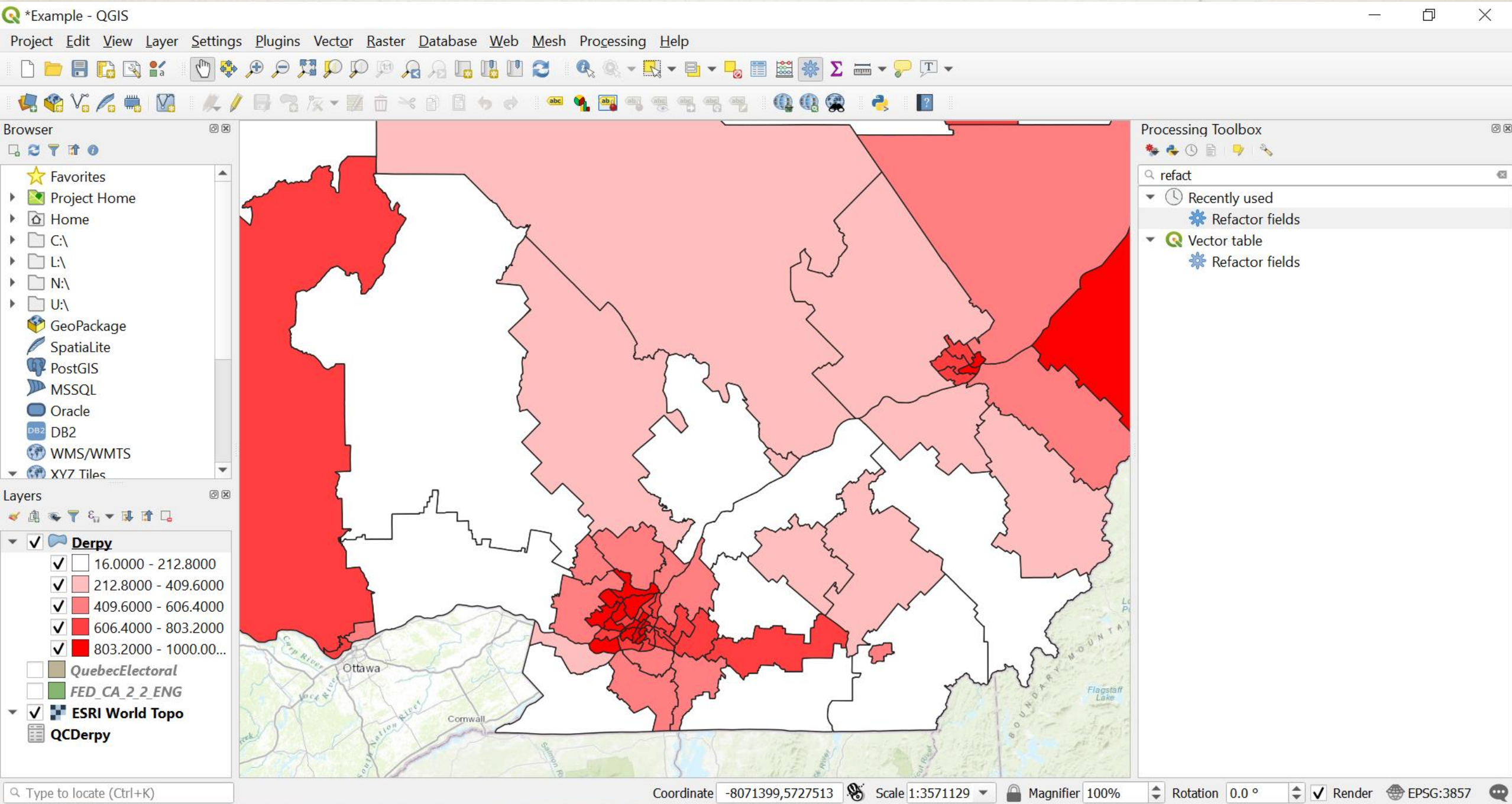
OK

Cancel

Apply

Help

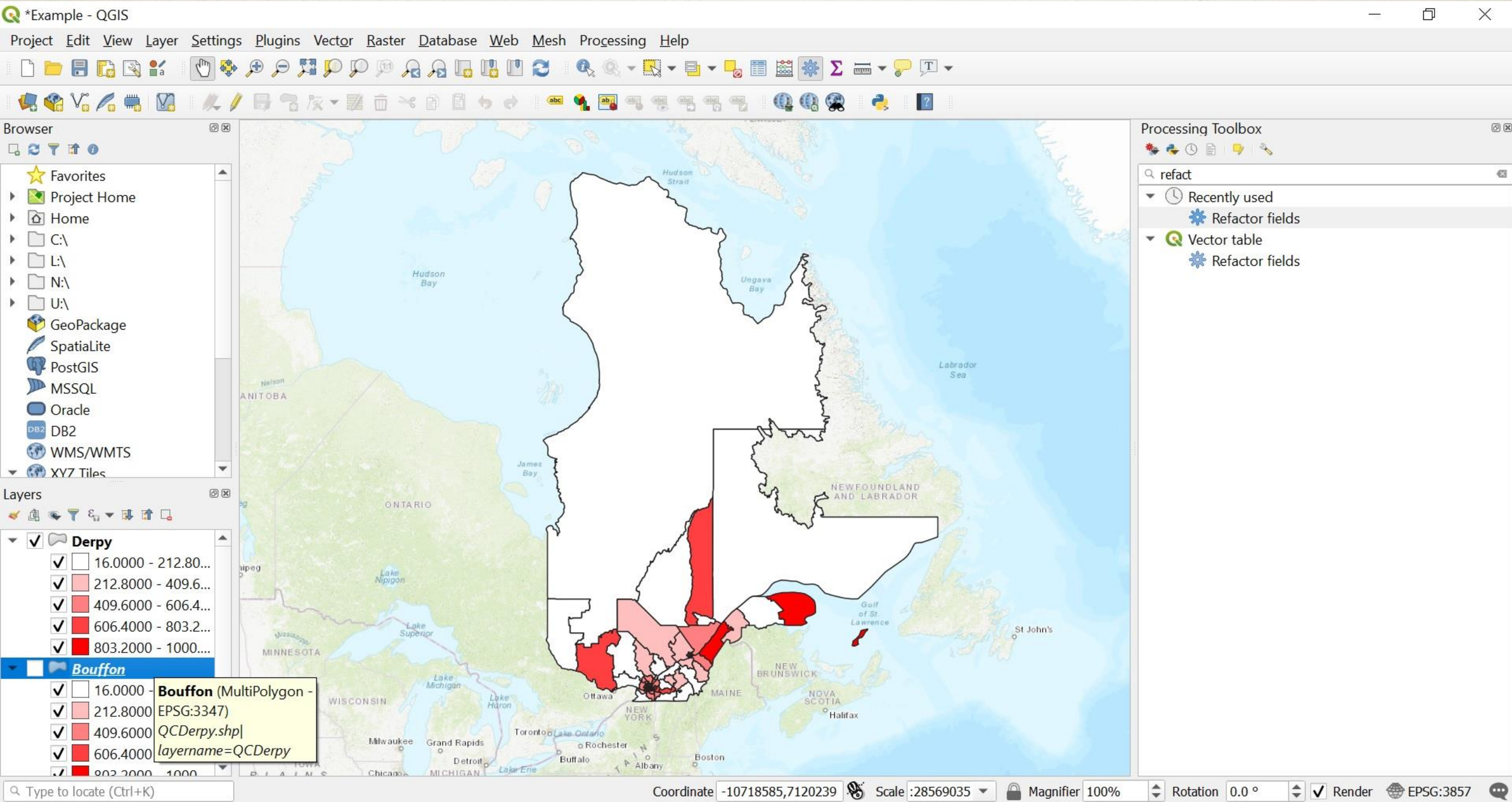




# ANALYSIS

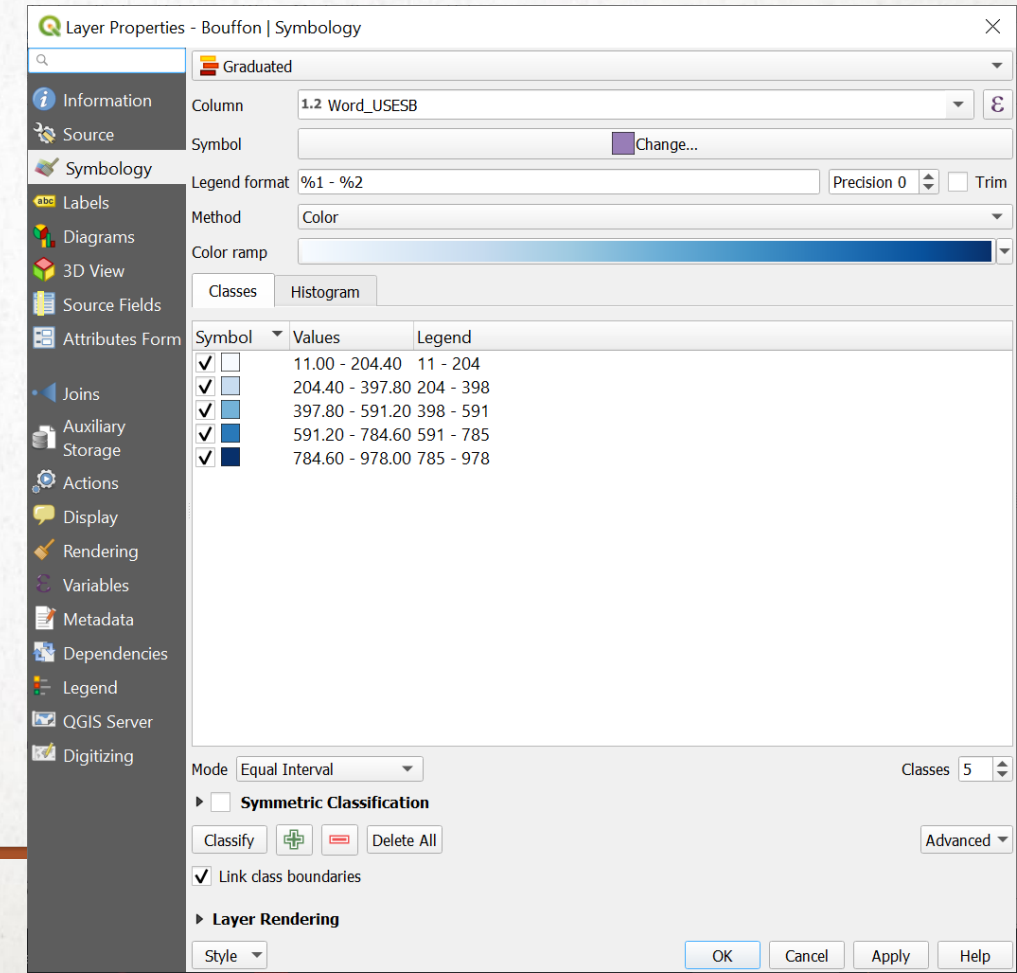
- We have visualized the use of the word “Derpy”. Now let’s show where “Bouffon” is used.
  - Right click on the layer you just worked with, and choose “Duplicate Layer”
  - Rename the new layer
-





# ANALYSIS

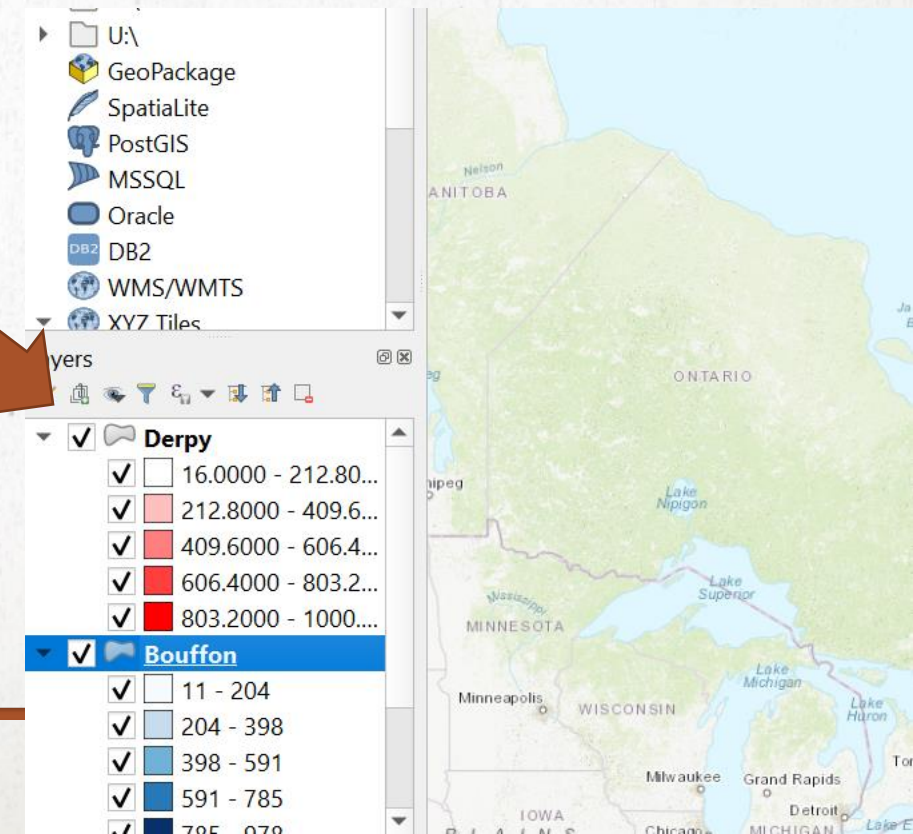
- Now, do the same graduated symbology that we did with the UsesDerpy variable, but this time use the “UsesBouffon” variable
- Change the colour, as well
- Remember to click “Classify” before “Apply”





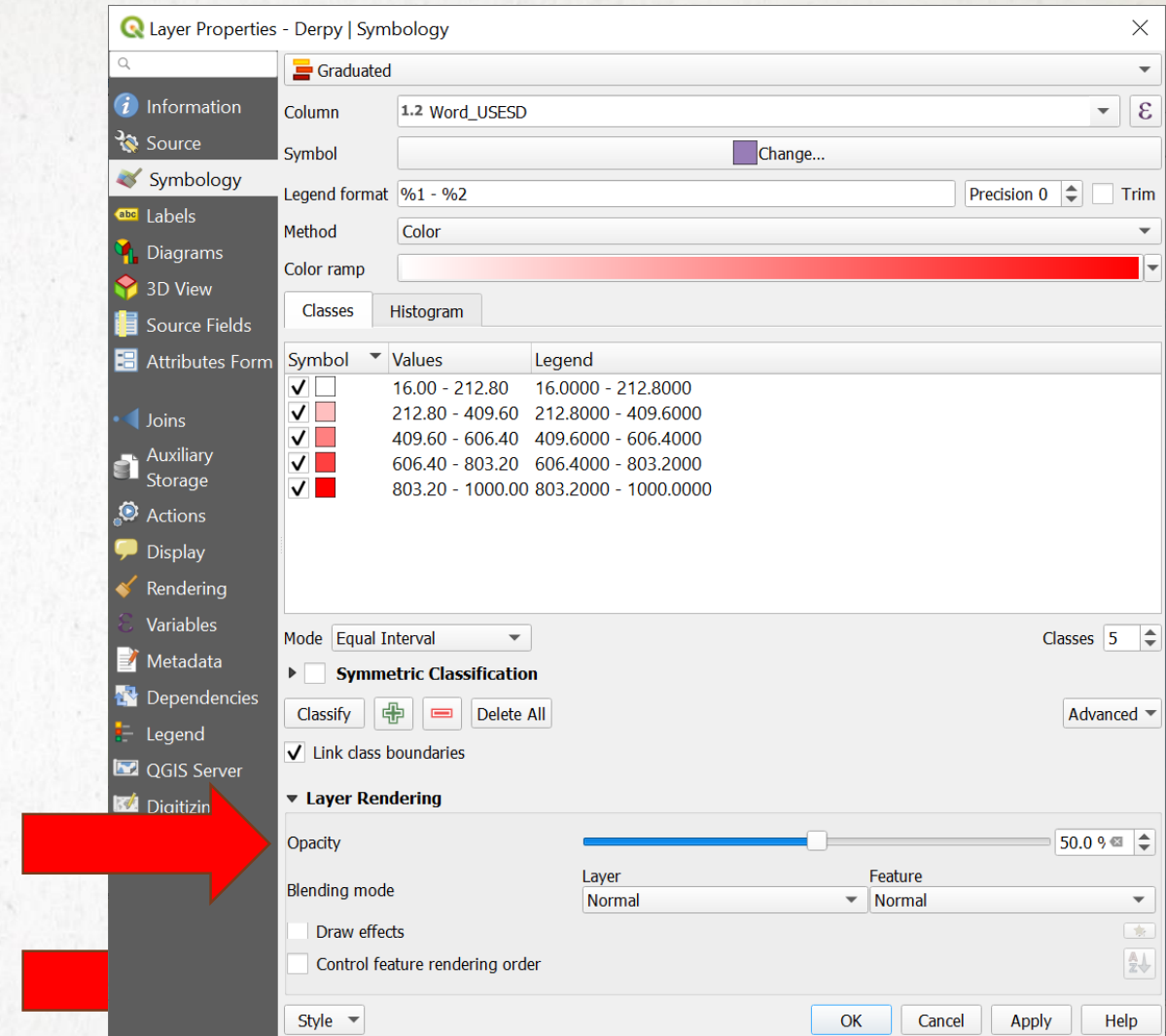
# ANALYSIS

- The “Bouffon” layer is currently under “Derpy”, so you won’t be able to see it
- We solve this in a couple of ways:
  1. To just see the “Bouffon” layer, click the check next to “Derpy” to turn off that layer
  2. We can also change the transparency/opacity of layers, so that you can see the two layers together.



# ANALYSIS

- Re-open the Properties -> Symbology for the “Derpy” layer
- Click on the “Layer Rendering” arrow
- Change the Opacity to 50%







Browser

☆ Favorites

- Project Home
- Home
- C:\
- L:\
- N:\
- U:\
- GeoPackage
- Spatialite
- PostGIS
- MSSQL
- Oracle
- DB2
- WMS/WMTS
- XYZ Tiles

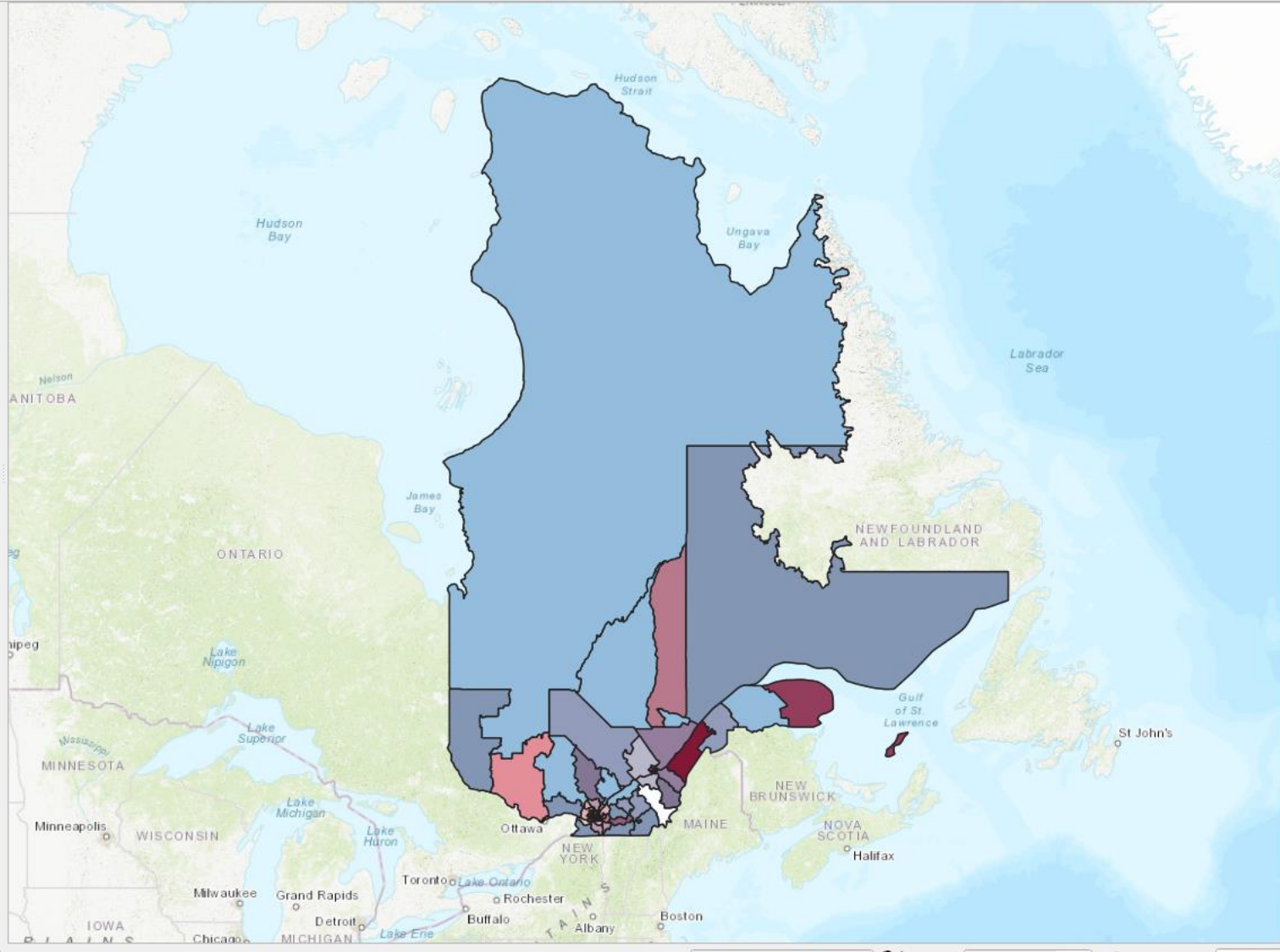
Layers

Derpy

- 16.0000 - 212.80...
- 212.8000 - 409.6...
- 409.6000 - 606.4...
- 606.4000 - 803.2...
- 803.2000 - 1000....

Bouffon

- 11 - 204
- 204 - 398
- 398 - 591
- 591 - 785
- 785 - 979



Processing Toolbox

refact

- Recently used
  - Refactor fields
- Vector table
  - Refactor fields



Browser

★ Favorites

- Project Home
- Home
- C:\
- L:\
- N:\
- U:\
- GeoPackage
- SpatiaLite
- PostGIS
- MSSQL
- Oracle
- DB2
- WMS/WMTS
- XYZ Tiles

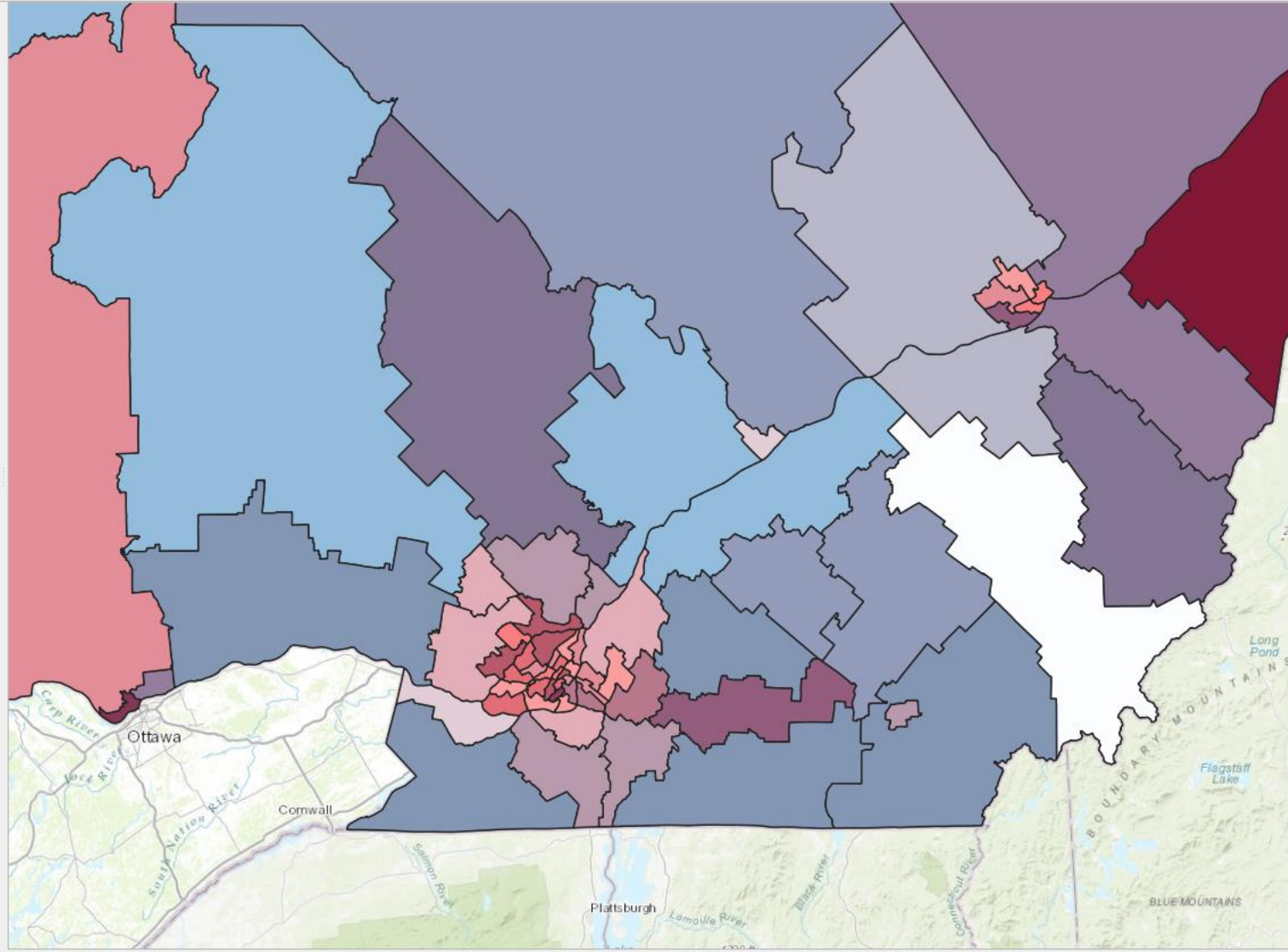
Layers

✓ **Derpy**

- ✓ 16.0000 - 212.80...
- ✓ 212.8000 - 409.6...
- ✓ 409.6000 - 606.4...
- ✓ 606.4000 - 803.2...
- ✓ 803.2000 - 1000....

✓ **Bouffon**

- ✓ 11 - 204
- ✓ 204 - 398
- ✓ 398 - 591
- ✓ 591 - 785
- ✓ 785 - 979



Processing Toolbox

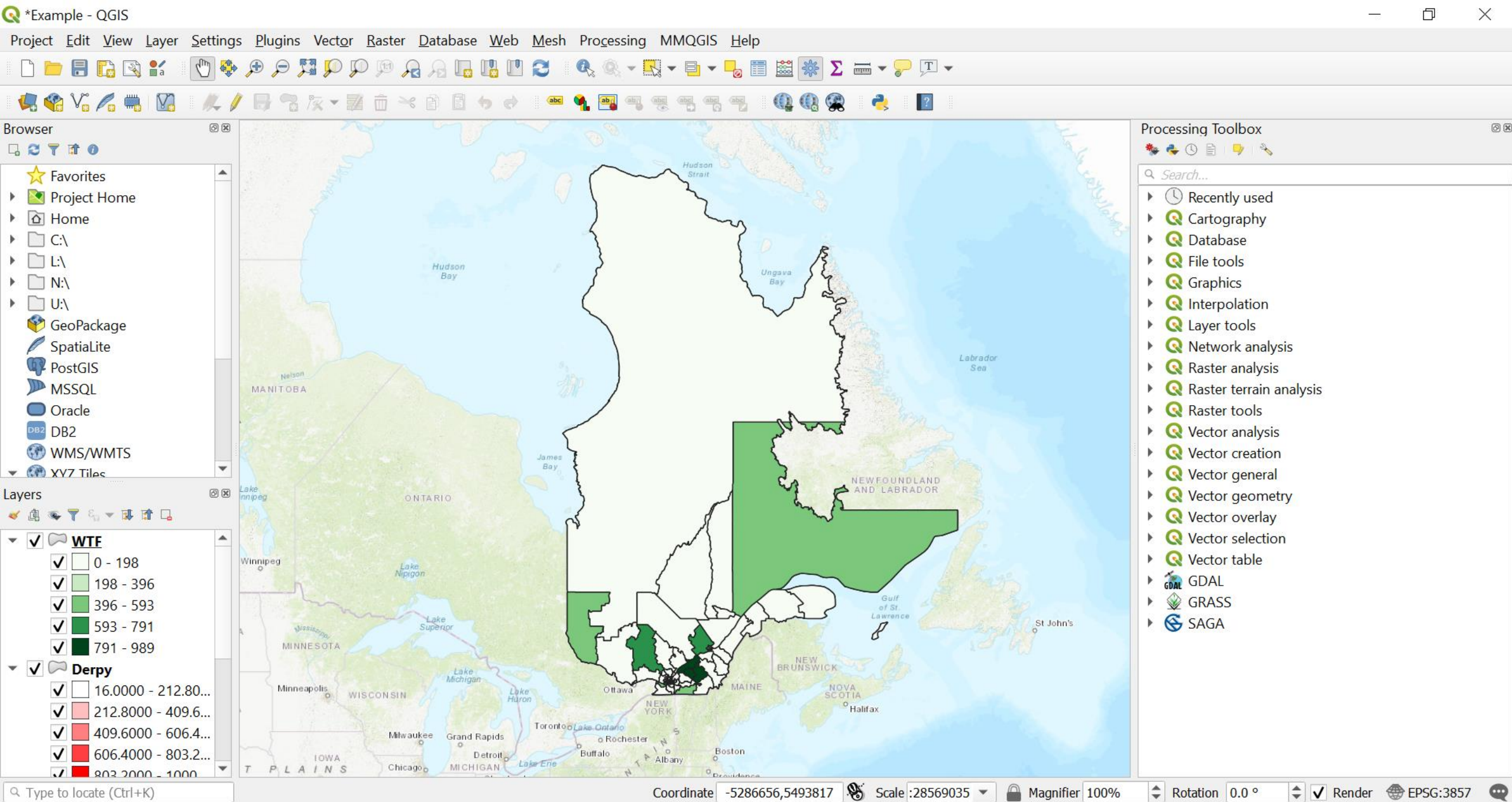
refact

- Recently used
  - Refactor fields
- Vector table
  - Refactor fields



# ANALYSIS

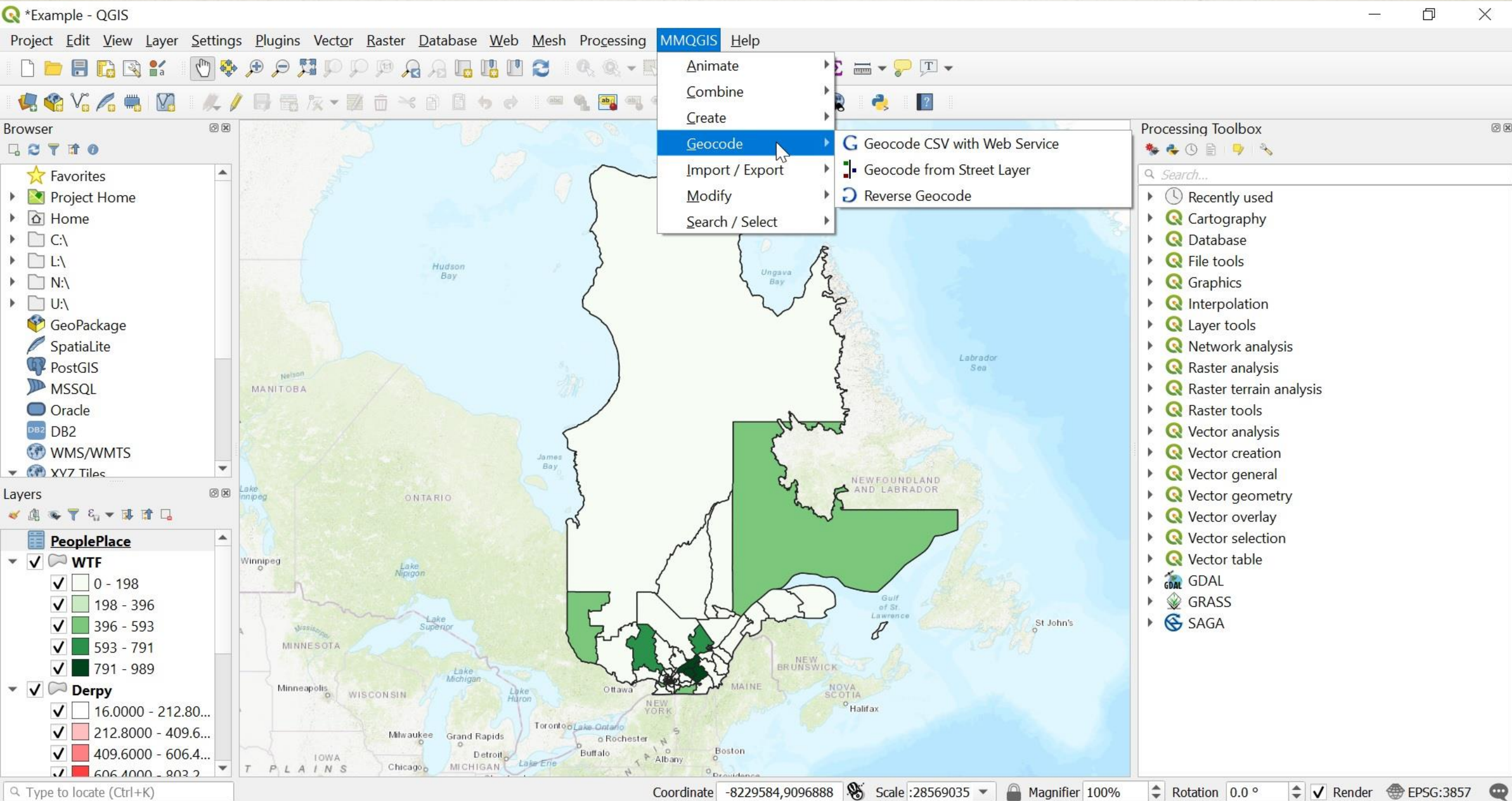
- We still have to add a visualization of those who were confused by the question
  - Right click either and choose “Duplicate Layer”
  - Rename the new layer
  - Now, do the same graduated symbology that we did with the UsesDerpy variable, but this time use the “WTF” variable
  - Change the colour in the Symbology
  - Remember to click “Classify” before “Apply”
-





# GEOCODING

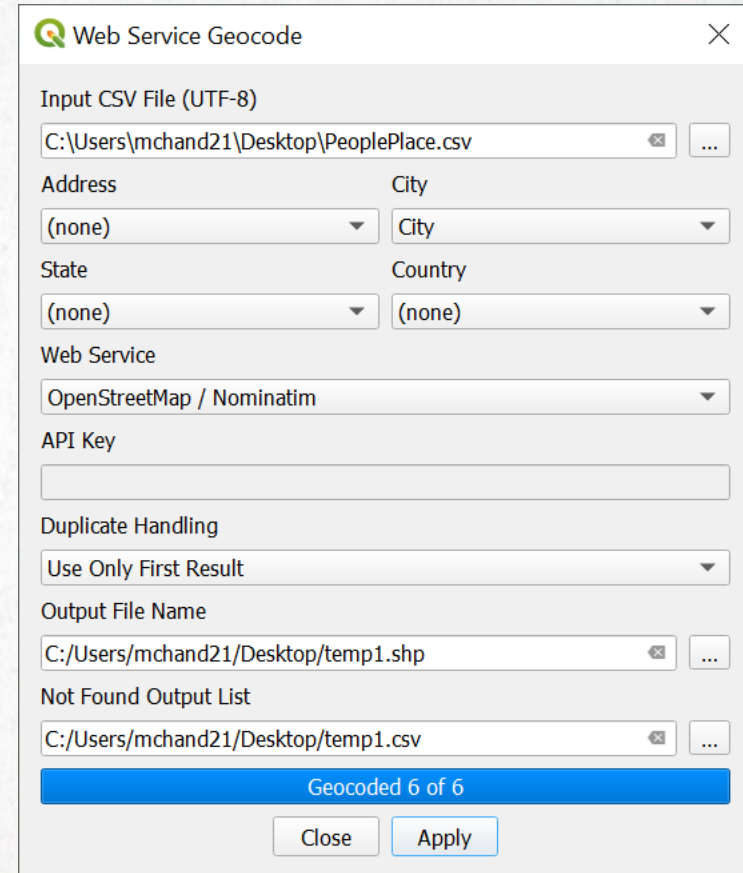
- Let's say we wanted to display the cities or places where individuals are located
  - We have a csv (titled "PeoplePlace.csv") where we have collected this information
  - We need to install a plugin, from the "Plugins" menu: search for "MMQGIS" and install it
  - Bring the PeoplePlace csv in to QGIS
  - Then, under the new MMQGIS menu, choose Geocode > Geocode CSV with Web Service
-





# GEOCODING

- On the pane that opens, you'll need to browse to and open the csv to input
- For Web Service, choose OpenStreetMap
- Under “Duplicate Handling”, make sure “Use Only First Result” is selected.
- You can change the name of the output file.
- Click “Apply”, then “Close”



Web Service Geocode

Input CSV File (UTF-8)  
C:\Users\mchand21\Desktop\PeoplePlace.csv

Address (none) City City  
State (none) Country (none)

Web Service  
OpenStreetMap / Nominatim

API Key

Duplicate Handling  
Use Only First Result

Output File Name  
C:/Users/mchand21/Desktop/temp1.shp

Not Found Output List  
C:/Users/mchand21/Desktop/temp1.csv

Geocoded 6 of 6

Close Apply

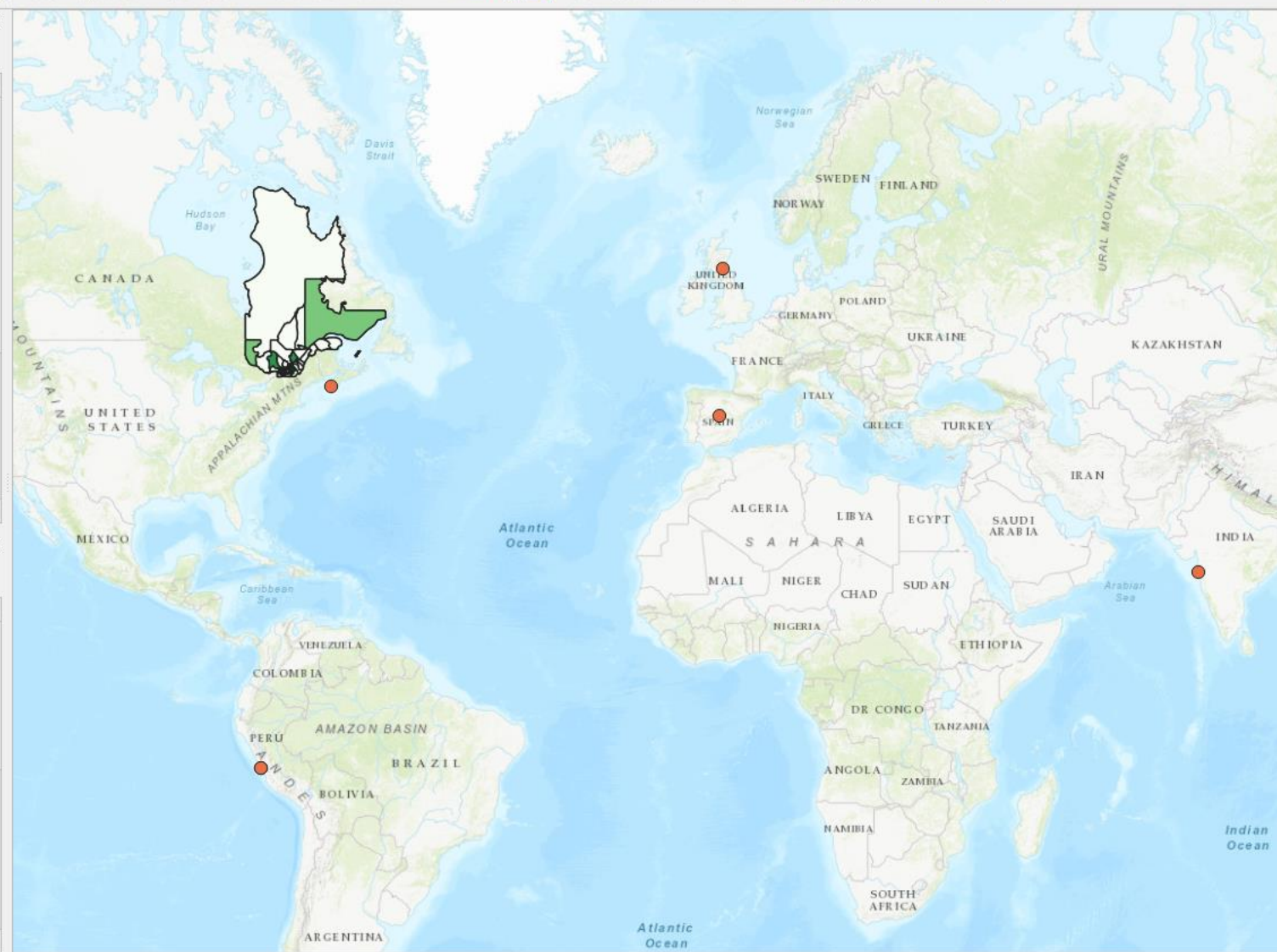


Browser

- ★ Favorites
- ▶ Project Home
- ▶ Home
- ▶ C:\
- ▶ L:\
- ▶ N:\
- ▶ U:\
- GeoPackage
- Spatialite
- PostGIS
- MSSQL
- Oracle
- DB2
- WMS/WMTS
- XYZ Tiles

Layers

- ☒ temp1
- ☒ PeoplePlace
- ☒ WTF
  - ☒ 0 - 198
  - ☒ 198 - 396
  - ☒ 396 - 593
  - ☒ 593 - 791
  - ☒ 791 - 989
- ☒ Derpy
  - ☒ 16.0000 - 212.80...
  - ☒ 212.8000 - 409.6...
  - ☒ 409.6000 - 606.4...

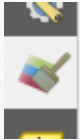


Processing Toolbox

- Search...
- ▶ Recently used
  - ▶ Cartography
  - ▶ Database
  - ▶ File tools
  - ▶ Graphics
  - ▶ Interpolation
  - ▶ Layer tools
  - ▶ Network analysis
  - ▶ Raster analysis
  - ▶ Raster terrain analysis
  - ▶ Raster tools
  - ▶ Vector analysis
  - ▶ Vector creation
  - ▶ Vector general
  - ▶ Vector geometry
  - ▶ Vector overlay
  - ▶ Vector selection
  - ▶ Vector table
  - ▶ GDAL
  - ▶ GRASS
  - ▶ SAGA



# GEOCODING

- We actually had 2 people from Lima, Peru, but only one point shows up
- We can change this in the Properties of the new layer created – double click the layer, or right click and open the properties
- Choose “Symbology” A small screenshot of the QGIS Symbology pane. It shows a 'Single symbol' dropdown menu with a list of symbol types. The 'Point Displacement' option is highlighted.
- At the top, where it says “Single symbol”, open the drop down and choose “Point Displacement”
- Click “Apply”. There are now 2 points on the map for Lima, Peru

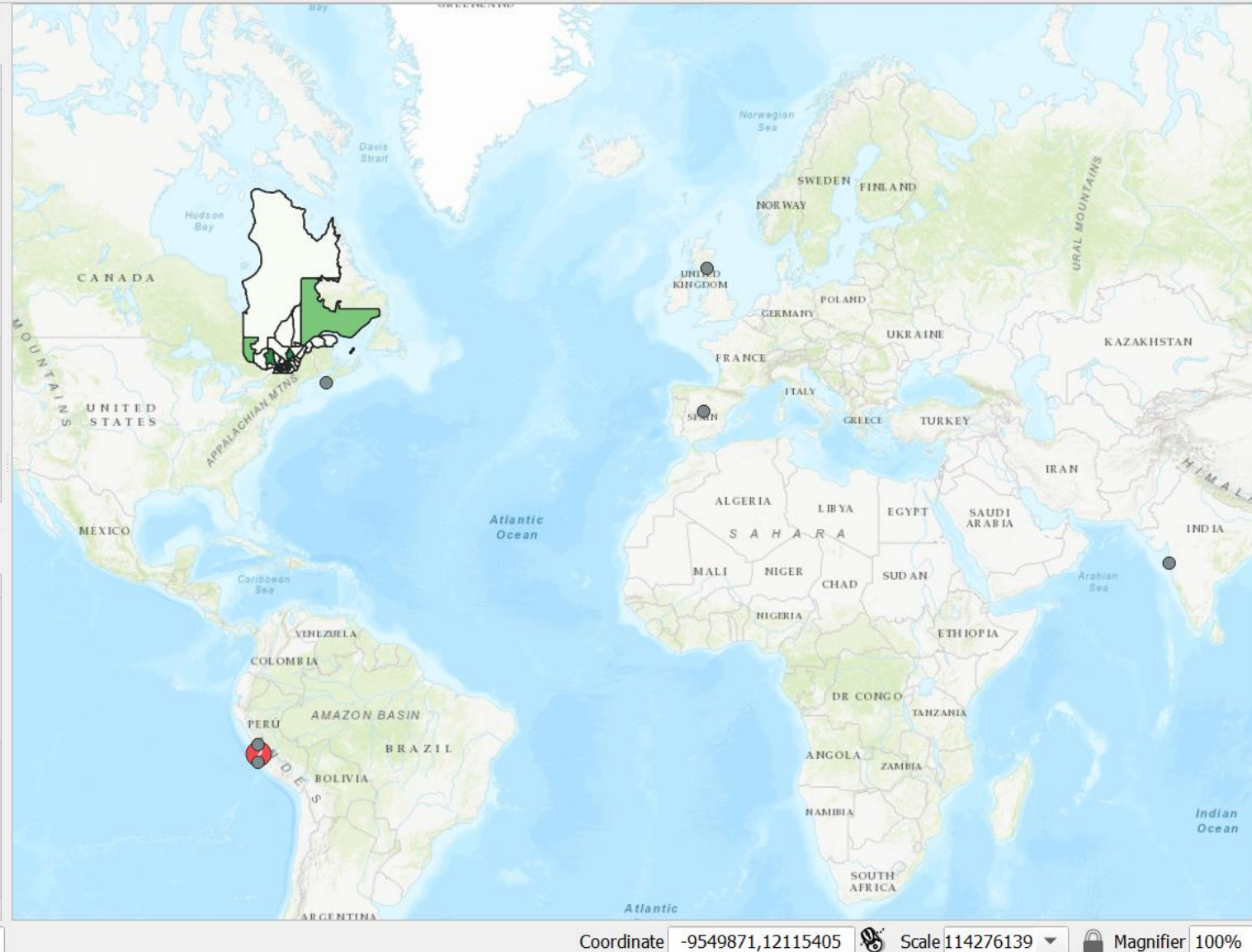


Browser

- ★ Favorites
- ▶ Project Home
- ▶ Home
- ▶ C:\
- ▶ L:\
- ▶ N:\
- ▶ U:\
- GeoPackage
- Spatialite
- PostGIS
- MSSQL
- Oracle
- DB2
- WMS/WMTS
- XYZ Tiles

Layers

- temp1
- PeoplePlace
- WTF
  - 0 - 198
  - 198 - 396
  - 396 - 593
  - 593 - 791
  - 791 - 989
- Derpy
  - 16.0000 - 212.80...
  - 212.8000 - 409.6...
  - 409.6000 - 606.4...



Processing Toolbox

Search...

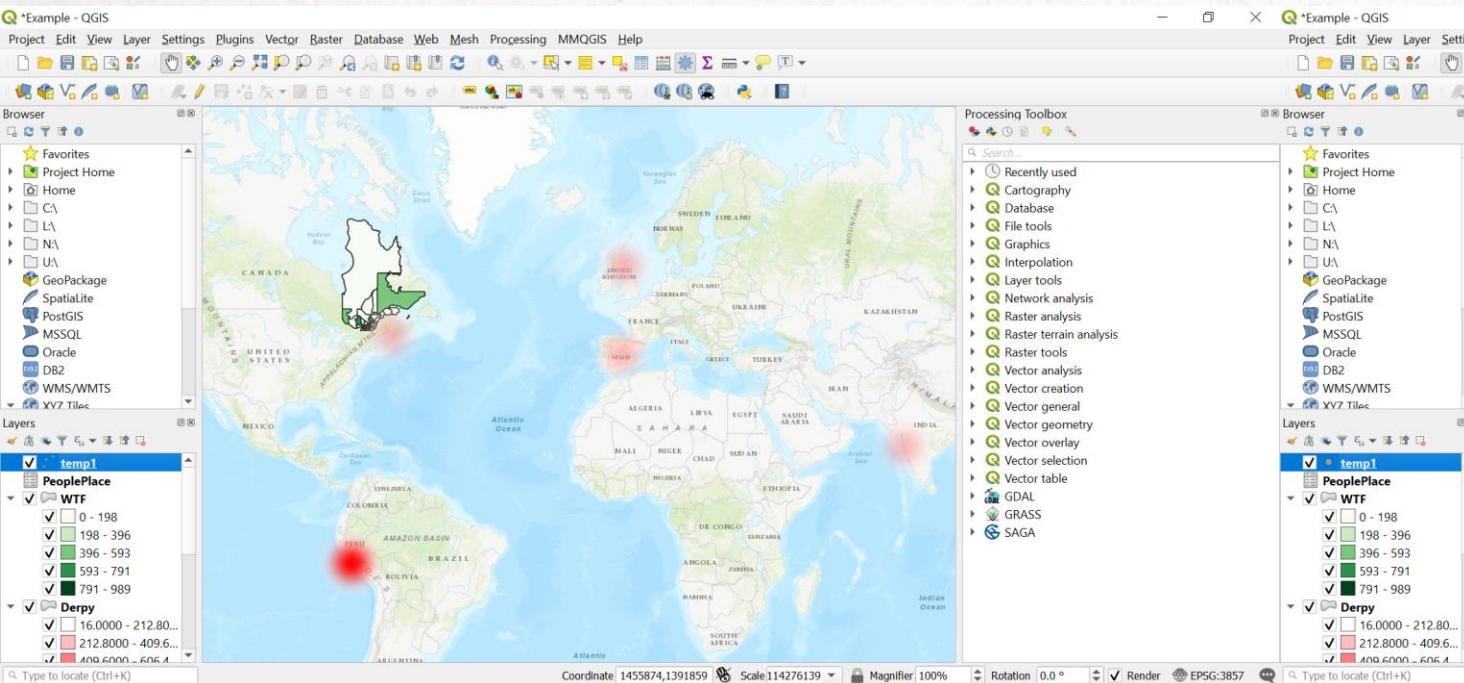
- Recently used
- Cartography
- Database
- File tools
- Graphics
- Interpolation
- Layer tools
- Network analysis
- Raster analysis
- Raster terrain analysis
- Raster tools
- Vector analysis
- Vector creation
- Vector general
- Vector geometry
- Vector overlay
- Vector selection
- Vector table
- GDAL
- GRASS
- SAGA



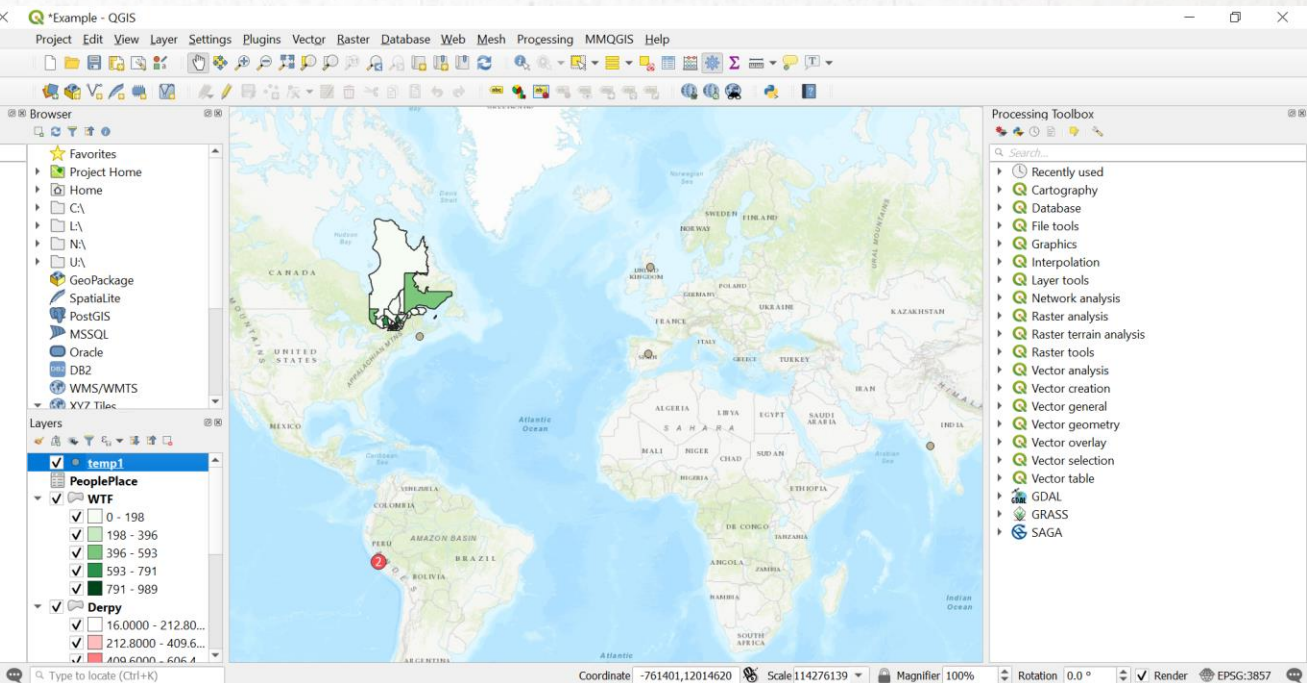
# GEOCODING

- You can play around with the Symbology, including creating a Heat Map, or Point Cluster

## HEAT MAP

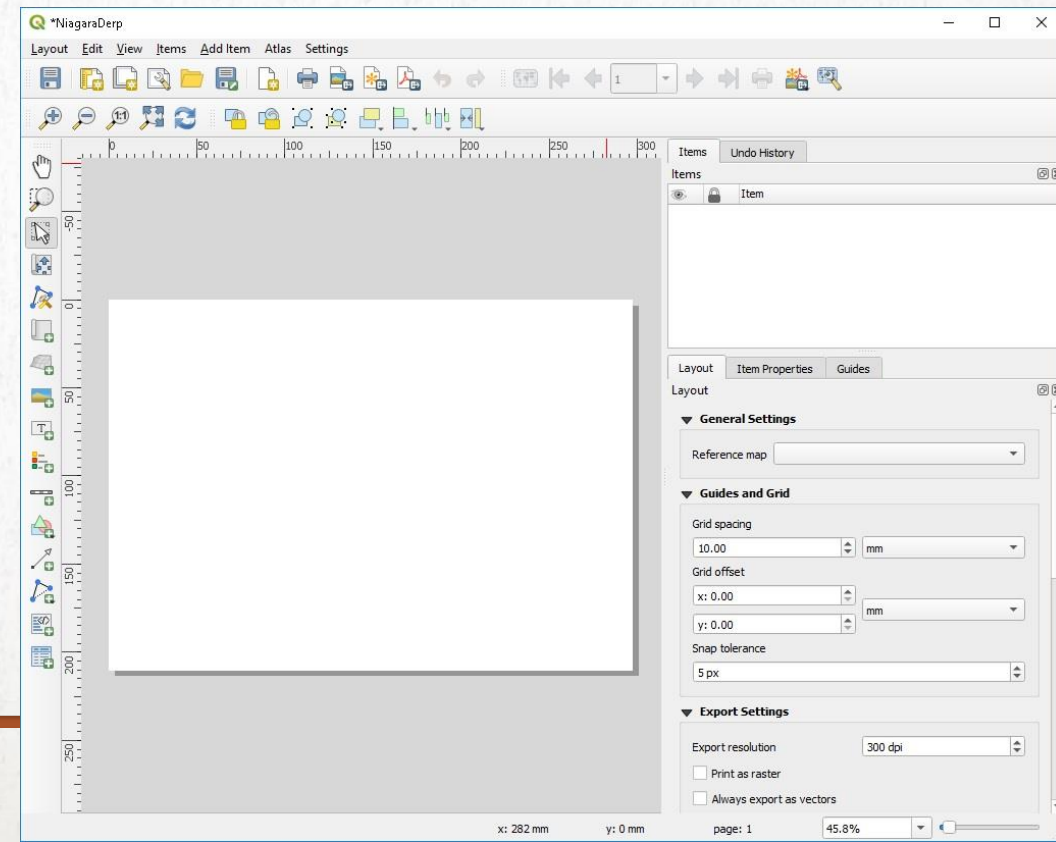


## POINT CLUSTER



# CREATING A MAP LAYOUT

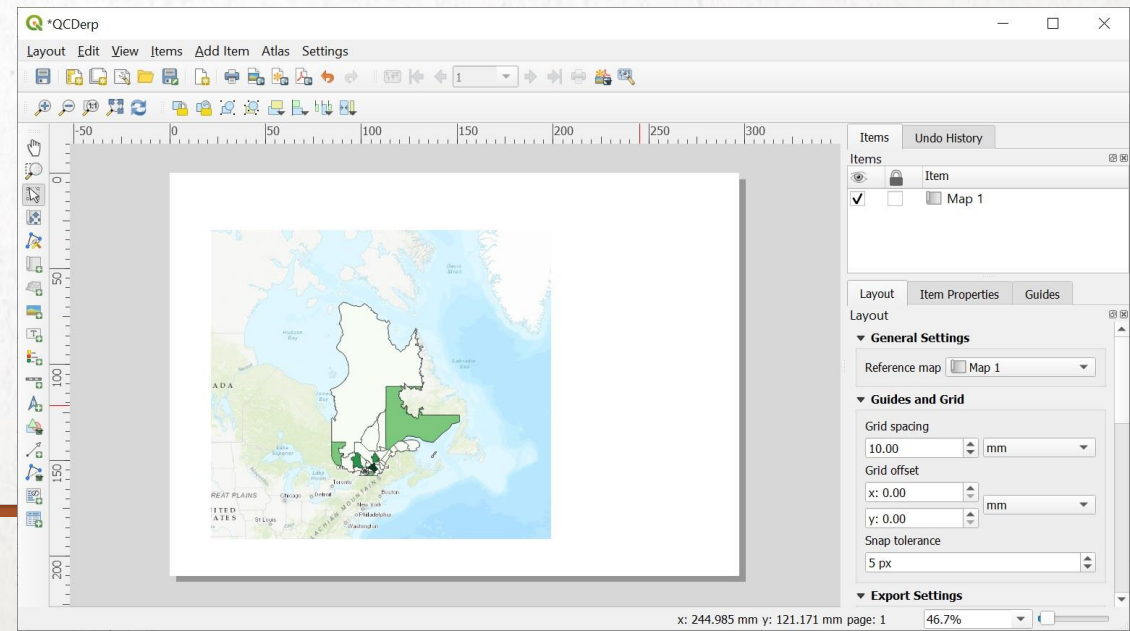
- Under “Project”, select “New Print Layout”
- Give your new map a name in the dialog box, and click “OK”
- A new window will appear:





# CREATING A MAP LAYOUT

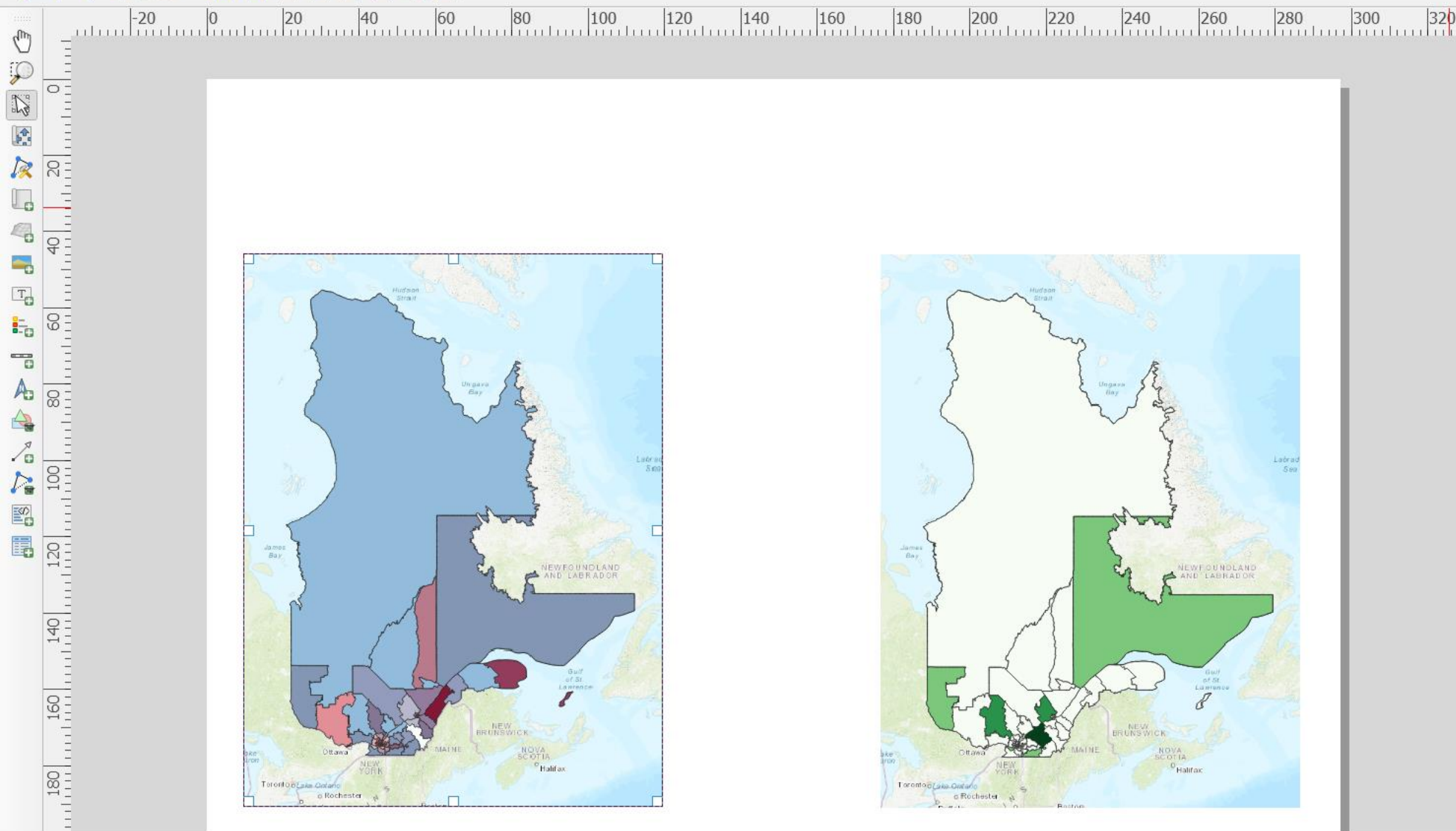
- Under “Add Item”, click “Add map”
- Move your cursor to the page – it will now be a +
- Draw a box – this is where your map will appear
- You can move the map by clicking and dragging
- You can resize the map by clicking and dragging the edges of the box



# CREATING A MAP LAYOUT

- We actually need to show two maps with this one – the differences between “Derpy” and “Bouffon”, and those confused by the question
  - You can add the second map using “Add Map”, but you’ll need to change the layers that appear for each
  - Once you have both maps up, choose one and select “Lock layers” in the “Item Properties” tab
  - Then, in your main map window, change the layers that appear – this will update on your map layout (it may take a moment)
-





Items

Undo History

Items

Item	Item
<input type="checkbox"/>	A Map Showing Use of the...
<input type="checkbox"/>	<Scalebar>
<input type="checkbox"/>	North Arrow
<input checked="" type="checkbox"/>	Map 2
<input type="checkbox"/>	Legend
<input checked="" type="checkbox"/>	<b>Map 1</b>

Layout

Item Properties

Guides

Item Properties

Map 1

Scale

27663230

Map rotation

0.00 °

CRS

Use project CRS

☒ Draw map canvas items

Layers

☐ Follow map theme (none)

☒ Lock layers


☐ Lock styles for layers

Extents

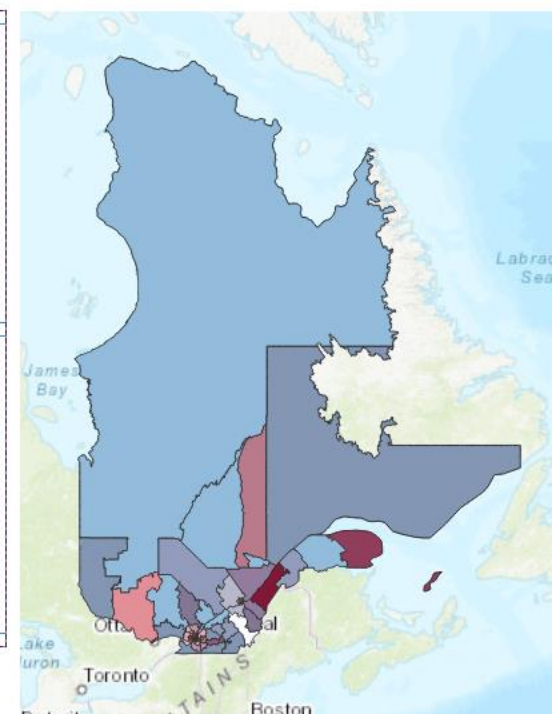
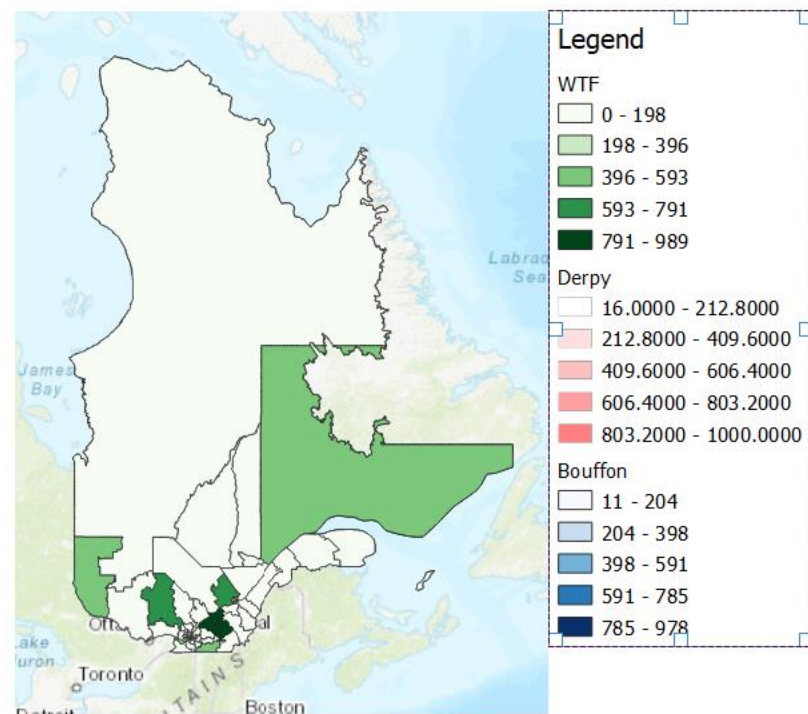
X min

-9189196.955

# CREATING A MAP LAYOUT

- You can change the map scale under “Item Properties”, to show a larger or smaller area (a larger number will show more area, but particular features appear smaller – a smaller scale)
- To add a legend: Under “Add Item”, choose “Add Legend”, then draw a box where you would like your legend. You can move this around and resize as needed
- To remove items from the legend, click on Item Properties (this time, it’s referring to the legend, rather than the map), and under “Legend Items” uncheck “Auto update”. You can then highlight any items you don’t want/need in the legend, and click the  sign to remove them.
- You can also give the legend a title, such as “Legend”, by typing it in to the box “Title” in the Item Properties.





**Items** **Undo History**

Item	Item
<input checked="" type="checkbox"/>	Map 2
<input checked="" type="checkbox"/>	<b>Legend</b>
<input checked="" type="checkbox"/>	Map 1

**Layout** **Item Properties** **Guides**

**Item Properties**

**Legend**

**Legend Items**

☐ Auto update Update All

- WTF**
  - 0 - 198
  - 198 - 396
  - 396 - 593
  - 593 - 791
  - 791 - 989
- Derpy**
  - 16.0000 - 212.8000
  - 212.8000 - 409.6000

☐ Only show items inside current atlas feature

**Fonts and Text Formatting**

**Columns**

# CREATING A MAP LAYOUT

- You can change the name of an item in the legend by clicking on the legend item, then clicking the edit button (next to the minus button).
- To add a north arrow, click on “Add Item” and select “Add picture”. Draw a box on the canvas, then in the Item Properties panel on the right, expand the “Search Directories” section. Choose an arrow from here, or design your own
- To add a scale bar, click “Add Item” and select “Add Scale Bar”. Draw a box on the canvas, then edit the appearance, units, and number of segments in the Item Properties panel
- To give your map a title, click “Add Item” and select “Add Label”. Draw a box where you’d like your map title, then replace the “Lorem Ipsum” in the Item Properties box with your map title
- Adjust the items in your map until they look good – a good map is both informative and enjoyable to look at!



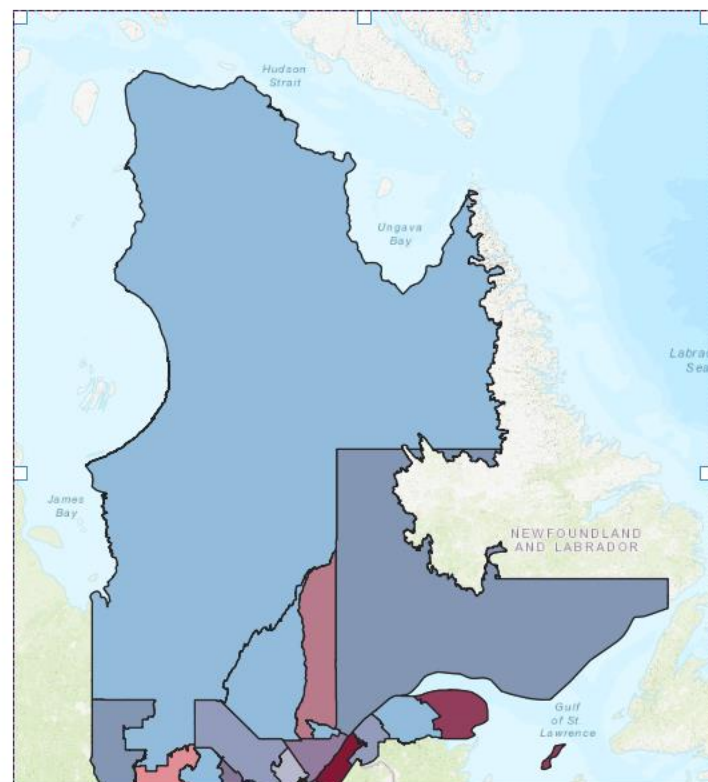




0 20 40 60 80 100 120 140 160 180 200 220 240 260 280

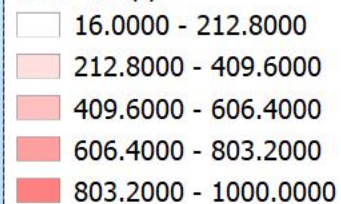


# A Map Showing Use of the word "Derpy" vs "Bouffon" in Quebec, and General Confusion about the Question

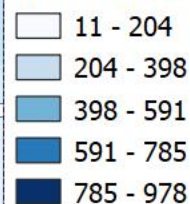


## Legend

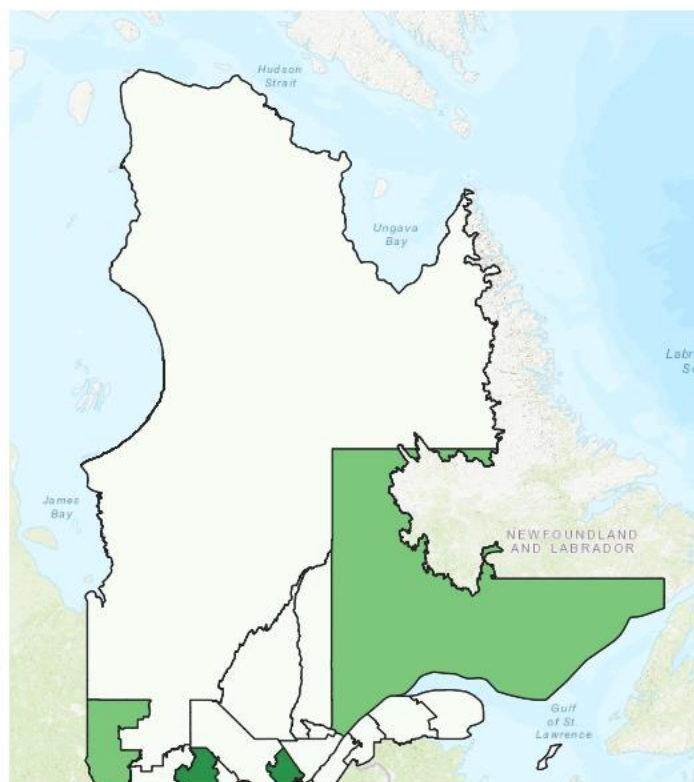
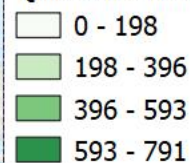
### Uses "Derpy"



### Uses "Bouffon"



### Question Confusing



Items Undo History

Items

Item
<input checked="" type="checkbox"/> <input type="checkbox"/> A Map Showing Use of the...
<input checked="" type="checkbox"/> <input type="checkbox"/> <Scalebar>
<input checked="" type="checkbox"/> <input type="checkbox"/> North Arrow
<input checked="" type="checkbox"/> <input type="checkbox"/> Map 2
<input checked="" type="checkbox"/> <input type="checkbox"/> Legend
<input checked="" type="checkbox"/> <input type="checkbox"/> Map 1

Layout

Item Properties

Guides

Item Properties

Map 1



## Main Properties

Scale	27663230	
Map rotation	0.00 °	
CRS	Use project CRS	
<input checked="" type="checkbox"/> Draw map canvas items		

## Layers

<input type="checkbox"/> Follow map theme	(none)	
<input checked="" type="checkbox"/> Lock layers		
<input type="checkbox"/> Lock styles for layers		

## Extents

X min	-9189196.955	
-------	--------------	--

# CREATING A MAP LAYOUT

- Remember to add a attribution information to your map – ie your name, the year of creation, and any affiliation you have related to the map, as well as data you used (in this case, OpenStreetMap). To do this, use the “Add Label” that we used for the title, but make it smaller, usually in a lower corner of the map
  - QGIS doesn't have as many design elements readily available as commercial software, but you can import things like fonts, images, etc. to work with. The trade-off that comes with free software is that it takes a bit more work to get the same result
  - Once your map looks how you'd like it to, remember to save it
  - You can then print your map, or export it as an image or pdf, using the Layout
-



Save Project Ctrl+S

New Layout... Ctrl+N

Duplicate Layout...

Delete Layout...

Layout Manager...

Layouts

Layout Properties...

Rename Layout...

Add Pages...

Add Items from Template...

Save as Template...

Export as Image...

Export as SVG...

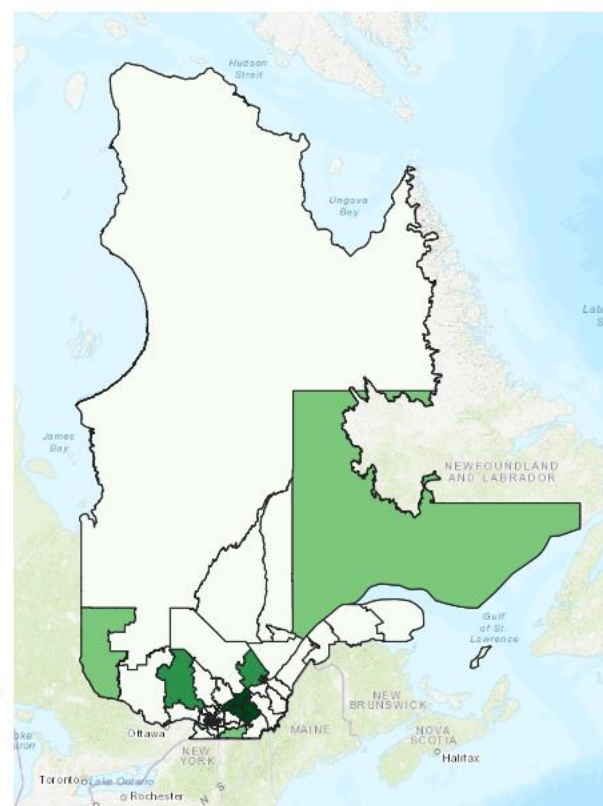
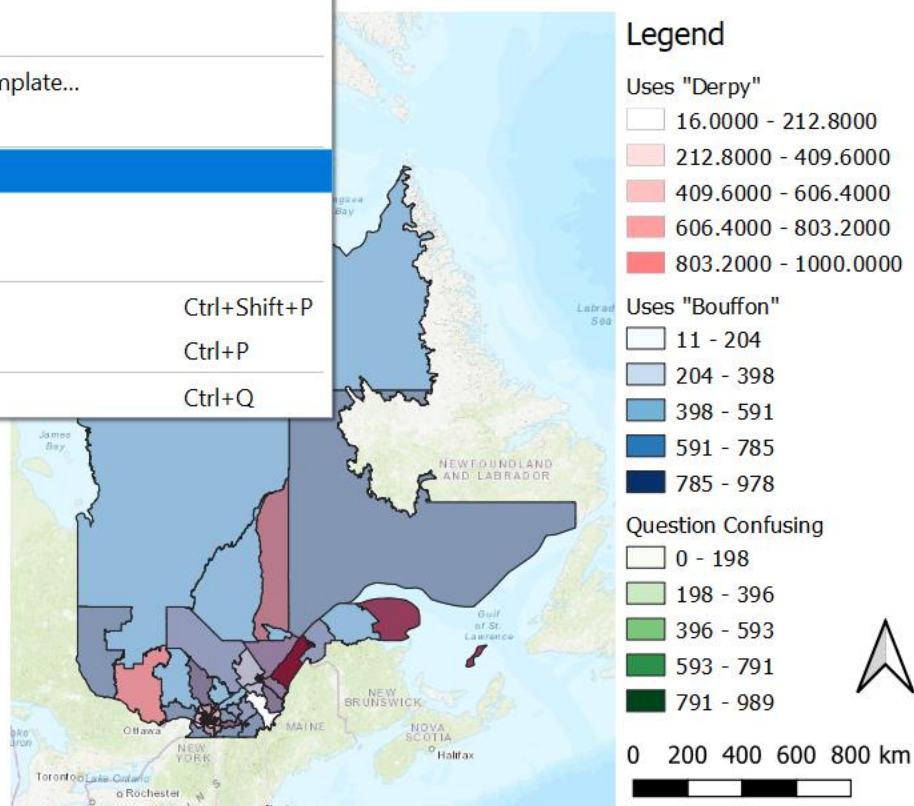
Export as PDF...

Page Setup... Ctrl+Shift+P

Print... Ctrl+P

Close Ctrl+Q

## Showing Use of the word "Derpy" vs "Bouffon" ec, and General Confusion about the Question



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Elections Canada (2015), "Federal Electoral Districts - Canada 2015", Natural Resources Canada: Ottawa.

Items Undo History

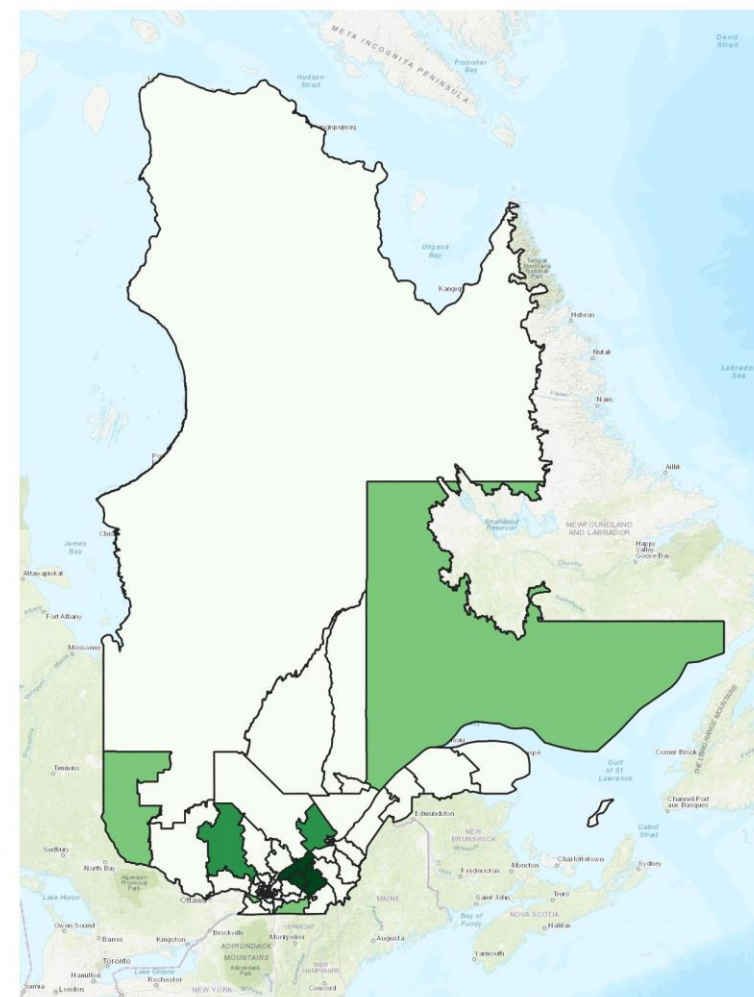
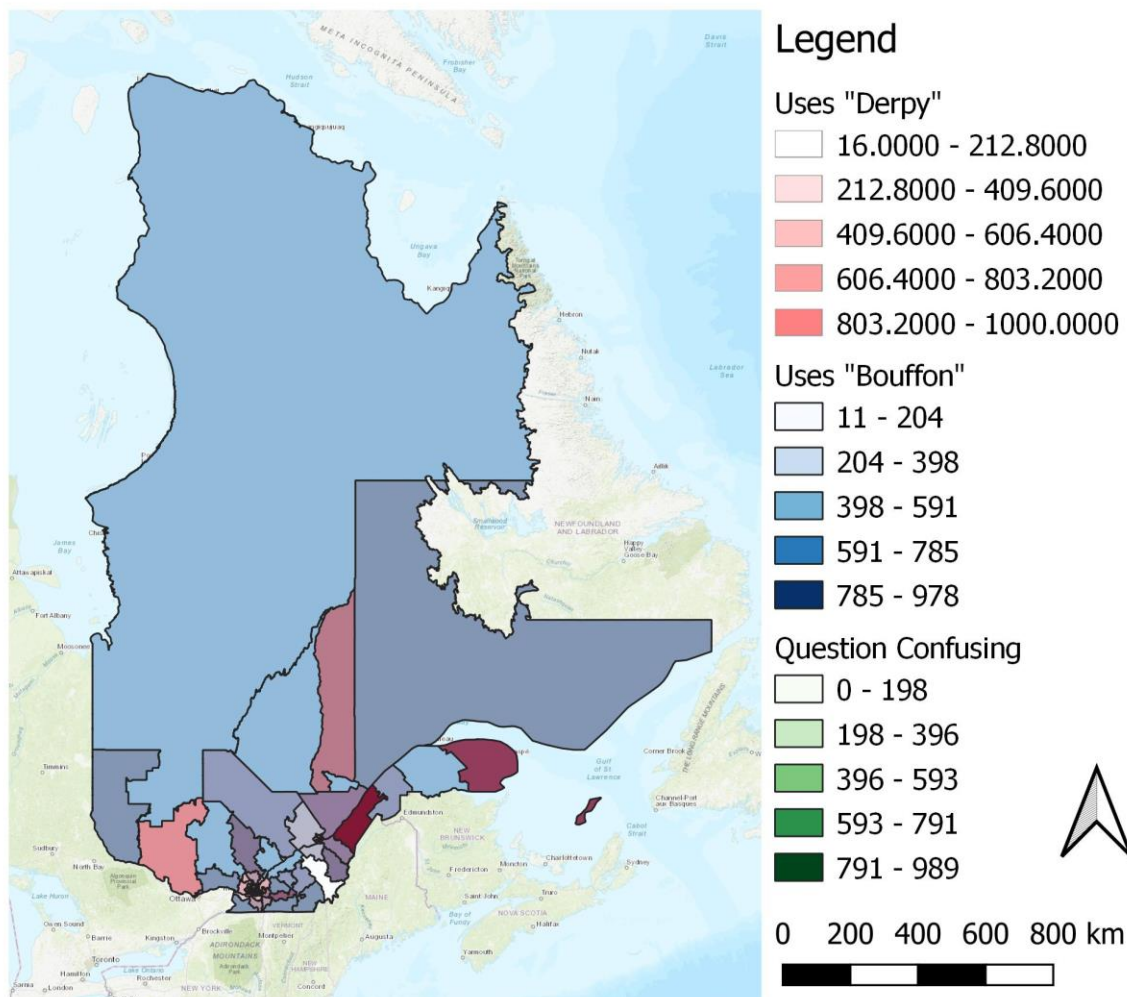
Items

Item
<input checked="" type="checkbox"/> Copyright Martin Chandler...
<input checked="" type="checkbox"/> A Map Showing Use of the...
<input checked="" type="checkbox"/> <Scalebar>
<input checked="" type="checkbox"/> North Arrow
<input checked="" type="checkbox"/> Map 2
<input checked="" type="checkbox"/> Legend

Layout Item Properties Guides

Item Properties

# A Map Showing Use of the word "Derpy" vs "Bouffon" in Quebec, and General Confusion about the Question



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Elections Canada (2015), "Federal Electoral Districts - Canada 2015", Natural Resources Canada: Ottawa.



# SOURCES

- Borneman, Elizabeth. "Types of Map Projections". GeoLounge. 5 Jan 2015. Web. Accessed on 16 Jan 2019 from <https://www.geolounge.com/types-map-projections/>
- Buczkowski, Aleks. "These 5 tools will let you master map projections". Geoawesomeness. 14 Apr 2017. Web. Accessed on 16 Jan 2019 from <http://geoawesomeness.com/5-tools-will-let-master-map-projections/>
- Google. [McGill University and surrounding area]. 1:4513.988880. Google Maps. Retrieved on October 23, 2019 from <https://www.google.com/maps/@45.5043825,-73.5759763,17.75z>
- Maps, Terrible (TerribleMaps). "This is actually in a textbook..(Glencoe Science: Biology, Chapter 5, Section 3.) Retweet if you see it. <https://t.co/k48MkRws9A>". 15 Jul 2018, 17:36 UTC. Tweet
- Ministère des Ressources naturelles. [Carte topographique du Québec à l'échelle de 1:20 000]. 31-H-12-200-0102, Montréal-Nord [document cartographique]. 1:20 000. Québec topographique. Accessed on October 23, 2019 from <http://numerique.banq.qc.ca/patrimoine/details/52327/2245910?docsearchtext=Montr%C3%A9al>
- My13InchDuck. "Nutella making a classic mistake". Reddit, Inc. 23 Jul 2017, 05:36:29 GMT. Web. Accessed on 17 Jan 2019 from [https://www.reddit.com/r/MapsWithoutNZ/comments/6p0i1f/nutella\\_making\\_a\\_classic\\_mistake/](https://www.reddit.com/r/MapsWithoutNZ/comments/6p0i1f/nutella_making_a_classic_mistake/)
- Natural Resources Canada. Niagara Falls, Ontario. 1:25,000. Map Sheet 030M03A, ed. 2, 1963. Accessed on January 14, 2019 from <https://ocul.on.ca/topomaps/maps/map09/>
- OpalsandOranges. "IKEA is conspiring against us". Reddit, Inc. 03 Jan 2019, 07:20:39 GMT. Web. Accessed on 16 January 2019 from [https://www.reddit.com/r/MapsWithoutNZ/comments/ac57s9/ikea\\_is\\_conspiring\\_against\\_us](https://www.reddit.com/r/MapsWithoutNZ/comments/ac57s9/ikea_is_conspiring_against_us)
- The Flat Earthers 🌩️ (Theflateartherz). "It's #FlatEarth Friday 😊👍 <https://t.co/eZcH5YwXUx>". 14 Dec 2018, 11:37 UTC. Tweet
- Thecasualcaribou. "Bear location map North America". Reddit, Inc. 15 Jan 2019, 08:56:35 GMT. Web. Accessed on 16 January 2019 from [https://www.reddit.com/r/MapPorn/comments/ag8qc4/bear\\_location\\_map\\_north\\_america](https://www.reddit.com/r/MapPorn/comments/ag8qc4/bear_location_map_north_america)
- Yeet69Lasagna. "Where on the planet we can see the human footprint and which areas are still untouched? Brighter values represent higher pressure on the environment.". Reddit, Inc. 15 Jan 2019, 09:36:53 GMT. Web. Accessed on 16 Jan 2019 from [https://www.reddit.com/r/MapPorn/comments/ag93ws/where\\_on\\_the\\_planet\\_we\\_can\\_see\\_the\\_human/](https://www.reddit.com/r/MapPorn/comments/ag93ws/where_on_the_planet_we_can_see_the_human/)

# QUESTIONS?

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