

OPEN MAPPING EDUCATION SERIES

GIS MODULES 1-3

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GIS MODULE 2

QGIS BASICS I: INTERFACE

LEARNING OBJECTIVES

In this module, you will learn:

- The QGIS interface, including basic tools and menu options
- How to download TIGER data from the US Census website
- How to add TIGER vector data to a map
- How to explore a data attribute table
- How to save a map file.
- Time Required: 15-20 minutes with self-paced learning breaks and download time.



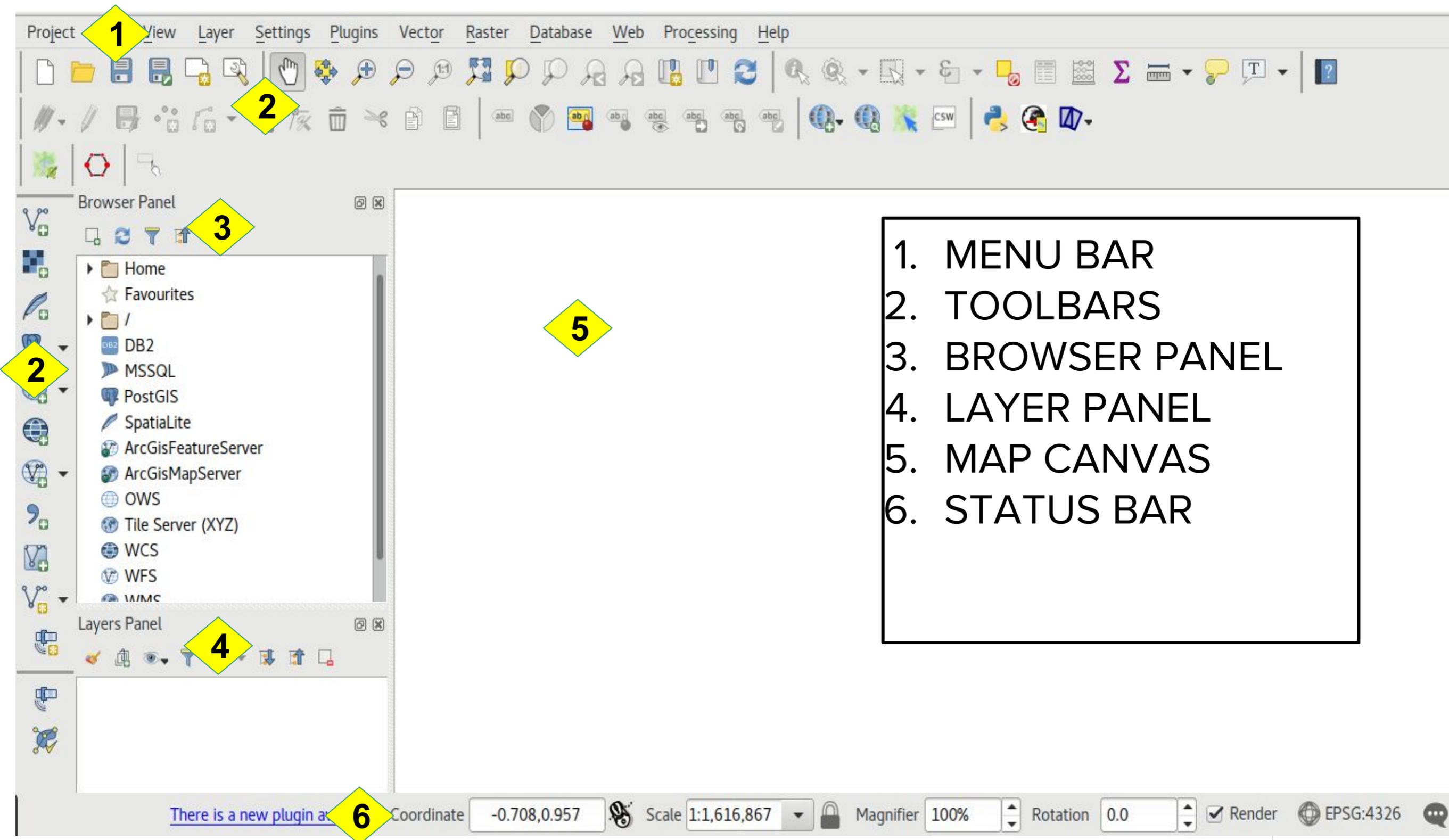
PART ONE - QGIS INTERFACE

OPEN QGIS

- In Module 1 you installed QGIS. Look for the QGIS Desktop icon on your Desktop or in your downloads folder. Double click on it to open.
- It will take a moment or two to load depending on your computer. A tip screen will appear each time you start the program that may provide helpful information as you learn the program.
- Close the tip screen. NOTE: It can be turned on/off under Settings > Options > General.
- Use the open QGIS program to explore as you go through the next 8 slides.



QGIS INTERFACE



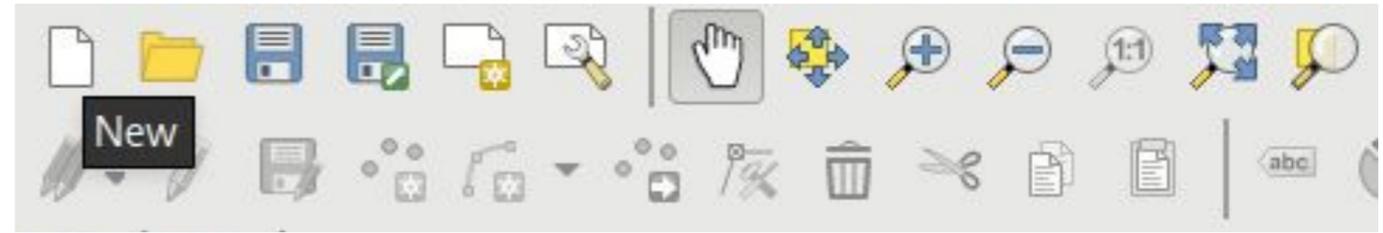
1. MENU BAR
2. TOOLBARS
3. BROWSER PANEL
4. LAYER PANEL
5. MAP CANVAS
6. STATUS BAR

1 - MENU BAR

Project Edit View Layer Settings Plugins Vector Raster Database Web Processing Help

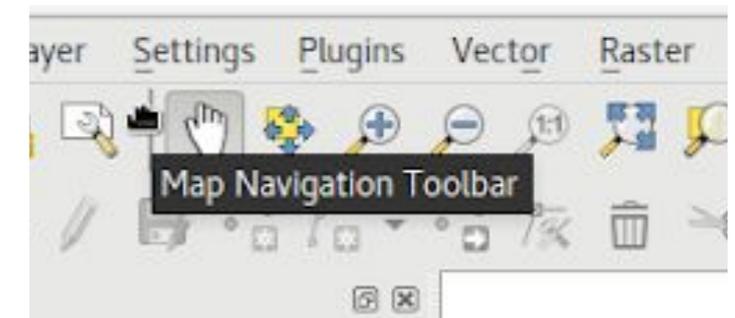
- Provides access to various QGIS features using a standard hierarchical menu. Hover or click on each menu item to explore.
- The top-level menus and a summary of some of the menu options are listed below
- Note: QGIS is a cross-platform application. The same tools may be in different menus depending upon the operating system specification.
- For additional information about tools and toolbars, see documentation section [Toolbars](#).

2 - TOOLBARS



- Toolbars provide quick access to many of the same functions as the menus and additional map interaction tools.
- Hover your cursor over the toolbar icon to display a short description of the tool's purpose.

- TIP: Hover over the vertical line to find out what toolbar you are viewing.



- Customize your Interface via the Settings ▸ Toolbars menu. Toolbars can be reorganized, added, or switched off. If they are not visible in a toolbar, all tools remain accessible via the Menu.

- **TIP:** If you hide a toolbar, you can restore it by choosing Menu --> View > Toolbars.



3 - BROWSER PANEL

Panels are special widgets that you can interact with when performing advanced tasks.

The Browser panel lets you navigate in your database, and access common vector files (e.g. ESRI shapefile), databases (e.g. PostGIS, Spatialite) and WMS/WFS connections, and view GRASS data.

ACTION: We will not be using the Browser Panel in these modules. Please close it using the 'x' in the corner!

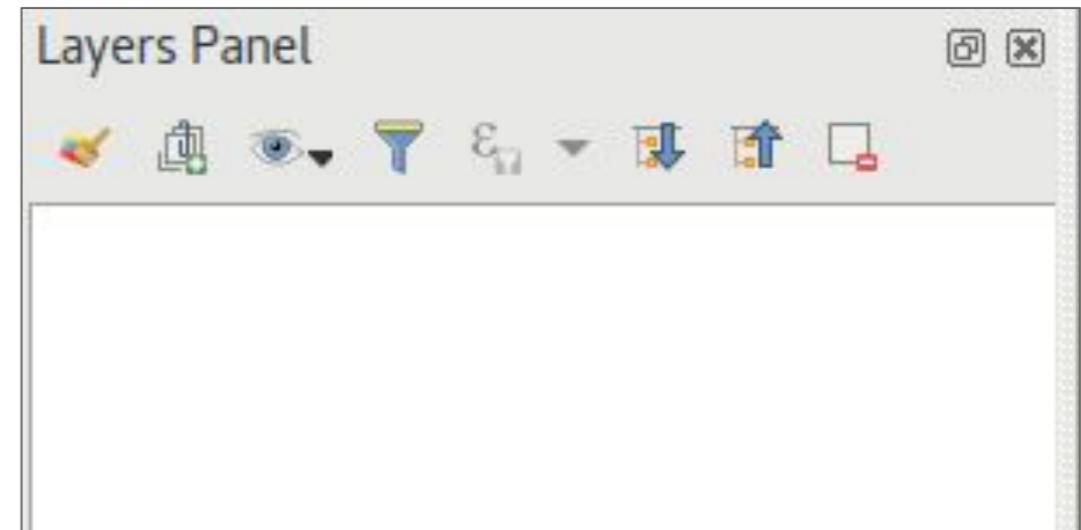


4 - LAYERS PANEL & LAYER TOOLS

The Layer Panel provides a list of all the layers added to the map.

The layer tools allow you to add different types of geospatial data to the map.

The map canvas displays the layers in the order in which they are listed in the Layers Panel. Drag and drop to reorder.



LAYER TOOLS



5 - MAP VIEW / MAP CANVAS

This window displays a map that will depend on the vector and raster layers you have chosen to load (listed in the Layer Panel).

MAP NAVIGATION TOOLBAR: Using the toolbar to navigate the map.



MOUSE WHEEL: Place the cursor inside the map area and roll the wheel away from you to zoom in and towards you to zoom out. The zoom is centered on the mouse cursor position. Pan by moving the mouse while holding down space bar or the click button on mouse wheel. Customize settings in Settings ▸ Options > Map Tools Menu.

ARROW KEYS - PAN: With the cursor inside the map canvas, press the right arrow key to pan east, left arrow key to pan west, up arrow key to pan north and down arrow key to pan south.

6 - STATUS BAR - LEFT SIDE

[There is a new plugin available](#)

On start up, shows the availability of new or upgradeable plugins.

During mapping - a summary of actions you've done (such as selecting features in a layer, removing layer) or a long description of the tool you are hovering over (not available for all tools).

Coordinate 

The current position of the mouse, following it while moving across the map view. Set the unit in Project Properties, General tab.

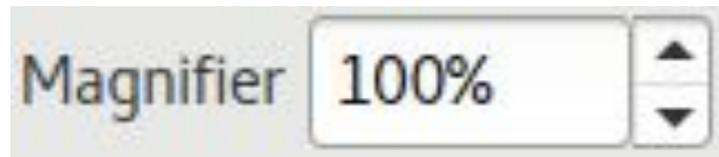
The small button at the right of the box toggles between the Coordinate option and the Extents option that displays in map units.

Scale  

The scale of the map view. Zoom in or out and see the current scale. There is a scale selector, which allows you to choose among predefined or custom scales to assign to the map view.

The lock allows you to lock the scale to use the magnifier (next slide).

6 - STATUS BAR - RIGHT SIDE



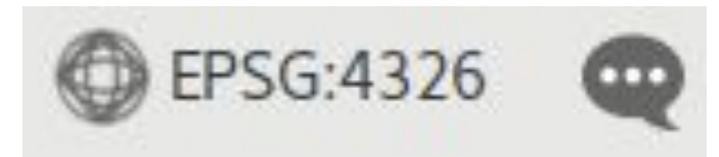
Define a magnification level (expressed as a %) for your map view. Zoom in to a map without altering the map scale. For example, at 100%, the current map is not magnified.

Define a default value in Settings ▸ Options ▸ Rendering ▸ Rendering Behaviour.



Define a current clockwise rotation for your map view in degrees.

Use the checkbox to temporarily prevent layers being rendered, or drawn, in the map view.

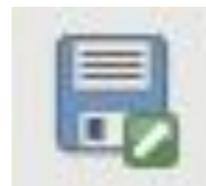


Shows the current Coordinate Reference System (CRS). Click on this to open the CRS Project Properties dialog box.

Messages button opens the Log Messages Panel which informs you on any underlying process (QGIS startup, plugins loading, etc)

STOP & EXPLORE

- Take a few minutes to explore the different components of the QGIS Interface.
- Try to identify the following six tools and their functions on your own screen. You will become more familiar with these tools as you use them in the upcoming modules.





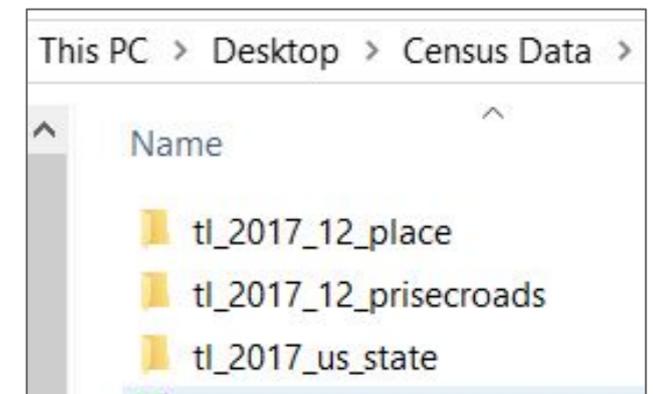
PART TWO - ADD DATA TO A MAP

UNZIP CENSUS TIGER DATA



In Module 1 you downloaded TIGER data from the US Census website. You will now explore these data layers in a map.

- Open your 'Census Data' folder on your desktop. Unzip the 3 files you previously downloaded - tl_2017_12_prisecroads.zip, tl_2017_12_places.zip, tl_2017_us_state.zip.
- For more support in how to unzip a file in [Windows](#), [Mac OS](#), or [Linux](#).
- QGIS should be open, but if not reopen QGIS by double clicking the icon 
- Start a new project 



PROJECTING THE DATA

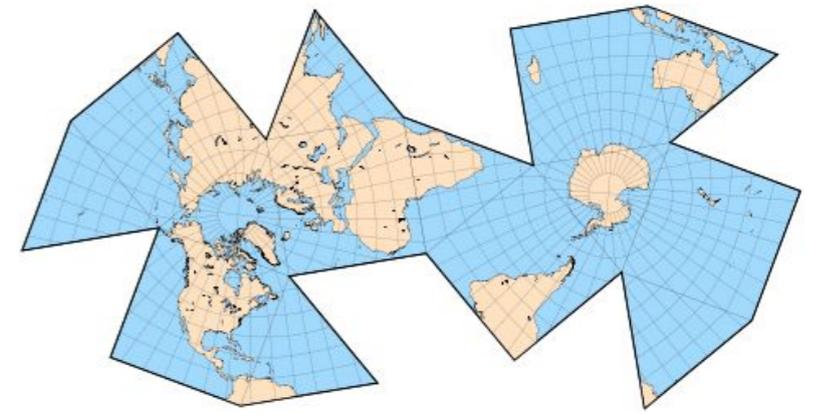
When you add a layer in a new project, QGIS automatically looks for its *Coordinate Reference System (CRS)* and zooms to its extent.

NOTE: The CRS of the first layer added to the map is applied to your entire project. If you add a new layer in a different CRS from the first layer you must enable on-the-fly CRS transformation to help them fit together on the map.

We will do this now.

For more about projections and CRS, see

<https://www.youtube.com/watch?v=klID5FDi2JQ>



Map Projections - Used to portray the surface of the earth or a portion of the earth on a flat piece of paper or computer screen. All map projections necessarily distort the surface in some fashion.

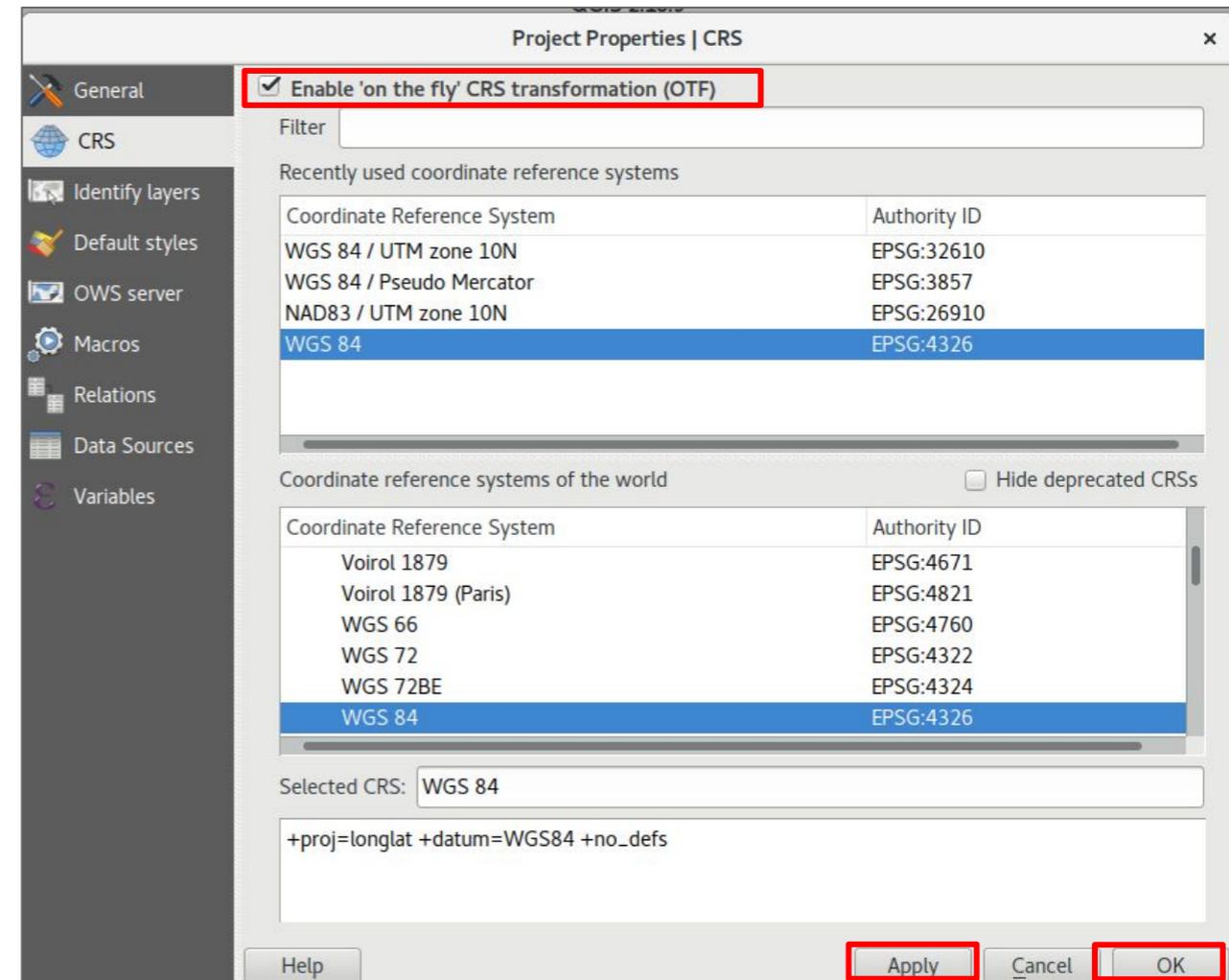
Coordinate Reference System (CRS) - Used to define, with the help of coordinates, how the two-dimensional, projected map in your GIS is related to real places on the earth.

The map projection and coordinate reference system to use depends on the regional extent of your map area, your intended analysis and often the availability of data. For example, if you are mapping Maine you will use a different CRS than if you are mapping Argentina.



TRANSFORM CRS - ENABLE 'ON THE FLY'

- Navigate to Project ▸ Project Properties ▸ CRS **OR** click EPSG on the status bar 
- Click the box 'Enable 'on the fly' CRS transformation (OTF)'
- Click 'Apply' & Click 'Ok'
- When you add new data layers, they will now project automatically.



ADD VECTOR DATA - UNITED STATES

- Click on the 'Add Vector Data' button.



If you are unsure of the button, hover over each button to see the function.

- Click 'Browse'

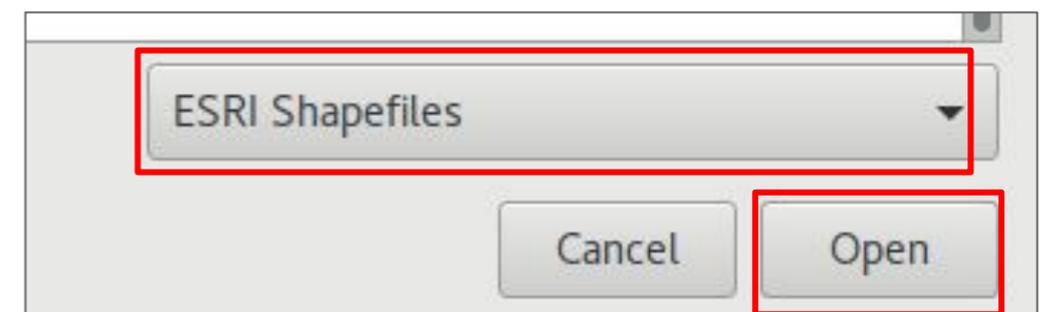
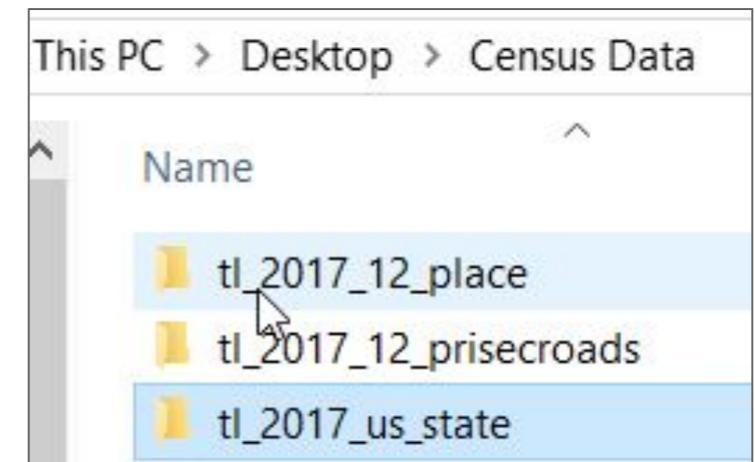
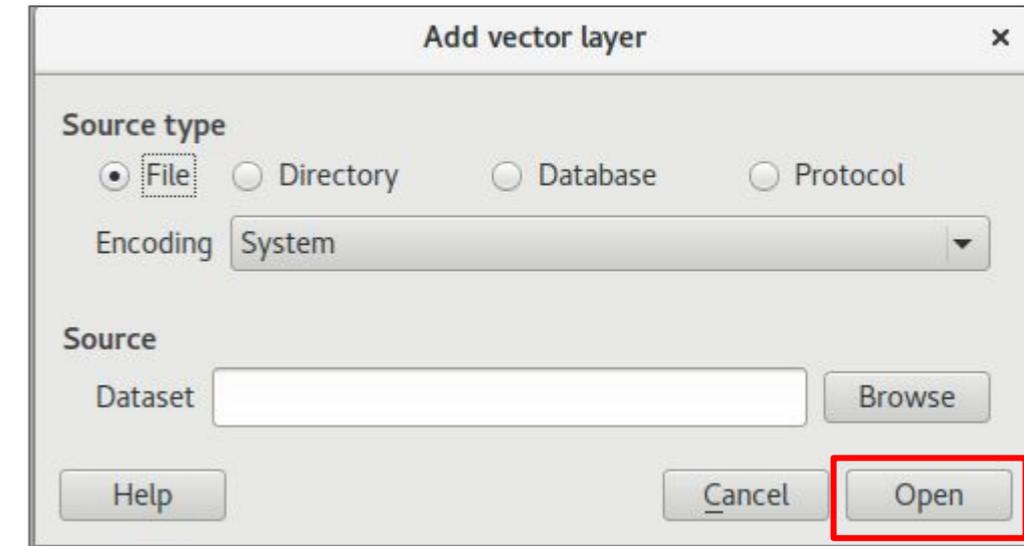
- Navigate to your 'Census Data' folder on the desktop.

- Double click on the tl_2017_us_state folder. One file should be visible. If not,

make sure that the file type is set to

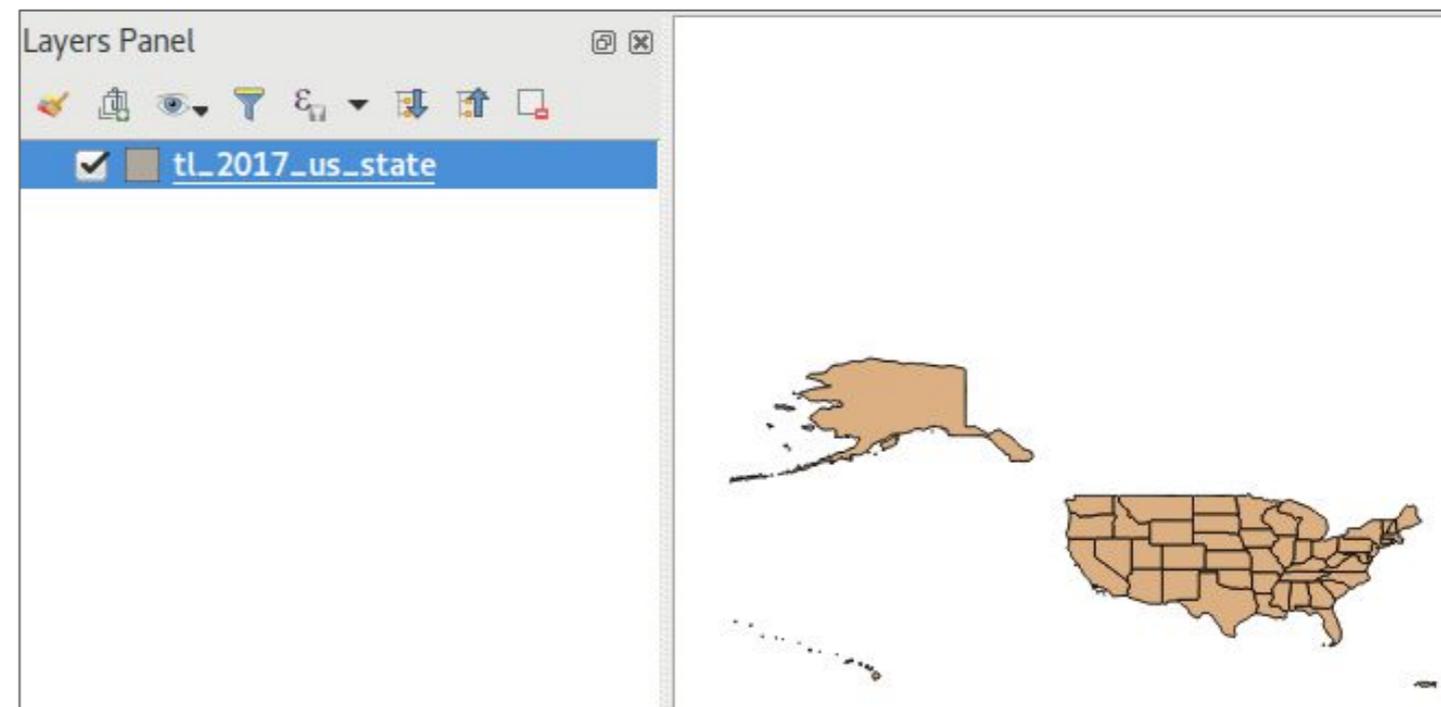
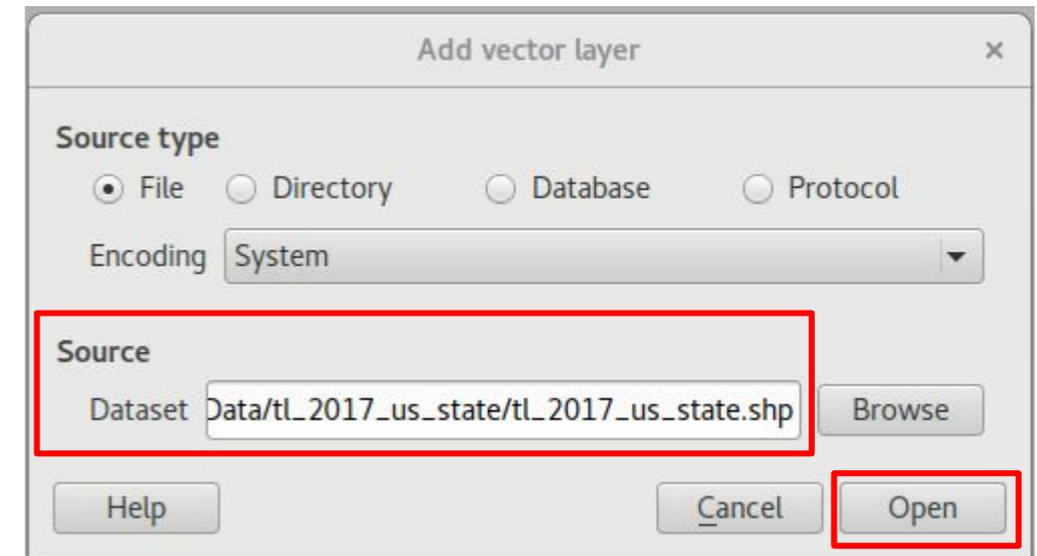
'ESRI Shapefiles'

- Click 'Open'



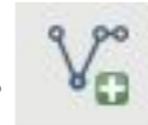
ADD VECTOR DATA - UNITED STATES

- You will return to the original screen, and the Source window should now have the dataset name.
- Click 'Open'
- Your map view should now show a map of the United States. The Layers Panel should show the tl_2017_us_state vector layer.



ADD VECTOR DATA - ROADS

- Click on the 'Add Vector Data' button.



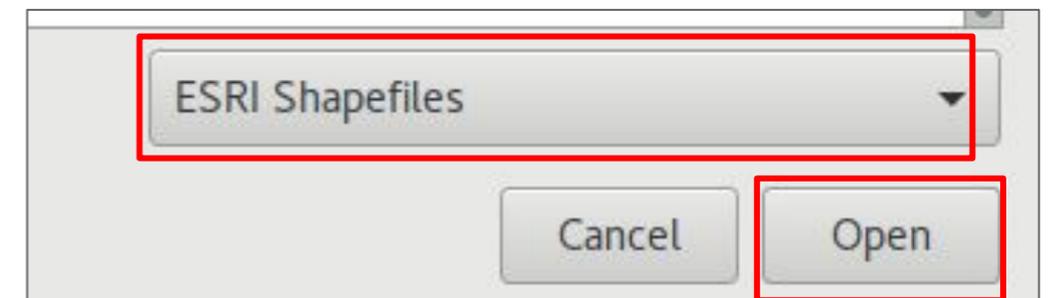
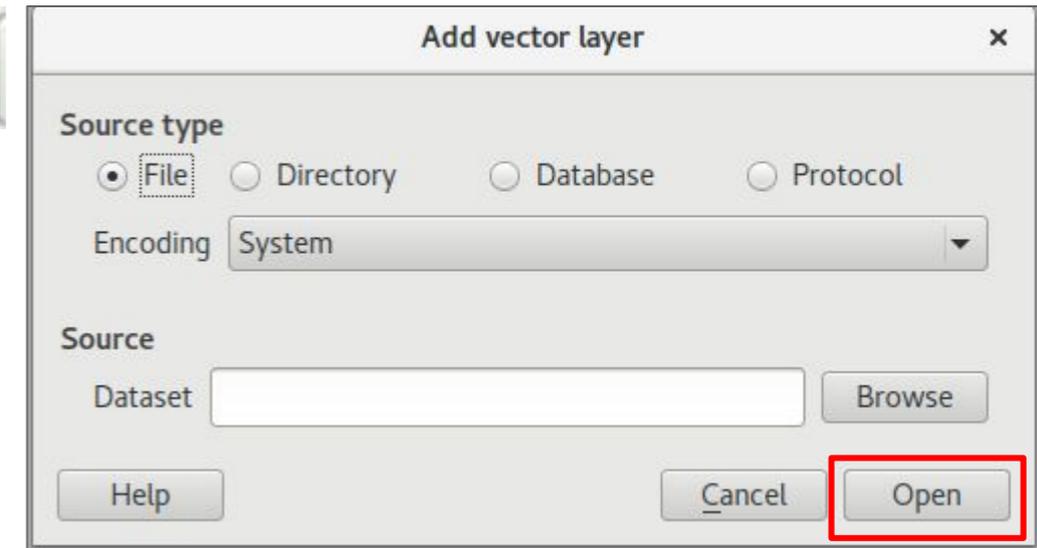
If you are unsure of the button, hover over each button to see the function.

- Click 'Browse'

- Navigate to your 'Census Data' folder.

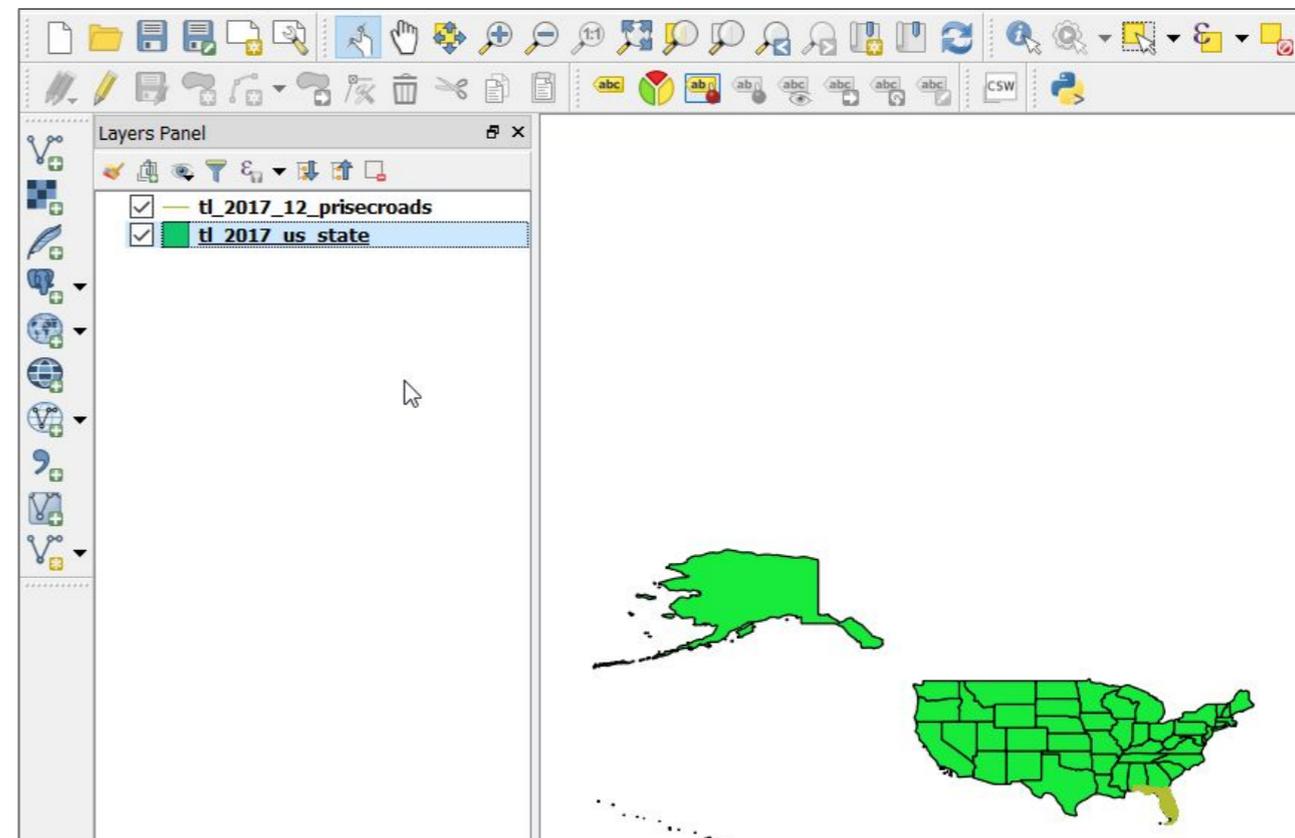
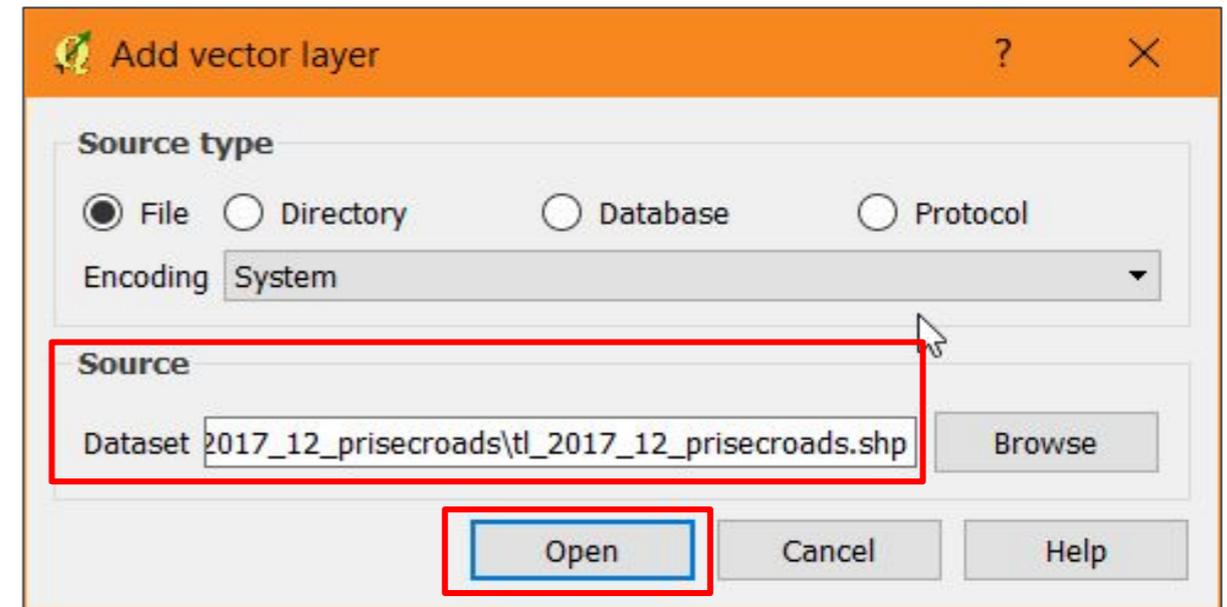
- Double click on the tl_2017_12_prisecroads folder. One file should be visible. If not, make sure that the file type is set to 'ESRI Shapefiles'

- Click 'Open'



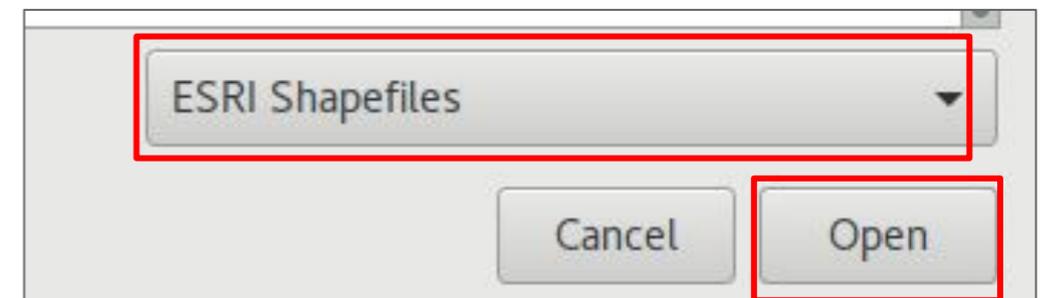
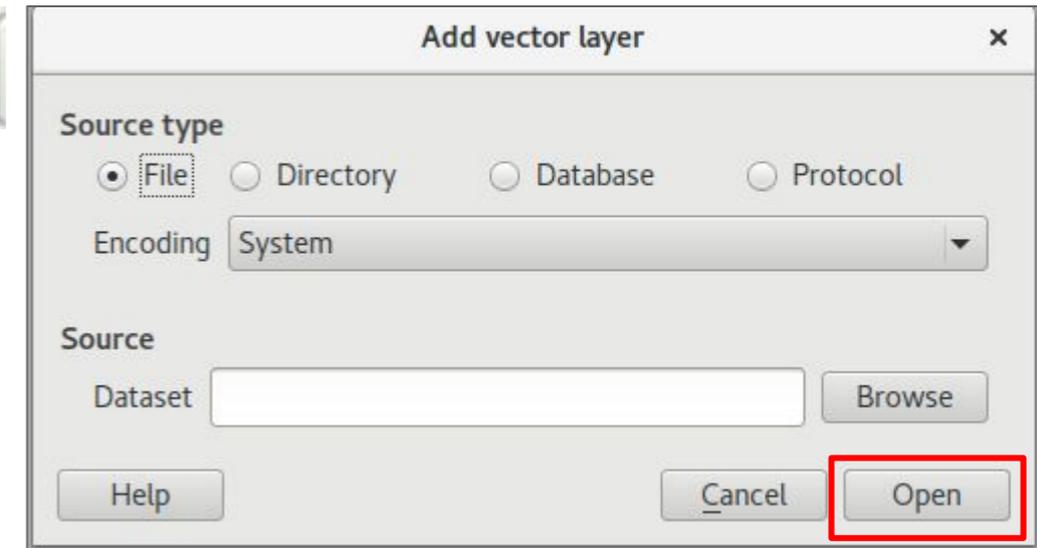
ADD VECTOR DATA - ROADS

- You will return to the original screen, and the Source window should now have the dataset name.
- Click 'Open'
- Your map view will be visible on top of a map of the United States. The Layers Panel will display the tl_2017_12_prisecroads and the tl_2017_us_state layer.



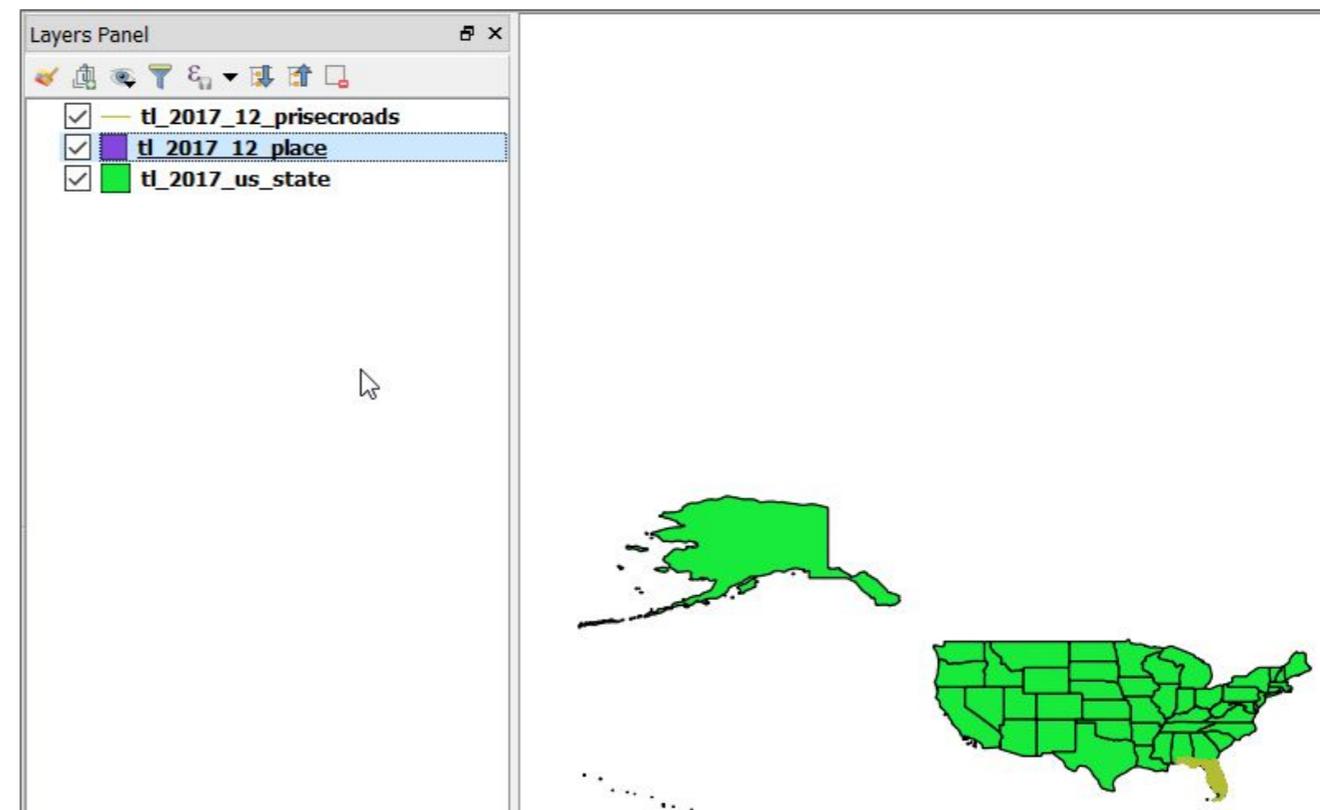
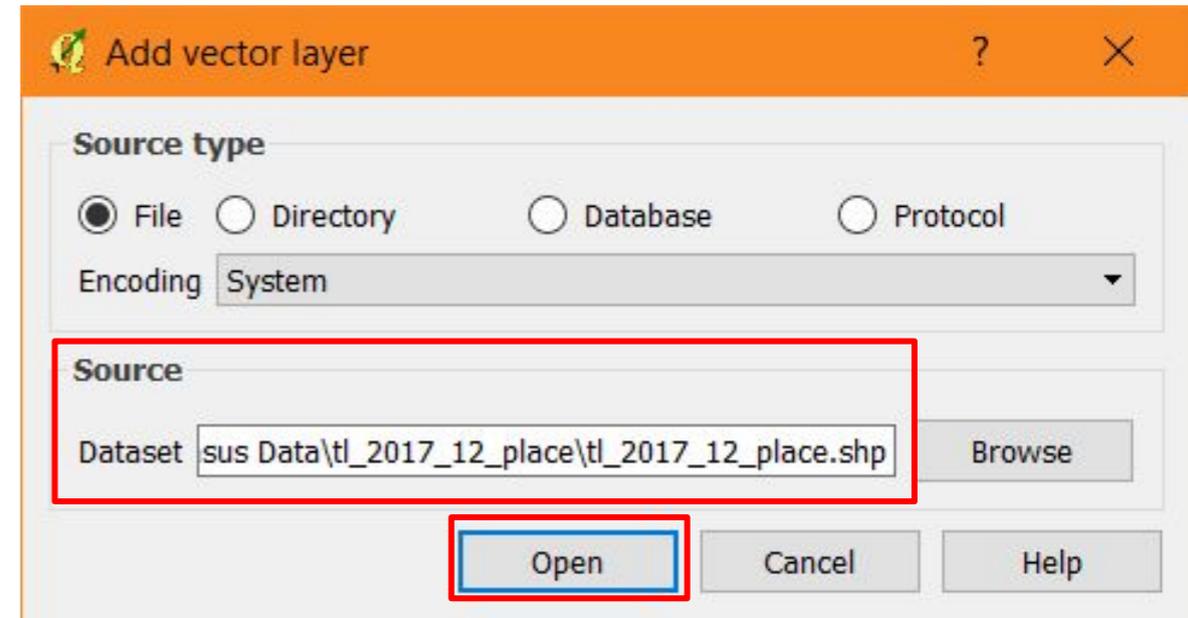
ADD VECTOR DATA - PLACES

- Click on the 'Add Vector Data' button. If you are unsure of the button, hover over each button to see the function.
- Click 'Browse'
- Navigate to your 'Census Data' folder.
- Double click on the tl_2017_12_place folder. One file should be visible. If not, make sure that the file type is set to 'ESRI Shapefiles'
- Click 'Open'



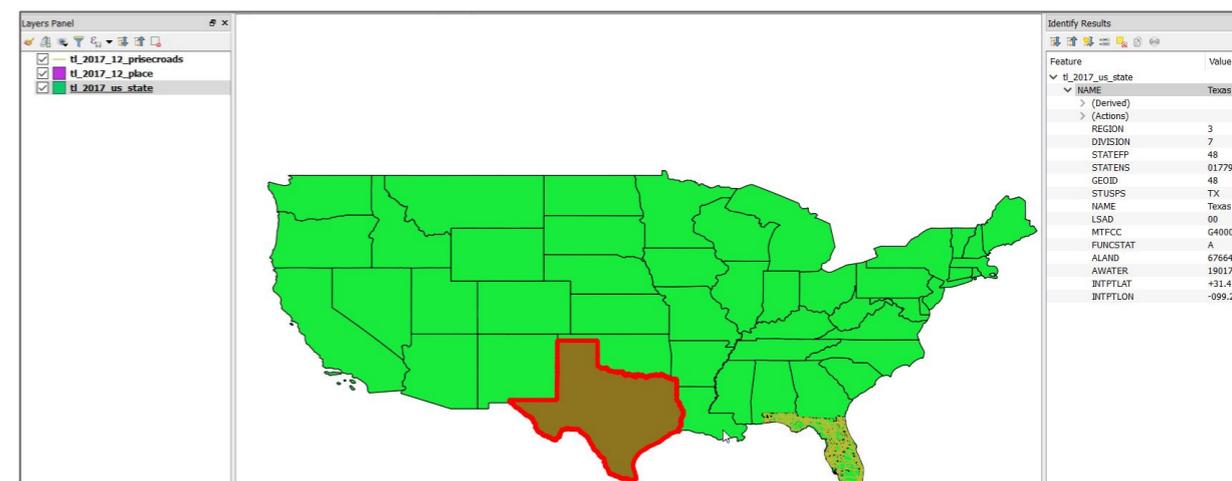
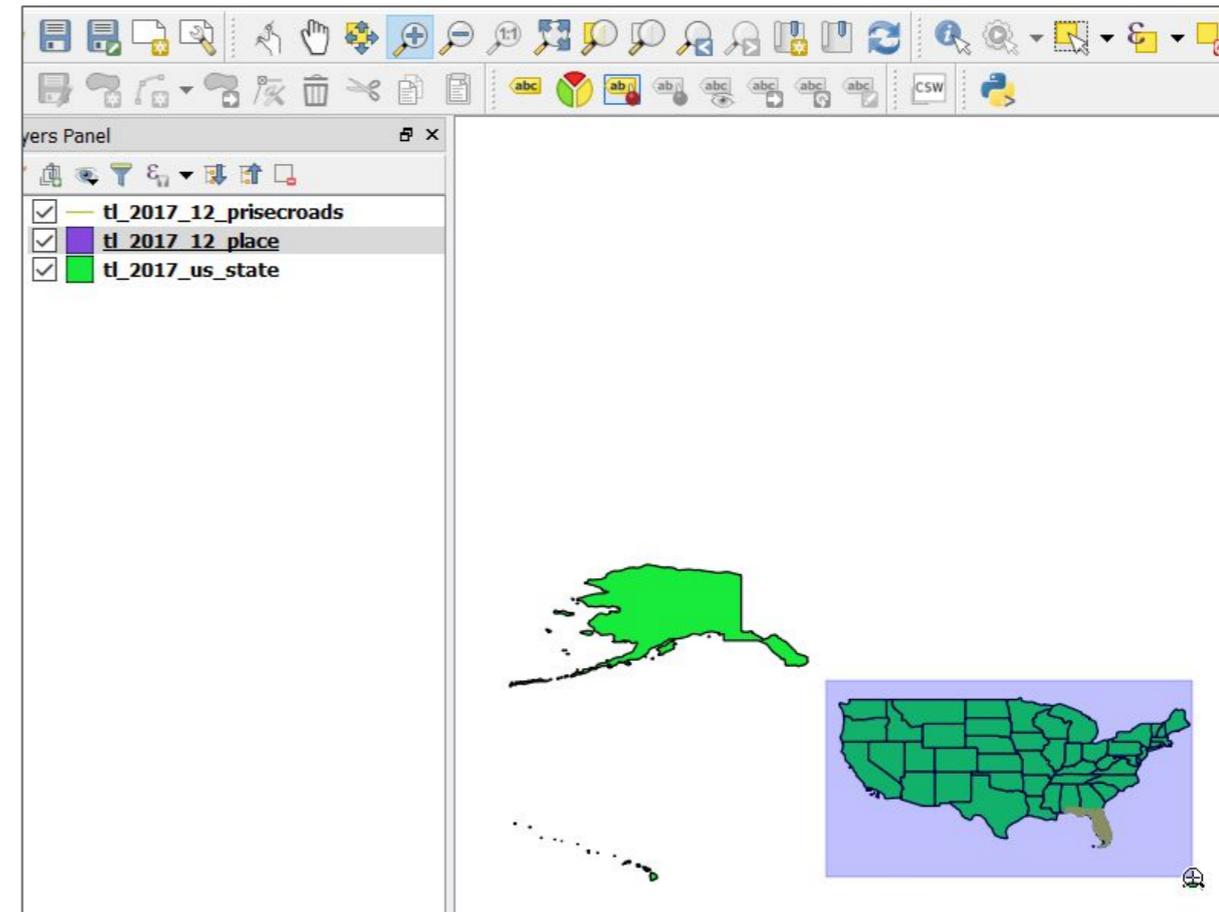
ADD VECTOR DATA - PLACES

- You will return to the original screen, and the Source window should now have the dataset name. Click 'Open'
- Your map view will be visible on top of a map of the United States. The Layers Panel will display the tl_2017_12_places tl_2017_12_prisecroads and the tl_2017_us_state layers.
- Drag and drop to reorder the layers within the Layers Panel. They will appear in the canvas as listed in the Panel.



INVESTIGATE THE DATA - IDENTIFY TOOL

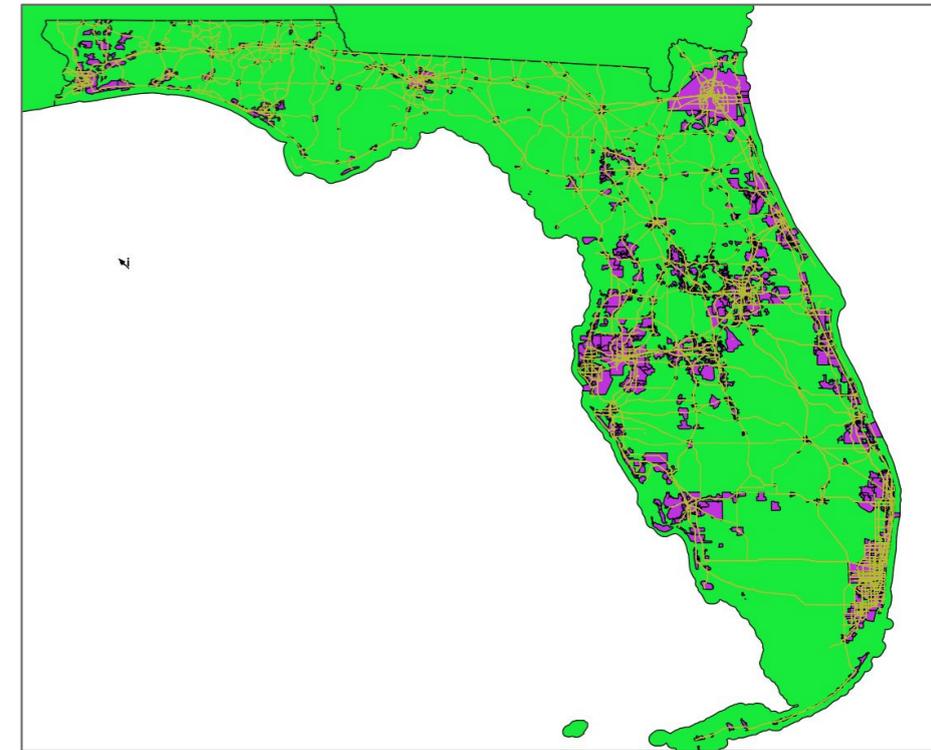
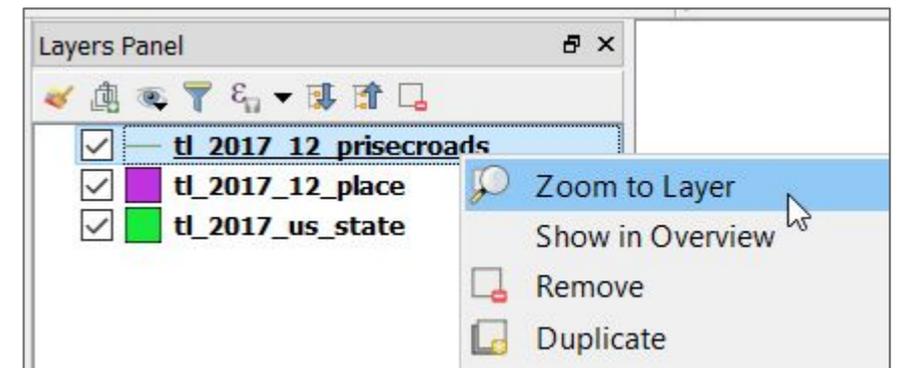
- Zoom into the continental USA by using the zoom tool  and drag to select the continental US.
- With the state file highlighted in the Layer Panel, click the  'Identify Features' tool.
- Click on what looks like Texas. The state will be outlined in red, and an information box will open, displaying the attributes of the chosen state, or feature.
- Take a minute to explore the US.
- Click in the white space around the US to unselect.



ZOOM TO LAYER

Let's zoom into Florida! There are 4 different ways to do this:

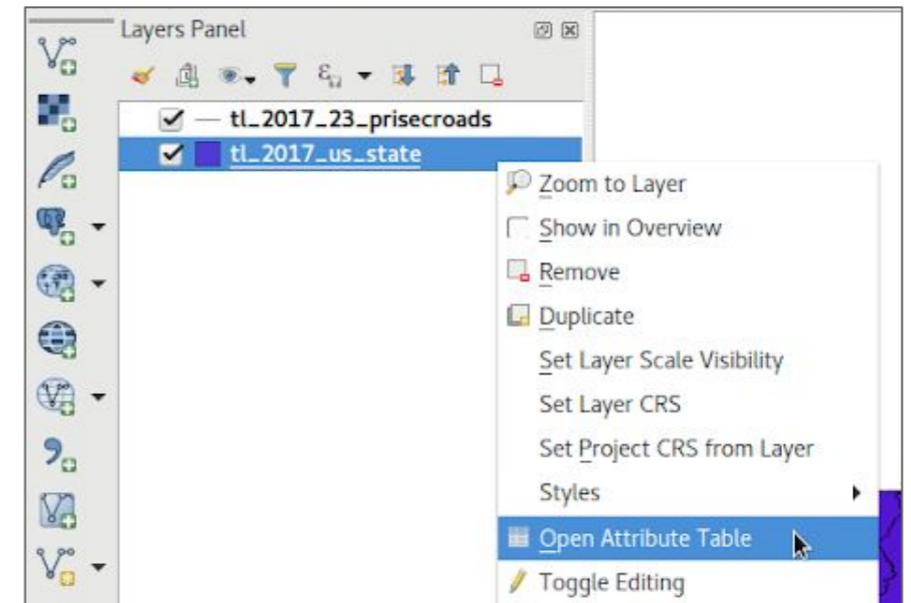
1. Use your mouse wheel and scroll forward zoom into Florida
2. Use the zoom tool  to select and zoom into Florida
3. Right click on 'tl_2017_12_prisecroads' in the Layers Panel. Choose the first option 'Zoom to Layer'. Because this is a Florida-only road layer, it will zoom to that extent.
4. Highlight 'tl_2017_12_prisecroads' in the Layers Panel. Go View > Zoom to Layer in the Menu bar.
5. Florida will appear in your Map Canvas.



INVESTIGATE THE DATA - ATTRIBUTE TABLE

Attribute tables contain the data related to each feature, and are a fundamental part of a GIS.

- Open the Attribute Table by right clicking on tl_2017_us_state then clicking on Open Attribute Table OR highlight the layer in the Layer Panel and Click 
- Take time to explore.



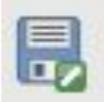
Shows total number of features. Here, US states and territories

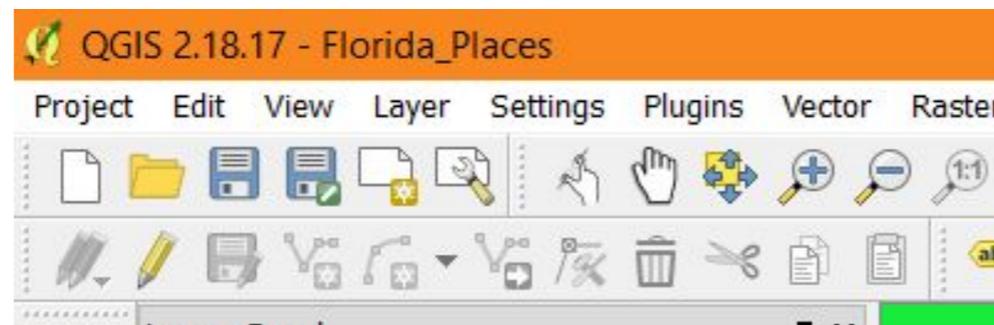
tl_2017_us_state :: Features total: 56, filtered: 56, selected: 1

	STATEFP	STATENS	GEOID	STUSPS	NAME	LSAD	MTFCC	FUNCSTAT	ALAND	AWATER	INT
1	54	01779805	54	WV	West Virginia	00	G4000	A	62265662566	489840834	+38.6
2	12	00294478	12	FL	Florida	00	G4000	A	138911437...	31398800291	+28.4
3	17	01779784	17	IL	Illinois	00	G4000	A	143784114...	6211277447	+40.1
4	27	00662849	27	MN	Minnesota	00	G4000	A	206229176...	18944967530	+46.3
5	24	01714934	24	MD	Maryland	00	G4000	A	25150696145	6980371026	+38.9
6	44	01219835	44	RI	Rhode Island	00	G4000	A	2677997539	1323452846	+41.5
7	16	01779783	16	ID	Idaho	00	G4000	A	214048160...	2393355752	+44.3
8	33	01779794	33	NH	New Hamps...	00	G4000	A	23187445452	1028643155	+43.6
9	37	01027616	37	NC	North Caroli...	00	G4000	A	125919712...	13470113896	+35.5
10	50	01779802	50	VT	Vermont	00	G4000	A	23873457570	1031134839	+44.0
11	09	01779780	09	CT	Connecticut	00	G4000	A	12542619303	1815495323	+41.5
12	10	01779781	10	DE	Delaware	00	G4000	A	5047241079	1398670234	+38.9

Each row represents a feature. In this case, a state

SAVE THE MAP PROJECT

- To save your map, Click  OR on the Menu Bar go to 'Project' > 'Save As' - and a save window will open.
- Navigate to your Census folder. Name the project 'Florida Places' and Click 'Save'
- The project name should now be at the top of your program window



In the next Module, you will learn how to style these layers and compose a printed map.

Please keep QGIS open if you are continuing to Module 3.

NEXT IN THE PATH - GIS MODULE 3

QGIS BASICS II: DESIGN A MAP

