Using QGIS

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Outline

- QGIS overview
- GIS Data files
- Basic operations
- QGIS interface
- Follow along

QGIS

QGIS is a powerful software built by many developers as a free, open-source tool to perform GIS tasks.

Open-source indicates that it's programming, content, and design are open to use and modification by anybody*

* Some terms apply: Some licenses do not allow commercial use.

GIS

While other open-source GIS software exist (e.g. DIVA-GIS), QGIS is the most popular and best supported.

Another software that is important to know about is ArcGIS, developed by ESRI. All of the principles and techniques learned for QGIS are able to translate over to ArcGIS. Fortunately, there is no cost for QGIS. Some of the higher-end tools are less elegant in QGIS, but there is a lot of overlap.

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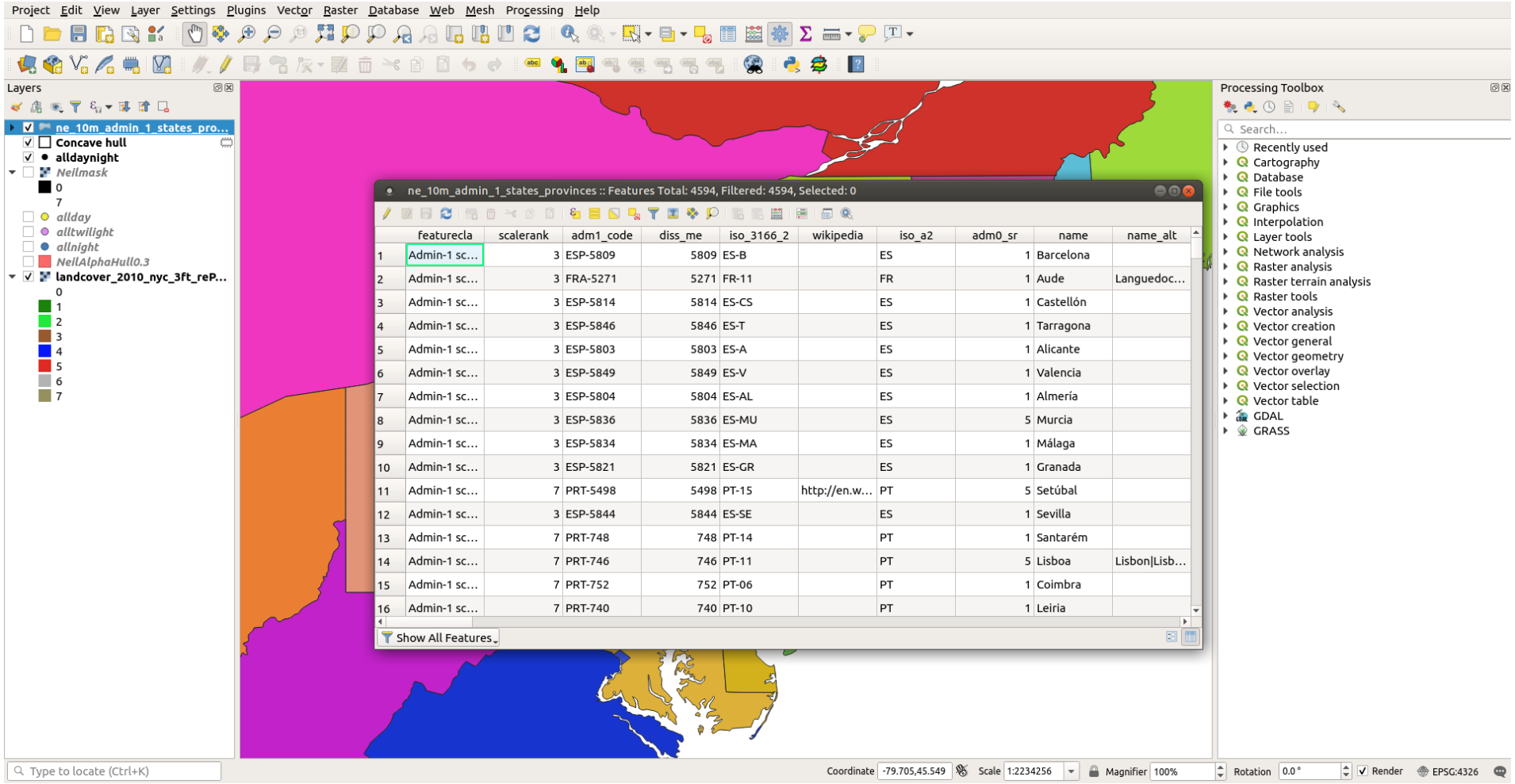
Vector Data Files

The most common type of vector data (polygon, point, line) you will come across are “shapefiles”. These data are usually broken up into many ancillary files that help to plot the data.
These file types were developed by ESRI, the developer of arguably the most popular GIS software: ArcGIS.

.shp file is the geometry file that described the shapes
.shx file is the “index” file used for plotting
.dbf file contains the database that is paired with each shape. This is where the shape’s attribute table is found
Other files:
.prj contains information relating to the projection of the shape

When managing your GIS data, you **MUST** keep all shapefile ancillary files together in the same directory.
The easiest way to do this without using a databasing software (e.g., ArcCatalog, DB Manager) is to save shapefiles into their own directory.

Attribute Table



	featurecla	scalerank	adm1_code	diss_me	iso_3166_2	wikipedia	iso_a2	adm0_sr	name	name_alt
1	Admin-1 sc...	3	ESP-5809	5809	ES-B		ES	1	Barcelona	
2	Admin-1 sc...	3	FRA-5271	5271	FR-11		FR	1	Aude	Languedoc...
3	Admin-1 sc...	3	ESP-5814	5814	ES-CS		ES	1	Castellón	
4	Admin-1 sc...	3	ESP-5846	5846	ES-T		ES	1	Tarragona	
5	Admin-1 sc...	3	ESP-5803	5803	ES-A		ES	1	Alicante	
6	Admin-1 sc...	3	ESP-5849	5849	ES-V		ES	1	Valencia	
7	Admin-1 sc...	3	ESP-5804	5804	ES-AL		ES	1	Almería	
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9	Admin-1 sc...	3	ESP-5834	5834	ES-MA		ES	1	Málaga	
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11	Admin-1 sc...	7	PRT-5498	5498	PT-15	http://en.w...	PT	5	Setúbal	
12	Admin-1 sc...	3	ESP-5844	5844	ES-SE		ES	1	Sevilla	
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14	Admin-1 sc...	7	PRT-746	746	PT-11		PT	5	Lisboa	Lisbon|Lisb...
15	Admin-1 sc...	7	PRT-752	752	PT-06		PT	1	Coimbra	
16	Admin-1 sc...	7	PRT-740	740	PT-10		PT	1	Leiria	

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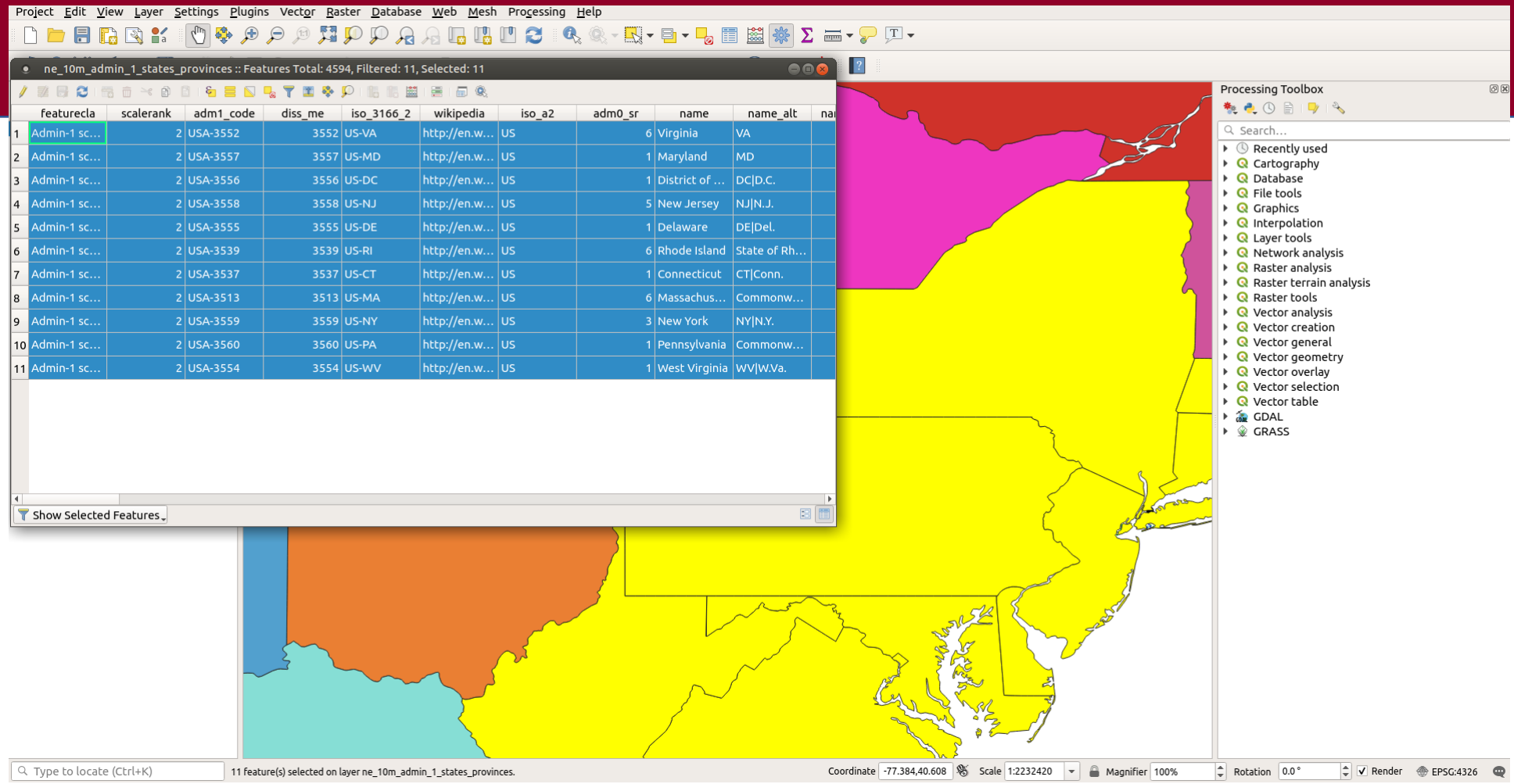

The table is paired with geographic data and can be queried graphically, and through basic SQL.

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Raster Data Files

Since rasters are essentially grids, many types of files can be plotted as rasters.
The most popular are:

1. GeoTiff – .tif files with geography metadata associated (origin, x, y, information)
   These are by far the most popular in biology
2. Ascii – .asc files are text files with geography metadata in the header

3. netCDF – .cdf files are popular with some older datasets

There are many more, but you are most likely to come across these. Since rasters are essentially image files, even .jpg or .jpeg files can be used.

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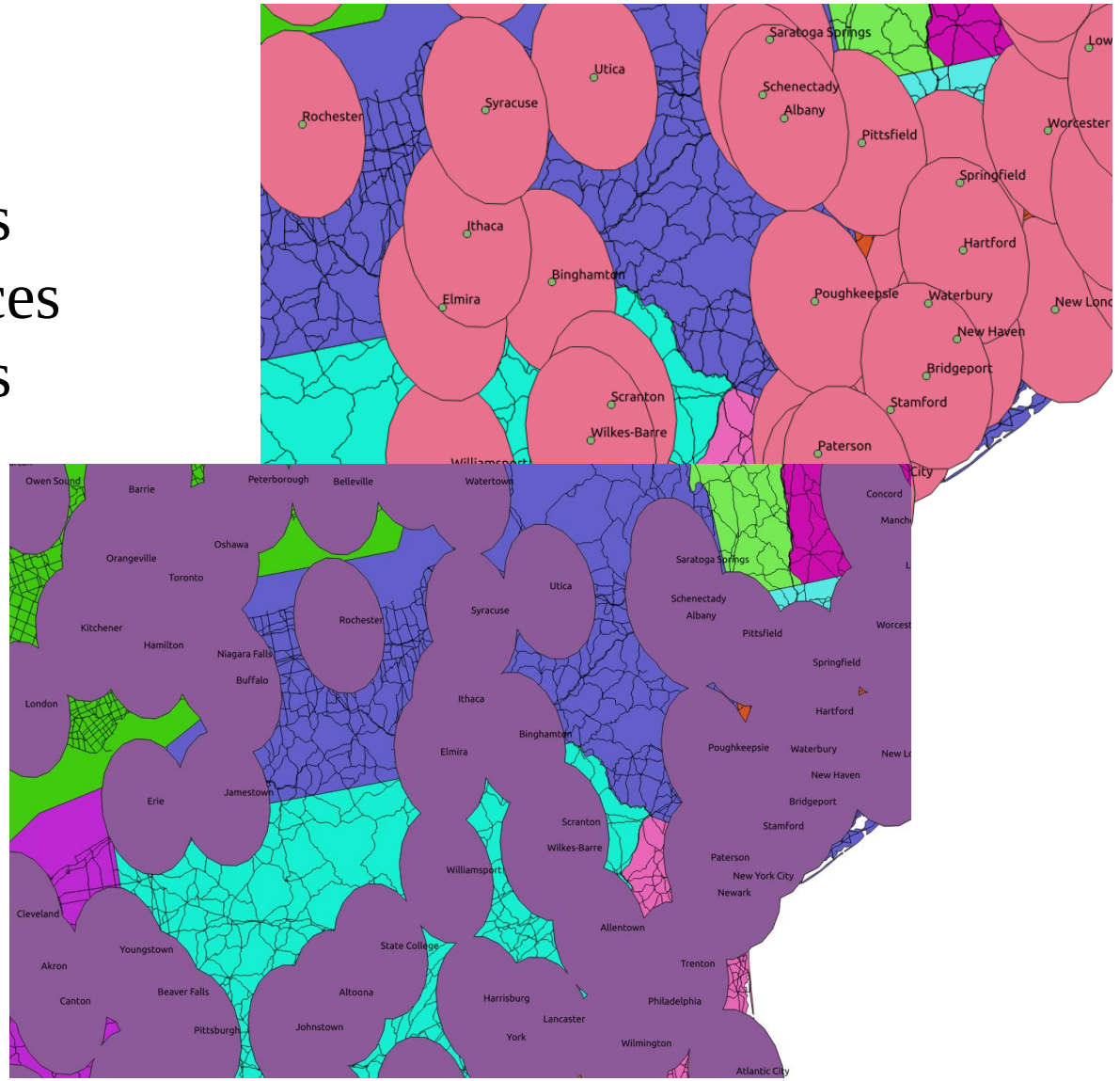
GIS operations

Spatial analyses.

- Buffers
- Dissolves
- Differences
- Centroids
- Masks



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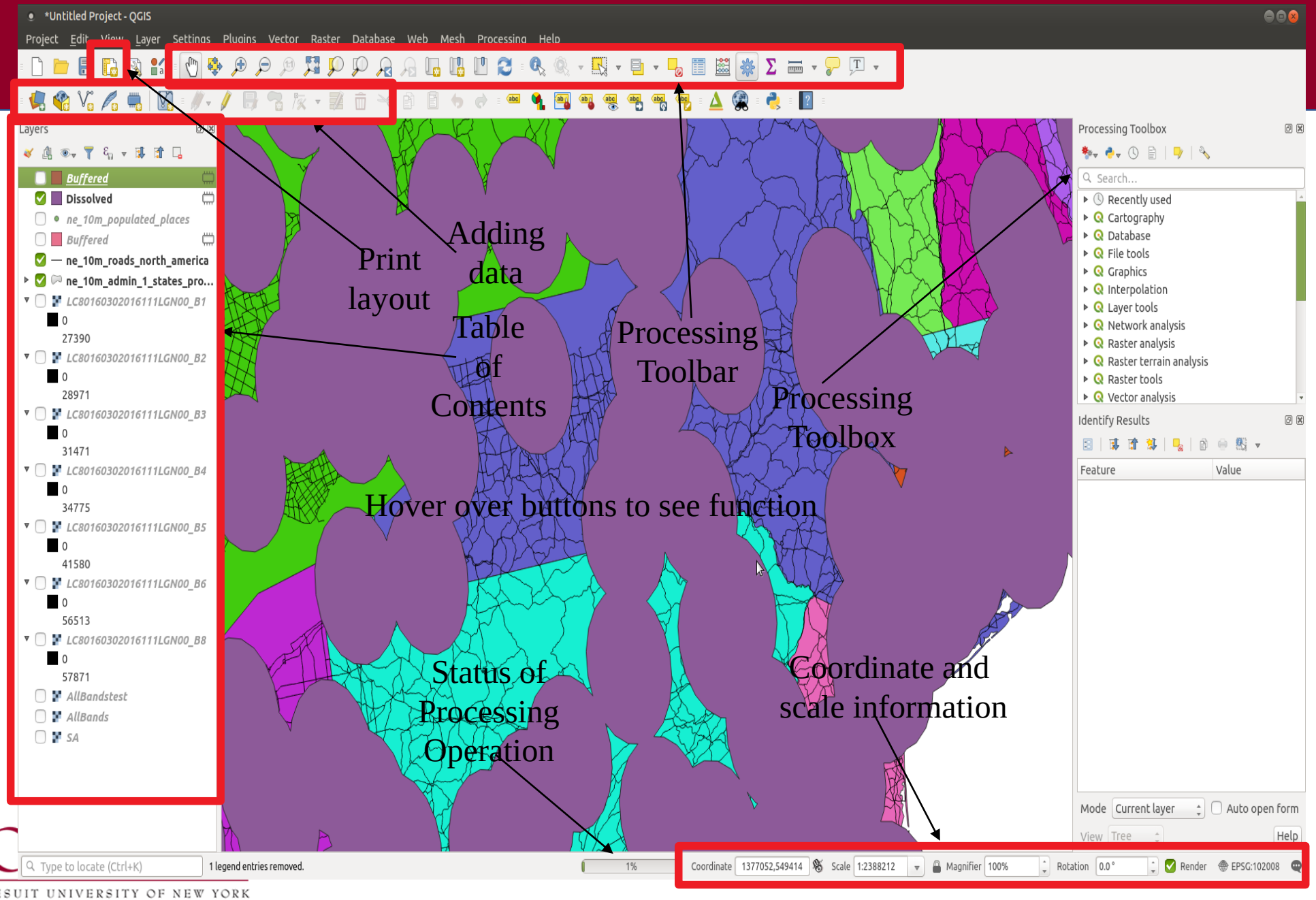

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Follow Along

- Mapping nearby **Bigfoot!** sightings.

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Follow Along

- **Bigfoot analysis: Data**

1. Find vector data online
   1. Navigate to naturalearthdata.com and download large scale states and provinces

2. Download bigfoot occurrence from Courseworks

These data come from the Bigfoot Research Organization and were accessed from the R package 'plotKML'; Hengl et al., 2015

Follow Along

Add the data to QGIS:

Vector data:

Easily dragged into the map pane

Point data:

Must be added through the "Add delimited text layer" button

Follow Along

Data can be subset in a number of ways:

1. Open up the attribute table for the states/provinces layer and explore it.

Sort the column header “admin” by clicking on it and scroll to “United States of America” and highlight all of these rows. (there should be 51 – why?)

Right click on the layer and export>Save selected features as…

2. Using “Select features by area or single click” tool, highlight the northeastern states and save as a new layer

Follow Along

Data can be subset in a number of ways:

2. Using "Select features by area or single click" tool, highlight the northeastern states and save as a new layer

3. Using "Select by location" tool, find all Bigfoot sightings within the northeastern states. Save these as a new layer.

Follow Along

Change custom colors for points and states.

Add labels for states

Follow Along

First, take a look at some examples of bad maps:

https://blog.stratasan.com/bad-maps-bad-maps

https://sites.psu.edu/swabmaps/2014/03/28/good-and-bad-maps/

Follow Along

Using the “Print Composer” tool, create a map

All maps should include:
1. Map Contents – what are you showing
2. Legend – how does the viewer interpret
3. Title
4. Scale bar – usually in km, but depends on context
5. North Arrow – for orientation
6. Data source