Selecting Research Specimens using Occurrence Data in QGIS

Created by: Cecily D. Bronson, The George Washington University

INTRODUCTION

This is an optional extension to the main activity in *Mapping Specimen Occurrence Data in QGIS* (Bronson, 2023). In this activity, you will learn how to select specific specimens using two tools in QGIS: Select Features by Area and Select Features by Value. Being able to separate specimens from your original shapefile and create additional, more specific, shapefiles will aide you in making more complex maps and in your analysis. Lastly, you will export the attribute tables of these new shapefiles as CSV files.

In this activity you will:

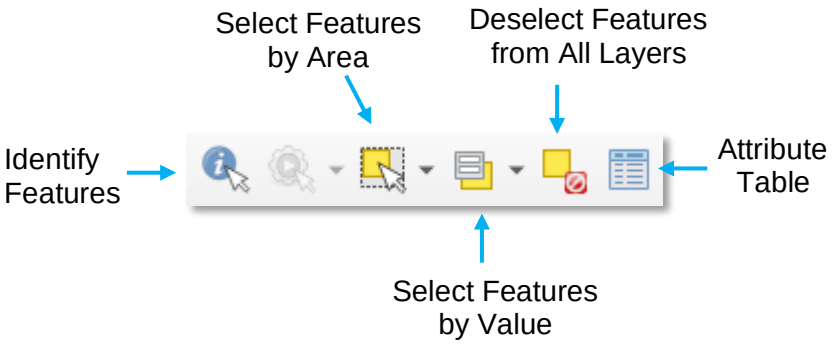
1. Select specimens by area
2. Select specimens by value
3. Export selected specimens as a new shapefile
4. Export attribute tables as a new CSV file

Before you begin:

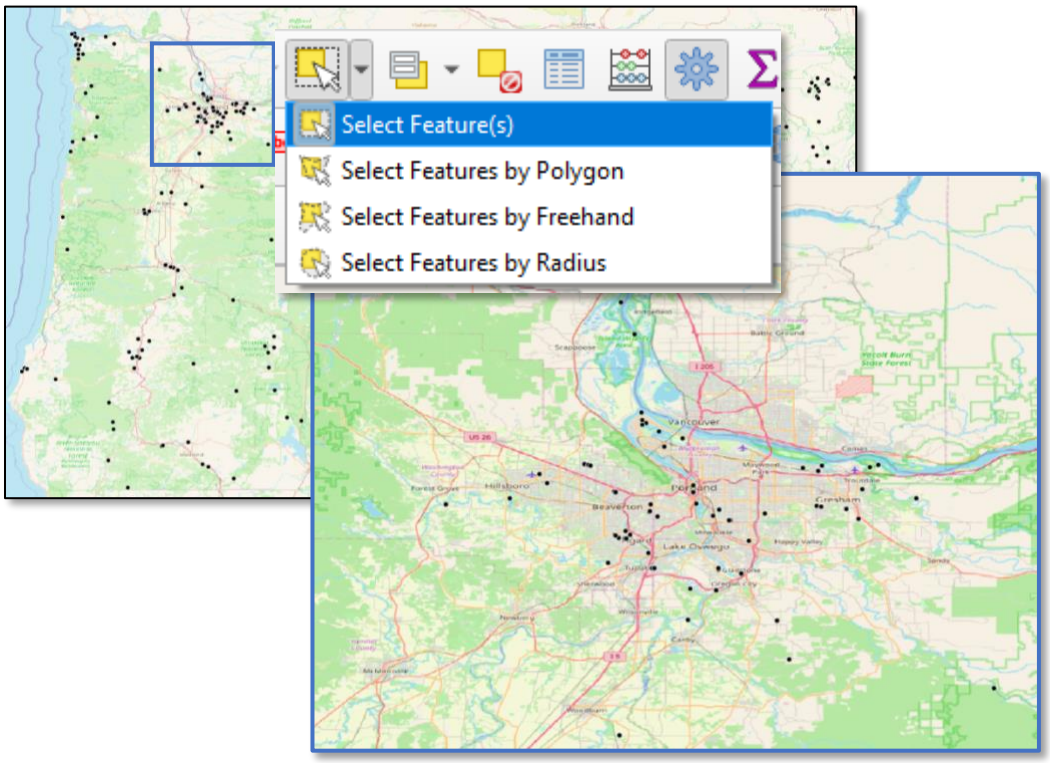
This is an optional extension to the Mapping Specimen Occurrence Data in QGIS activity. Please refer to that document before you begin this activity. This extension is best suited to **start after "Step 3: Open the Attribute Table"**.

STEP 1: SELECT SPECIMENS BY AREA

In this step, you will select the beaver records in the Portland Metropolitan area using the box and freehand selection tools. Once selected, you will export them as a new shapefile. You will use various buttons from the Attributes Toolbar (shown below). If you do not see this toolbar, turn it on by going to View >> Toolbars >> Attributes Toolbar and checking the box.

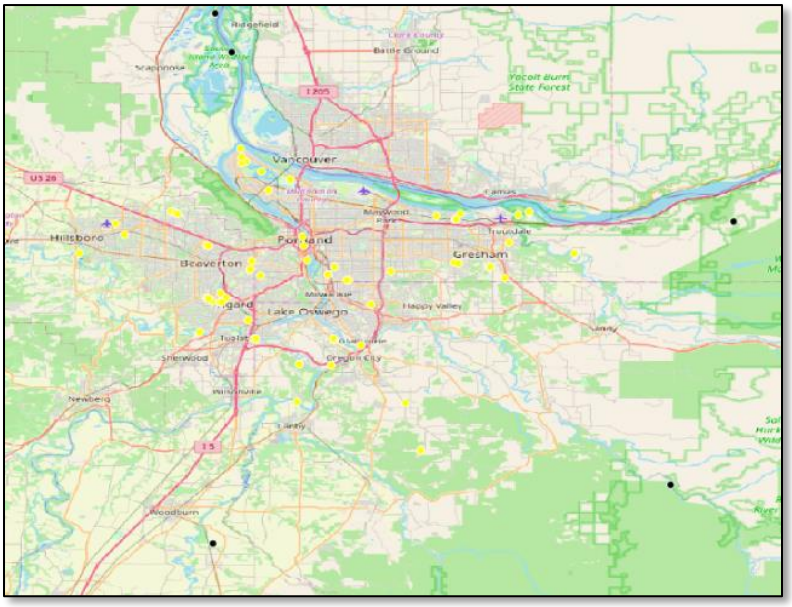


1. Select the Beavers shapefile layer and right-click (or command click for a Mac) and choose Zoom to Layer. You will now see the full extent of the distribution of the Beaver occurrence data.
2. Zoom in to the greater Portland area so your view looks something like the image below.

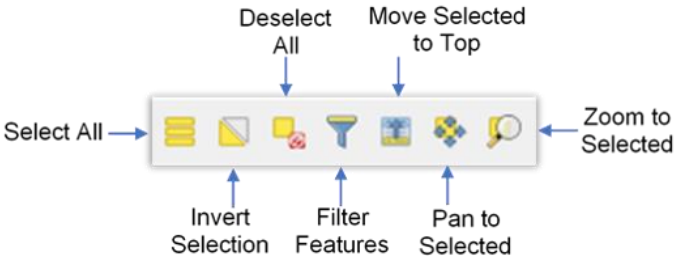


3. Click the Select Features by Area tool and choose Select Feature(s).

4. Draw a box around the Portland area using the neighborhoods of Vancouver, Forest Grove, Canby, and Sandy as boundaries. You will see something like the image below- the selected records are shown in yellow.



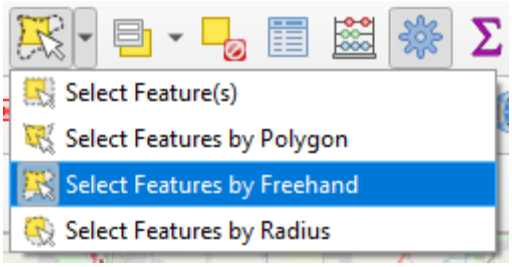
5. Open the Attribute Table (toolbar shown below). There are now a number of records highlighted.



6. Move the selected records to the top of the Attribute Table and explore the records you have selected. Reference Step 3.5 from *Mapping Specimen Occurrence Data in QGIS* to navigate the attribute table. How many records have you selected?
7. Export the selected features as a new shapefile by right-clicking on the beavers layer and choose Export >> Save Selected Features as and save this shapefile in your mapping folder. Name it "Portland_Beavers".
8. Save your project!
9. Try selecting the Portland beavers again, but this time use the Select Features by Radius tool. This tool allows you to select records within a set distance from a central point. Click on the center of Portland and drag your mouse out so that the circle covers the same area that your box covered. How many records are selected with this tool? Do you see a benefit to using this tool over the box?

Note: If you run into an issue with your map units being shown in degrees and not meters, this is an issue with the Coordinate Reference System (CRS). We set the CRS to WGS 84 EPSG: 4326, and while this is a default CRS, it is projected onto a sphere, so it uses 3D units which are degrees.
To get a 2-D unit of length, meters, you'll need to change your CRS to something which uses meters, not degrees. Go to Project >> Properties, select the CRS tab and search for EPSG: 3857. Select the option that says WGS 84 Pseudo-Mercator ESPG: 3857, click Apply, and then OK. Your map units should now be in meters.

10. Finally, use the Select Features by Polygon or Freehand tool to divide the new Portland beaver shapefile into east and west groups. Use the Willamette River, which runs north-south through the center of the city, as the dividing boundary.



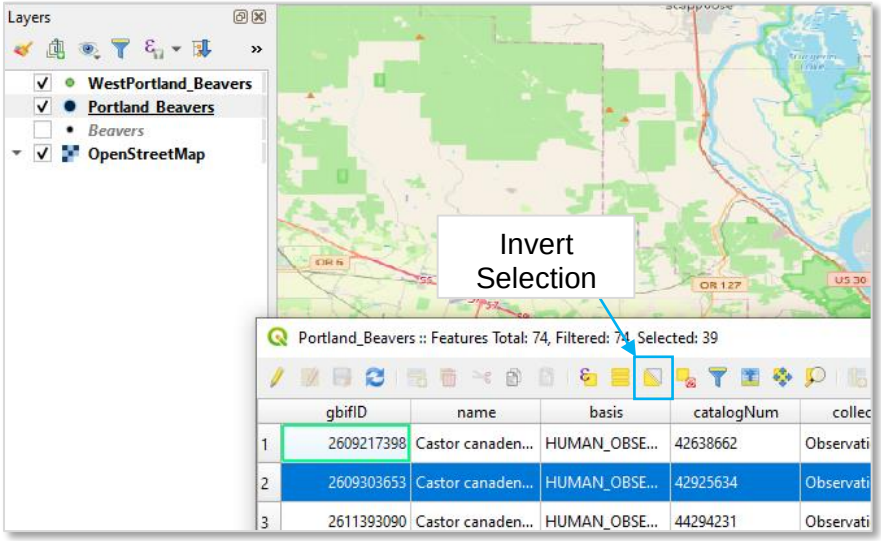
a. To use the polygon tool, click on the map to create your vertices to change the shape of your polygon. if you need to start over, just right-click.

b. To use the freehand tool, click once to start drawing with your mouse, and click once when you have made the desired shape.

11. Once you have your west group selected, export that as a new shapefile following the same instructions from step 6. Name the new shapefile "WestPortland_Beavers".

12. Save your project!

13. For the east group, you don't need to use the tool again. With the west group beavers still selected in your Portland_Beaver shapefile, open its Attribute Table and click Invert Selection (see image below). This will unselect your west group and select all the other records instead. That will be your east group. Save that as a new shapefile "EastPortland_Beavers".



14. Save your project and then deselect all features.

15. You should now have a total of four shapefiles on your map that you can play around with:

a. Beavers

b. Portland_Beavers

c. EastPortland_Beavers

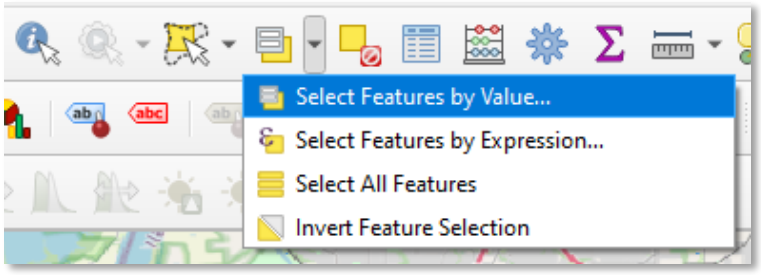
d. WestPortland_Beavers

Now that you have used a few of the Select Features by Area tools, compare the utility of each. Can you imagine different scenarios that you might run into during your research where you would choose one tool over another? Can you think of a situation where using the Radius would be more beneficial than the Polygon? What about Freehand versus Box?

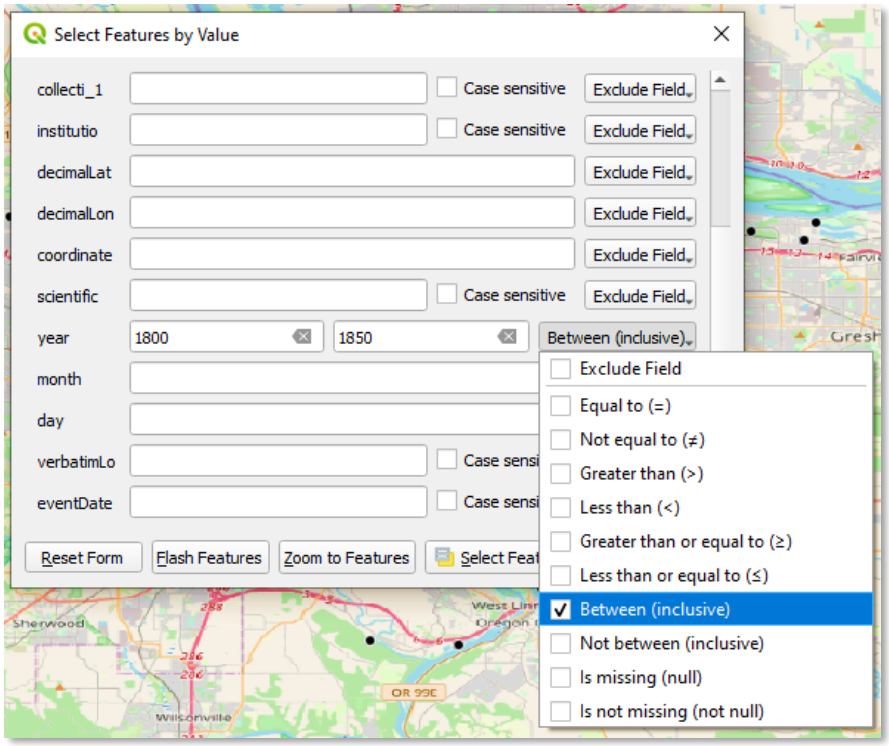
STEP 2: SELECT SPECIMENS BY VALUE

Besides area, you may want to select and separate specimen records by some value in your data. In this example, we are going to use the year collected to separate all the beaver records into 50-year interval groups. Based on the data in the attribute table, the earliest record we have is from the 1800. You will create 5 new shapefiles from this step, but you are free to choose a different number of years for your interval (10, 20, 25…).

1. Uncheck the shapefiles you created in Step 1. You will use the “Beavers” shapefile for this step.
2. Select the “Beavers” shapefile and click the Select Features by Value tool.



3. In the new window that pops up, scroll down to the year section and from the drop-down menu on the right-hand side, choose “Between”. Then enter the start and end years for your first interval.

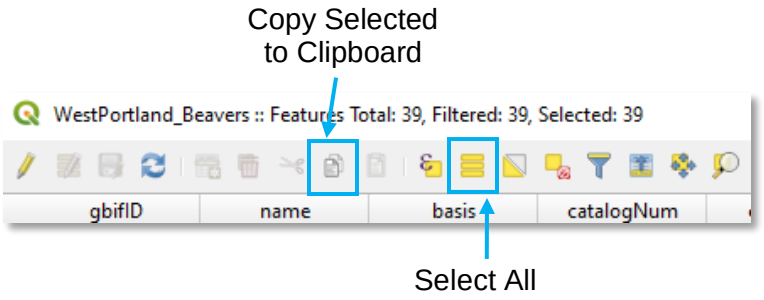


4. Click “Select Features” and close the window.
5. Export those selected features and save them as a new shapefile with an appropriate and informative name.
6. Save your project!
7. Deselect all features and repeat for your remaining year intervals.

STEP 3: EXPORTING ATTRIBUTE TABLES TO CSV

Once you have your data separated how you would like, it might be helpful to save these new shapefiles as new CSV files for your data collection. There are a few ways to do this, but we will cover two. There is a simple copy and paste method that requires removing one added column, or you can export the data as a CSV file straight from QGIS.

Copy and Paste Method



1. Open the attribute table for the “WestPortland_Beavers”.
2. Select all the records and copy them to your clipboard.
3. Open a new excel sheet and paste. Save as a CSV.
4. There will be a new column (wkt_geom) at the very beginning that the QGIS program used to assign geospatial data to your point (notice it has the GPS coordinates in it). Delete that column.

	A	B	C	D
1	wkt_geom	gbifID	name	basis
2	Point (-122.75198600000000226 45.40872099999999989)	2.543E+09	Castor ca	HUMAN_
3	Point (-122.80623400000000345 45.51201199999999858)	2.58E+09	Castor ca	HUMAN_
4	Point (-122.85303700000000049 45.55748299999999773)	2.579E+09	Castor ca	HUMAN_

Export as CSV file Method

1. Select “EastPortland_Beavers”. Right-click and go to Export >> Save Features As.
2. In the new window, choose “Comma Separated Value” (CSV) from the file format drop down menu.
3. Browse to your project folder, and save the file there. This will give you a perfect copy of your attribute table, minus the extra column that appears when you copy and pasted with the “WestPortland_Beavers”.

You now have more tools to select, separate, and analyze your data based on your research goals. Now, you may continue with “Mapping Specimen Occurrence in QGIS” starting at Step 4 to symbolize your layers and make a basic map.