32.23123° N / -110.94909°W

UA Libraries Data Cooperative Unit's

GIS TUTORIALS

OPENING QGIS AND STARTING A PROJECT

QGIS

SOFTWARE USED

1

TUTORIAL NUMBER

★★☆☆

DIFFICULTY LEVEL

★★★★

LEVEL OF STOKE

HARDWARE NEEDED:

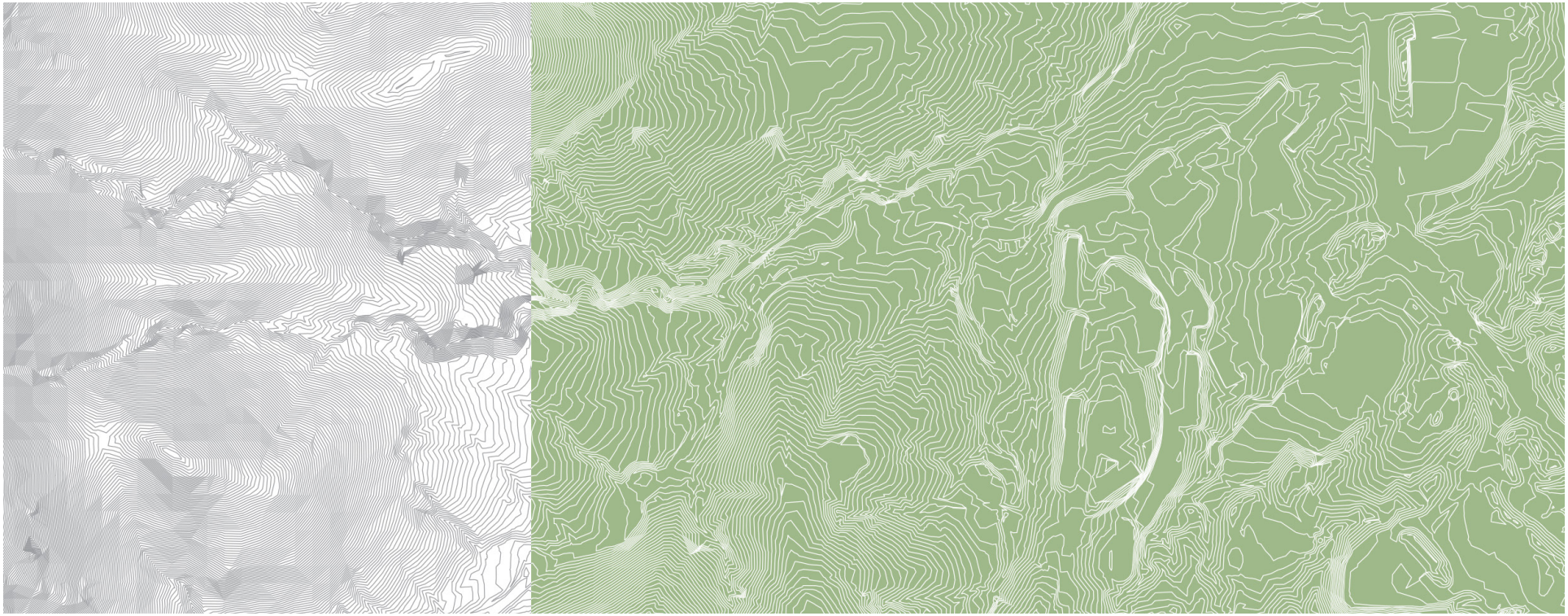
desktop or laptop computer running Windows, Mac, or Linux

internet connection

SOFTWARE NEEDED:

QGIS

UNIVERSITY LIBRARIES
Data Cooperative



INTRODUCTION

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The purpose of this tutorial is to teach you how to do basic data wrangling tasks in QGIS. Oftentimes when you download secondary (data that is collected by someone else) GIS data it may be larger than the study area that you are interested in, or contain observations that may not be useful to the analysis that you are going to undertake. Most, if not all, GIS projects contain some form of data wrangling tasks that will provide you with geospatial data that is more relevant to your intended project.

Please note: This tutorial is a continuation of the previous tutorial, please refer to this tutorial in order to follow this tutorial in its entirety.

Upon completion of this tutorial, you should be comfortable:

1. Use the attribute table to create a subset of geospatial data based on different query types.
2. Use the clip tool to create a subset of data based on geographic locations.

REOPENING A PREVIOUS PROJECT

Reopen the QGIS project you created in the previous tutorial and make sure the following shapefiles are added to the map:

Dam
CO4
Water_Basins
Your selected Basemap

1. Right-click on the Dam feature layer and select Open Attribute Table.

2. The attribute table contains all the attributes (characteristics) of the individual feature and is displayed as a table of rows (features) and columns (attributes) contained within the shapefile.

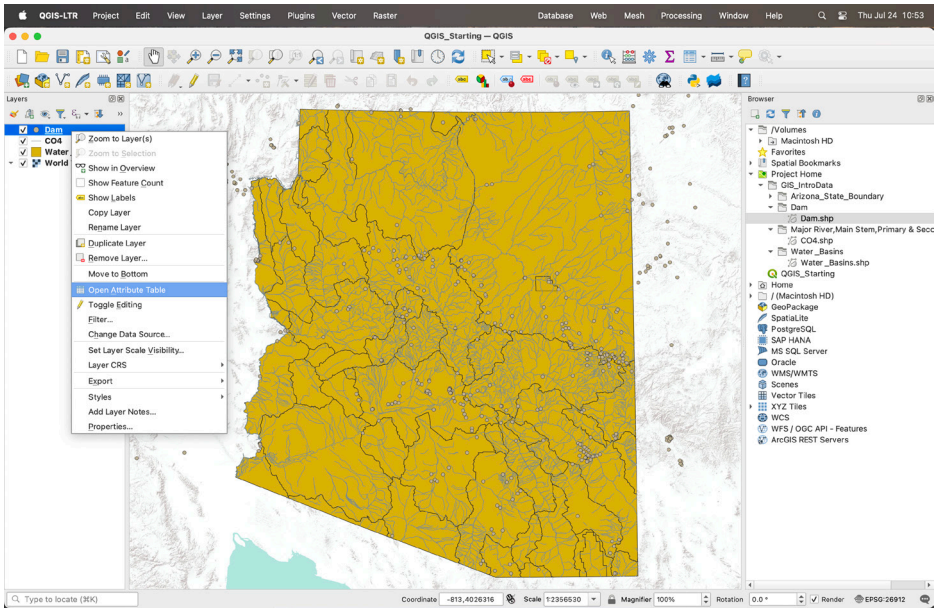
ATTRIBUTE TABLES:

Attribute tables consist of the following characteristics:

- Tables that contains rows
- All rows in the table have the same fields
- Each column has a data type (integer, decimal, number, character, date)

HELPFUL HINT:

Whenever loading new data into a GIS project it is good practice to (1) place the data on the Map to ensure that it is contained within your study area and to (2) open the attribute table after loading the data into the Contents pane to make sure that there are attributes listed that will ensure that you are able to complete your GIS analysis.



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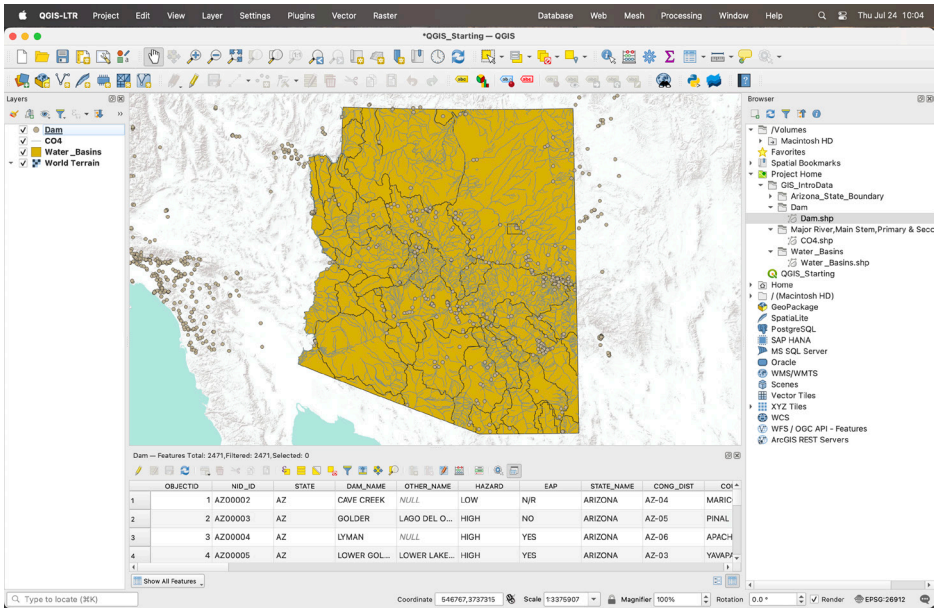

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SIMPLE DATA QUERY AND CREATION

1. In the Dam attribute table click on the Select features using an expression.

2. In the Dam - Select by Expression window complete the following steps.

   Expand the Field and Values and double-click on STATE in the middle window.

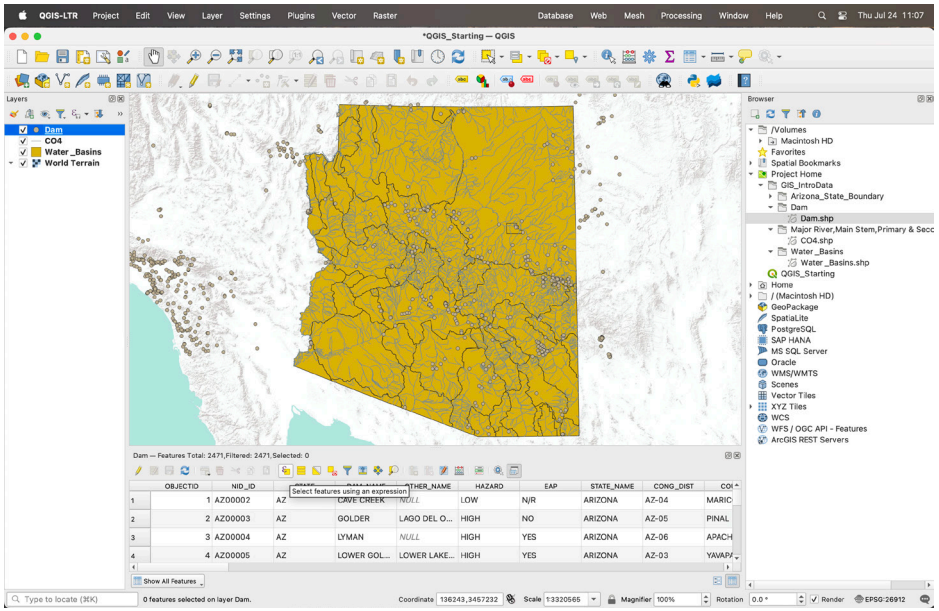
   Double-click on the = operator in the expression window.

   Click on All Unique in the right-hand window and then double click on AZ.

   Your expression should read:
   “STATE” = “AZ”

   Click on Select features.

   Click on Close.



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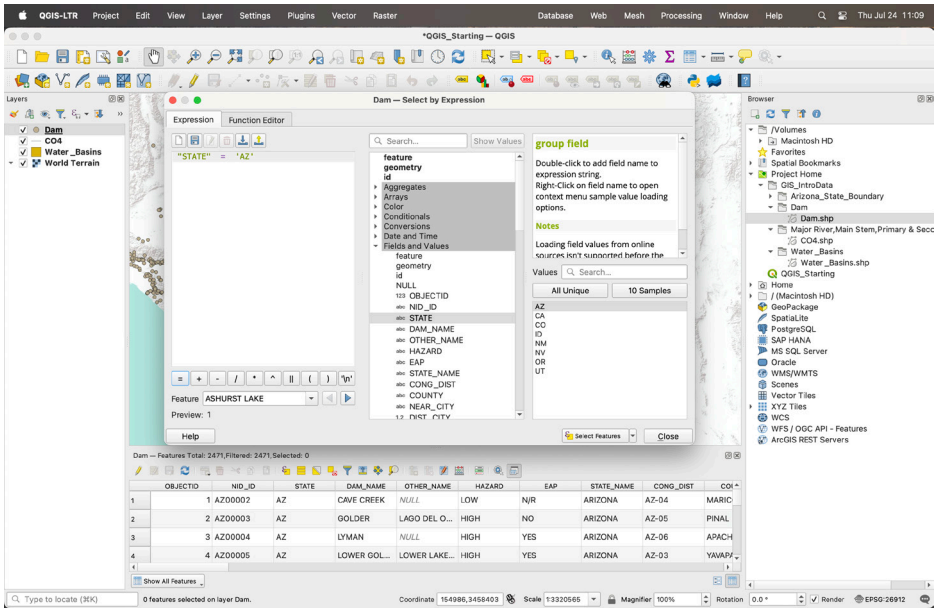

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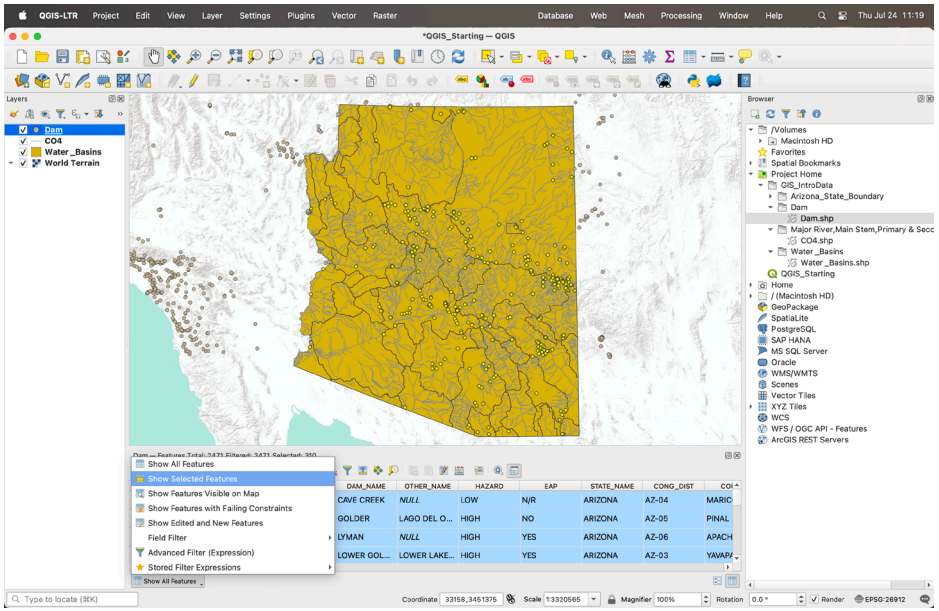
SELECT BY EXPRESSION:
The Select By Expression window allows you to select features in a map based on a certain attribute (characteristic). It allows you to create a subset of the data based on a defined conditional statement.

In this case, you are asking QGIS to select all the features (rows) in the Dam feature layer that are located in Arizona. This is a conditional analysis and the condition is dams that are located in Arizona.

3. On the bottom left-hand corner of the Dam attribute table click on Show All Features and select Show Selected Features.

Notice that there are 310 of the 2,471 dams in the west that are located in Arizona. Also notice that the dams are also highlighted in the Map View window.

4. Right-click on the Dam feature layer and select Export and then Save Selected Features As...



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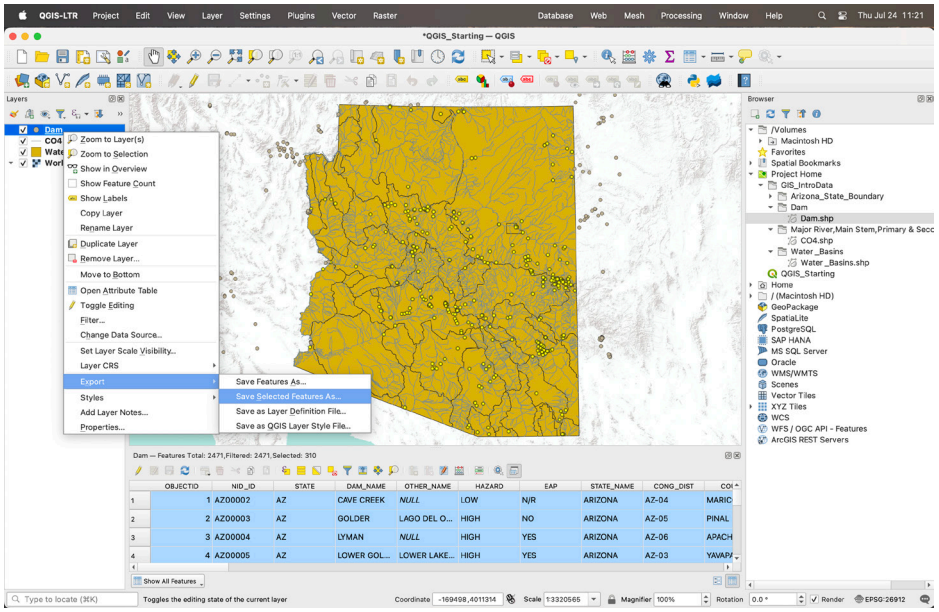

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5. In the Save Vector Layer as... window choose ESRI Shapefile as the Format and choose a location, preferably within the project's folder, to save your shapefile.

Click OK.

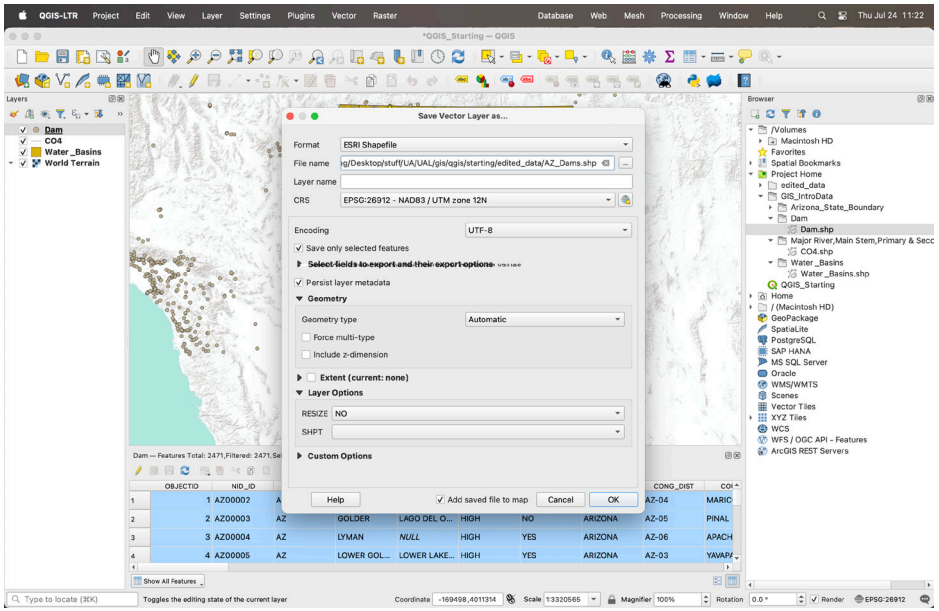
6. In the Attribute Table click on Deselect all features from the layer.

CLEARING SELECTED DATA:

Anytime you select data (highlighted in the attribute table or on the map) you need to clear the selection before moving to the next step. If you do not clear the selection any subsequent processes that you undertake will only be done on the selected features.

HELPFUL HINT:

Data organization is an important component of any GIS project, this is particularly true when it comes to naming data. Data should be named in a manner that is obvious for others in case you need to share the data and/or if you are working collaboratively on a project. Most GIS collaborative projects will have a naming convention protocol established so that data is consistently named throughout the process.



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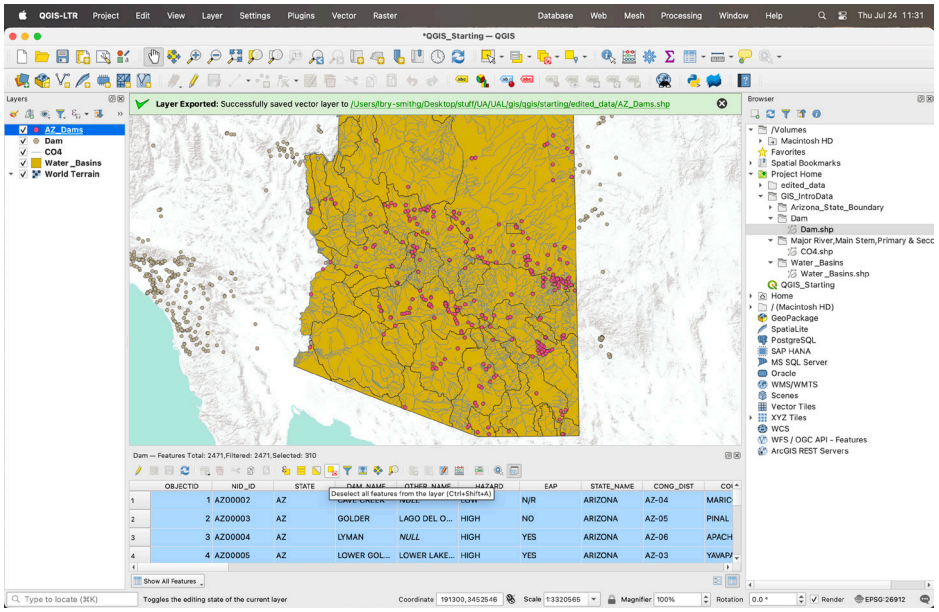

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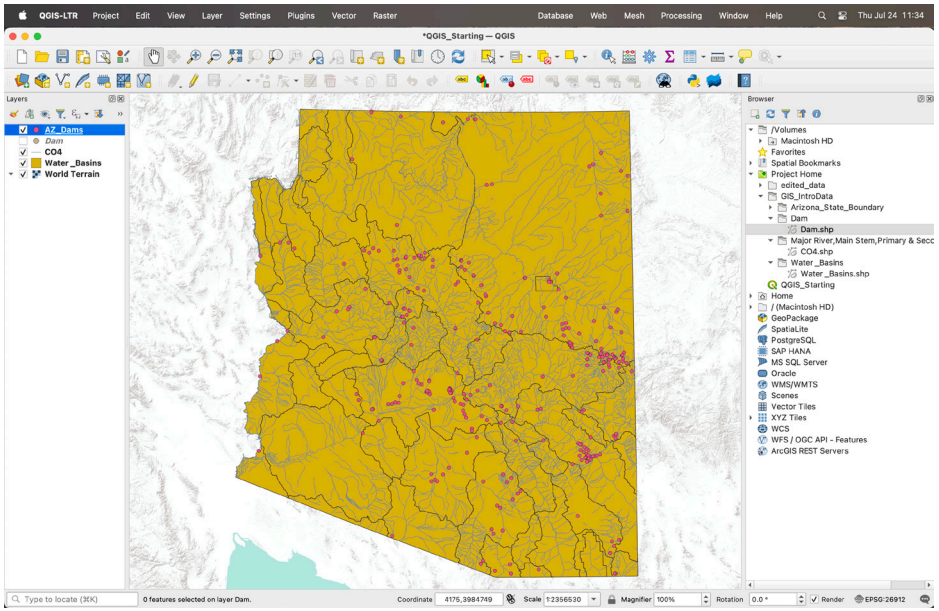
7. Uncheck the Dam layer and close the attribute table.

8. Repeat the previous steps to create a Tucson_WaterBasin feature layer using the Water_Basins feature layer and Select By Expression.



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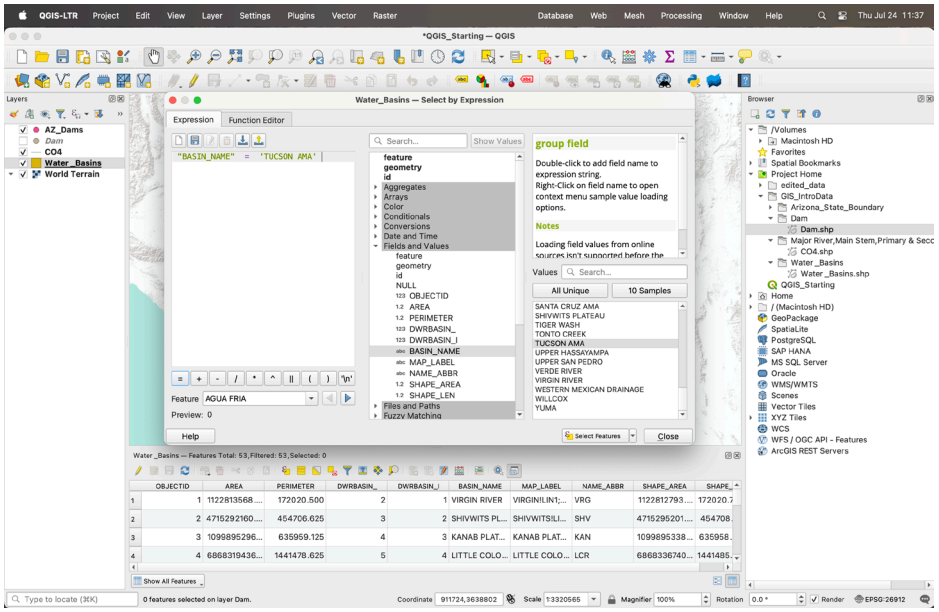

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LOCATION DATA QUERY AND CREATION

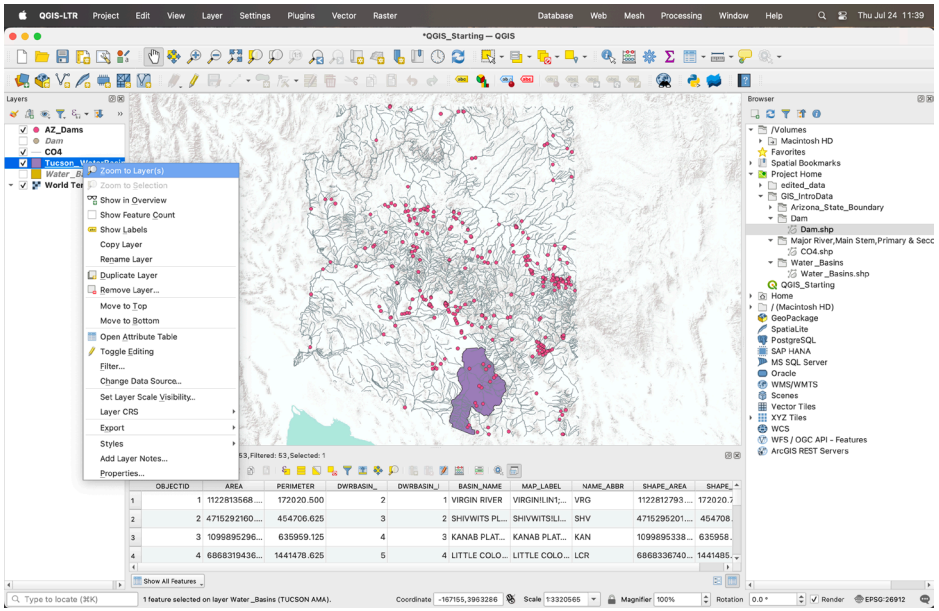
1. In the Layers window right-click on the Tucson_ WaterBasins layer and choose Zoom to Layer(s).

2. In the top Toolbar select Select by Location.

SELECT BY LOCATION:

The Select By Location button allows you to select features from one feature layer based on their geographic relationship with another feature(s) in a separate feature layer.

In this case, you are asking QGIS to select all the features (rows) in the AZ_Dams feature layer that are located in the Tucson_WaterBasin feature layer. This is a geographic analysis and the geography are the dams that are located completely within the Tucson water basin.



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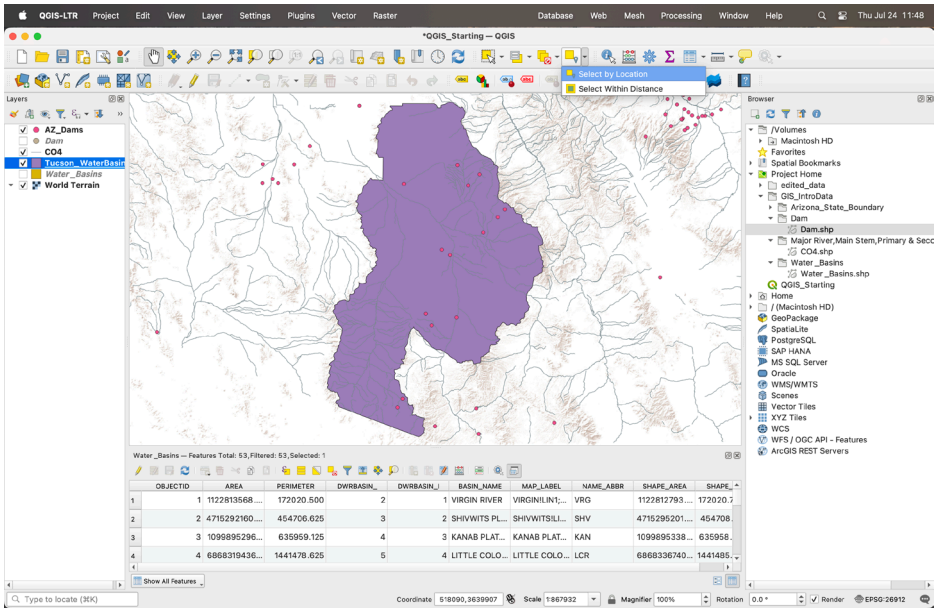

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3. In the Vector Selection - Select by Location window match the following:

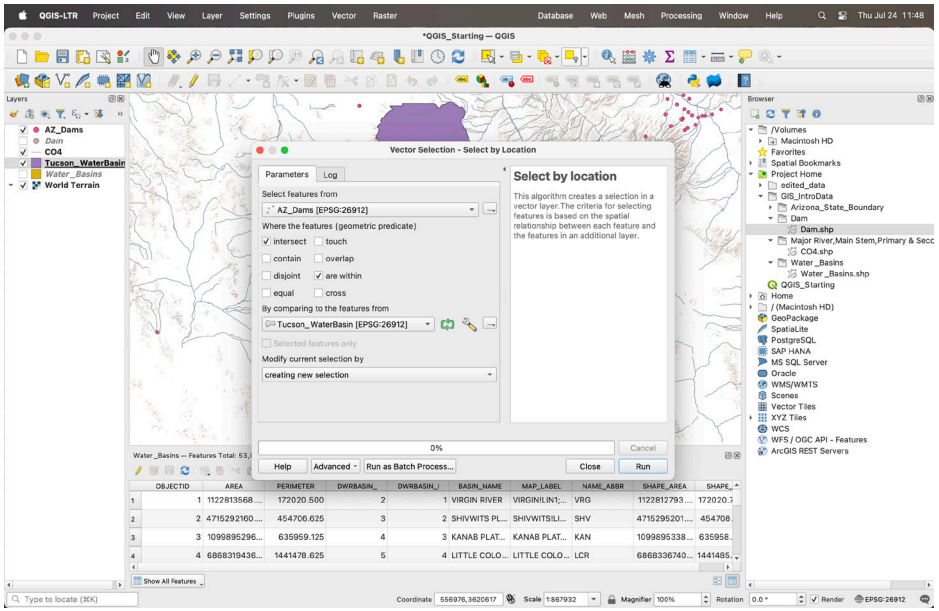
Select Features from
AZ_Dams

Where the features
are within

By comparing to the features from
Tuscon_WaterBasin

4. Create a new feature layer based on the dams found in the Tucson water basin and clear your selection.

Hint: You have completed this process previously in this tutorial.



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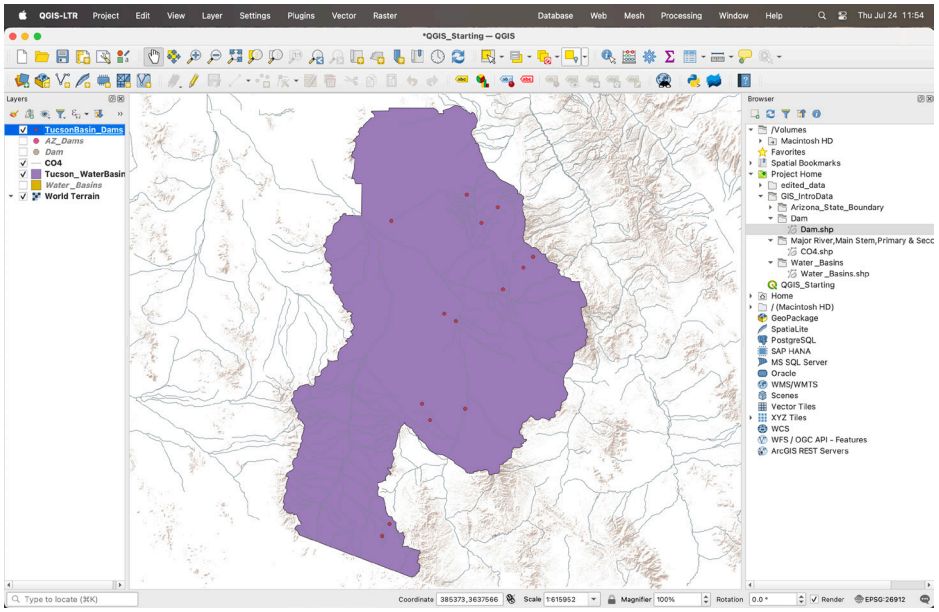

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CLIPPING DATA

1. On the Menu Bar click on Processing and then Toolbox to open the Toolbox window.

2. In the Toolbox window search for the Clip tool.

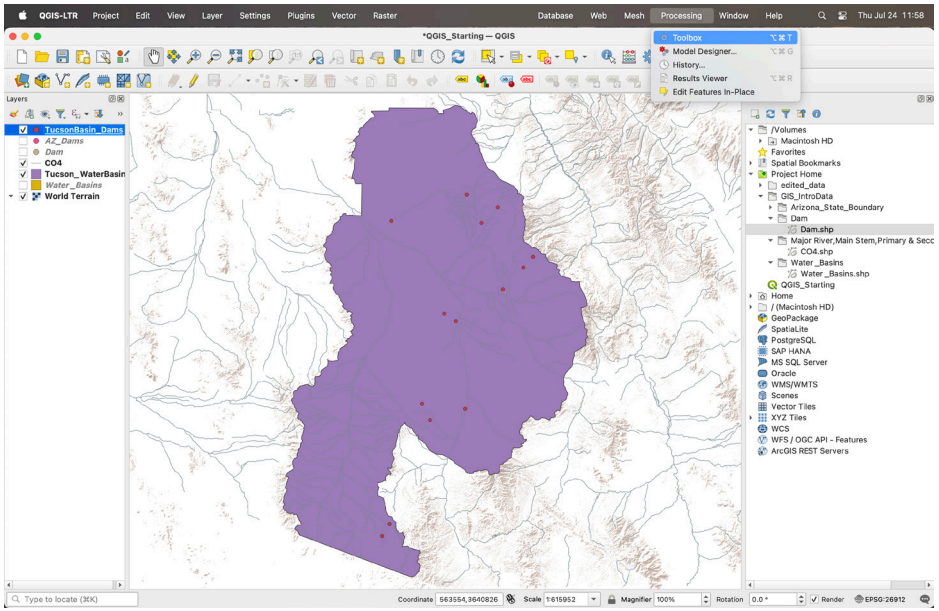
   Click on the Clip tool located under the QGIS default Vector overlay tools.

CLIP:

The Clip tool allows you to cut out (clip) features from one feature layer based on the boundaries of another feature layer. This tool is particularly useful when you are creating a study area and/or area of interest for your project and you need all of your data to be confined to the same boundary.

HELPFUL HINT:

The Processing Toolbox window is where you will find all of the tools that are available for you to use in QGIS.



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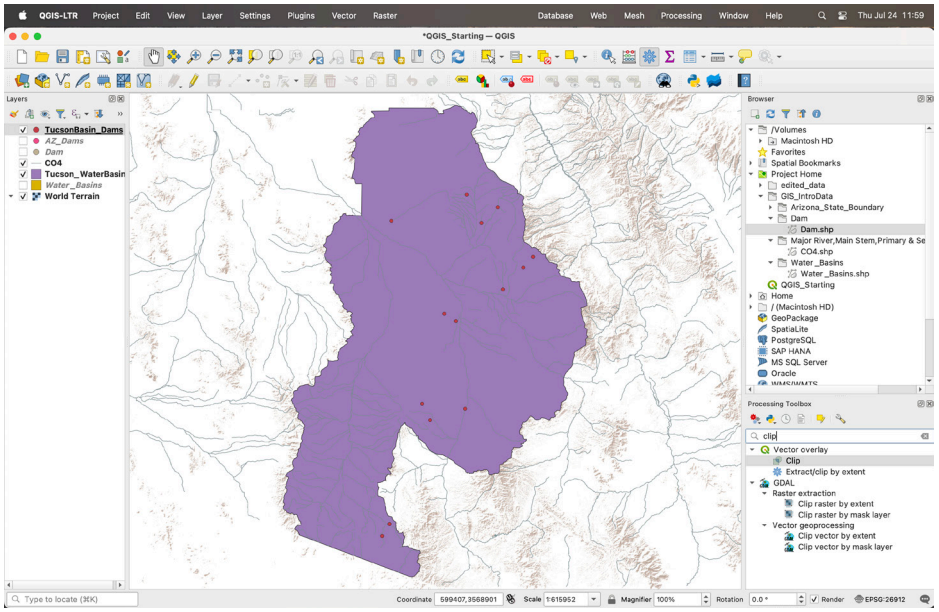

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3. In the Vector Overlay - Clip window match the following:

Input Layer
CO4

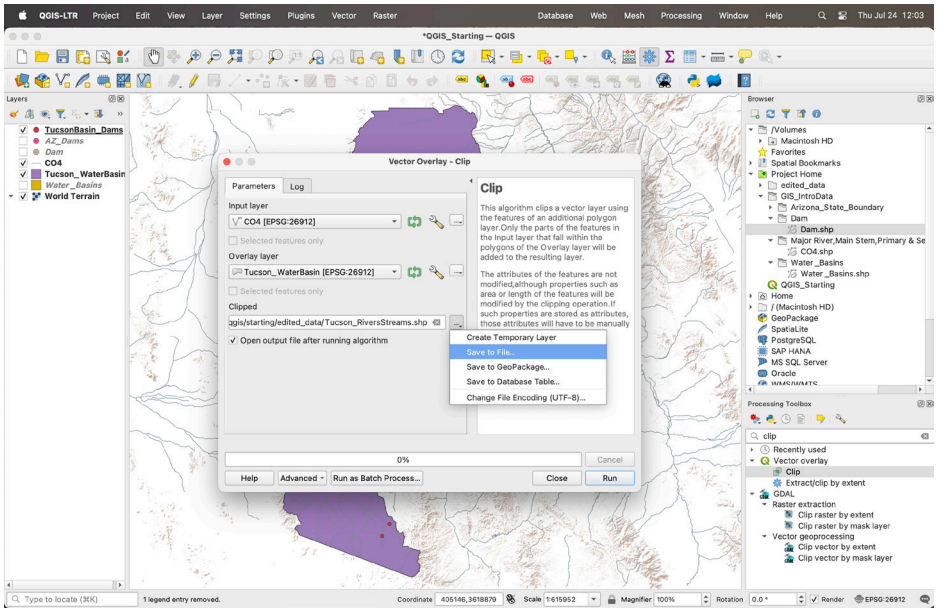
Overlay layer
Tucson_WaterBasins

Clipped
Click on the three dots next to the text field and select Save to File...

In the Save File window navigate to your project folder and give the file you are saving a relevant name. Also, ensure that you choose SHP (*.shp) as the file type.

Click on Run.

After the tool has run click on Close.



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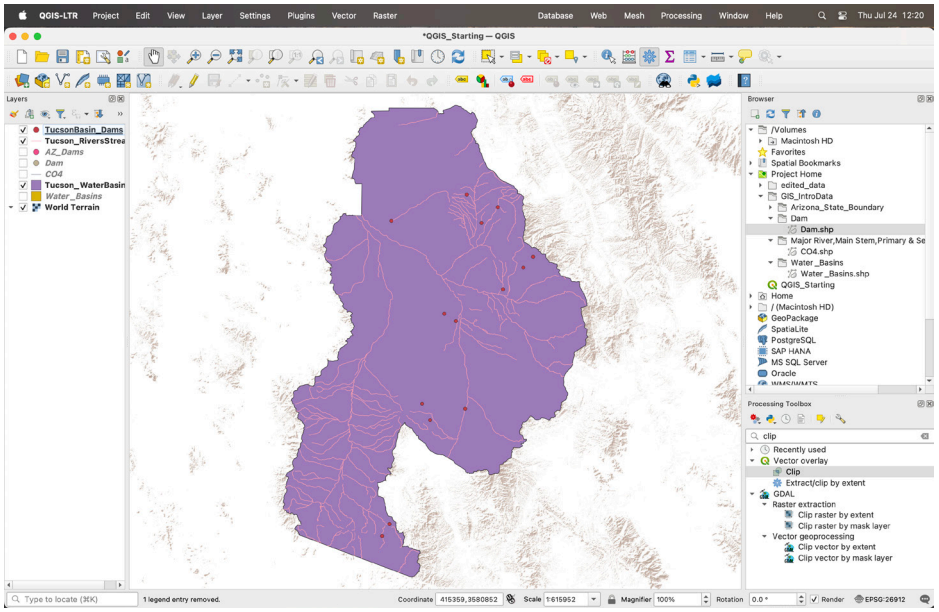
4. In the Layers window uncheck the CO4 layer and place the TucsonBasin_Dams layer on top of the Tucson_RiversStreams layer.



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MULTIPLE ATTRIBUTE QUERIES

1. On the top Toolbar click on Select Features Using an Expression.

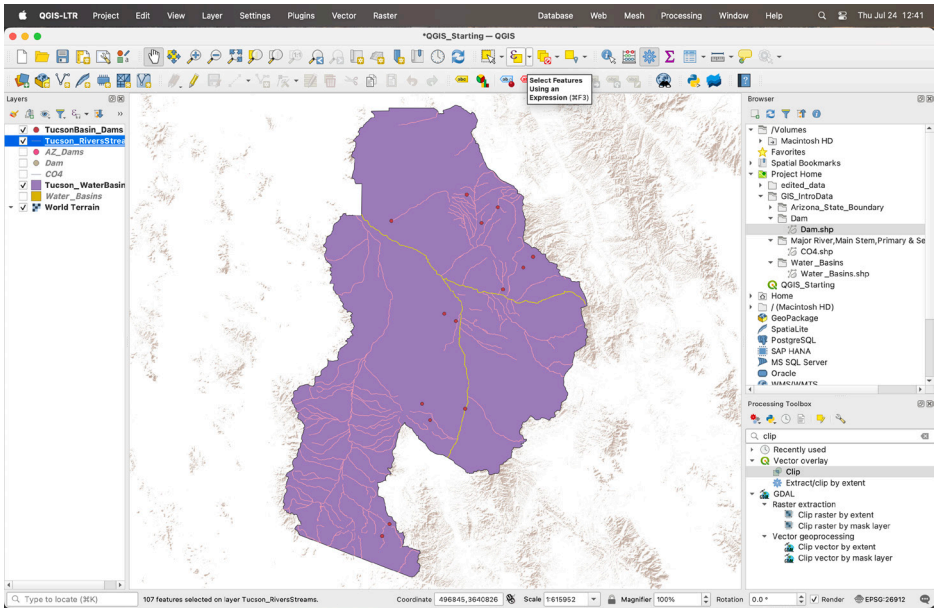
2. In the Tucson_RiversStreams - Select by Expression window match the following expression:

   “NAME” = “Santa Cruz River” OR
   “NAME” = “Tanque Verde Creek” OR
   “NAME” = “Rillito Creek”

   Click Select Features.

   Click Close.

HELPFUL HINT:
When writing multiple conditional statements it is important to understand the difference between the And and Or statements. The And statement implies that the values from both of your expressions are found within the same attribute field, while the Or statement implies that each of the attributes is unique from one another.



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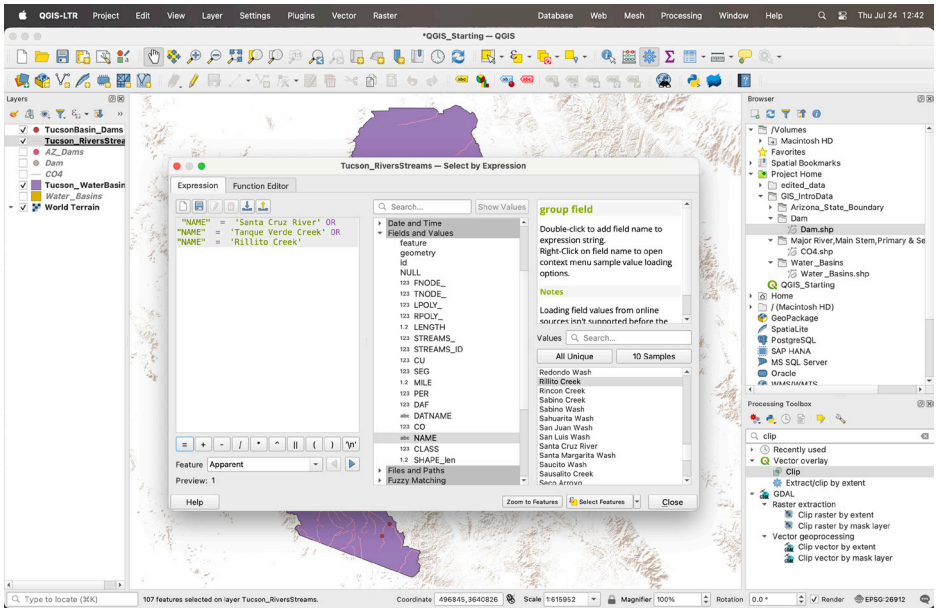

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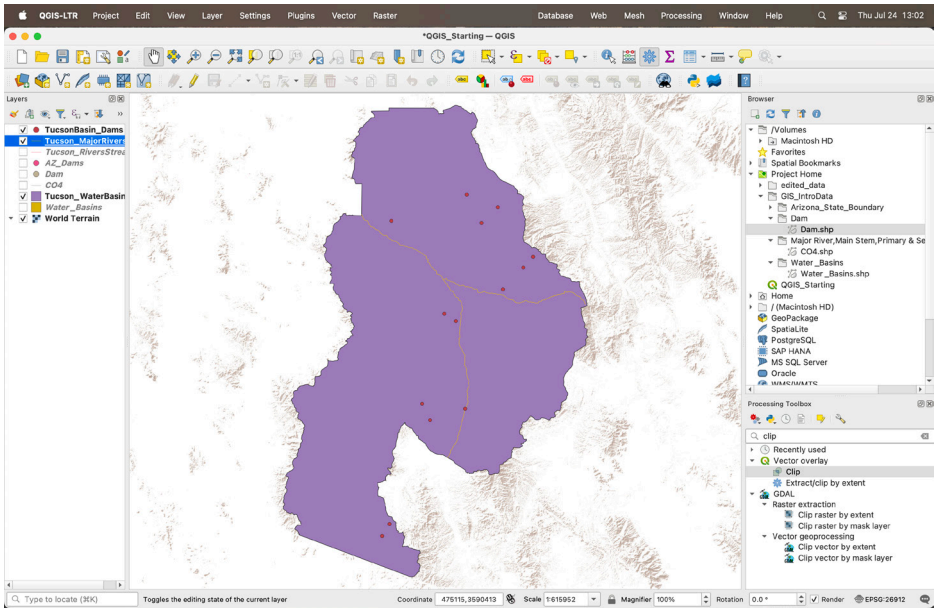
3. Right-click on the Tucson_RiverStreams feature layer and create a new feature layer named Tucson_MajorRivers.

   Clear the selection and uncheck Tucson_RiverStreams.



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END