

UA Libraries Data Cooperative Unit's

# GIS TUTORIALS

*DATA WRANGLING AND CREATING NEW GEOSPATIAL DATA*

## ESRI

SOFTWARE USED

2

TUTORIAL NUMBER



DIFFICULTY LEVEL



LEVEL OF STOKE

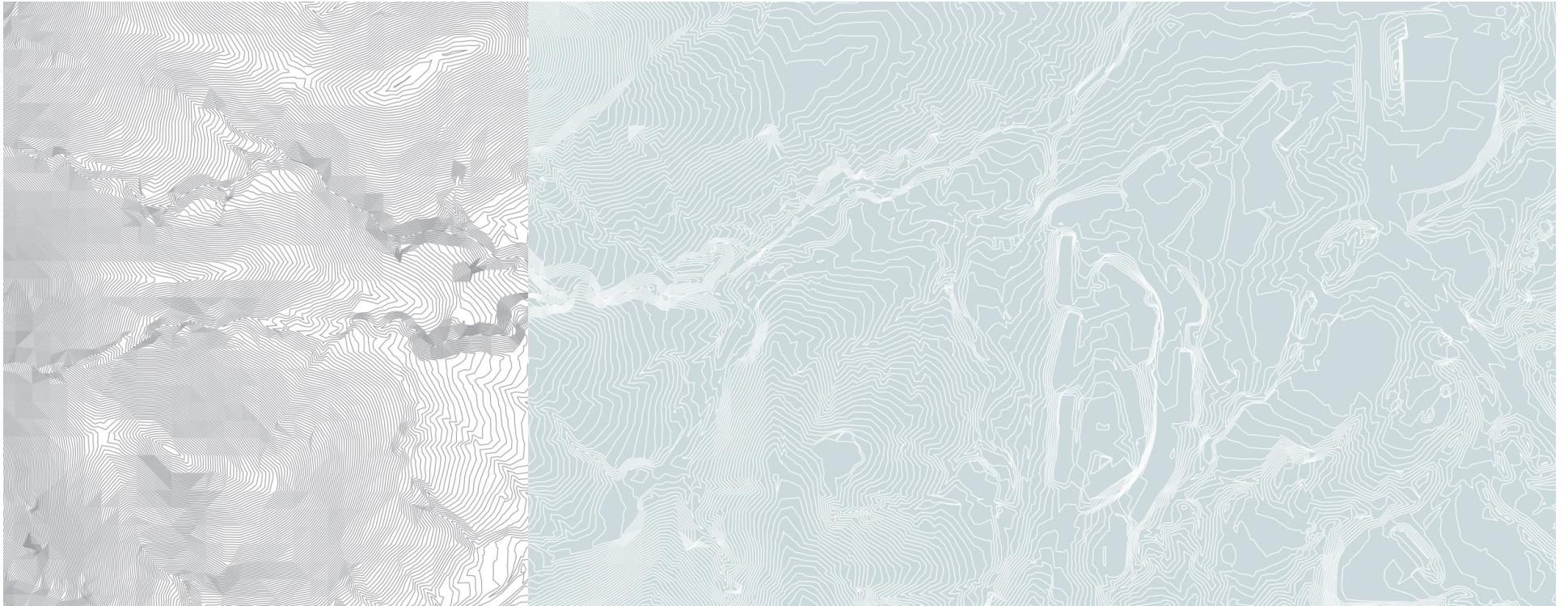


HARDWARE NEEDED:

desktop or laptop computer  
running Windows  
internet connection

SOFTWARE NEEDED:

ESRI ArcGIS Pro



## INTRODUCTION

# 2

The purpose of this tutorial is to teach you how to do basic data wrangling tasks in ArcGIS Pro. 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 ArcGIS Pro project you created in the previous tutorial and make sure the following shapefiles are added to the map:

Dam  
CO4  
Water\_Basins

Since you created an ArcGIS project in the previous tutorial, when you open an existing project all folder structures and data paths will remain consistent.

1. Right-click on the Dam feature layer and select 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:

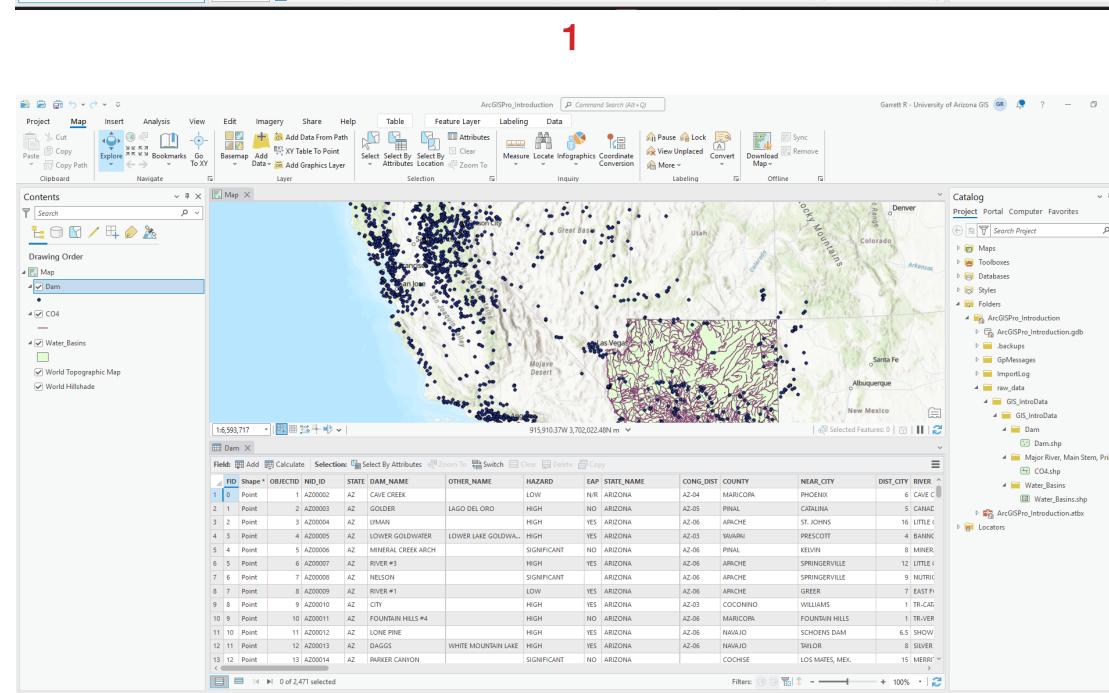
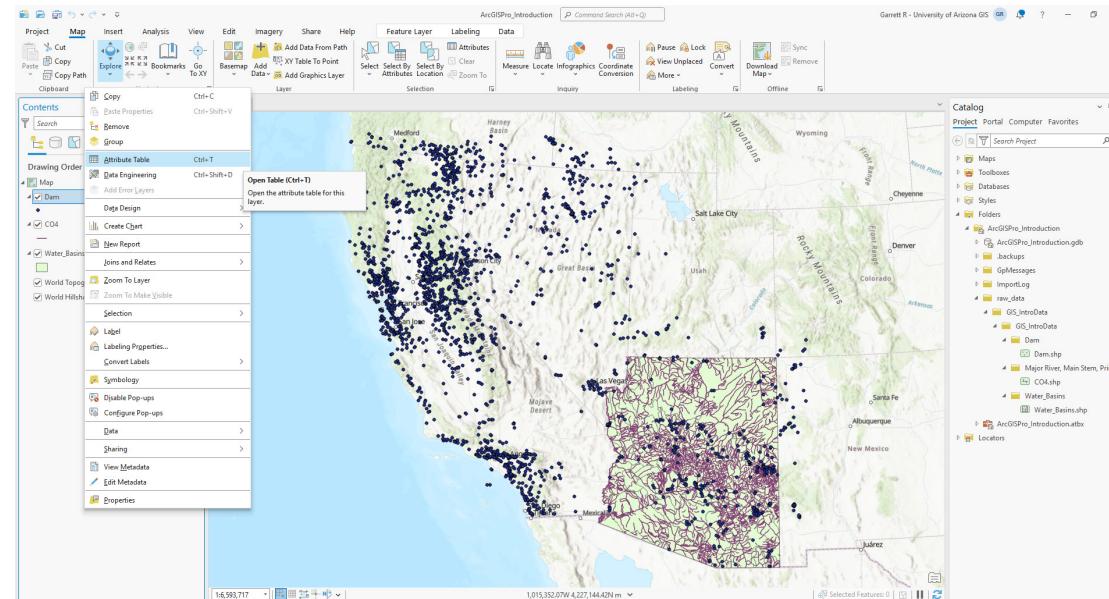
Tables that contain rows

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.



## SIMPLE DATA QUERY AND CREATION

1. Highlight the Dam feature layer in the Contents pane.

In the Map tab located within the ribbon select Select by Attributes.

2. In the Select by Attributes window match the following:

Input Rows  
Dam

Selection Type  
New Selection

Expression  
Where: STATE  
is equal to  
AZ

Click Apply.

### SELECT BY ATTRIBUTES:

The Select By Attributes button 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 ArcGIS Pro 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.

ID	Shape *	OBJECTID	NID_ID	STATE	DAM_NAME	OTHER_NAME	HAZARD	EAP	STATE_NAME	CONG_DIST	COUNTY	NEAR_CITY	DIST_CITY	RIVER
1	Point	1	AZ00002	AZ	CAVE CREEK		LOW	N/R	ARIZONA	AZ-04	MARICOPA	PHOENIX	6	CAVE C...
2	Point	2	AZ00003	AZ	GOLDER	LAGO DEL ORO	HIGH	NO	ARIZONA	AZ-05	PINAL	CABULINA	5	CABUL...
3	Point	3	AZ00004	AZ	UMAN		HIGH	YES	ARIZONA	AZ-06	APACHE	ST. JOHNS	16	LITTLE C...
4	Point	4	AZ00005	AZ	LOWER GOLDWATER	LOWER LAKE GOLDWATER	HIGH	YES	ARIZONA	AZ-03	WAJARU	PREScott	4	BANKE...
5	Point	5	AZ00006	AZ	MINERAL CREEK ARCH		SIGNIFICANT	NO	ARIZONA	AZ-06	PINAL	KEDDIN	8	MINER...
6	Point	6	AZ00007	AZ	RIVER #3		HIGH	YES	ARIZONA	AZ-06	APACHE	SPRINGERVILLE	12	UTTER...
7	Point	7	AZ00008	AZ	NESTON		SIGNIFICANT	NO	ARIZONA	AZ-06	APACHE	SPRINGERVILLE	14	MURDO...
8	Point	8	AZ00009	AZ	RIVER #1		LOW	YES	ARIZONA	AZ-06	APACHE	GREEK	7	EAST F...
9	Point	9	AZ00010	AZ	CTT		HIGH	YES	ARIZONA	AZ-03	COCONINO	WILLIAMS	1	TR-CIT...
10	Point	10	AZ00011	AZ	FOUNTAIN HILLS #4		HIGH	NO	ARIZONA	AZ-06	MARICOPA	FOUNTAIN HILLS	1	TR-VER...
11	Point	11	AZ00012	AZ	LOWE PINE		HIGH	YES	ARIZONA	AZ-06	MARICOPA	SCHORNS DAM	6.5	SHOW...
12	Point	12	AZ00013	AZ	DAGGS	WHITE MOUNTAIN LAKE	HIGH	YES	ARIZONA	AZ-06	NAVAJO	TALOB	8	SILVER...
13	Point	13	AZ00014	AZ	PARKER CANYON		SIGNIFICANT	NO	ARIZONA	AZ-06	COCHISE	LOS MATES, MEX.	15	MERR...

1

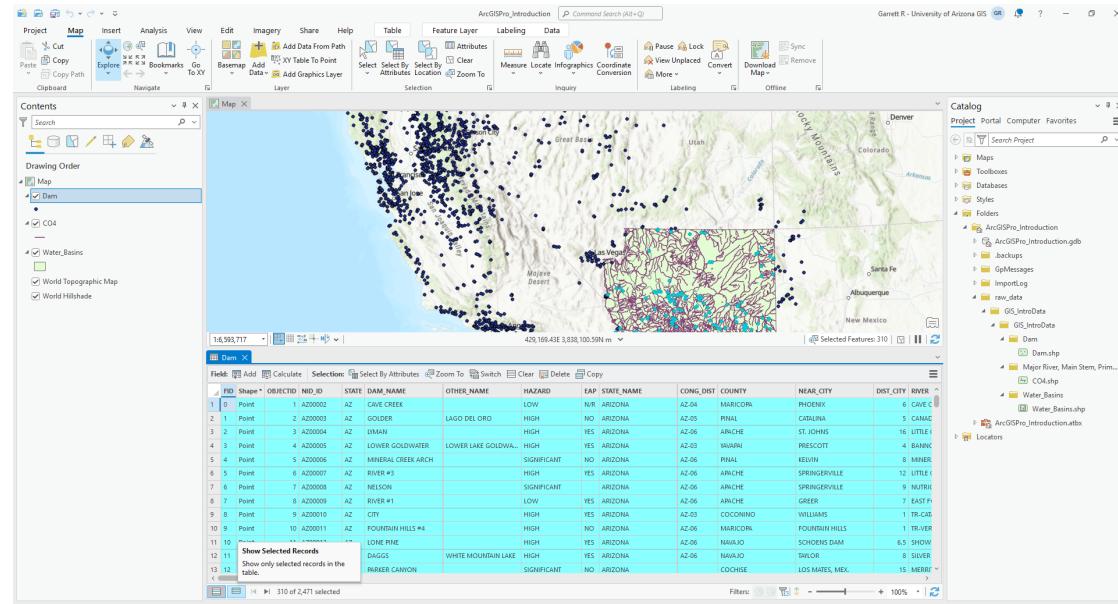
ID	Shape *	OBJECTID	NID_ID	STATE	DAM_NAME	OTHER_NAME	HAZARD	EAP	STATE_NAME	CONG_DIST	COUNTY	NEAR_CITY	DIST_CITY	RIVER
1	Point	1	AZ00002	AZ	CAVE CREEK		LOW	N/R	ARIZONA	AZ-04	MARICOPA	PHOENIX	6	CAVE C...
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13	Point	13	AZ00014	AZ	PARKER CANYON		SIGNIFICANT	NO	ARIZONA	AZ-06	COCHISE	LOS MATES, MEX.	15	MERR...

2

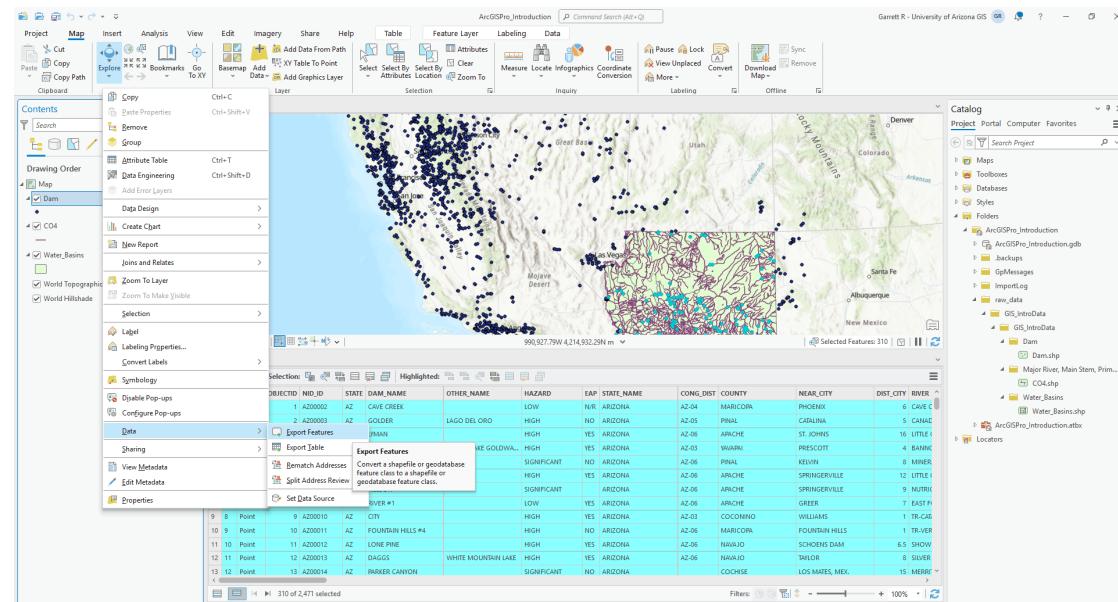
3. On the bottom left-hand corner of the ArcGIS Pro screen, beneath the attribute table, there are two table icons. Click on the table icon to the right to display only those features that are owned by Tucson.

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 pane.

4. Right-click on the Dam feature layer and select Data and then select Export Features.



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5. In the Export Features window in the Output Features Class dialogue field, type in AZ\_Dams.

Each ArcGIS project that you create will include a file geodatabase (.gdb) which all data created within the project will be saved to by default.

Click OK.

6. In the Map tab located within the ribbon select the Clear button to clear your selection.

### FILE GEODATABASE:

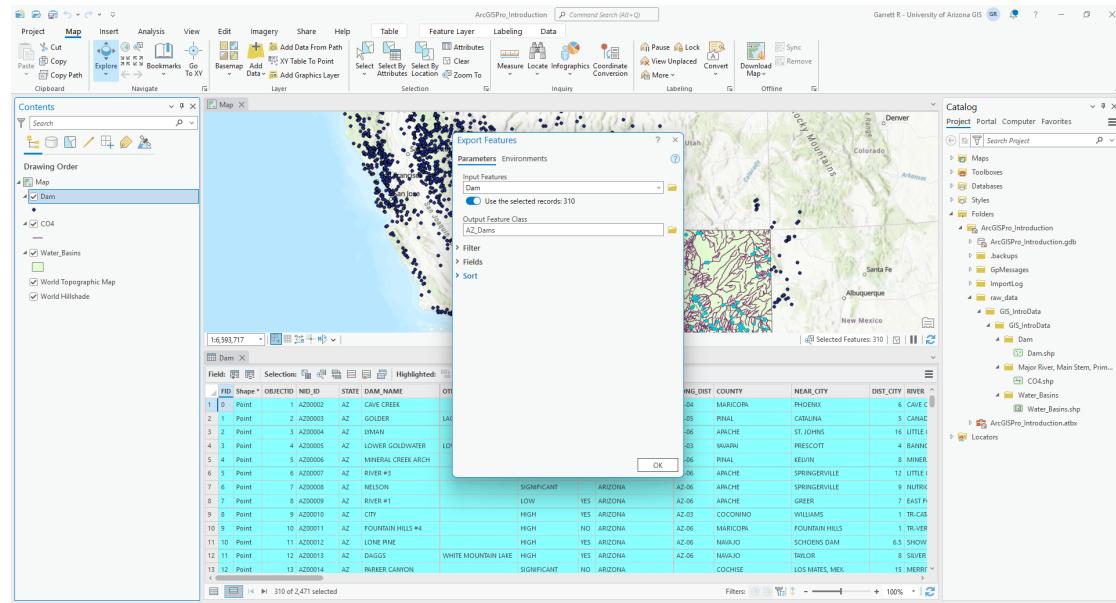
File geodatabases are a container that holds a collection of files in a folder. You can store, query, and manage spatial and nonspatial data within a file geodatabase.

### CLEARING SELECTED DATA:

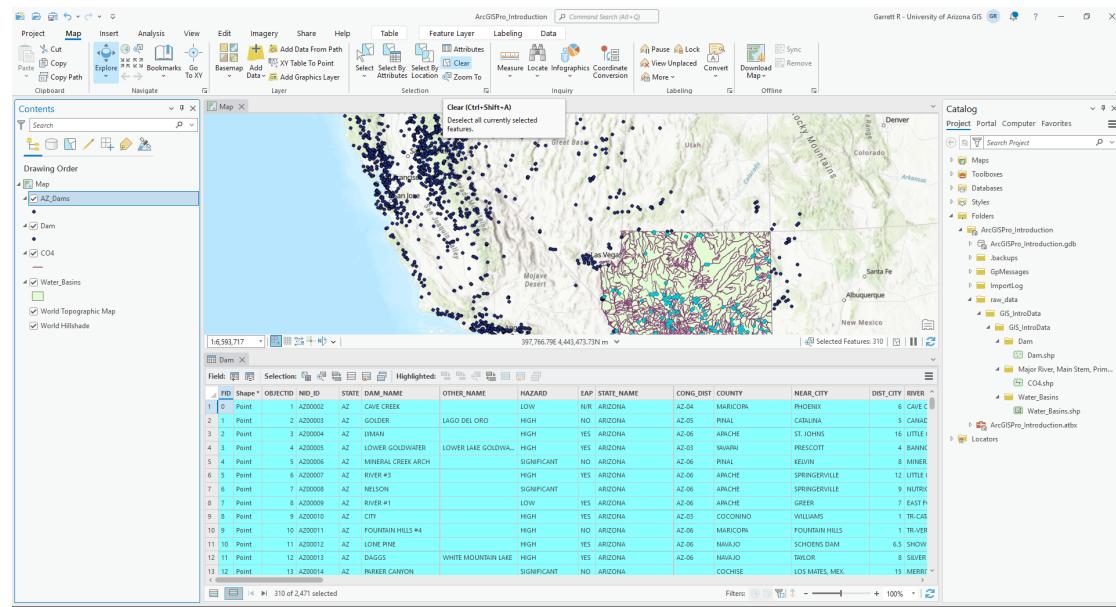
Anytime you select data (highlighted in the attribute table or on the map) you need to clear the selection before moving to the next step. If you do not clear the selection any subsequent processes that you undertake will only be done on the selected features.

### 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.



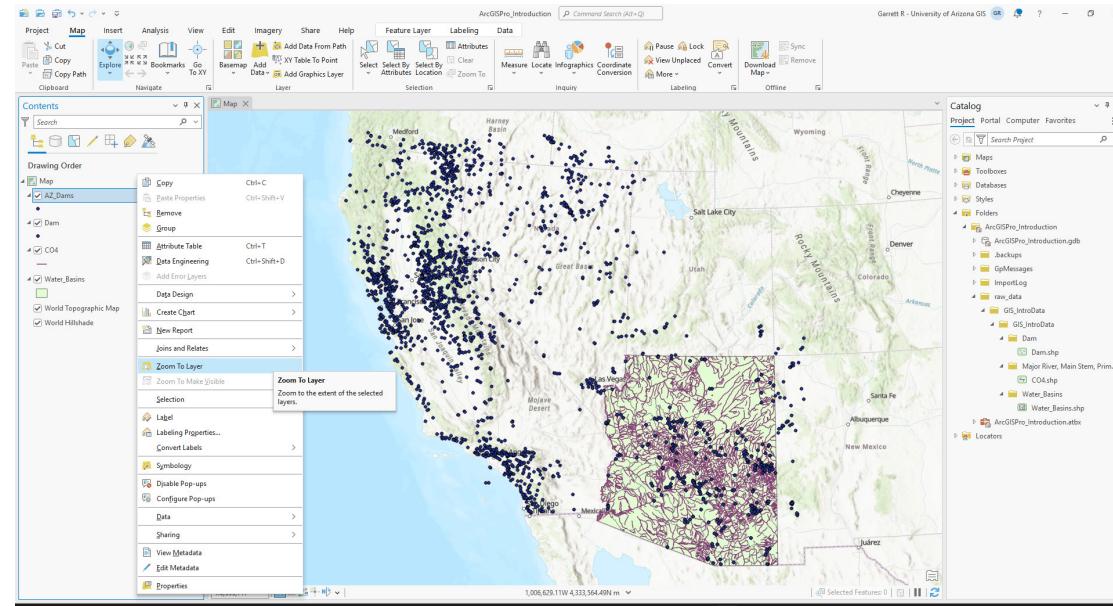
5



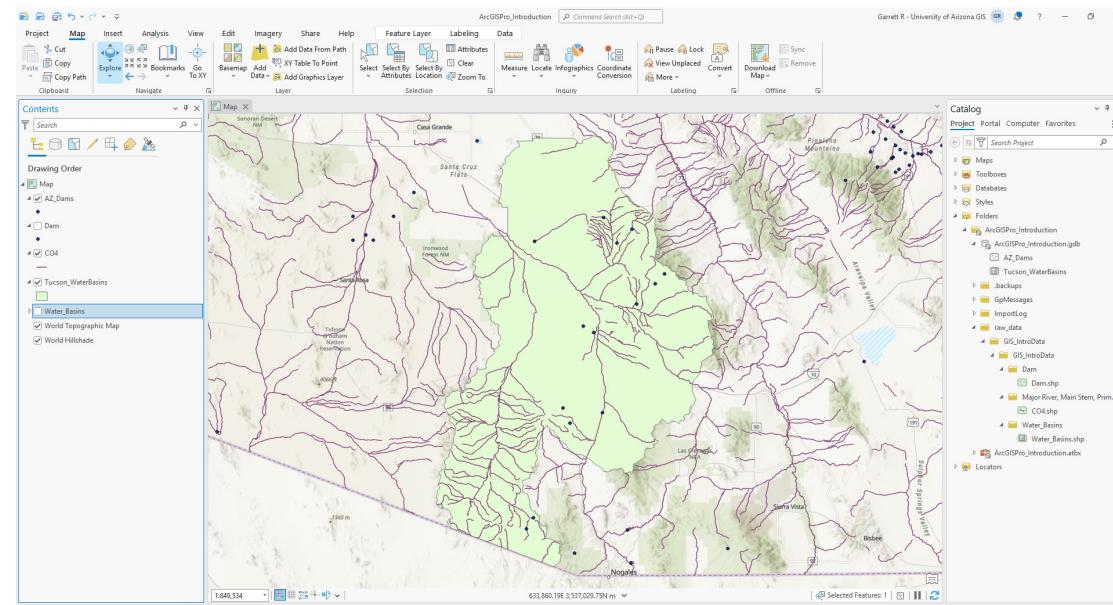
6

7. Right-click on the Dam feature layer and select Zoom To Layer.

8. Repeat the previous steps to create a Tucson\_WaterBasin feature layer using the Water\_Basins feature layer and Select By Attributes.



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## LOCATION DATA QUERY AND CREATION

1. On the Map tab on the Ribbon click on Select By Location

2. In the Select by Location window match the following:

Input Features  
AZ\_Dams

Relationship  
Completely within

Selecting Features  
Tucson\_WaterBasin

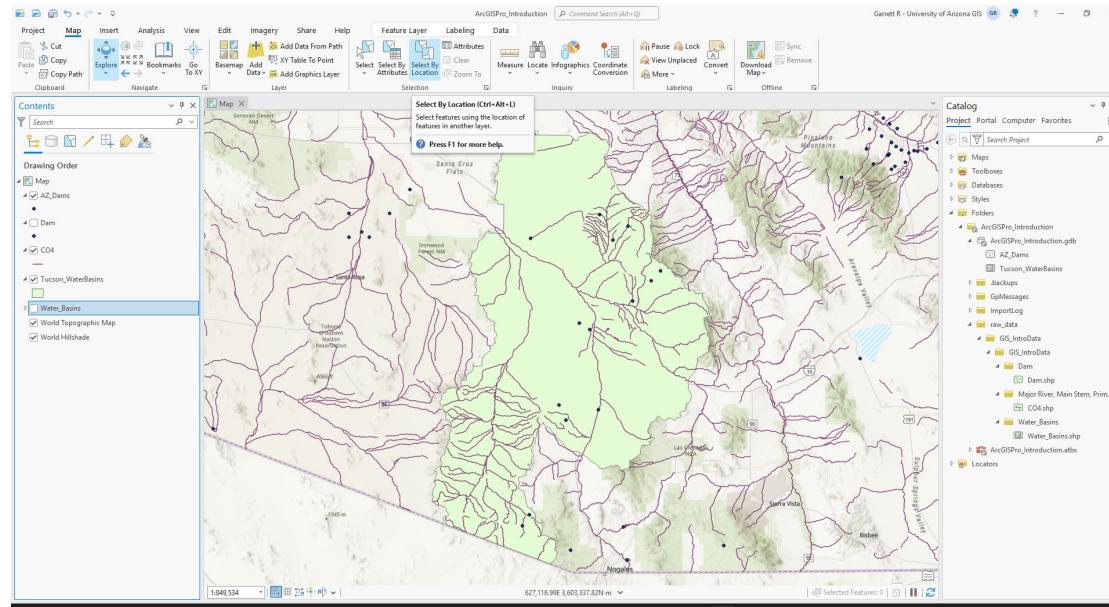
Selection Type  
New selection

Click OK

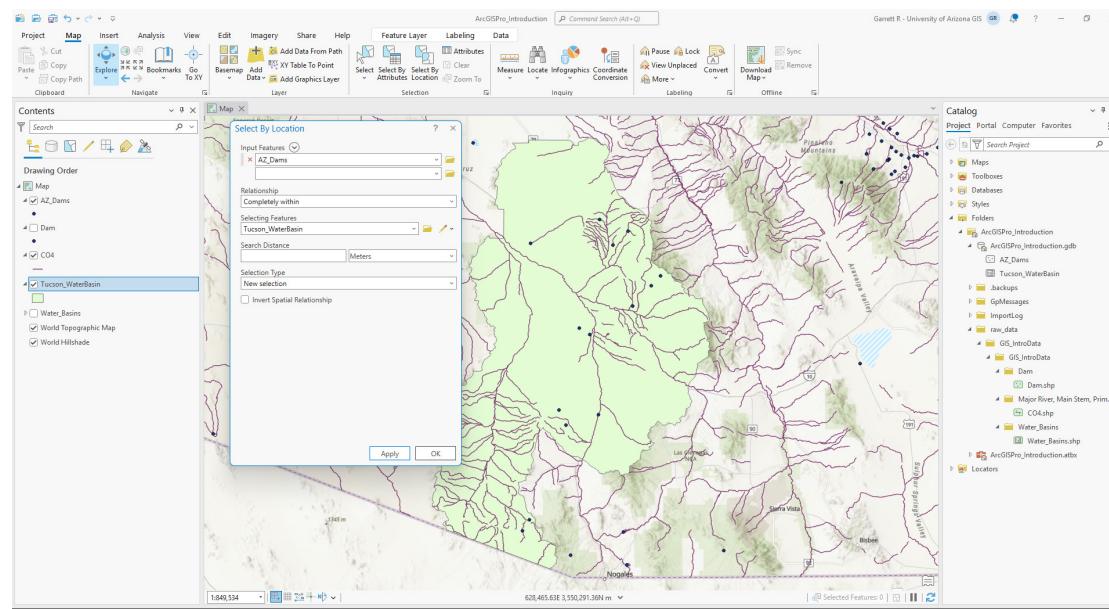
### SELECT BY LOCATION:

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 ArcGIS Pro 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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- 3.** 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, but the directions are outlined below:

Right-click on the AZ\_Dams feature layer and select Data > Export Features

In the Export Features window match the following:

Input Features

AZ\_Dams (should automatically be placed in the dialog box)

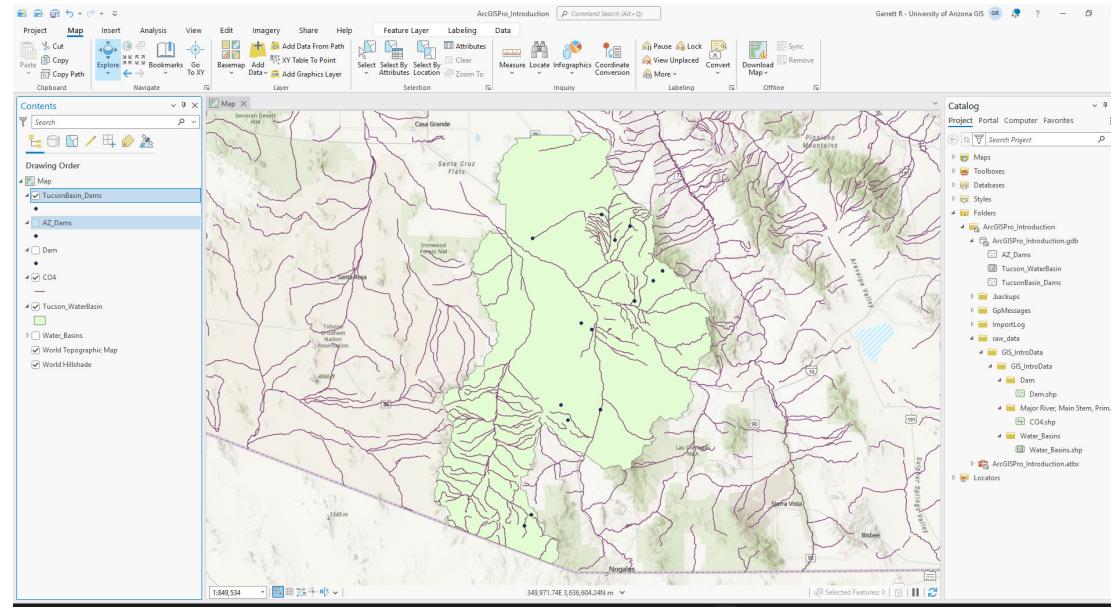
Use the selected records

15 (should automatically be selected)

Output Feature Class

TucsonBasin\_Dams

Clear the selection and uncheck AZ\_Dams.



## CLIPPING DATA

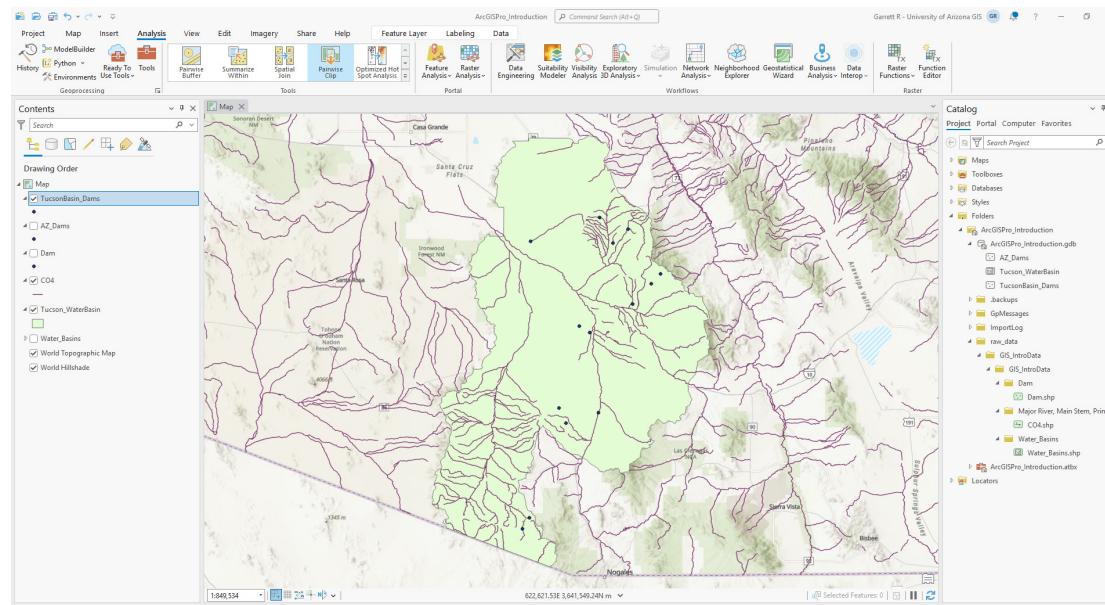
1. On the Analysis tab on the Ribbon in the Tools panel click on Pairwise Clip.
2. In the Geoprocessing Pane, for the Pairwise Clip tool match the following:

Input Features  
CO4

Clip Features  
Tucson\_WaterBasin

Output Feature Class  
Tucson\_RiverStreams

Click Run

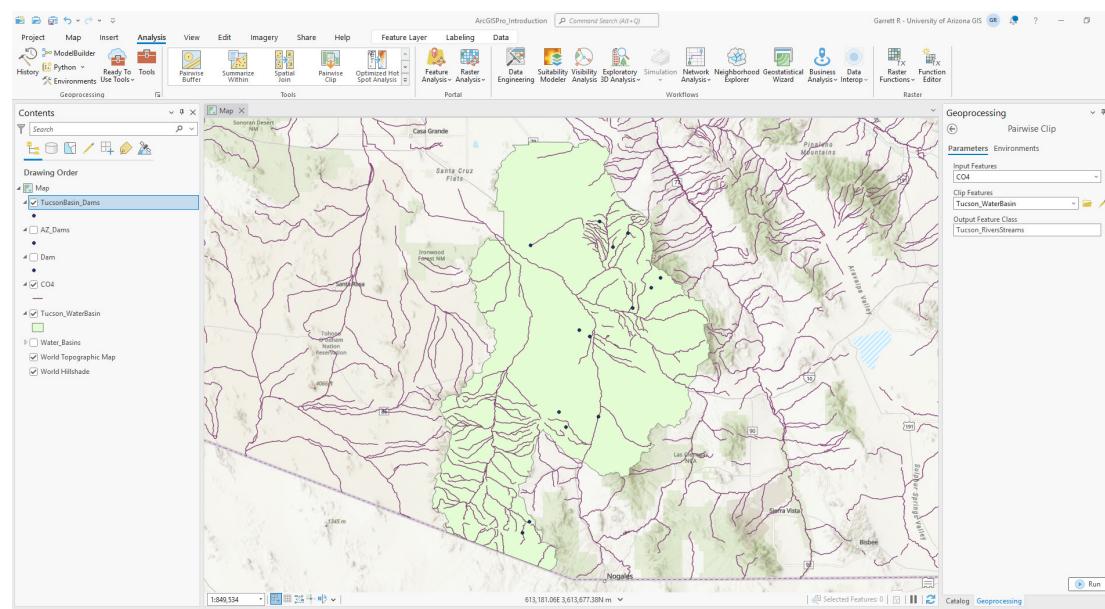


### PAIRWISE CLIP:

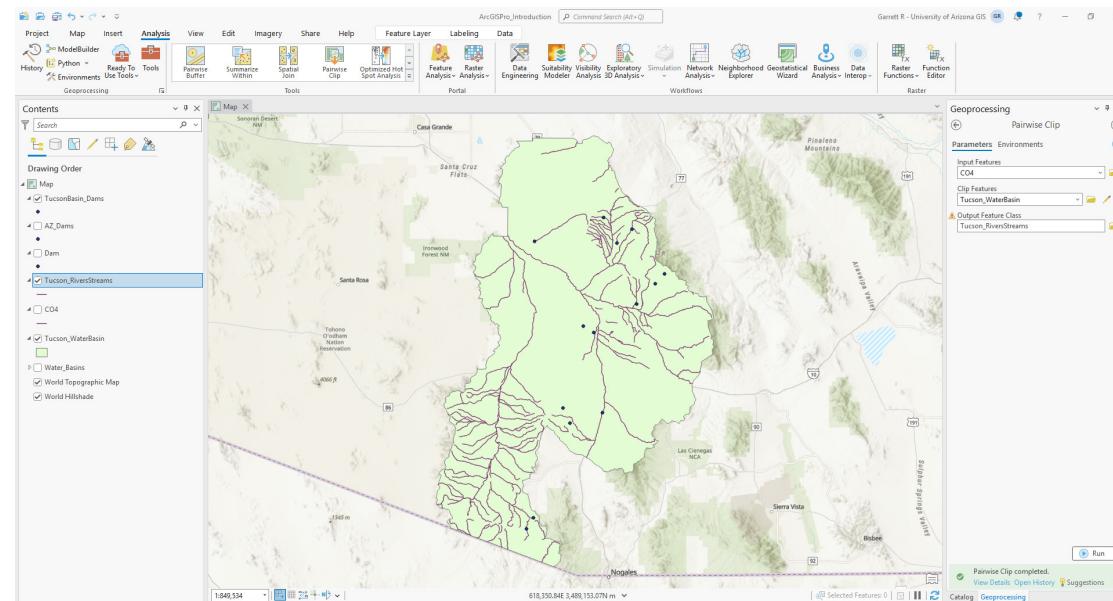
The Pairwise Clip tool allows you to cut out (clip) features from one feature layer based on the boundaries of another feature layer. This tool is particularly useful when you are creating a study area and/or area of interest for your project and you need all of your data to be confined to the same boundary.

### HELPFUL HINT:

The Geoprocessing pane is where you will find all of the tools that are available for you to use in ArcGIS Pro. The Tools panel on the Analysis tab contains the tools that are used most often in most ArcGIS Pro projects. If you have questions about how tools work and/or where you should place your own data you can hover over the i next to each option of the tool that will tell you what is expected in each of the options.



3. Uncheck the box next to the CO4 feature layer.



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## MULTIPLE ATTRIBUTE QUERIES

- On the Map tab on the Ribbon click on the Select By Attributes

In the Select By Attributes window match the following:

Input Rows  
TucsonRiverStreams

Selection Type  
New Selection

Expression  
Where NAME is equal to Santa Cruz River  
Or NAME is equal to Tanque Verde Creek  
Or NAME is equal to Rillito Creek

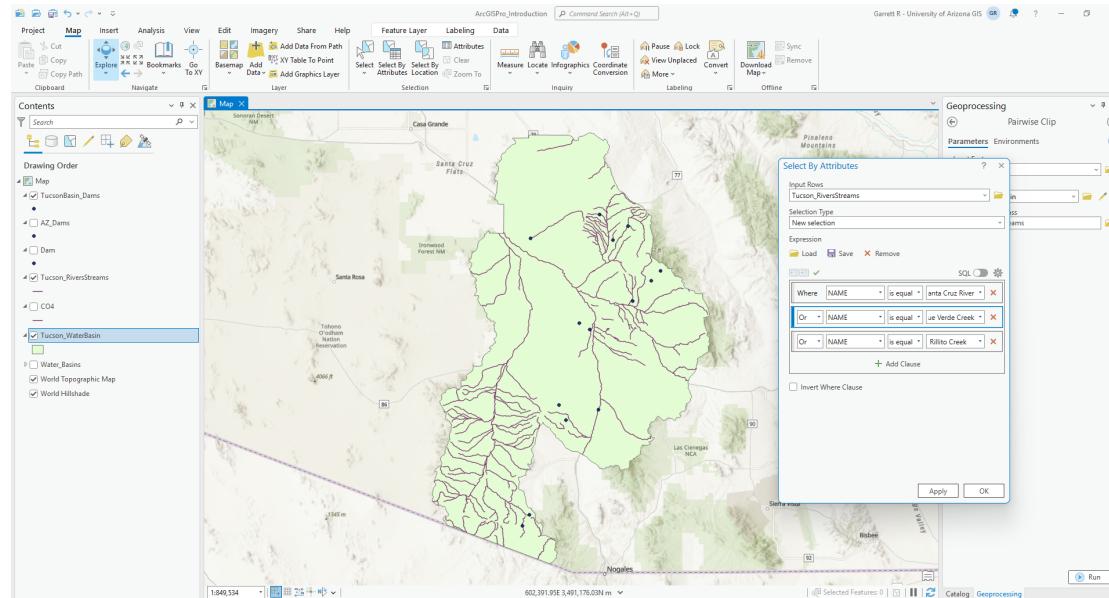
Press OK

- Right-click on the Tucson\_RiverStreams feature layer and create a new feature layer named Tucson\_MajorRivers.

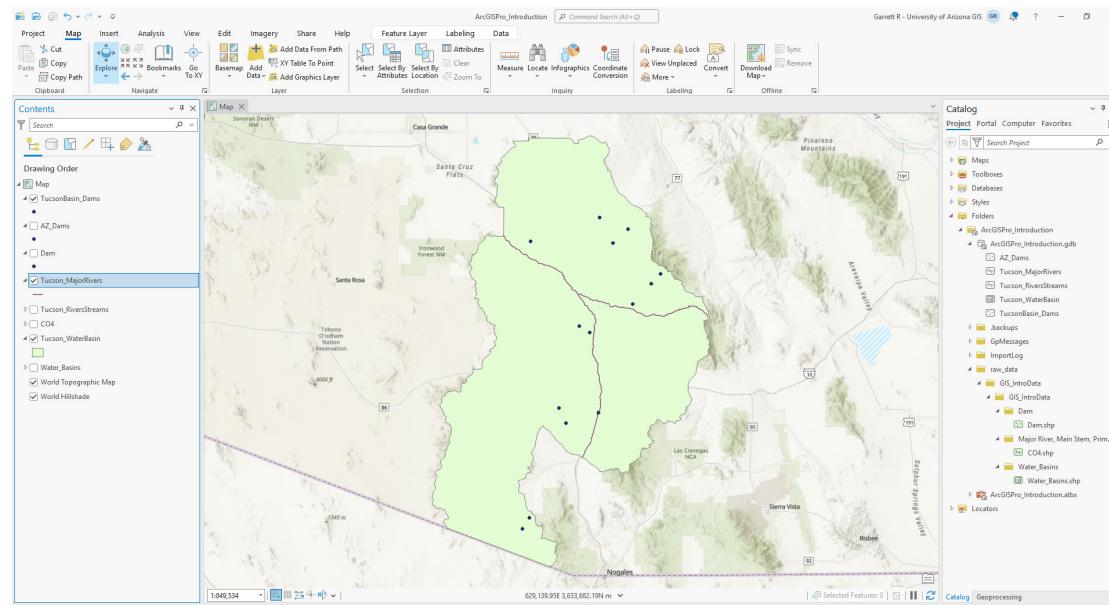
Clear the selection and uncheck Tucson\_RiverStreams.

### 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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**END**