Procedures

Further Issues Encountered

Eventually, my query tab disappeared. No amount of recreating the map or

downloading the files again fixed this query-tab-disappearing problem. Restarting the program

did not help. Attribute tables that previously had opened became inaccessible; every time I

tried to open an attribute table, ArcGIS crashed, and *Figure 6* is the screenshot of the error

message I received.

Figure 1: Screenshot of error message when trying to open attribute tables.
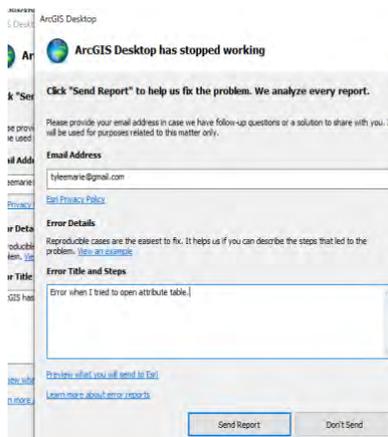
Unable to use Query to select the crops I wanted
to look at or open the attribute tablet, I began to
investigate. I used the *Symbology* tab in *Layer Properties*
to group things together. Thus, instead of having 4
different types of forest listed, I was able to highlight
them and group them together as seen below in *Figure 7*.

Then, I changed the legend label to 'Forests'. I went through this very painstaking

process of grouping all 'other' agriculture, grouping together all developed areas, grouping

together the different types of wetlands, grouping the different types of trees, aside from the

main orchard crops I wanted to feature, etc., and then giving them an appropriate label. I

altered the colors in *Symbology* applying very bright colors to the trees, such as pecan trees and

other nut trees. I represented developed areas with a dark grey, and water and the different

types of wetlands were changed to the color blue. Other colors were chosen to help make

pecans, grapes, and other orchards/vineyards more visible. The land cover marked Barren Land was left out of the map(s) because there is so much barren land in the county that allowing the Barren Land to be even a light color, caused the key features I was looking for to become extremely hard to see.

Figure 2: Screenshot of missing Query tab; how to group items together in the Symbology tab.
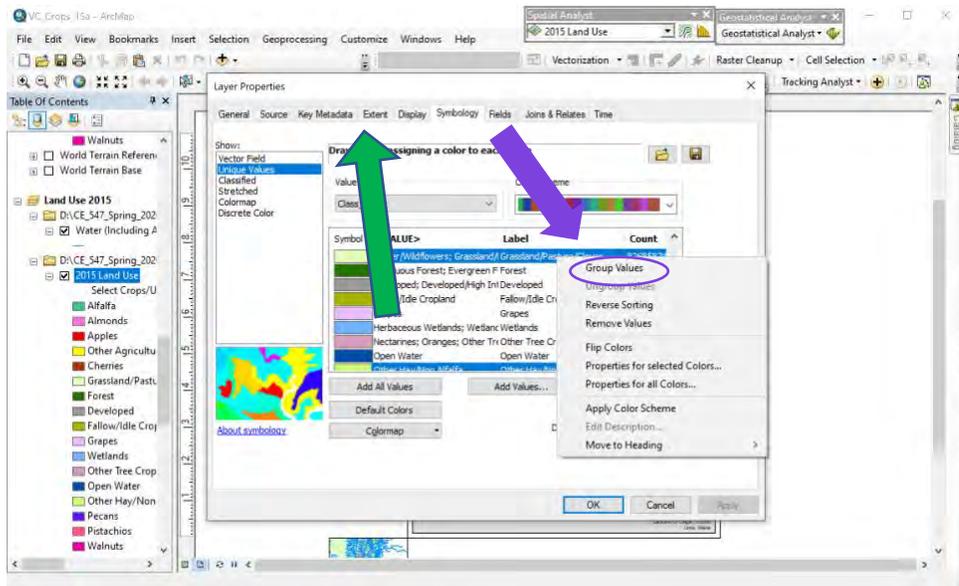
Figure 3: ArcMap error message - failing to draw layer, even when all other layers were turned off.
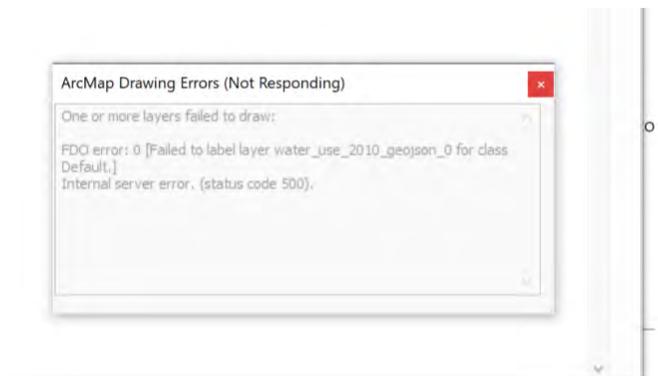
I further encounter issues with layers refusing to draw. I tried several times and received the error message seen in *Figure 8*.

I tried turning every other layer off, and still received the error message in *Figure 9*.

Ultimately, after restarting ArcMap and importing my data again, this issue seemed to resolve. I did see the error message once more, but then the layer began to display, and the error message disappeared.

Map Procedures

Four County Vicinity Map

(Found under Future Work)

Data Frame 1 – I imported the map of the U.S.A., as well as roads and rivers. I thought it looked odd in NAD_83 so I changed the projection to USA Contiguous Albers Equal Area Conic because I preferred the way this made the U.S.A. looked. I used a query for select only New Mexico. I created/exported this as shapefile from that for use in Data Frame 2. I used queries to get the main rivers flowing in New Mexico. Then I used the Clip tool to clip the rivers to show them only in New Mexico. I exported this as a shapefile for use in Data Frame 2.

Data Frame 2 (Valencia County)– I imported the shapefile I had created of New Mexico and the shapefile I had created of the main rivers. I added a shapefile of the counties of the U.S.A. as it turned out. I clipped counties to my New Mexico layer to display only New Mexico counties. I queried counties of interest, originally Boolean phrasing for Bernalillo, Sandoval, Socorro, and Valencia Counties.

I looked at my layout and ended up removing anything that seemed too cluttered. I added labels, then queried to show only desired labels. I ended taking out most of the rivers because after watching the maps and graphs displayed by the New Mexican government during this pandemic, I have concluded that while a really colorful map looks pretty, it may not be the best way to tell the story you are trying to tell or elucidate the important data.

Valencia County Vicinity Map

Data Frame 1 - I imported the map of the U.S.A. again, along with cities, rivers, and roads. It looked odd so I changed the data frame properties to USA Contiguous Albers Equal Area Conic. Queried → State Name = 'New Mexico'. I exported the data of the selected feature to a shapefile. I queried rivers in New Mexico, and exported a shapefile, added as a layer of the rivers in NM. I selected NM and labeled.

Data Frame 2 – Brought in shapefile of New Mexico. I used ArcToolbox to project the New Mexico shapefile into Albers with a Central Meridian of -106. I selected the Rio Grande River System via query and clipped it to New Mexico Projection. I added US Counties, queried Name = 'Valencia'. I added cities only in New Mexico by querying State Name = New Mexico. That was just too many cities, but I wanted more than the capital city only. I queried Population2012 >=15,000. I changed the symbol sizes to graduated symbols to range from 4-10 points. I then did a nested set of queries so that the name of the city could equal Socorro or Belen, but not the South Valley because the South Valley label was causing issues. The South Valley just refused to stop being labeled. So, finally, I settled on a query of pop2012 > 15,600 OR Name = Socorro AND NOT Name = South Valley. I played with adding a buffer to labels and making them better font sizes and colors.

I then clipped with my input as US Rivers being clipped to my New Mexico Proj. I went back up to the states' layer Queried New Mexico. I inserted all appropriate elements. Decided that I wanted to show only the counties I chose so I queried Name = Valencia OR Name = Bernalillo OR Name = Socorro OR Name = Sandoval. I changed the colors to each county having a different color in Symbology.

Ultimately, since I wanted the counties labeled the city names were getting in the way so I queries Pop2012 > 15,600 AND NOT 'Name' = "Albuquerque" AND NOT 'Name' = 'Rio Rancho' AND NOT 'Name' = 'South Valley'.

New Mexico: 2010 Surface Irrigation in K acres

New Mexico: 2010 Surface Water Withdrawals for Irrigation in Mgal/day

(Found other Additional Maps in Appendices)

Irrigation for crops in thousand acres found on ArcGIS online. Changed projection to NAD_1983_UTM_Zone_13N with a central meridian at -105 so that New Mexico would stand up straight. This is Transverse Mercator. I imported the 2010 Valencia County crop cover, building pyramids using nearest neighbors' value. This was in raster format. I added a shapefile for roads which was in WGS_1984 and transformed to match data frame. However, there were just too many roads so I changed symbology and went into query builder → "Type" = 'U.S.' OR "Type" = 'Interstate'. I added New Mexico Federal lands and BLM wilderness lands, as well as a water shapefile; however, I found most of these cluttered the map too much. I changed the field I was pulling data from so that I could represent New Mexico surface water withdrawals for irrigation in Mgal/day.

Land Use Data for 2008

I added crop data for New Mexico, and chose the Transverse Mercator with UTM Zone 13 N again (originally WGS_1984) with a central meridian of -105 degrees so New Mexico would stand upright. I queried crops with "Count" > '0'. I inserted the main rivers that are flowing through my study area. To focus on only the crops or uses I wanted, I did a query "Full Name" = 'Rio Puerco' OR "Full Name" = 'San Jose' OR "Full Name" = 'Rio Grande'. I used the query builder again trying to show tribal lands, but it just looked too distracting.

Valencia County Crops

I made a copy of the map above and downloaded data for crops in 2012. I used the query builder to select only the crop types I wanted to look at. I added waterways, arroyos, ditches, etc. I inserted different data frames for the years: 2008, 2012, 2015, and 2017, and downloaded the data for the other years performing queries for the crops I was interested in. I was not happy with the results of the four panel map I made as I had trouble getting the panels to have the same scale and the panels were just too small.

Thus, I made a map document for each of the years on its own, going through the laborious process of grouping types of land uses together into the appropriate categories and applying appropriate colors for consistency.

Basin Map

I went to CGIS and added the HUC layer to a new map. I used query builder selecting "REG" = '13'. I changed symbology on the Rio Grande Basin map to make the colors very bright for sub-basins included in Valencia County. I chose to use Transverse Mercator NAD_1983_UTM_Zone_13N because of its suitability for the New Mexico region.

I inserted a new data frame and inserted my HUC layer into it in the same projection as above. I queried "Cat" = '13020203' OR "Cat" = '13020204'. I then added in streams and queried "HUC" = '13020203' OR "HUC" = '13020204'. That did not work.

I decided to use the clipping tool again with the input of Streams and clipping it to my HUC of interest. I then added reservoirs, made sure the projection was correct, and exported my New Mexico reservoirs to a shapefile.

A Few Technology Issues

Attribute tables are no longer available for any of my land use data. I opened a new map document and inserted 2015 crop/land use data. I selected by attribute "Count" > 0. That didn't help me. I tried to make a column and did, but then couldn't figure out how to type in that column. I also realized that procedure was likely not going to get me to the information I wanted.

Symbology → I found through trial and error that if you highlight crops/land uses in the symbology table when you have chosen unique values, you can group those objects together. In this way, you can group all the various types of forests together under one heading name and one color displayed. This is a very slow process when you are doing it for multiple crops and multiple years. The benefit is that you are not leaving out information about certain crop types. If you are not interested in that crop type for analysis purposes, you are easily able to group all of that agriculture into an "other" category.