Lab 01: Introduction to ArcGIS Pro

(Due: 01/27/2020, 7:00pm)

Student: Federico Ferrero

Objective: To explore and understand ArcGIS Online and ArcGIS Pro

**Reference:** Chapters 1 and 2A of *Getting to know ArcGIS Pro*

Task:
This exercise covers Chapter 1 and 2A of our text book, *Getting to Know ArcGIS Pro*. You must go through all the steps for each exercise and answer the questions that are on this exercise assignment sheet. In addition, you need to get screen captures of your work and include them in your report.

Also note that the interface on ArcGIS Online may be slightly different from the textbook because the site is being updated continuously.

1. Exercise 1A (40%)
      S1. After Step 17 on page 24, capture the screen and include it in your report.
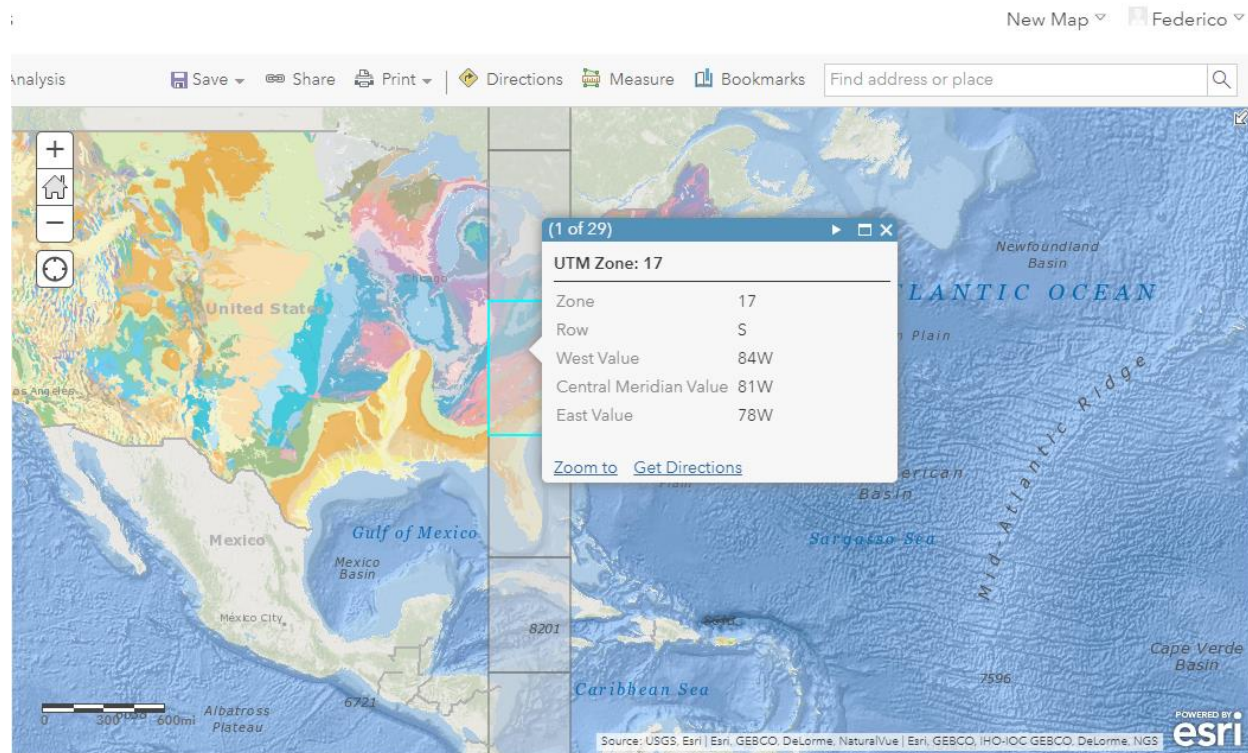

The UTM grid layer overlaps the geological units layers. The pop-up shows information about UTM Zone 17.

For the following task, because the online map we use for this exercise is changed, the content labels won't be exactly same as in the book. For example, the book has one layer called "Accidents 2014", but

the map we use has "Bicycle Involved Accidents" and "Pedestrian Involved Accidents". You'll do the same exercises as described in the book, but just be aware that our map is slightly different.

S2. At Step3 on page 28, search "**Lab 1_bicycle and pedestrian crashes_student version**" by jmchilds_umish

After Step 14 on page 36, capture the screen and include it in your report.
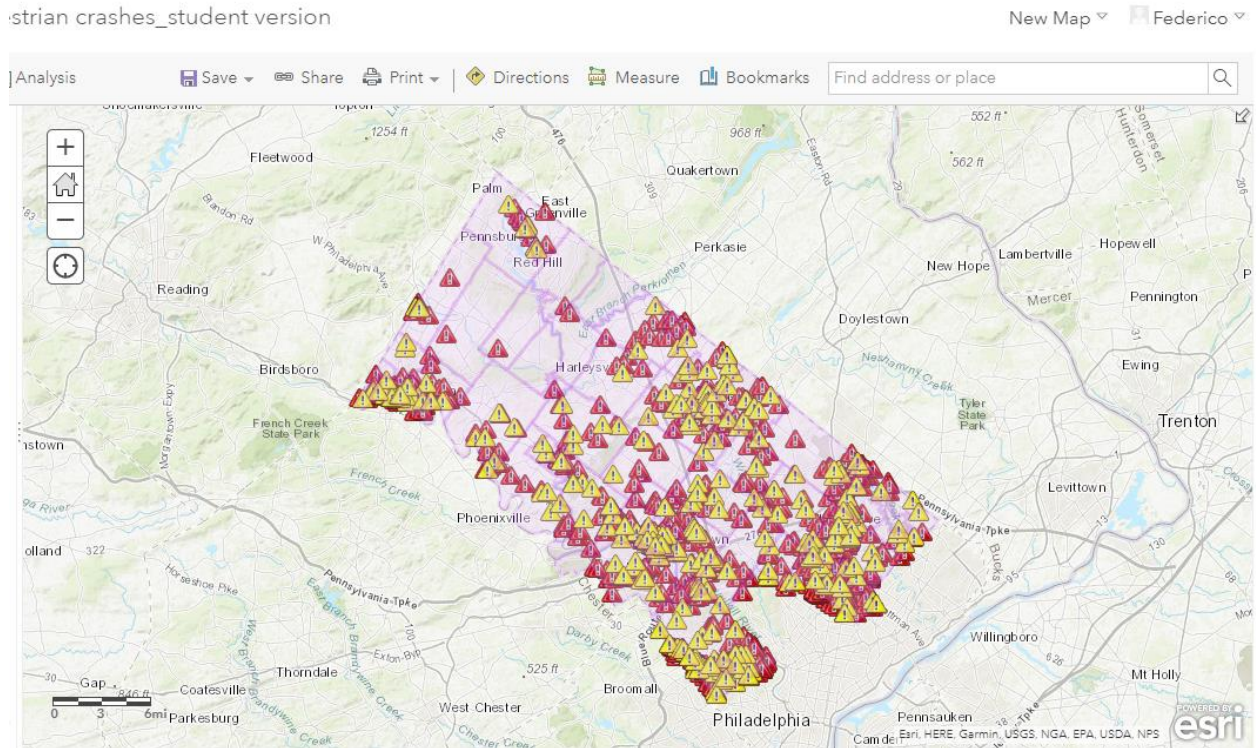
Bicycle and pedestrian accidents in Wilmington, DE 2014 (bicycle accident= yellow sign / pedestrian accident=red sign)
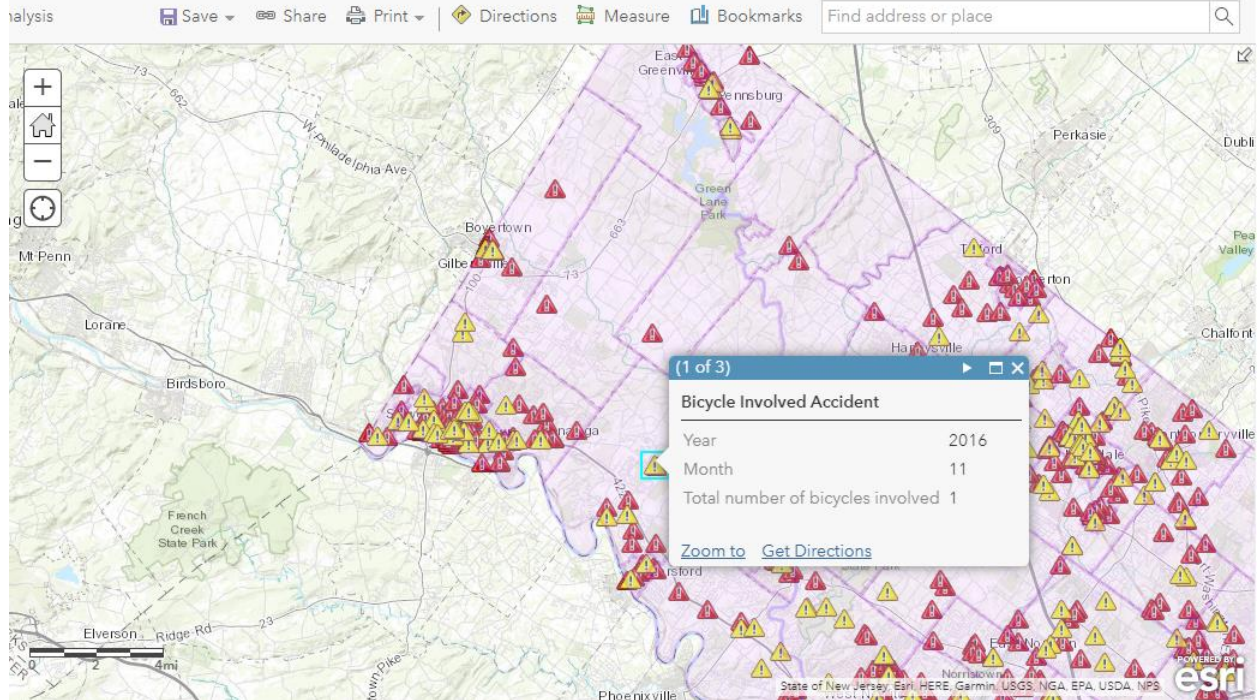
S3. At Step7 on page 39, for the Bicycle Accident layer, only select:
- {CRASH_YEAR} → rename as **Year**
  - (also uncheck the box by "Use 1000 Separator")

- {CRASH_MONTH} → rename as **Month**
- {BICYCLE_CO} → rename as **Total number of bicycles involved**

- For Pedestrian Accident Layer, only select:
  - {CRASH_YEAR} → rename as **Year**
    - (also uncheck the box by "Use 1000 Separator")
  - {CRASH_MONTH} → rename as **Month**
  - {PED_COUNT} → no need to rename this one

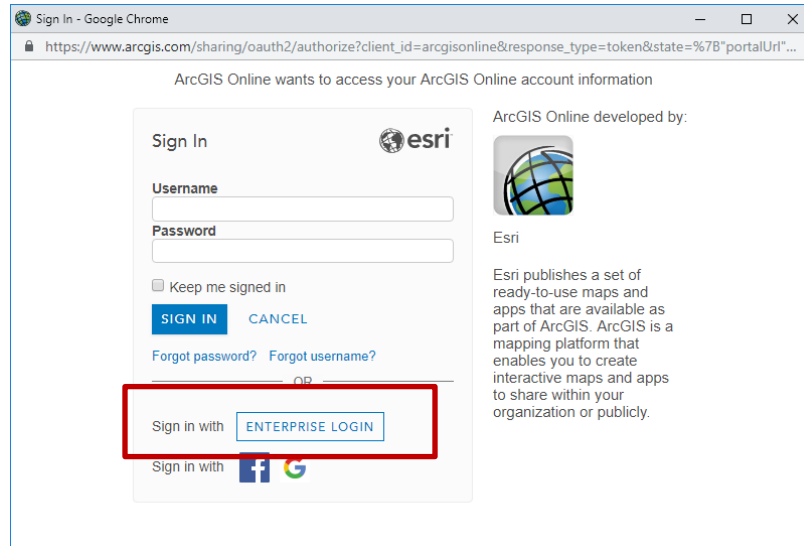After Step 10 on page 40, capture the screen and include it in your report.

Detail of a bicycle accident seen in a pop-up window.

Q1. After Step 4 on page 42, click the Share button, check "share with University of Texas at Dallas" You will get a URL for your shared map. Paste the string format URL in your answer. (one like in the last figure on page 25). Then click the Done button at the bottom.
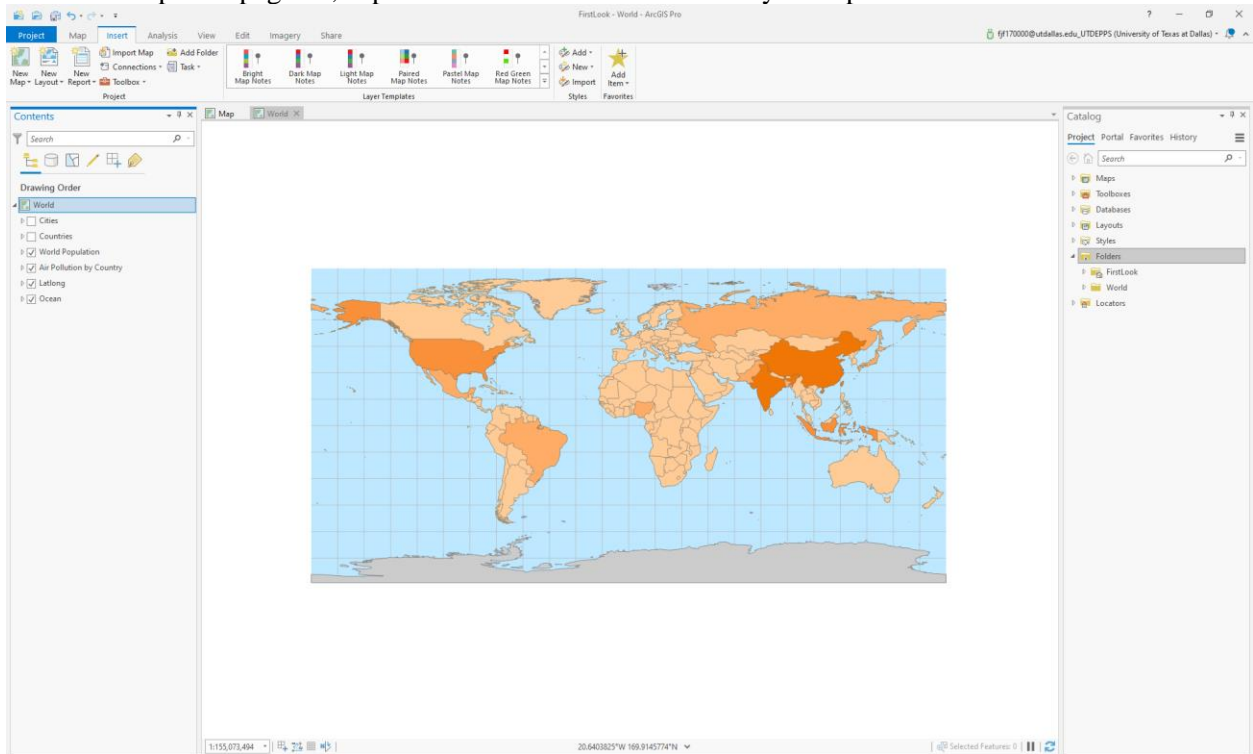
https://arcg.is/1eua1i

On page 27, you are asked to log in with either your personal or organizational account. Please choose **ENTERPRISE LOGIN** (the box in the below figure), and type in UTDEPPS for the organizational URL (i.e., utdepps.maps.arcgis.com)

2. Exercise 2A (60%)

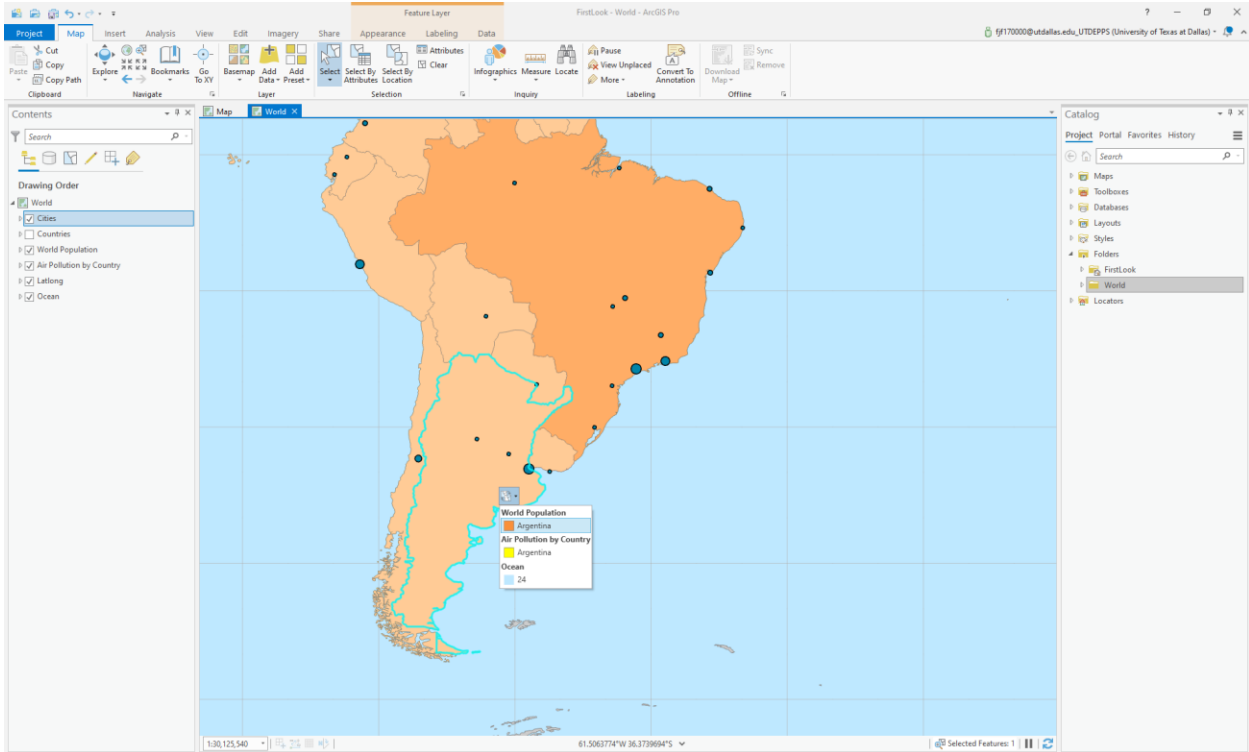S4. After Step 8 on page 55, capture the screen and include it in your report.

Screenshot of ArcGIS Pro. In the Content pane we can see in "World" the different layers turned on.
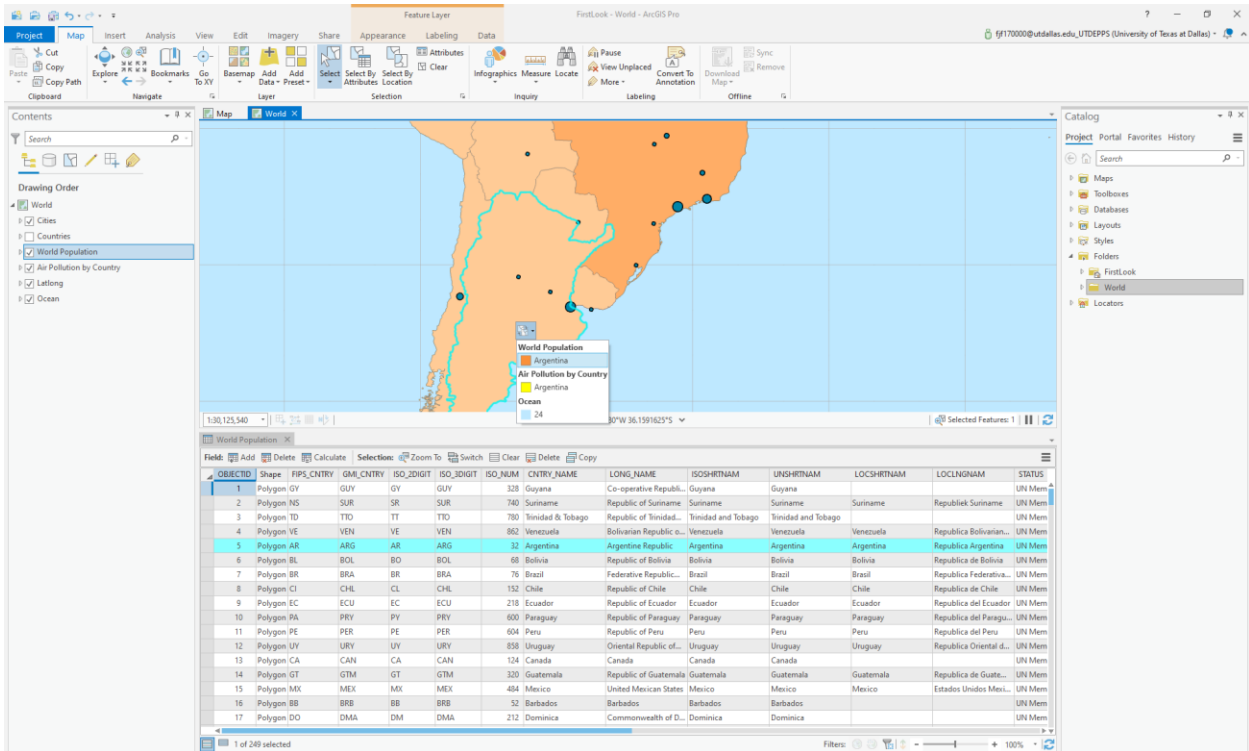
Q2. At Step 4 on page 59, which city has the largest population?

The largest population is Shanghai with 14,608,512.

S5. After Step 5 on page 61, capture the screen and include it in your report.

Screenshot of ArcGIS Pro. List of Argentina's overlapping features.

Screenshot of ArcGIS Pro. List of Argentina's overlapping features. The selected country's row is highlighted in the World Population attribute table.

Data

All required data are provided in the DVD which is distributed with the textbook. The data are installed in T:\ywchun\GISC6381\Labs\Data. Or you can download the data from www.esri.com/esripress-resources). You may copy the files in your flash drive to do your exercises.

How to obtain screen captures

If you cannot use commercial software to capture screenshots, you can use a windows function.
By pressing Print Screen key in your keyboard, you can capture screenshots (but it seems nothing happens). The easy way to see the captured screen is to open a favorite word processing program and create a new document and then press Ctrl + V in your keyboard which will paste the captured screen in the document. If you press Alt + Print Screen, you will get a screen capture of a selected window.

Log Out and Wrap Up
- Following items should be included in your report:
    - Screen shots at the specific step and their short descriptions
    - Answers for the questions
    - Put your screen shots and answers under each question properly in this word document and do not remove questions.
    - If you submit multiple files, do not compress them in a zip file. Please submit them as separate files.
- Do not forget to log out after you finish your assignment.
- Late submission will be penalized for 10% per day being late. Late submission after one week since the due date will not be graded.

Lab 02: Exploring data with ArcGIS Pro

(Due: 02/03/2020, 7:00pm)

Student: Federico Ferrero

Objective: To explore and understand ArcGIS Online and ArcGIS Pro

**Reference:** Exercises 2B and 2C of *Getting to know ArcGIS Pro Second Edition*

Task:
This exercise covers Exercises 2B and 2C in our text book, *Getting to Know ArcGIS Pro*. You must go through all the steps for each exercise and answer the questions that are on this exercise assignment sheet. In addition, you need to get screen captures of your work and include them in your report.

Note that the interface on ArcGIS Online may be slightly different from the textbook because the site is being updated continuously. Also note that the steps within one section are generally based on previous sections. You may need to follow all steps in a section to get correct results.

1. Exercise 2b (45%)
   S1. In "Label features" section, for "on your own" task after Step 4, capture the screen and include it in your report. Note that your map should have labels for the cities layer (CITY_NAME field) and the World Population layer (CNTRY_NAME field).
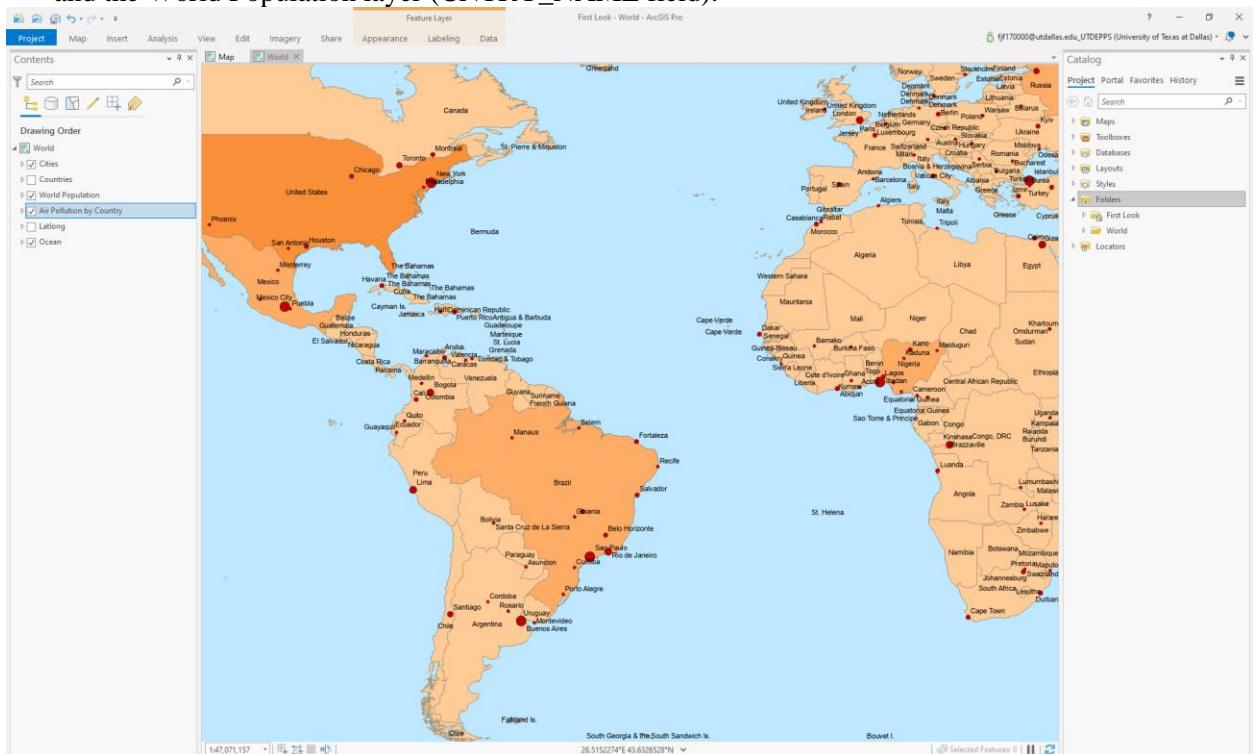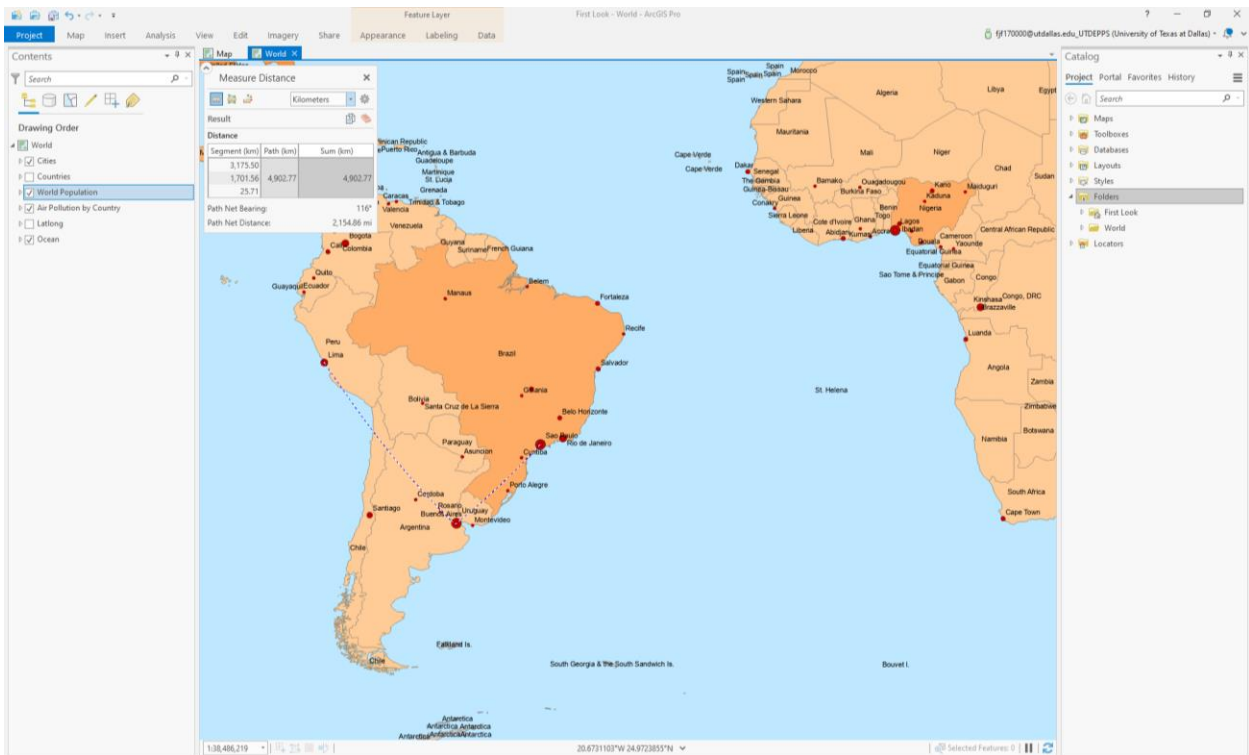

Screenshot of cities' and countries' labels.

   S2. In "Measure distances" section, for "on your own" task after Step 4, measure distance from Lima through Buenos Aires to Sao Paulo. Capture the screen and include it in your report.
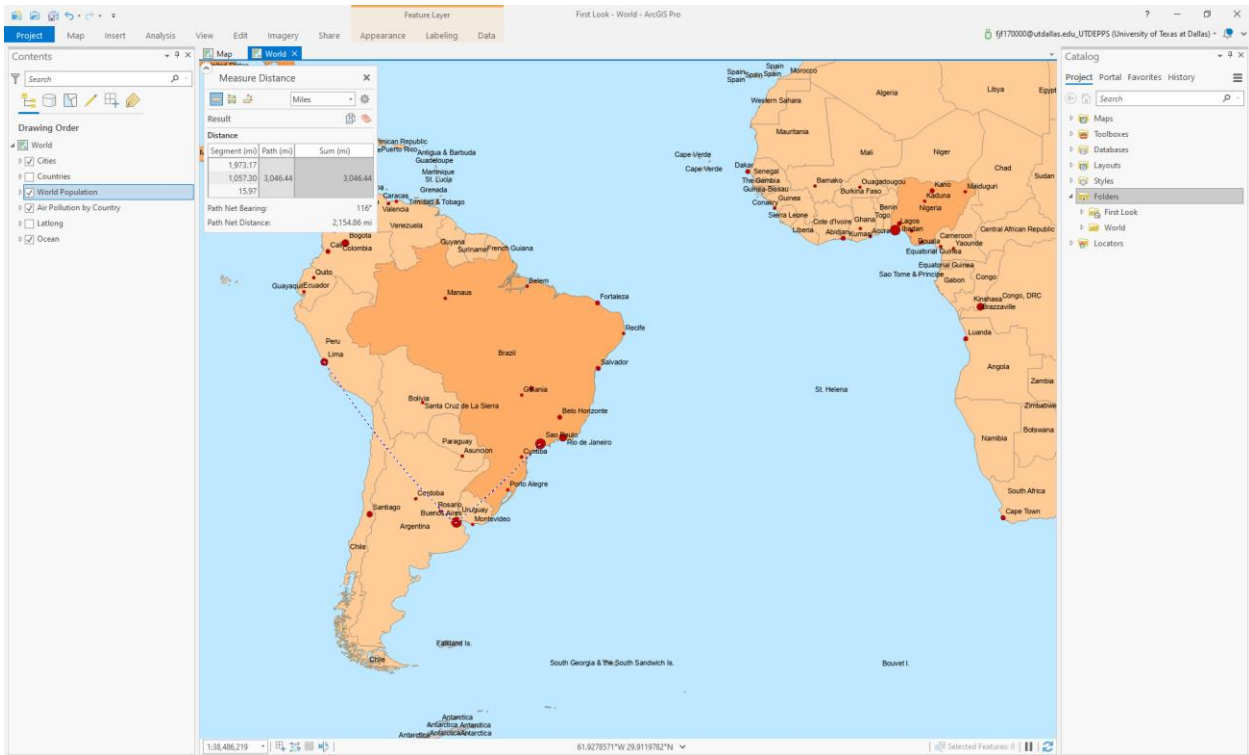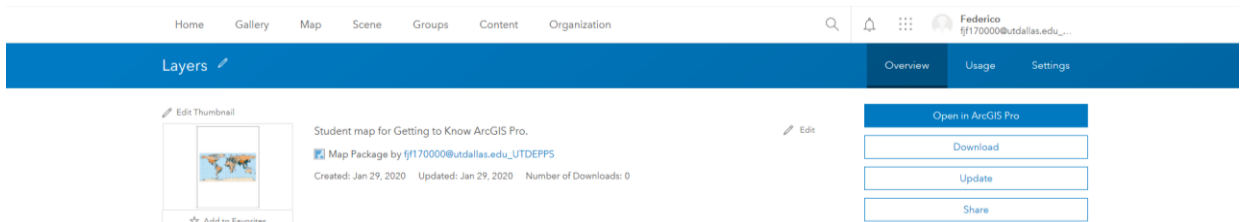
Distance from Lima through Buenos Aires to Sao Paulo in miles.

Distance from Lima through Buenos Aires to Sao Paulo in kilometers.

S3. In "Package and share the map" section, for "on your own" task after Step 3, capture ArcGIS Online page for the shared map.
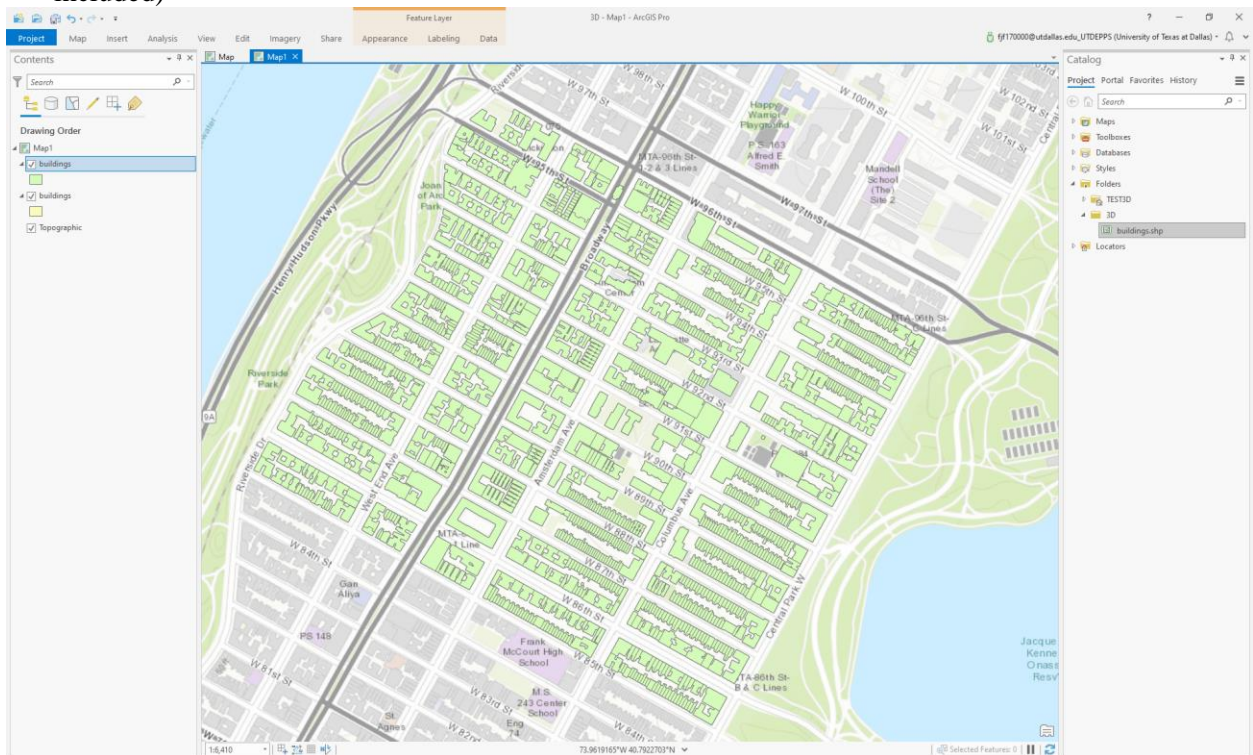
Map packaged and shared.

2. Exercise 2c (30%)

S4. In "Add data and create a bookmark" section, after Step 2, capture the screen and include it in your report. (There will be only a 3D shapefile in the 3D folder. 3D.gdb and 3D.tbx are not included)

Building footprints of New York City's Upper West Side neighborhood added to map.

S5. In "Create a 3D scene" section, after Step 11, capture the screen and include it in your report.
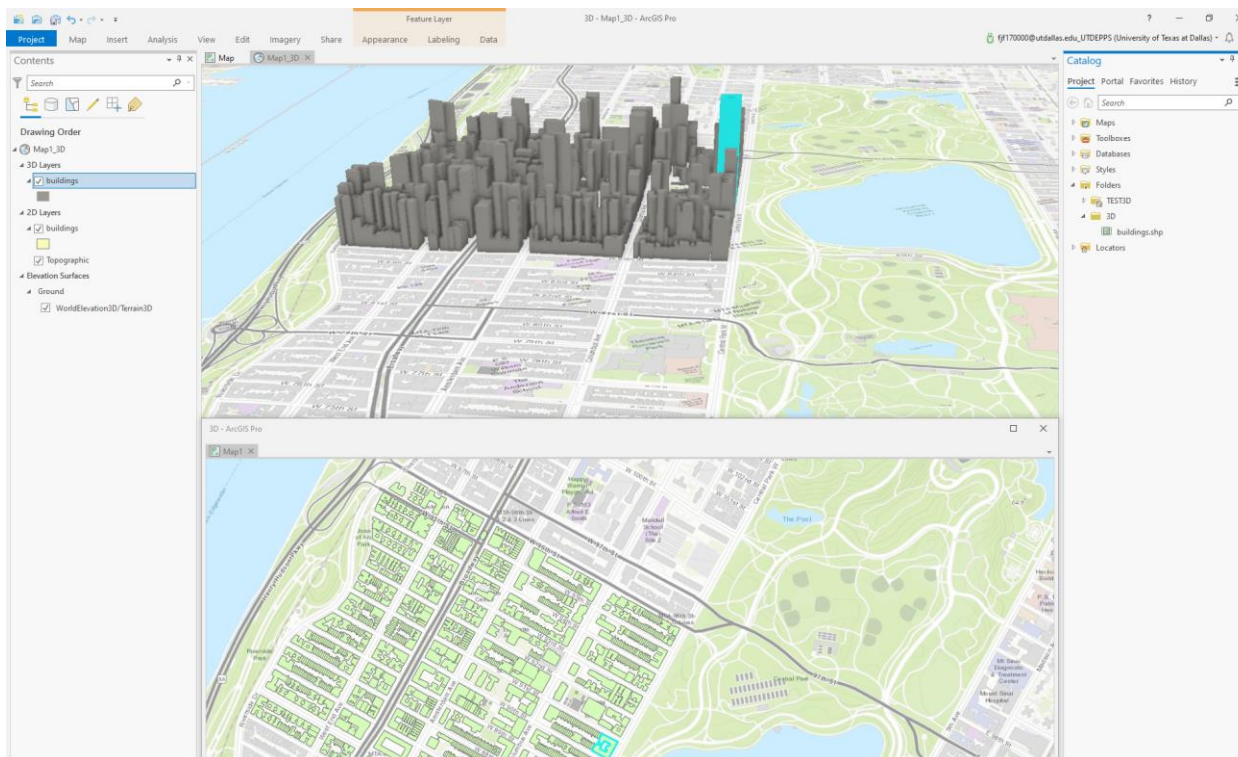
3D and 2D views of New York City's Upper West Side neighborhood map.

3. Exploring Plano (25%)

Explore the city of Plano with the provided dataset. Add four layers (railroad, parks, Plano_bnd, and Block_groups) as well as Imagery with labels as basemap.

- Copy Plano.gdb from eLearning or T drive and paste it on your local hard drive.
- Start ArcGIS Pro and create a new project.
- Create a new map and add the four layers in the new map.
- Insert the "Imagery with Labels" basemap.
- Reorder the layers if necessary.
- Change the display of the layers so that each layer will be visible in the map.
- Turn on the label of parks layer.

S6. Capture the screen and include it in your report.
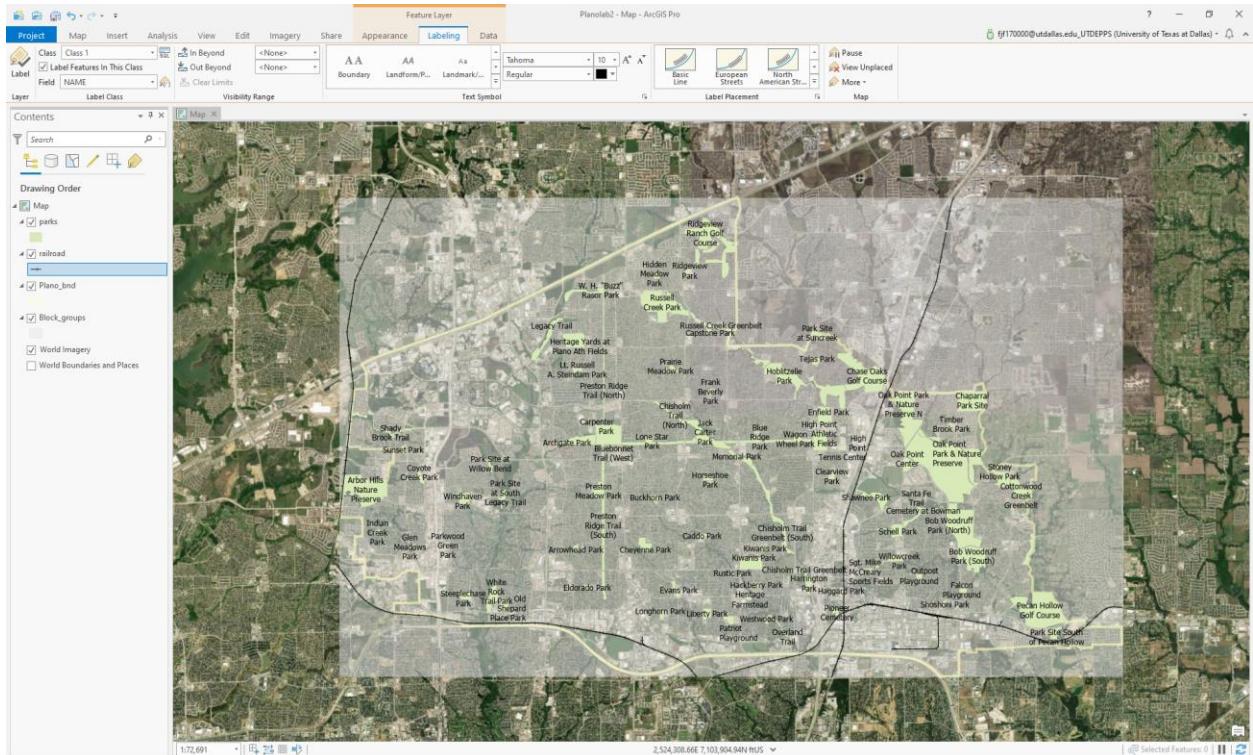
Plano map.

Data

All required data are provided in the DVD which is distributed with the textbook. The data are installed in T:\ywchun\GISC6381\Labs\Data. Or you can download the data from). You may copy the files in your flash drive to do your exercises.

How to obtain screen captures

If you cannot use commercial software to capture screenshots, you can use a windows function.

By pressing Print Screen key in your keyboard, you can capture screenshots (but it seems nothing happens). The easy way to see the captured screen is to open a favorite word processing program and create a new document and then press Ctrl + V in your keyboard which will paste the captured screen in the document. If you press Alt + Print Screen, you will get a screen capture of a selected window.

Log Out and Wrap Up

- Following items should be included in your report:
    - Screen shots at the specific step and their short descriptions
    - Answers to the questions
    - Kindly repeat the questions in your report. It will be greatly helpful when we grade labs.
- Do not forget to log out after you finish your assignment.
- Late submission will be penalized for 10% per day being late. Late submission after one week since the due date will not be graded.

Lab 03: Display GIS Data
(Due: 02/10/2020 7:00pm)

Student: Federico Ferrero

Objective: To symbolize feature and raster layers and creating layers for displaying data.

Task:
This exercise covers how to symbolize feature and raster layers in ArcGIS Pro. Following steps in this lab instruction, capture screens and answer to questions.

Ex 1: Creating custom symbology (20%)
- Copy Lab03_data.zip from T drive (or download it from eLearning), extract it on your local drive.
- Start ArcGIS Pro and create a new project. Name the project as Lab03.
- Import lab03a.mxd document and save the project.
At this point, the map contains only a raster dataset that presents ocean floors around Florida.

- Browse to Florida.gdb (in Lab03\Data folder).
- Add all of the 10 feature classes in the Geodatabase.
- Zoom to the extent of the Counties layer.
Note that the symbols are randomly assigned when a layer is added in a map. We have got some work to make this map better.

- Now, we will rename the layers as below:
  - Shipwrecks to Historical Shipwrecks
  - Hwy 1 to U.S. Route 1
  - Rivers to Major Rivers
  - Lakes to Major Lakes
  - StParks to State Parks
  - florida_cost.tif to Ocean Background
Note that you are just renaming layer names (not the source data files).

- Then clear the check boxes for Cities and Historical Shipwreck layers.
- Click the symbol under Bathymetry to open the Symbology pane.
- On the Symbology pane, click Properties and then change the color to Sugilite Sky.

Note that Bathymetry lines indicates changes in ocean depth, like the elevation lines on a topographical map. They somewhat obscure the coast boundaries.

- Move Bathymetry below State park. See if the coast lines appear more clearly.
- Similarly change the color of Major Rivers to Oxide Blue.

Let's also change the color symbol for Major Lakes. However, note that because Major lakes are polygons, there are two color options: one for the fill and the other for the outline.

- Change the color of Major Lakes also to Oxide blue.
- Set the outline color of Major Lakes to No color.
- Move Major Lakes below Major Rivers.
- Move State Parks above Counties.

Let's also change the color symbol for U.S. Route 1.

- Open Symbology pane for U.S. Route 1.
- Then choose Mars Red for color and set line with to 1.5.

Similarly, change the symbols of the other layers as follows:

- Coral:
  - Fill color: Medium Coral / Outline width: 1.5 / Outline color: Medium Coral
- State Parks:
  - Fill color: Macaw Green / No outline
- Counties:
  - No fill / Outline width: 0.40 / Outline color: Gray 10%
- Southeast:
  - Fill color: Light Apple / Outline width: 0.40 / Outline color: Gray 20%

Let's work on Historical Shipwrecks

- Turn on Historical Shipwrecks.
- On Contents pane, right-click on Historical Shipwrecks, and click Zoom to Layer.

You will save this extent as the full extent of your map. That means whenever you click the Full Extent button, the map will be shown in this setting.

- Right-click the Layers map, and then click Properties.
- Choose Extent in the list
- Click Custom extent and choose Historical Shipwrecks from the listbox as below:
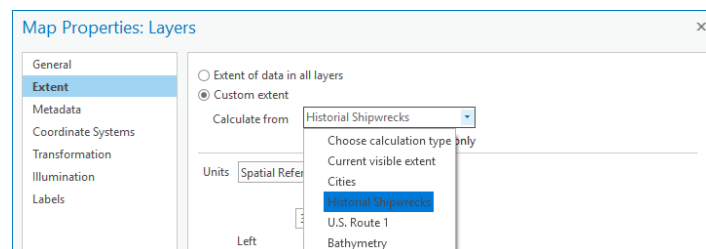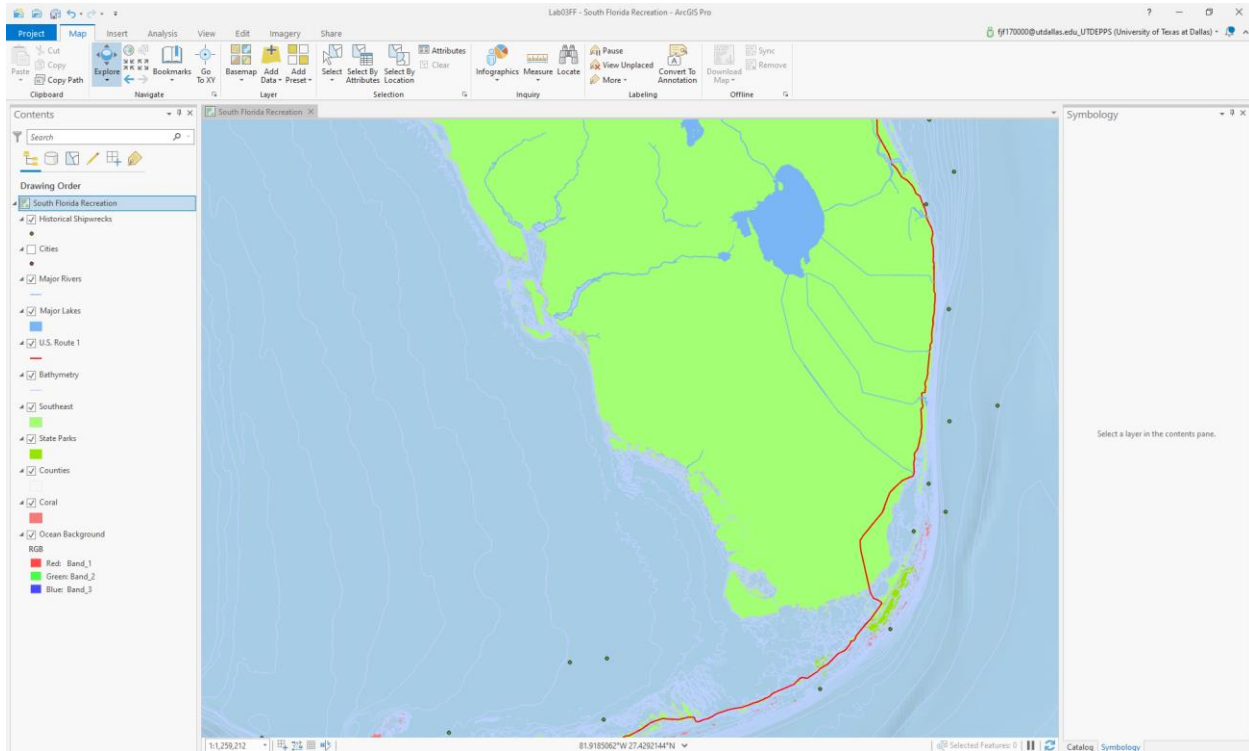

- Click OK button.

Check if the full extent works as described with the setting.

- Change the map name from Layers to South Florida Recreation.

S1. Capture the screen and include in your report.

Screenshot of exercise 1 (S1) completed: "Creating custom symbology"

- Save the project.

**Ex 2**: Symbolizing features by categorical attributes (20%)

- Import lab03b.mxd document and save the project.
Note that this map resembles that you just created in Ex 1.

We will change the symbols for State Parks and Cities.
- On the Contents pane, Right-click State Parks, and Open Attribute Table.
- If necessary, scroll to the right, and examine the Public_Acc (public access) field.

There are two categories: Open-Fee Required and Open-No Fee Required. We will set different symbols for these two categories.

- Close the table, and then open the Symbology pane for State Parks.
- Choose Unique Values for Primary Symbology, and choose PUBLIC_ACC for Field 1.
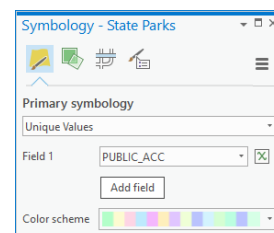
We will use a style file (ESRI.style)
- On Insert ribbon tab in Styles group, click Import and choose ESRI.style file from the lab data folder.
- Open the Symbology pane, if necessary. Click the symbol to the left of Open-Fee Required.
- Choose Sun under the ESRI style.
- Similarly, choose Green for Open-No Fee Required in the ESRI style, and set its outline to no color.
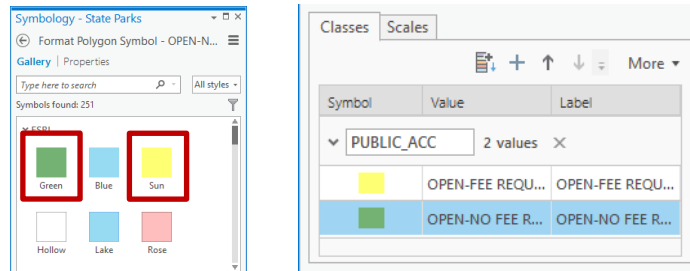
Let's change the category name
- On the Contents pane, click PUBLIC_ACC twice slowly to make it editable. Then rename the label Public Access.
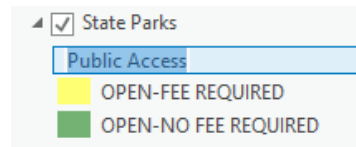
Changes symbols for Cities, but only large cities (with a population of 100,000 or greater) will be visible that will be done with definition query.
- Turn on Cities.
- Open the properties of the Cities layer, and then click Definition Query in the pop-up window.
- Click Add Clause button, and choose options as below:
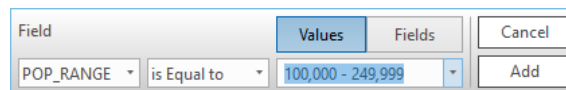
- Click Add button.
- Click Add Clause button again, and choose options as below (with OR for the first item):
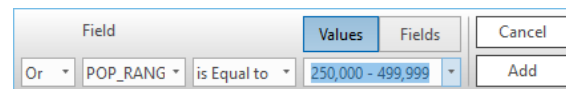
- Similarly, add one more item for a population of 500,000-999,999. As a result, the definition query is set as below:
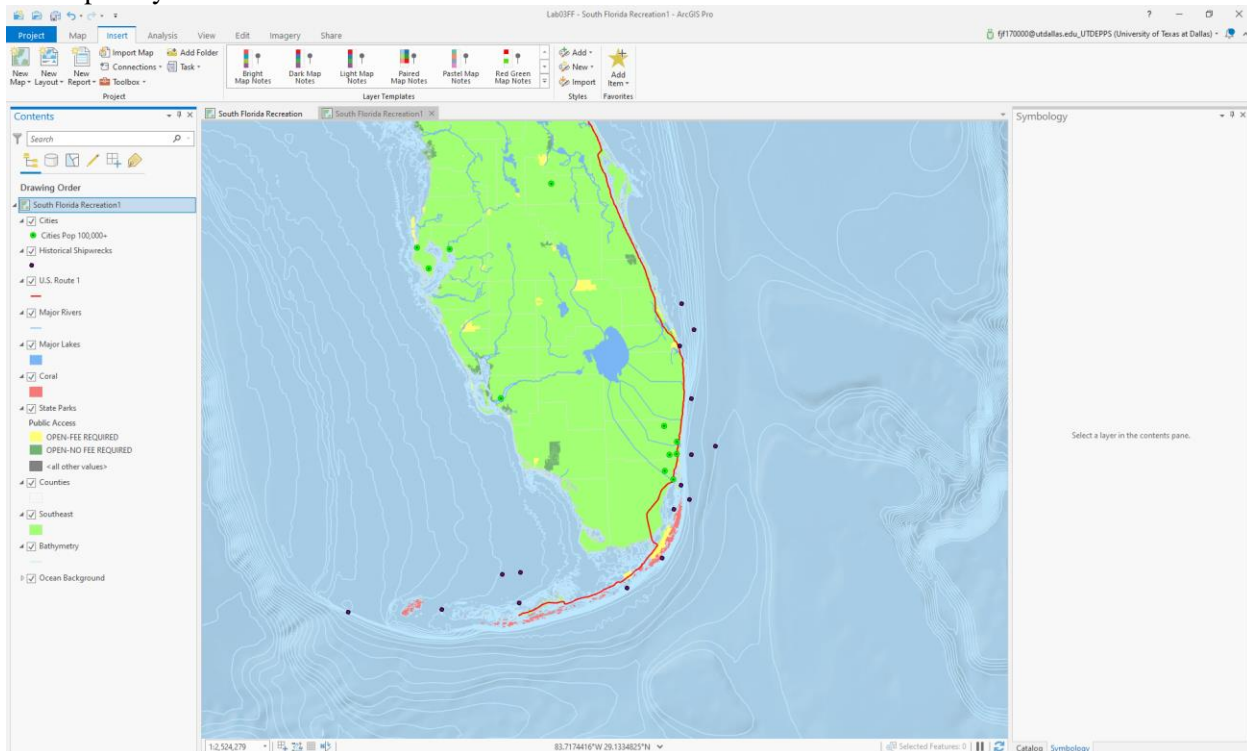
- Click OK.

Note that the number of cities has been dramatically reduced. Alternatively, you could have created a simpler query with POP_2000 ≥ 100,000.
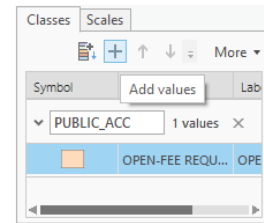
- Change the symbol for Cities to Circle 3 under ESRI style. Then change its size to 10.

- Put a label for the symbol as below (that is, Cities Pop 100,000+):
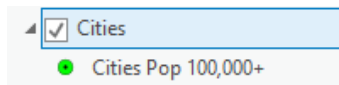

S2. Capture your screen here.

Screenshot of exercise 2 (S2) completed: "Symbolizing features by categorical attributes"

- Save the project.

Q1. Prepare a map that shows only the "OPEN-FEE REQUIRED" instead of both "OPEN-FEE REQUIRED" and "OPEN-NO FEE REQUIRED". Add a screen capture as an answer to this question.

Hint: In the Symbology pane for State Parks layer, you can remove values you do not need and add values you want to display.
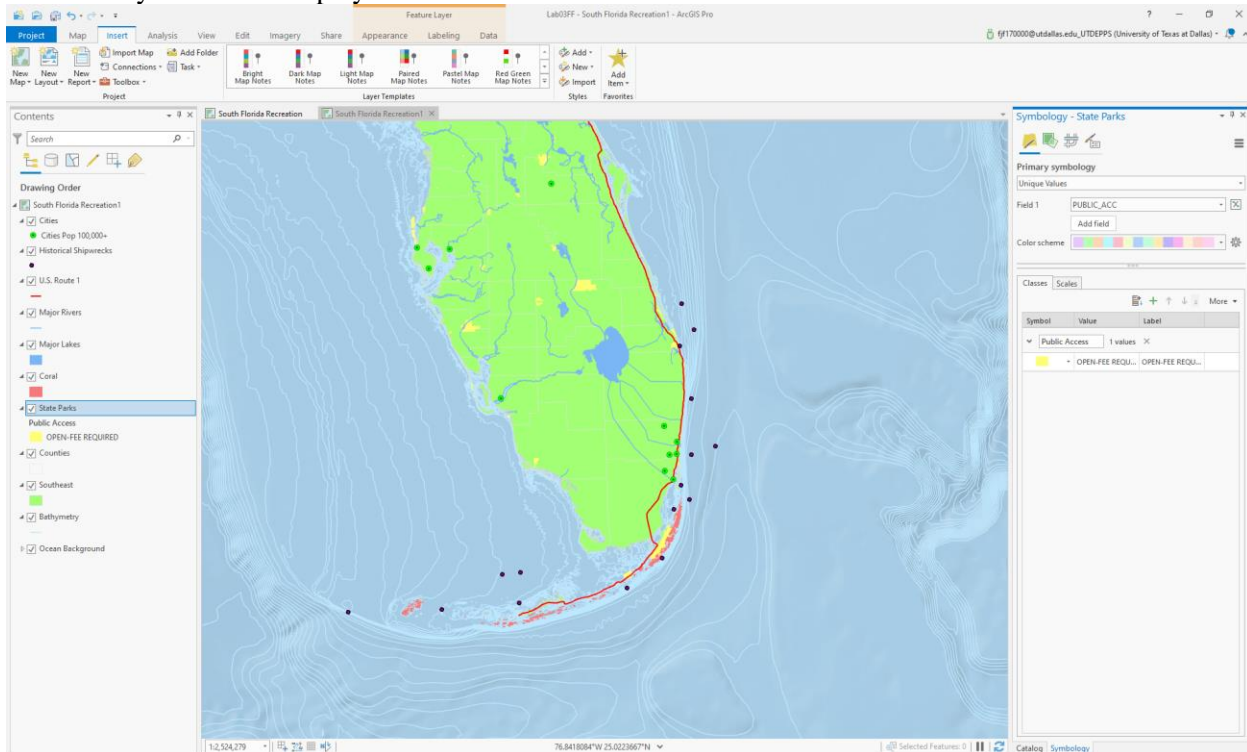
Screenshot of exercise 2 (Q1): map with only "Open-fee required" public access spaces

Ex 3: Using styles and creating layer files (30%)

We will work on symbols in this exercise. ArcGIS Pro has a limited symbol sets especially compared with ArcMap. Note that ESRI.style is a style file from ArcMap. For your information, a style is a collection of predefined symbols, colors, and other map elements such as labels, north arrows, scale bars, and borders.

- Import lab03c.mxd document and save the project.

Note that this map resembles that you just created in Ex 2.

We will use Civic.style that is also from ArcMap.
- On Insert ribbon tab, in Styles group, click Import and choose Civic.style file from the lab data folder.
- Open Symbology pane, for the Historical Shipwrecks layer.
- In the Search box, type wreck and press Enter.
- Choose the second Wreck symbol under the Civic style library as shown in the right figure.
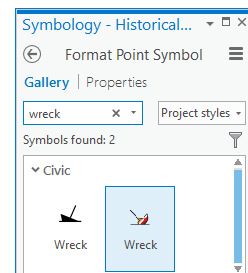
S3. Capture your screen and include it in your report.
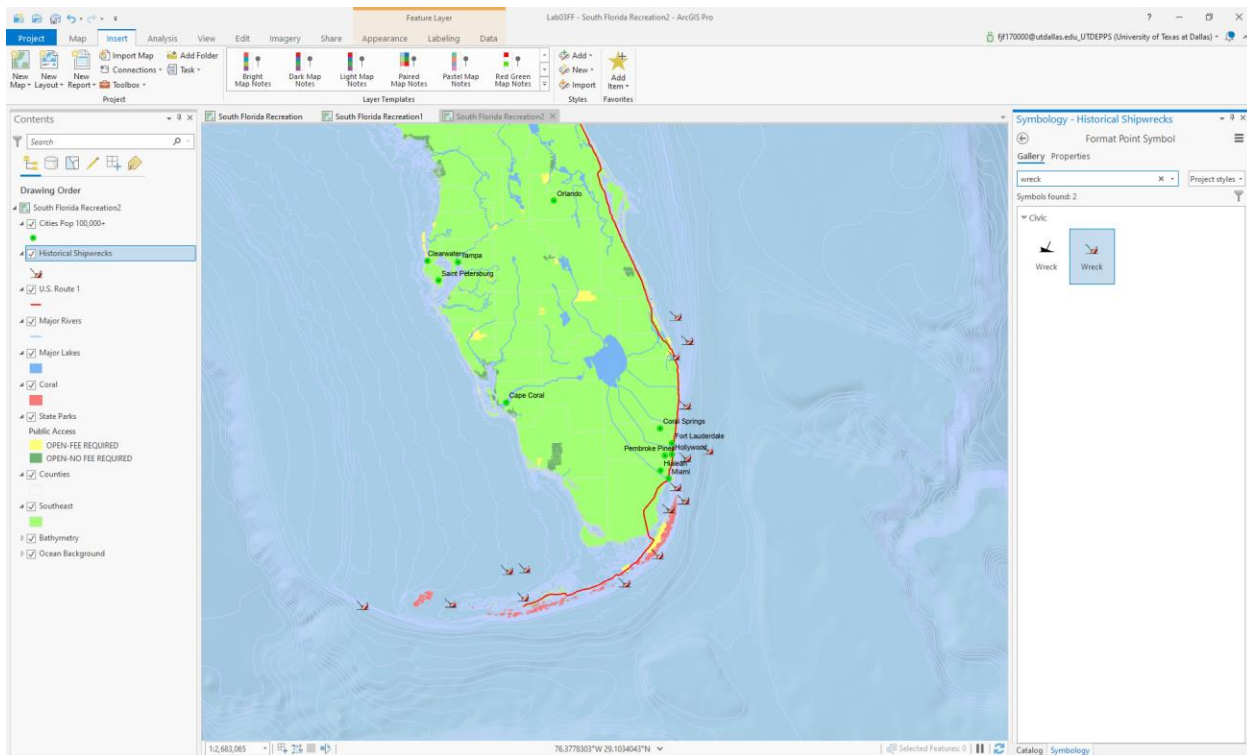
Screenshot of exercise 3 (S3): use of specific wreck symbol from Civic style library

We will symbolize the Bathymetry layer using graduated colors.
- Open Symbology pane, for the Bathymetry layer.
- Click Graduate Colors under Primary symbology.
- Click DEPTH_FT for field, and click Activity 4000 (could be different depending on the software versions) for Color scheme.
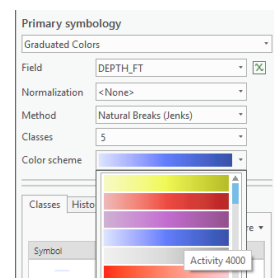
We will save the layers in .lyrx files.
- Choose Historical Shipwrecks on the Contents pane.
- On Share ribbon tab, in Save As group, click Layer File.
- On the Save Layer as LYRX file dialog box, browse to your lab folder.
- Accept the default file name and click Save.
- Similarly, save these three layers as layer files: State Parks (State Parks.lyrx), Bathymetry (Bathymetry.lyrx), and counties (counties.lyrx).

Note that these layer files can be added to any map. However, because a layer file references to its source GIS file, you need to send the source file as well as a layer file when you share your layer file. Let's check these layer files.

- Create a new map (On Insert ribbon tab, in Project group, click New Map).
- Click Add Data button (On Insert ribbon tab, in Layer group).
- Browse the folder where the layer files are saved and add these layer files.

S4. Capture your screen and include it in your report.
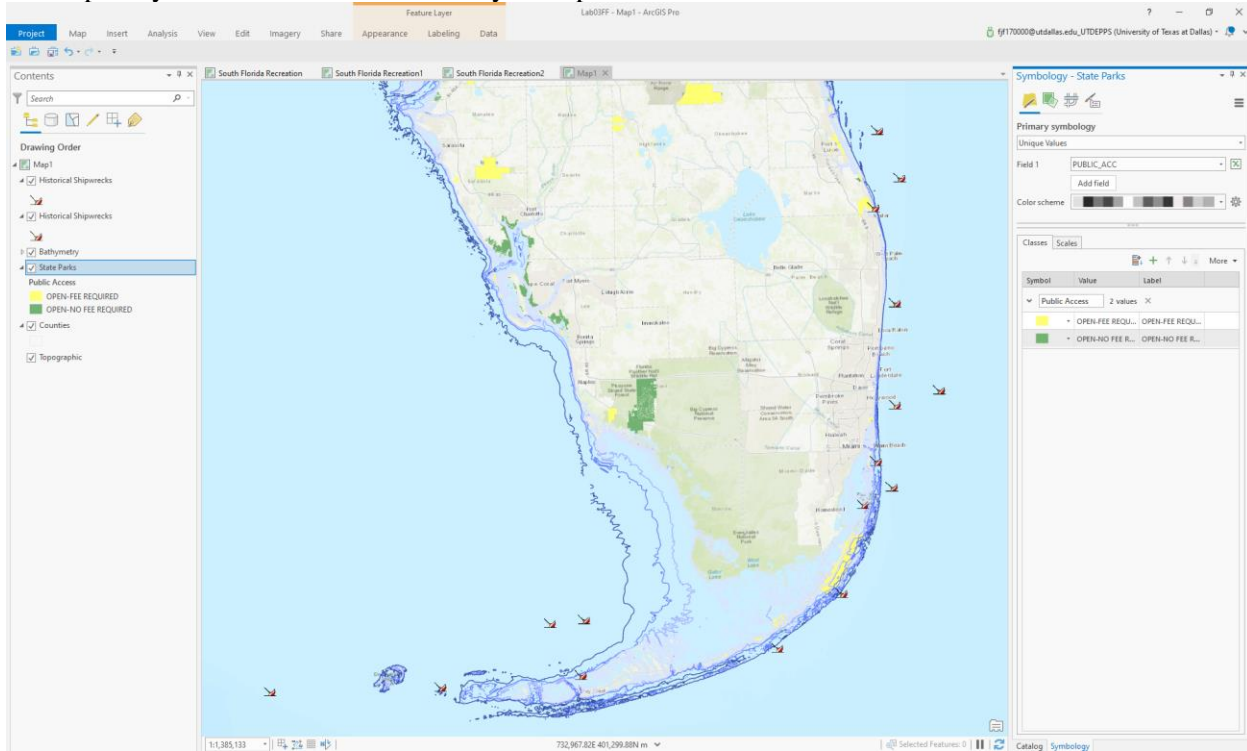
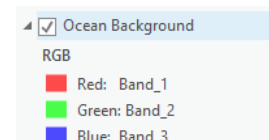*Screenshot of exercise 3 (S4): verification of the layer files saved*

- Save the project.

Ex 4: Symbolizing raster (30%)

We will symbolize raster data in this exercise.

- Import lab03d.mxd document and save the project.
- On the Contents pane, expand the Ocean Background layer, which is an image file.

You can see that the Ocean Background image is a three-band raster (RGB).

Let's add two raster data in the map.
- Click Add Data button (On Insert ribbon tab, in Layer group).
- Browse to your lab data folder and choose shdrl and usgsdem layers.
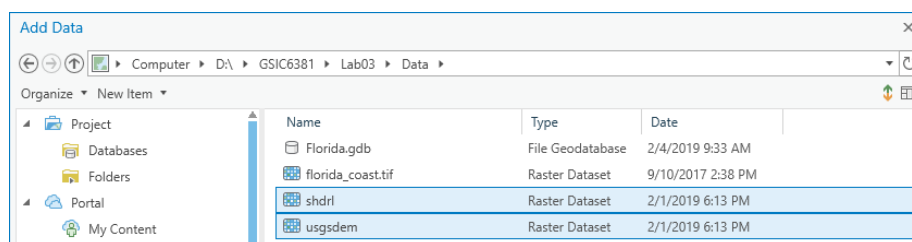
- Click OK.
- Rename the usgsdem layer Elevation.
- Now rename shdrl Hillshade.
- Move these rasters above the Southeast layer in the Contents pane.

Note that a raster has a rectangular structure, as you see that the Elevation layer covers a rectangular. Its pixels with -1 are meant to be no data. Let's make these no data pixels invisible.

- Open the Symbology pane for the Elevation layer.
- In the Mask tab, check on Display background value, and type −1. Then, click no color for the symbol as in the box in the right figure.
- Close the Symbology pane.

Now you will see that the Elevation does not appear in ocean areas.
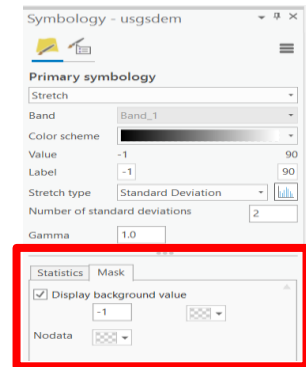
S5. Capture your screen and include it in your report.
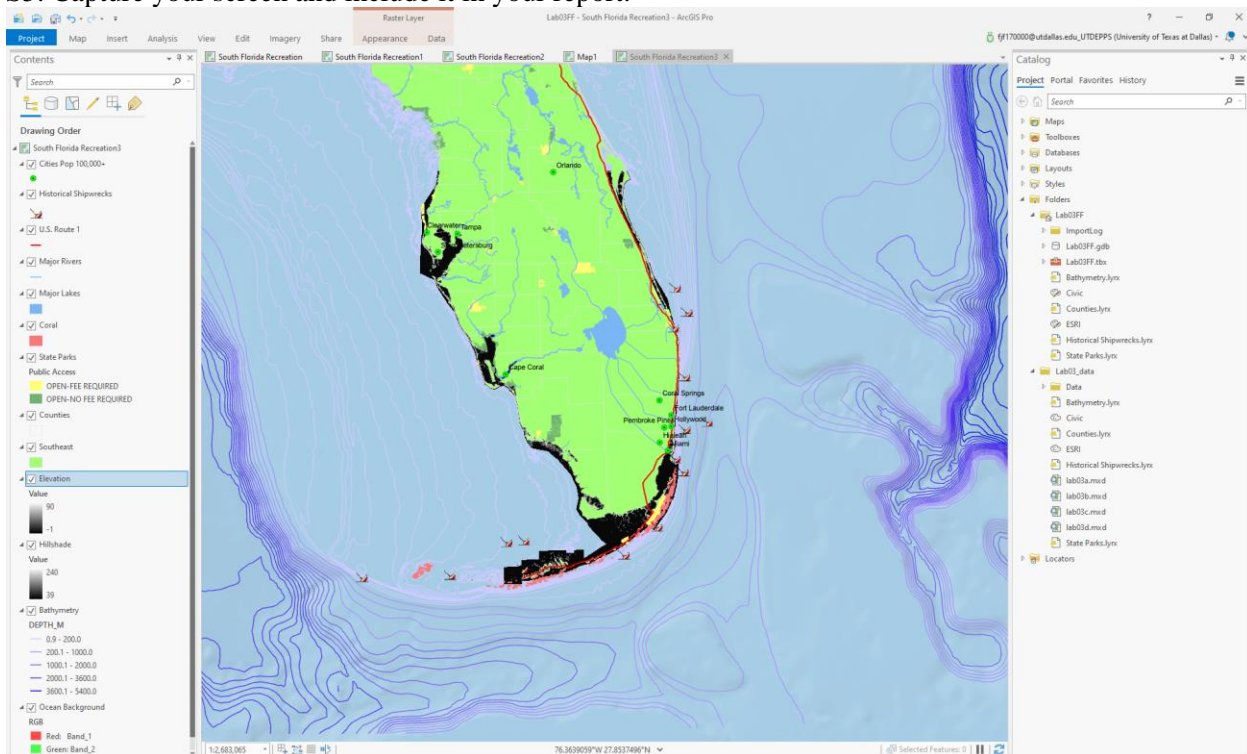
Screenshot of exercise 4 (S5): "Elevation" no longer appears in ocean areas

- Reopen the Symbology pane for the Elevation layer.

- Click the color scheme, and click the Activity 1000 or yellow to read color ramp (could be different depending on the software versions), and then click format color scheme… on the dialog.
- On the Color Scheme Editor popup dialog, click Reverse Color Scheme button (⏩).
- Move the Elevation layer above the Hillshade layer.
- Then click OK.
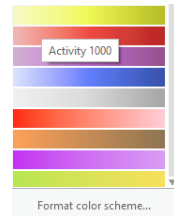
S6. Capture your screen and include it in your report.
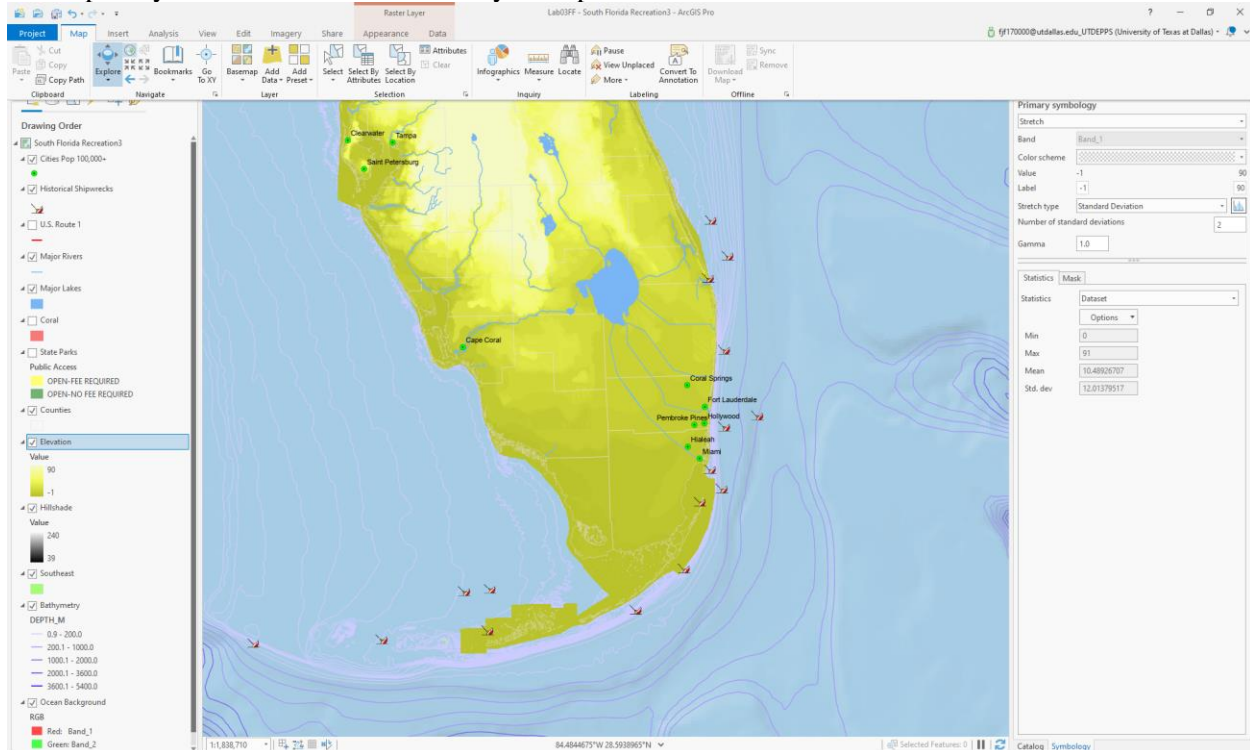
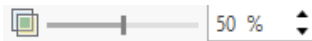*Screenshot of exercise 4 (S6): coloring of the "Elevation" layer*

- On Map ribbon tab, in Navigate group, click Explore dropdown arrow and click selected in the contents. Make sure that the Elevation layer is selected in the Contents pane.
- Click any location on the map to see elevation values on the Pop-up dialog.
- Change back to Topmost layer in the Explore dropdown list.
- Click any location on the map. You may see that the attributes of another layer are shown on the Pop-up dialog.

If you zoom in enough, you can see the raster cell structure.

- Zoom in to any region where elevation changes rapidly.

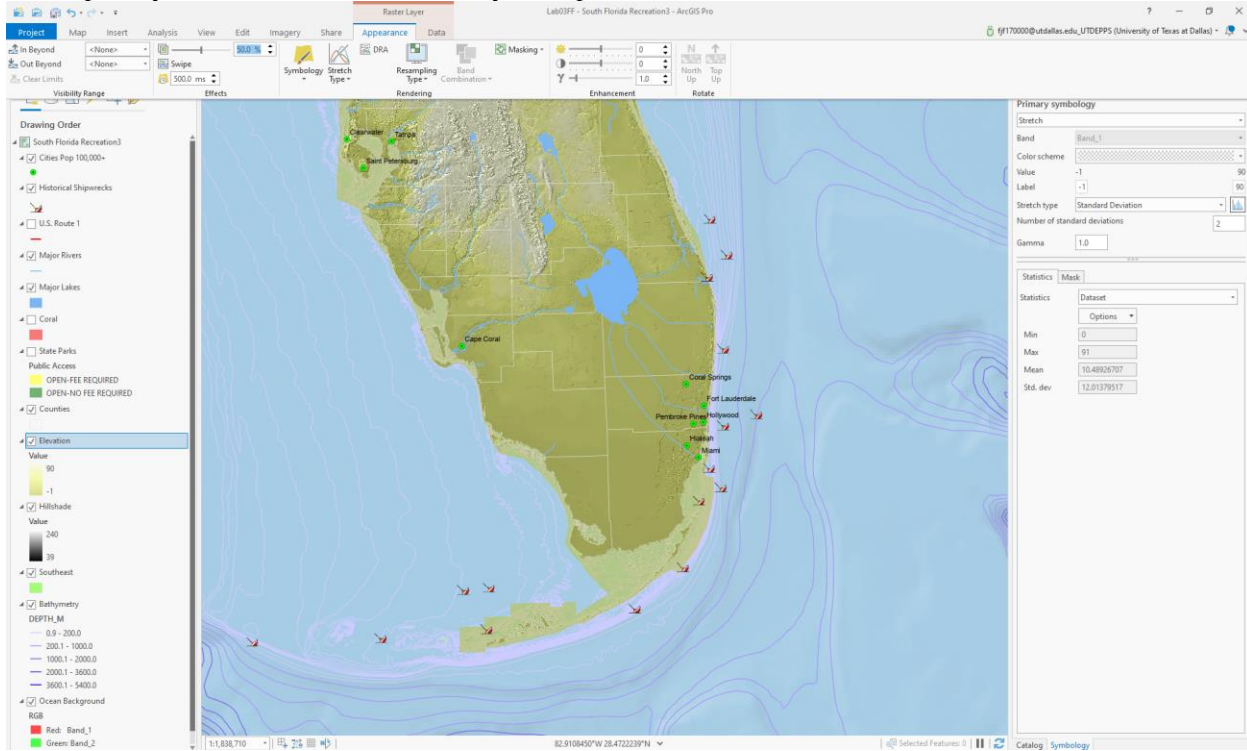Notice that the raster is made up of an array of square cells, or pixels.

- Zoom to the full extent of the map.
- Make sure the Elevation layer is selected in the Contents.
- On Appearance tab of a raster layer, in the Effects group, set transparency to 50.

Note that Hillshade is now visible in the map.

S7. Capture your screen and include it in your report.

Screenshot of exercise 4 (S7): transparency to the "Elevation" layer

Q2. Observe and note down any one difference between symbolizing raster and feature layers.

Applying raster layers (field view) is better for representing continuous events (like elevation) while when it is required to represent discrete entities with well-defined boundaries (as in the case of shipwrecks) it is recommended to use feature layers (object view).
In GIS, there is a strong association between raster and fields and between vector and discrete objects. In the case of raster data, for example elevation, we can see that by using small colored pixels it is possible to represent variations of that continuous data. The appearance obtained with the raster method is that of the degraded color. Contrary, in the case of vector data, the objects are precisely located as units or uniform entities.

Data
All required data are provided in the CD-Rom which is distributed with the textbook. The data files are located in T:\ywchun\GISC6381\Labs\Lab03 folder or you can download it from eLearning. You may copy the files in your flash drive to do your exercises.

How to obtain screen captures
If you cannot use commercial software to capture screenshots, you can use a windows function.

By pressing Print Screen key in your keyboard, you can capture screenshots (but it seems nothing happens). The easy way to see the captured screen is to open a favorite word processing program and create a new document and then press Ctrl + V in your keyboard which will paste the captured screen in the document. If you press Alt + Print Screen, you will get a screen capture of a selected window.

Log Out and Wrap Up
- Following items should be included in your report:
    - Screen shots at the specific step
    - Answers for the questions
- Do not forget to log out after you finish your assignment.
- Late submission will be penalized for 10 % per day being late. Late submission after one week since the due date will not be graded.

Lab 04: Classification
(Due: 02/17/2020 7:00pm)

Student: Federico Ferrero

Objective: To symbolize feature and raster layers and creating layers for displaying data.

Task:
This exercise covers how to symbolize feature and raster layers in ArcGIS Pro. Following steps in this lab instruction, capture screens and answer to questions.

Ex 1: Classifying feature by standard methods (30%)
- Start ArcGIS Pro and create a new project. Name the project as Lab04.
- Import lab04a.mxd document and save the project.
- Open Attribute Table of the Counties layer.
- Scroll to the right to see more of the table column headings.

Note that we will use some columns including county name, population, and crime data from 1994 and 2002.

Let's make a map with classes.
- Close the attribute table.
- Open *Symbology* pane for the Counties layer.
- Click **Graduated Colors** under *Primary Symbology*, and click **BURG02** in the field list.

Note that the BURG02 attribute represents burglaries for each county in 2002.

- Click the Color scheme dropdown list and click **Blues (Continuous)**

If you want to find a color scheme by name, check on Show names as shown in the right figure.

This map has 5 classes. The light colors represent fewer burglaries and the dark color represent more burglaries. Note that the number of counties in each class is different. The class with the greatest values has just two members: Dallas and Harris counties.
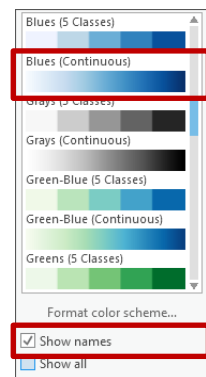
- Change the number of classes to **3**.

You will see that the map reflects the new classification. The highest burglaries class now contains four counties. Also you can see that the value ranges of the classes are different from the previous ones.

- Change the classification method to **Quantile**.

This map looks much different from the previous classification methods. Each class contains roughly a same number of counties.
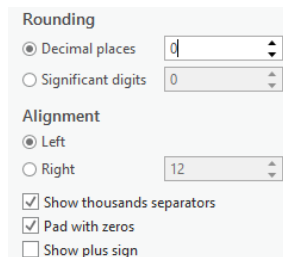
Let's prepare another map

- Change the classification method to **Natural Breaks (Jenks)** and the number of classes to **7**.
- Click Advanced Symbol Options shown in the below figure.
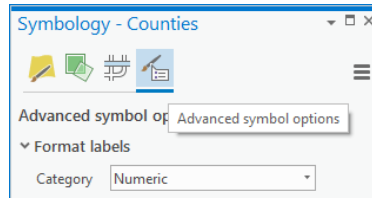
- Change the Rounding number of decimal places to **0**.
- Select *Show thousand separator check* box.

- On the Insert tab, in the project group, click the **New Layout** button to create a new Layout.
- Click Letter under Portrait.
- Click the **Map Frame** button in the map frames group on the Insert tab.
- Click **Default Extent** under Texas.
- Click on a location where a new map frame is located. If necessary, adjust its size and location.

- Click the Legend button, and then draw a rectangle to set a location for a new legend.
- Click the **Text** Tool in the Text group as in the below figure.
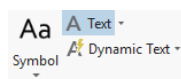
- Draw a rectangle to set a location of a new title.
- Then type "Texas Burglaries, County level, 2002" for the title.

Your map would look similar with the right map.

S1. Capture the screen and include in your report.
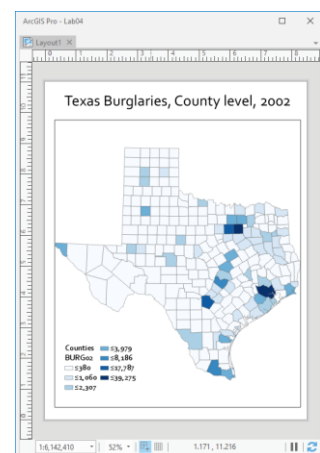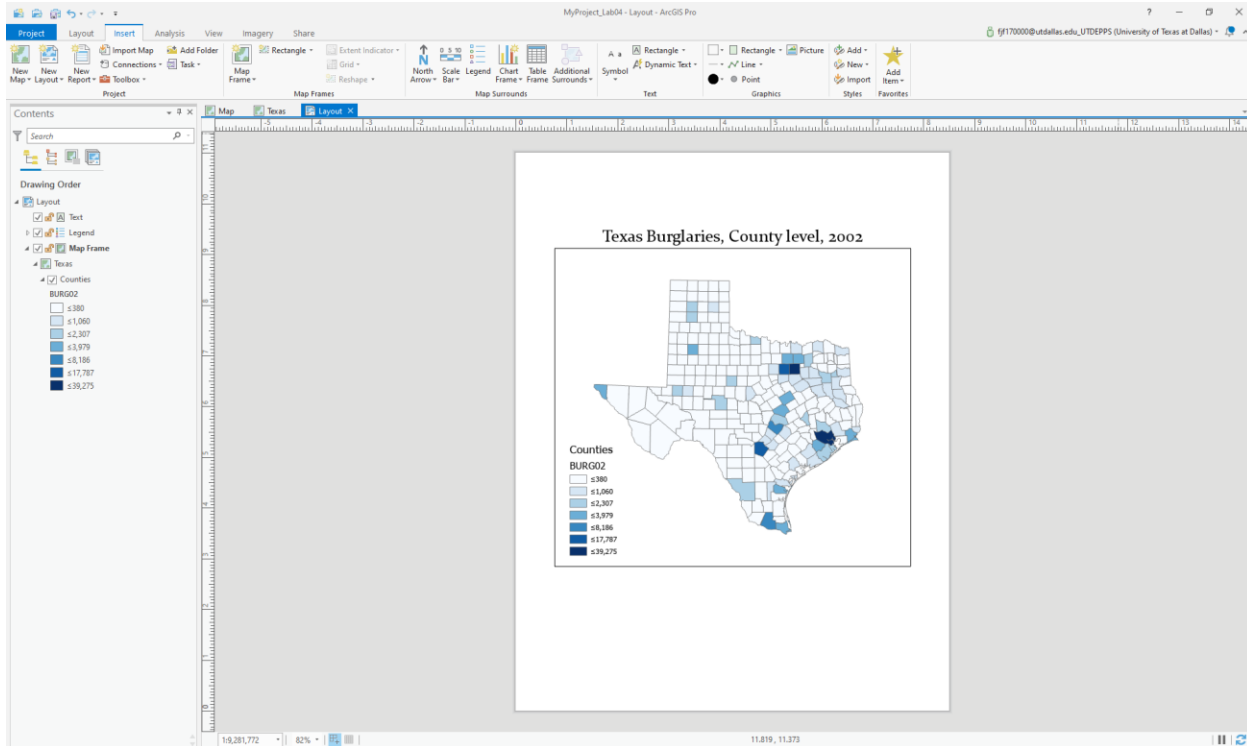
Map with classes using standard methods (S1): Texas burglaries, County level, 2002.

Q1. What classification methods are available in ArcGIS Pro? You can list the names of the methods in your report.

Classification methods available in ArcGIS Pro:
- Natural breaks (Jenks)
- Quantile
- Equal interval
- Defined interval
- Manual interval
- Geometric interval
- Standard deviation

- Save the project.

Ex 2: Mapping density (50%)

- Import **lab04b.mxd** document.
- Right-click on the map frame and click **Open** in the context menu.

We will make a population density map. We will use POPULATION and AREA_SQ_MI columns.
- Open the attribute table of the Counties 2 layer, and find these two columns.

- Close the attribute table.
- Open the **Symbology** pane for the Counties 2 layer.
- Click **Graduate Colors**.
- Click **POPULATION** in the field list.
- Click **AREA_SQ_MI** in the normalization field list.
- Click **Oranges (continuous)** for Color scheme (or a similar color scheme).
- Set Rounding decimal places to **2**.
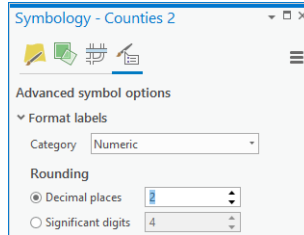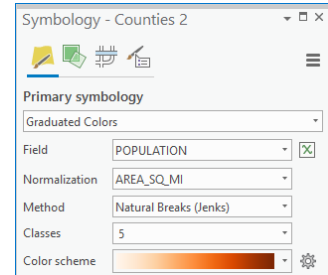
- Click the check box next to Counties 1 to hide the layer.

A population density map appears. You can find the following three counties have the greatest population densities: Tarrant, Harris, and Dallas. You can verify with the Identify tool.

S2. Capture the screen and include in your report.
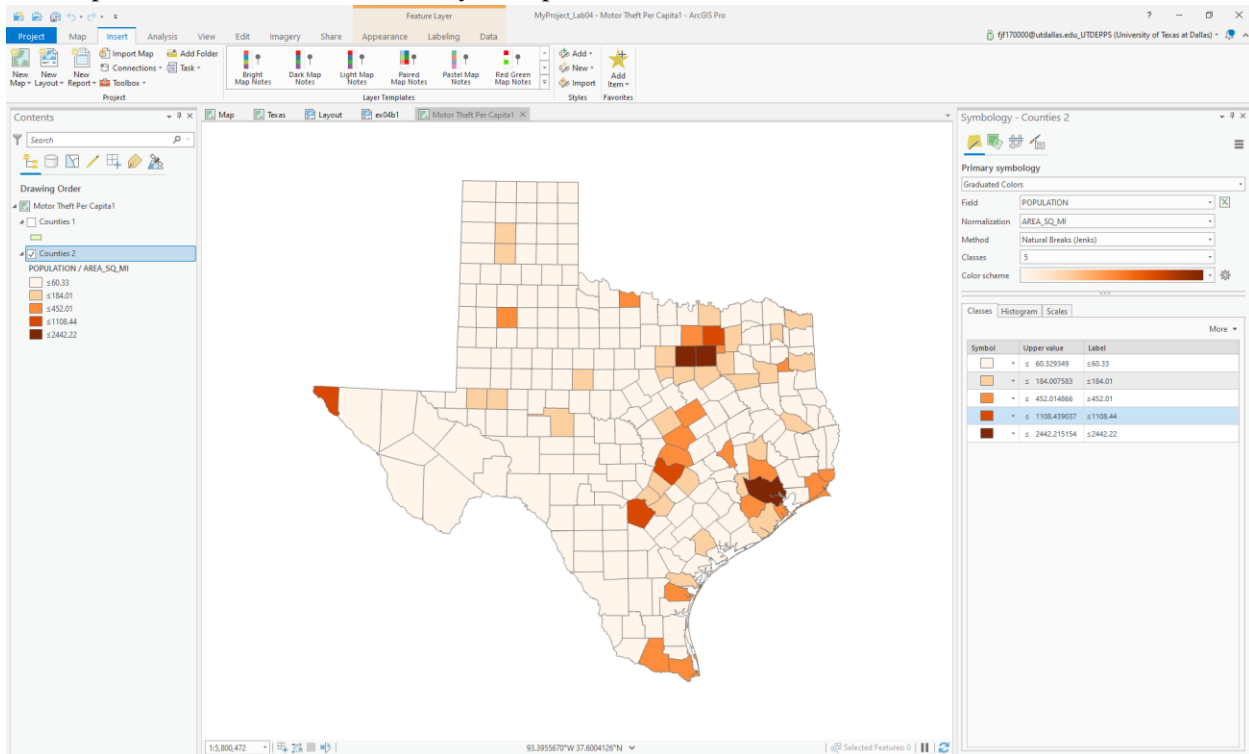
Map with classes using graduated colors (S2): Population density map, Texas, 2002.

- Click the check box next to Counties 1 to make the layer visible again.
- Open the *Symbology* pane for Counties 1.
- Choose **Dot Density** under Primary Symbology.
- Click **MVTHEFT02** in the field list (Motor vehicle theft in 2002).
- Change the dot value to **100**.

Note that a dot value of 100 means that each dot represents 100 vehicle thefts.

- Click the *point symbol* next to MVTHEFT02.
- Set the color to **Black** and click the **Apply** button.
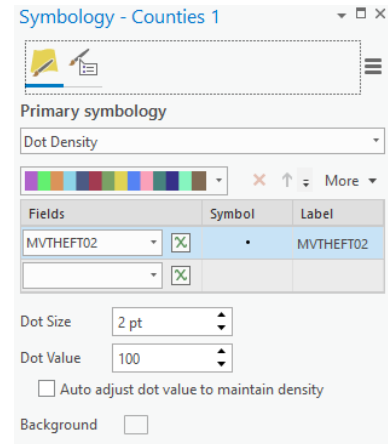
S3. Capture the screen and include in your report.
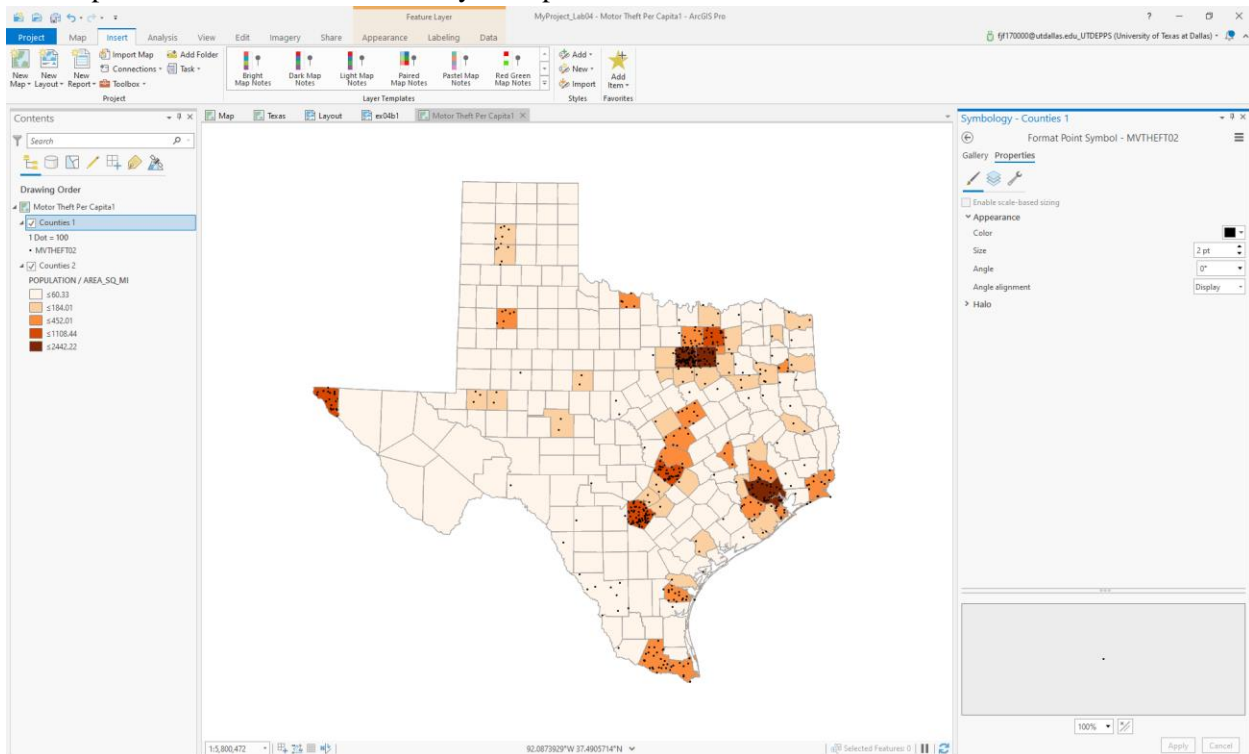
Map with dot density (S3): Population density and density of motor vehicle thefts in Texas, 2002. Note= each dot represents 100 vehicle thefts.

Let's focus on Harris and its adjacent counties.

- Add the *HarrisAdjacentCounties* feature class in the TexasCounty geodatabase (in the lab data folder).
- Zoom to the newly added layer.
- Open the *Symbology* pane for the **Counties 1 layer**.
- Choose Advance Symbol Options and set the Masking options as in the below figure.
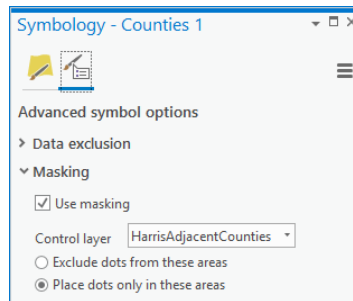
- Turn off the HarrisAdjacentCountes layer.

Note that when creating dot density maps, the following items should be considered: area units, dot size, dot value, and dot placement. Also note that the dots in a county is randomly distributed, which can be misleading.

S4. Capture the screen and include in your report.
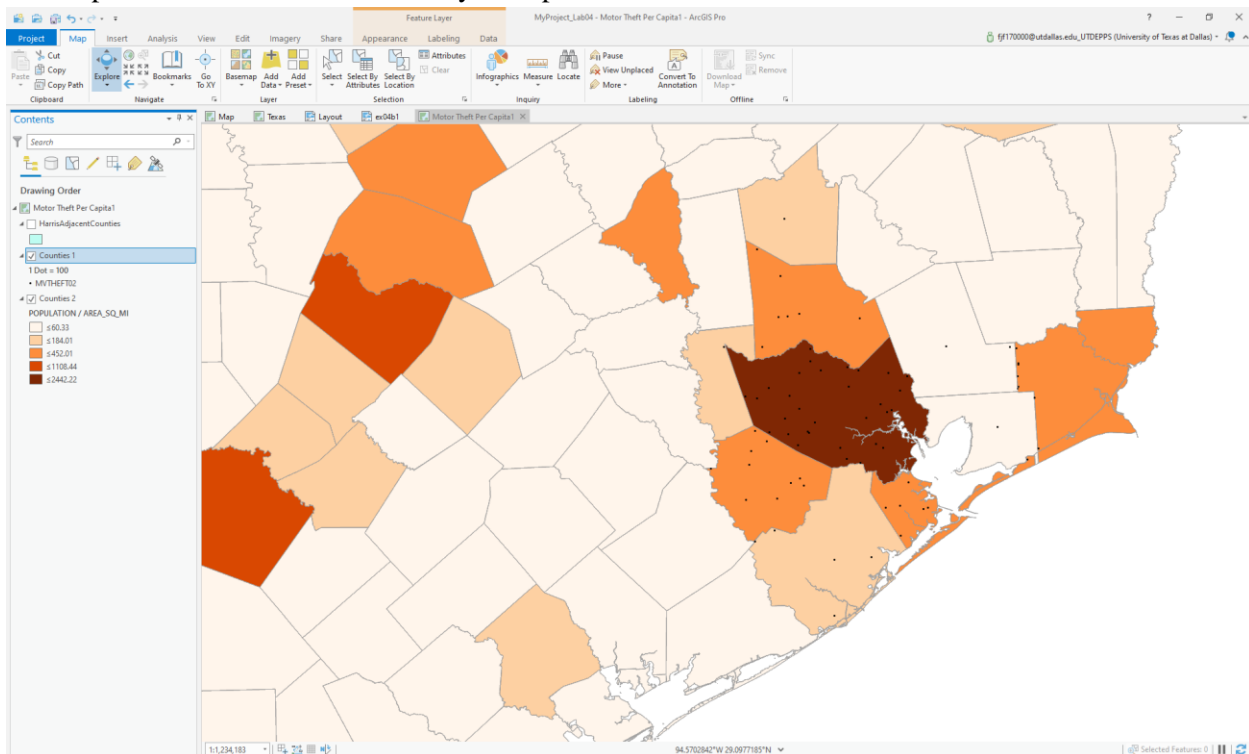
Map with dot density (S4): Density of motor vehicle thefts in Harris and adjacent counties, Texas, 2002. Note= each dot represents 100 vehicle thefts.

Q2. Explain what a dot density map is?
A dot density map is a type of map that uses a dot to show the presence of a feature or phenomenon in a certain geographic space. In some cases, each point represents a unique record of a phenomenon and, in other cases, they can represent many of them (just like the previous map in which each point indicates 100 thefts of vehicles.)

- Save the project.

Ex 3: Using graduated symbols (20%)

- Import **lab04c.mxd** document and save the project.
- Open the attribute table of the Counties layer, and scroll to the right to the AGRASLT02 column heading (this column represents the number of aggravated assaults for each of the 254 counties in 2002).
- Right-click on the AGRASLT02 column heading, and click **Sort Descending**.
- Open the *Symbology* pane for the Counties layer.
- Click **Graduated Symbols** under Primary symbology.
- Click **AGRASLT02** in the field list.
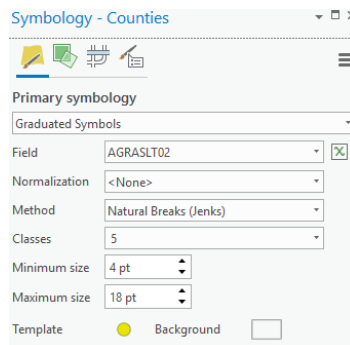
- Click the Template symbol.
- On the Gallery, click **Circle 1** under ArcGIS 2D.
- On the Properties, change its color to **Poinsettia Red** and click apply.

- Go back to Primary Symbology and then click the *background*.
- On the Gallery, click **Yellow (Pastel)**.
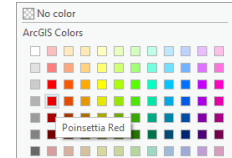
S5. Capture the screen and include in your report.
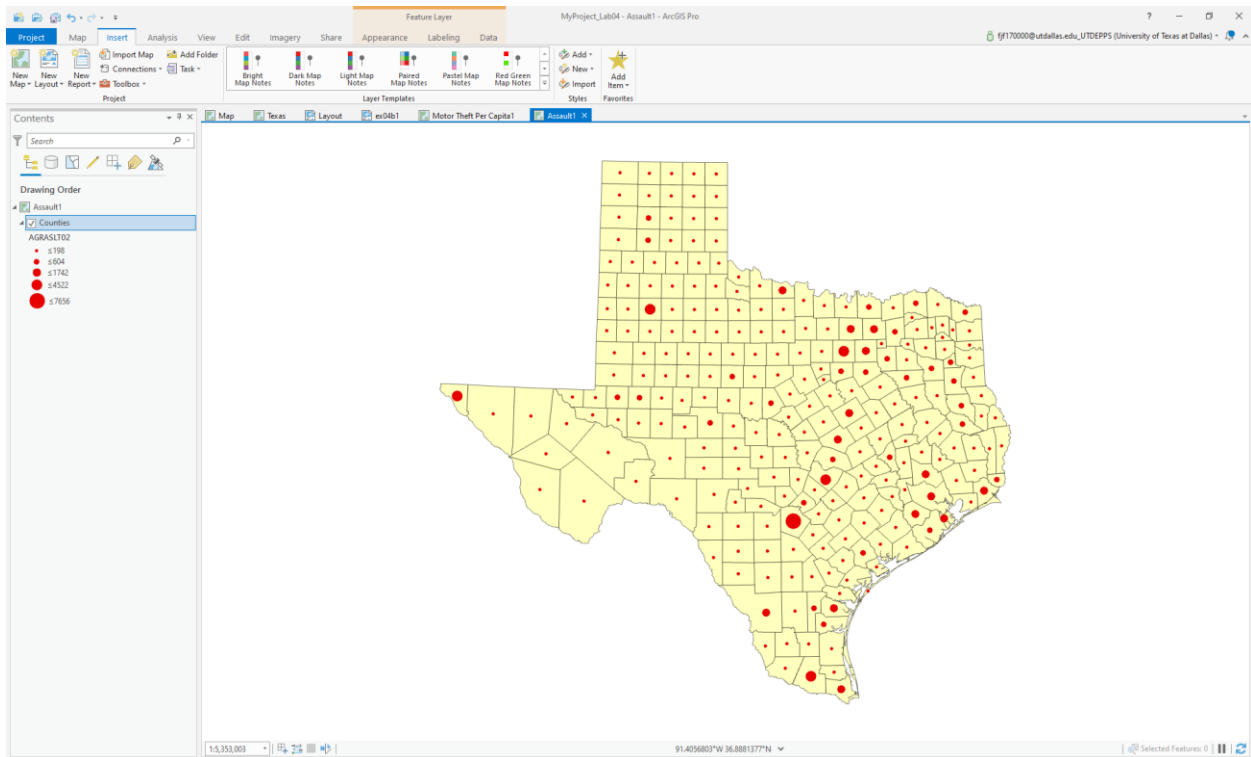
Map with graduated symbols (S5): Number of aggravated assaults by county, Texas, 2002.

Extra Credit (1 point)

EC1. You have created a 2002 burglary map in Texas (see Ex1). Make another graduated color map for **burglary ratio**; that is, the ratio between the number of burglaries and population. Hint: you can achieve it with the normalization option in the Symbology pane (see how you created a population density map in Ex2). Use the BURG02 field and the POPULATION field. Compare this map with the raw count map (S1). Describe briefly how these two maps are different? Insert a screen capture of this burglary ratio map in your report.
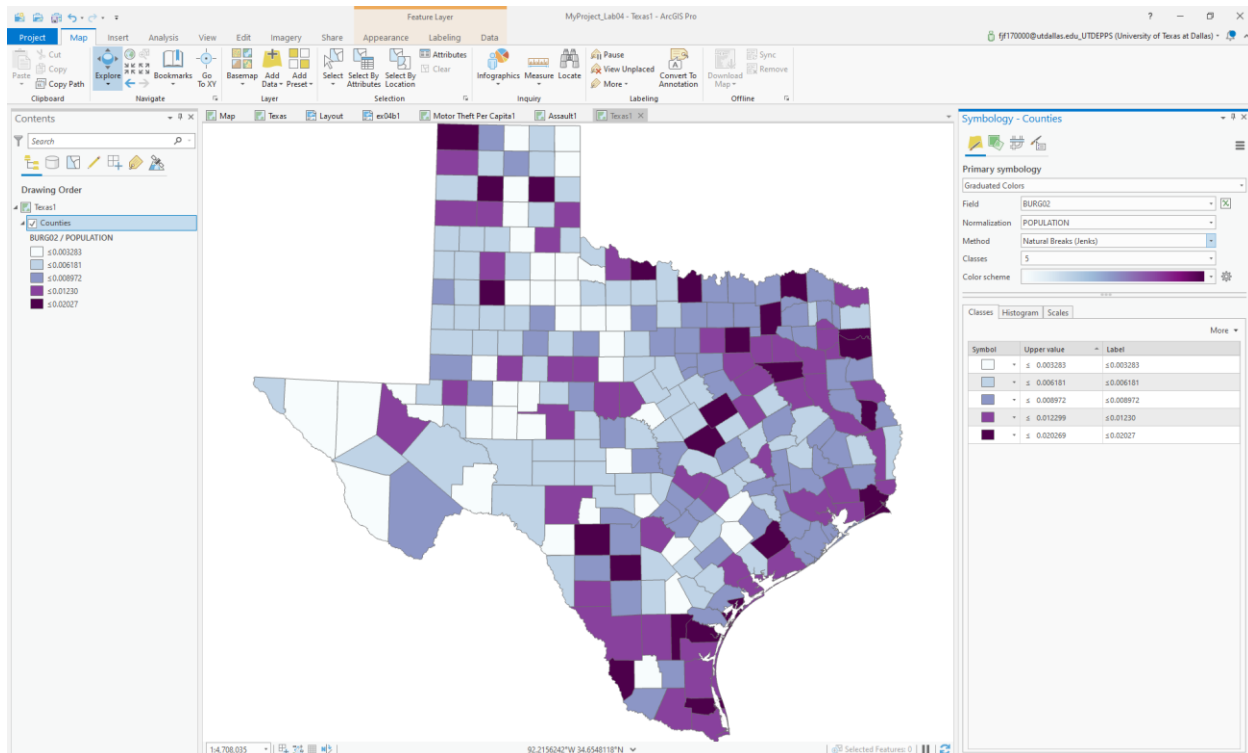
Map with classes using graduated colors (EC1): Texas burglary ratio, County level, 2002.

In (S1), the map of the number of burglaries in Texas by county (2002), we have raw data, just the absolute values or numbers of burglaries per county. As can be observed, just a few more populated areas are colored showing high numbers of robberies: the result is a slightly colored map.

On the other map, Texas burglary ratio by county in 2002 (ECI1), the number of burglaries is considered according to the amount of population in each county. As can be seen in this case, more counties are classified according to the highest categories because, although there are few robberies in certain counties, if they are sparsely populated, the corresponding ratio is high.

In summary, certain areas that are not colored in (S1), have high values in (ECI1) because in the first map the absolute values of burglaries are considered while in the second map is showed the ratio of burglaries regarding the amount of population.

Data
All required data are provided in the CD-Rom which is distributed with the textbook. The data files are located in T:\ywchun\GISC6381\Labs\Lab04 folder or you can download it from eLearning. You may copy the files in your flash drive to do your exercises.

How to obtain screen captures
If you cannot use commercial software to capture screenshots, you can use a windows function.
By pressing Print Screen key in your keyboard, you can capture screenshots (but it seems nothing happens).
The easy way to see the captured screen is to open a favorite word processing program and create a new document and then press Ctrl + V in your keyboard which will paste the captured screen in the document.
If you press Alt + Print Screen, you will get a screen capture of a selected window.

Log Out and Wrap Up
- Following items should be included in your report:
  - Screen shots at the specific step

       o   Answers for the questions
       o   **Kindly repeat the questions in your report. It will be greatly helpful when we grade labs.**
- Do not forget to log out after you finish your assignment.
- Late submission will be penalized for 10 % per day being late. Late submission after one week since the due date will not be graded.

Lab 05: Working with attributes

(Due: 02/24/2020, 7:00pm)

Student: Federico Ferrero
Objective: To explore and understand ArcGIS Online and ArcGIS Pro

Reference: Exercises in Chapter 3 of *Getting to know ArcGIS Pro*

Task:
This exercise covers exercises in Chapter 3 in our text book, *Getting to Know ArcGIS Pro*. You must go through all the steps for each exercise and answer the questions that are on this exercise assignment sheet. In addition, you need to get screen captures of your work and include them in your report.

Not that it would be greatly helpful if you keep the questions in your report. Please place your screen captures and answers immediately below each of the questions in your report.

1. Exercise 3A (20%)
    Q1. How many residents of Wayne County are between the ages of 22 and 29? It is the question at step 5 under the "Add data to a project" section.

    Answer: In Wayne County (Illinois) there are 1448 residents between the ages of 22 and 29.

    S1. After step 4 under the "select features by attributes" section, capture the screen and include it in your report.
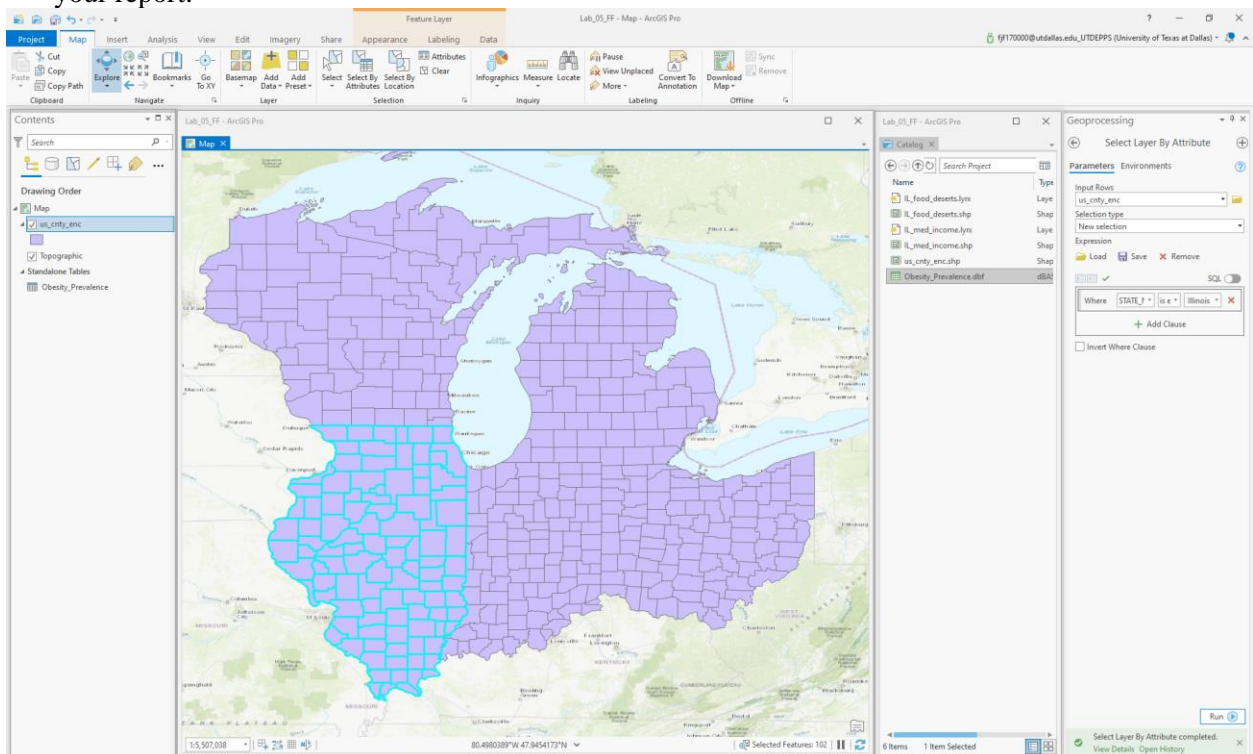
    Select by attribute (S1): all counties of Illinois.

2. Exercise 3B (20%)

Q2. How many years of data are represented in the table? It is the question at step 3 under the "Join data tables" section.
Answer: In the table are represented 7 years of data (from 2004 to 2010).

S2. After step 6 under the "Apply informative symbols" section, capture the screen and include it in your report.
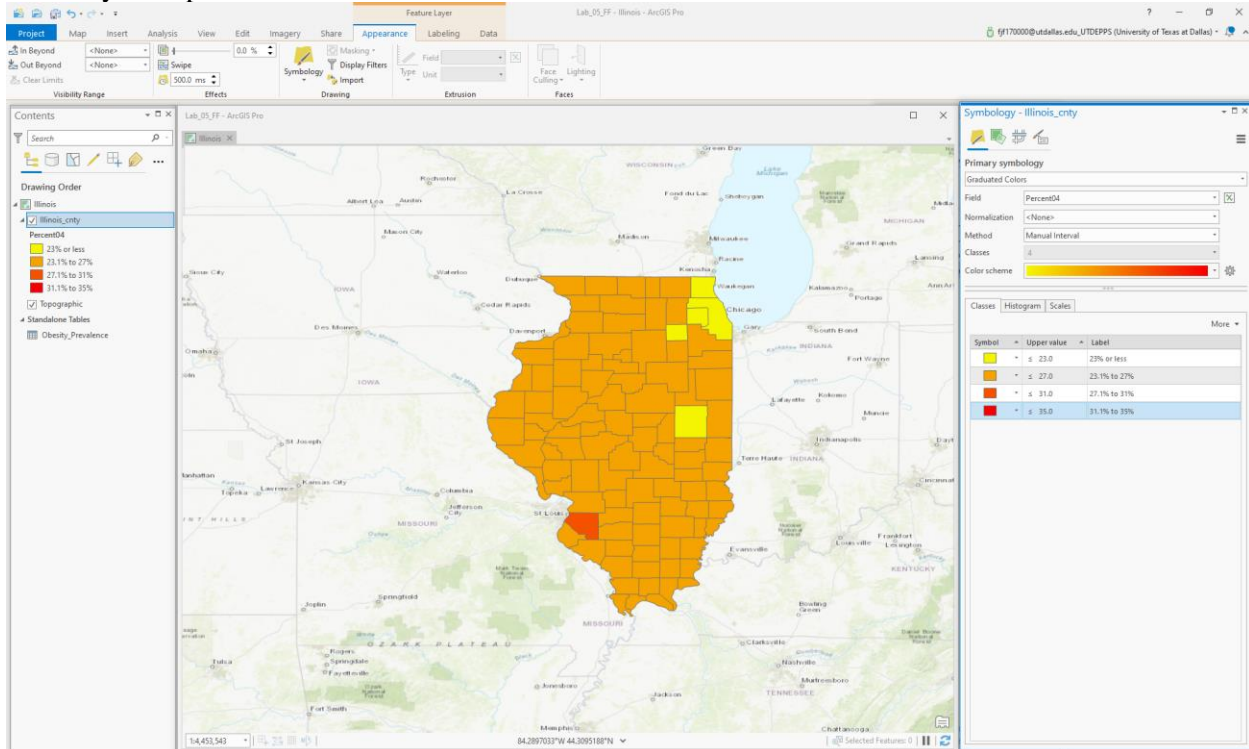
Applying graduated colors (S2): Percentage of obesity prevalence in Illinois (2004).

S3. After step 2 under the "Use the Swipe function to compare layers" section, capture the screen and include it in your report. Your screen capture should display a half of the 2010 map and a half of the 2004 map.
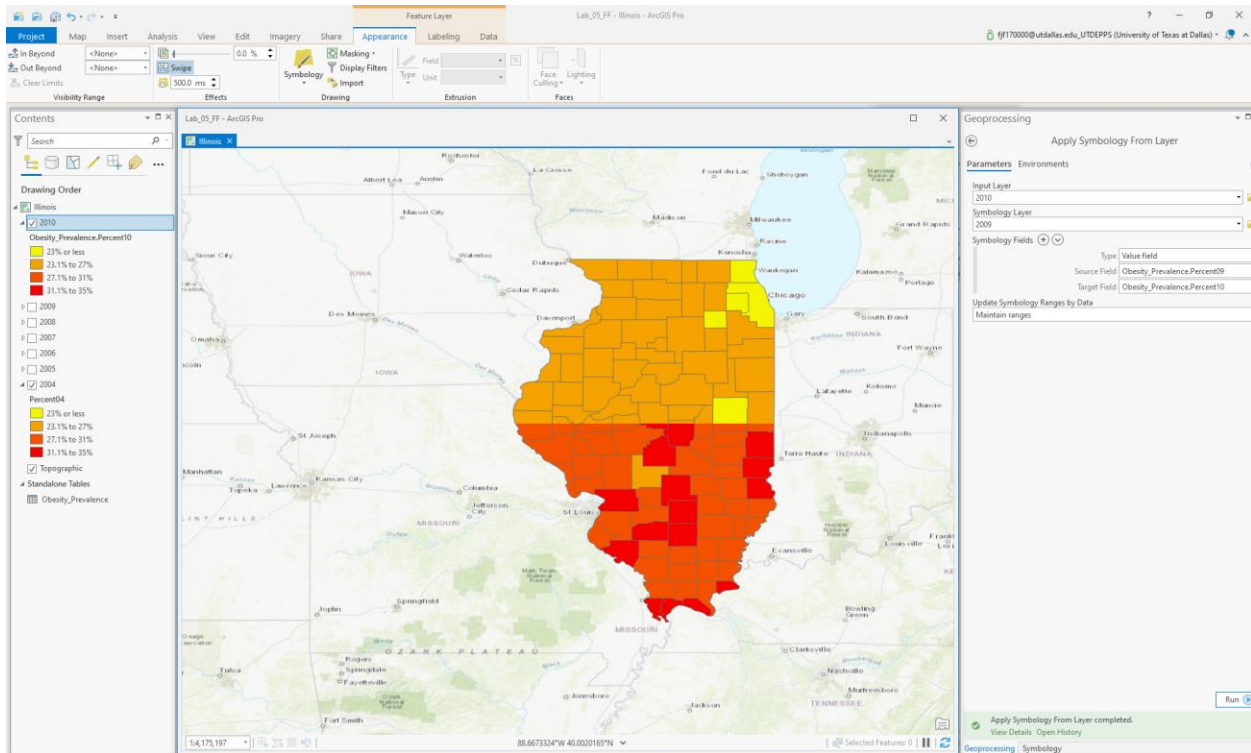
Using the swipe function to reveal the change over six years (S3): Percentage of obesity prevalence in 2004 (up) and 2010 (down).

3. Exercise 3C (20%)
    S3. After step 4 under the "Display a new field" section, capture the screen and include it in your report.
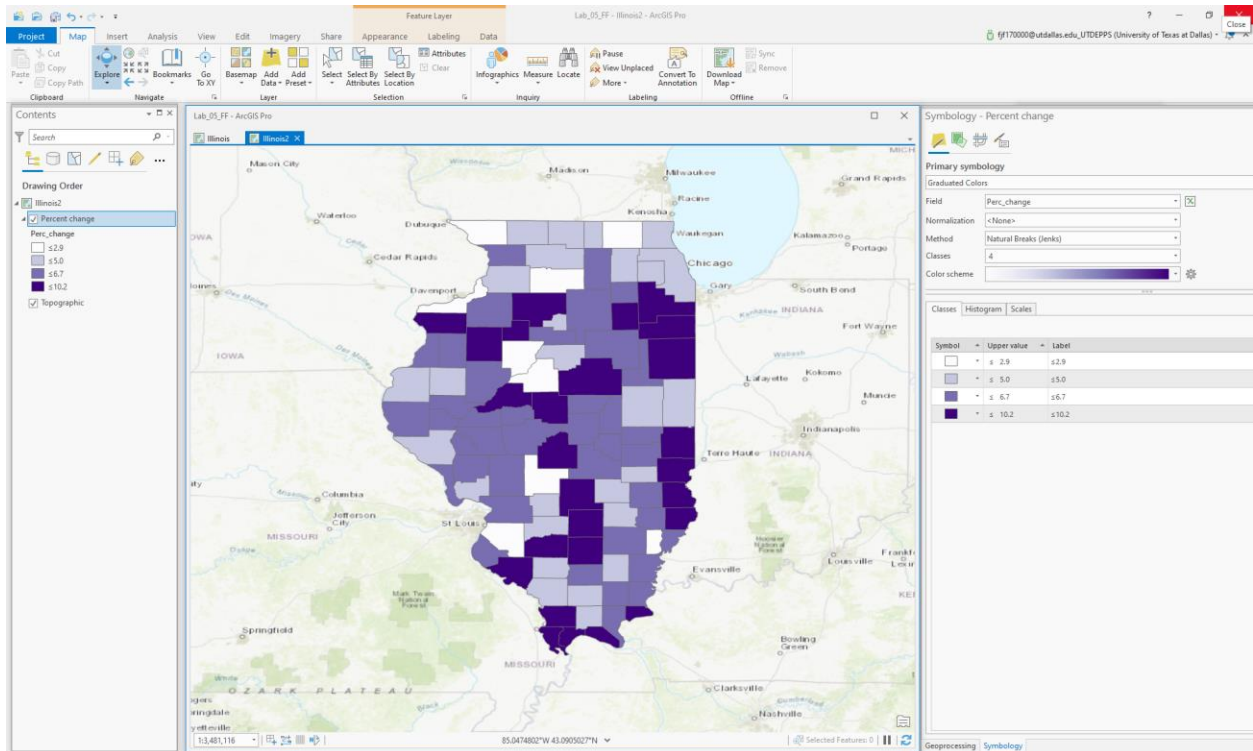
S3: Percent change of obesity prevalence between 2004 and 2010 in Illinois per counties.

Q3. What percentage of households have an income of less than $15,000 per year? It is the question at step 3 under the "Examine infographics" section. (The graphics in ArcGIS Pro could be slightly different from the textbook)

Answer: 14.3% of households have an income of less than $15,000 per year.

4. Exercise 3D (20%)

S4. After step 7 under the "Relate tables" section, capture the screen of the food desert table and include it in your report. The Add Relate tool is available under the option button, ☰ .
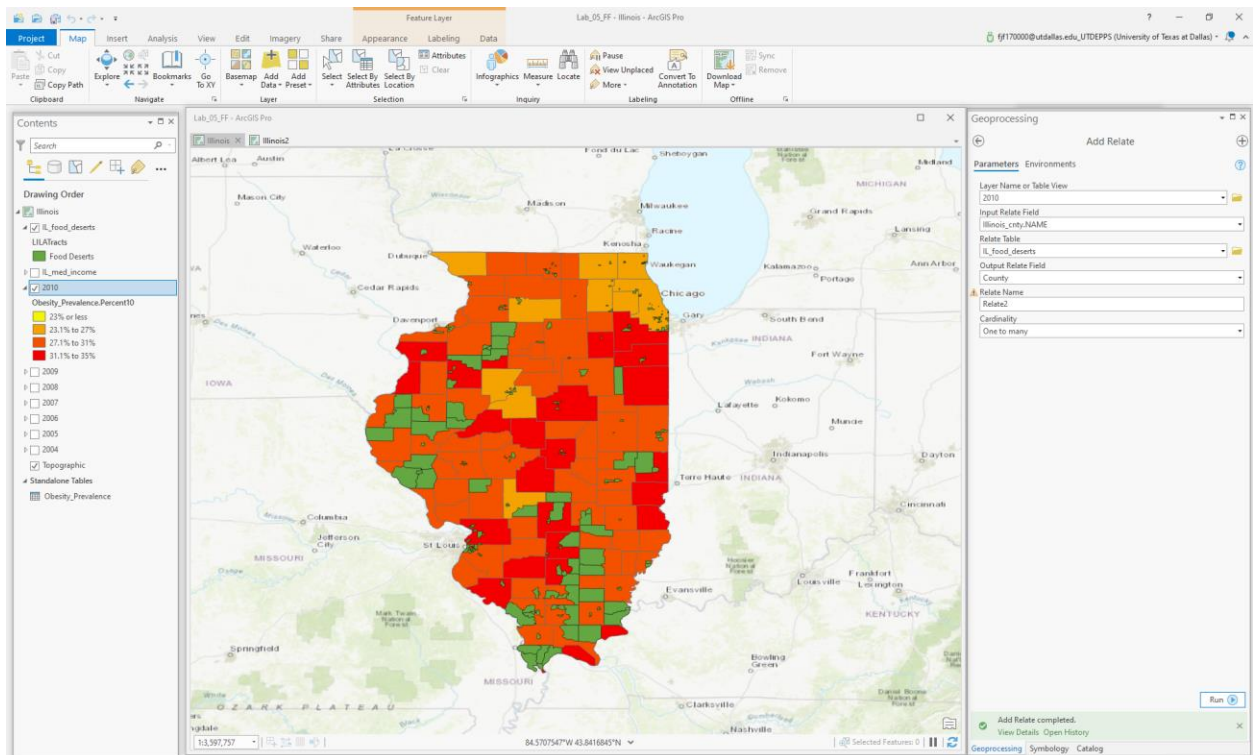
S4: Use of related data function to show the records for food desert tracts that share name with the selected record in the other table.

S5. After step 9 under the "Spatially join data" section, capture the screen and include it in your report. (Make sure you have cleared any selections you made on IL_food_deserts or 2010 layer before starting the spatial join operation)
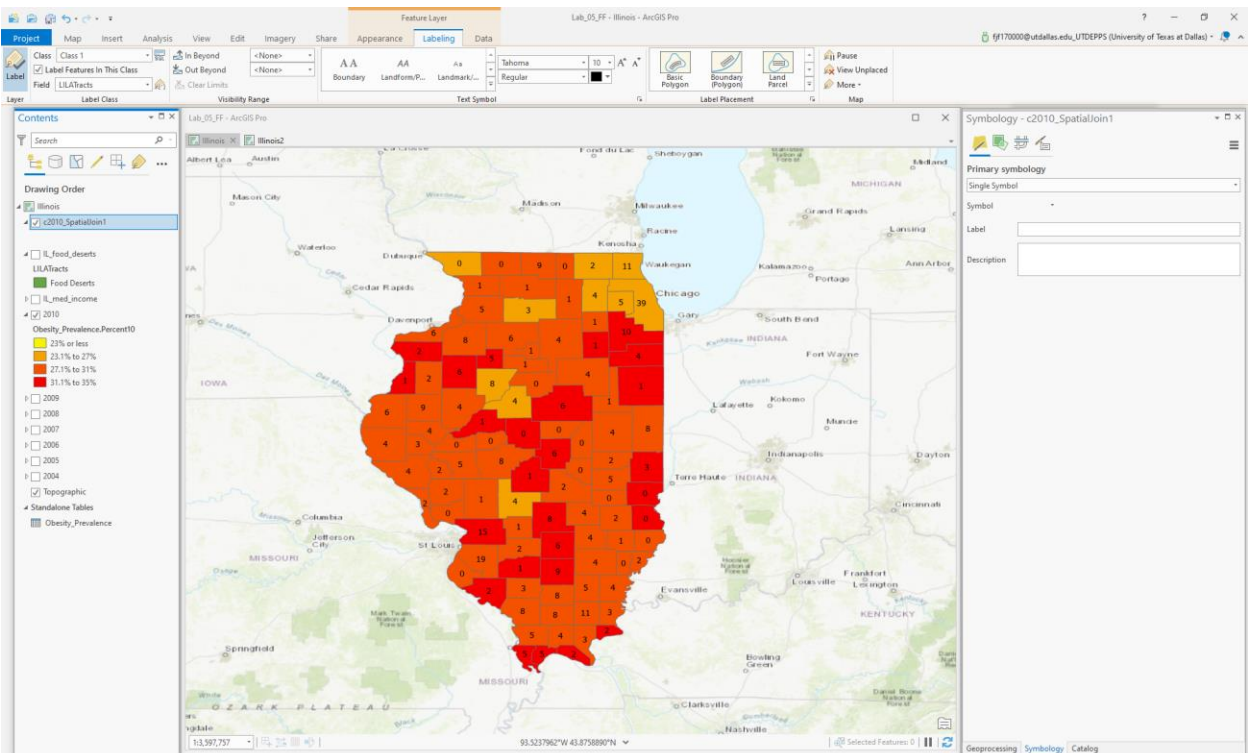
Spatial join, summarization and visualization (S5): labels show how many food deserts are in each county of Illinois (2010).

5. Additional task (20%)

You will work with crime incidents in Washington D.C. Your task is to create maps that show the number of crime incidents for each police precinct. There are two feature classes: one for crime points and the other for police precincts. There are three crime types in the crime feature class. You need to make one map for each crime type which show the number of crime incidents in each precinct. **Your maps should have classes and color symbols based on the number of crime incidents, labels of the crime number counts, a legend and your name**. Please export the three maps and include them in your report.

The 3 maps are attached in Learning Management System as 3 .pdf format files.

Data
The data are installed in T:\ywchun\GISC6381\Labs\Data. Or you can download the data from). You may copy the files in your flash drive to do your exercises.

How to obtain screen captures
If you cannot use commercial software to capture screenshots, you can use a windows function.
By pressing Print Screen key in your keyboard, you can capture screenshots (but it seems nothing happens). The easy way to see the captured screen is to open a favorite word processing program and create a new document and then press Ctrl + V in your keyboard which will paste the captured screen in the document. If you press Alt + Print Screen, you will get a screen capture of a selected window.

Log Out and Wrap Up
- Following items should be included in your report:
  - Screen shots at the specific step and their short descriptions

- o   Answers to the questions
- o   Kindly repeat the questions in your report. It will be greatly helpful when we grade labs.
- Do not forget to log out after you finish your assignment.
- Late submission will be penalized for 10% per day being late. Late submission after one week since the due date will not be graded.

Lab 06: GIS Analysis I

(Due: 3/09/2020, 7:00pm)

Student: Federico Ferrero

Objective: To explore and understand ArcGIS Online and ArcGIS Pro

Reference: Exercises in Chapter 7 of *Getting to know ArcGIS Pro*

Task:
This exercise covers exercises in Chapter 7 in our text book, *Getting to Know ArcGIS Pro*. You must go through all the steps for each exercise and answer the questions that are on this exercise assignment sheet. In addition, you need to get screen captures of your work and include them in your report.

1. Exercise 7A (20%)
   S1. After step 7 under the "Symbolize using graduate colors" section, capture the screen and include it in your report. (Your result could be slightly different from the textbook. If symbols are not in proper order after changing the value, select the color scheme again to refresh the symbol order.)
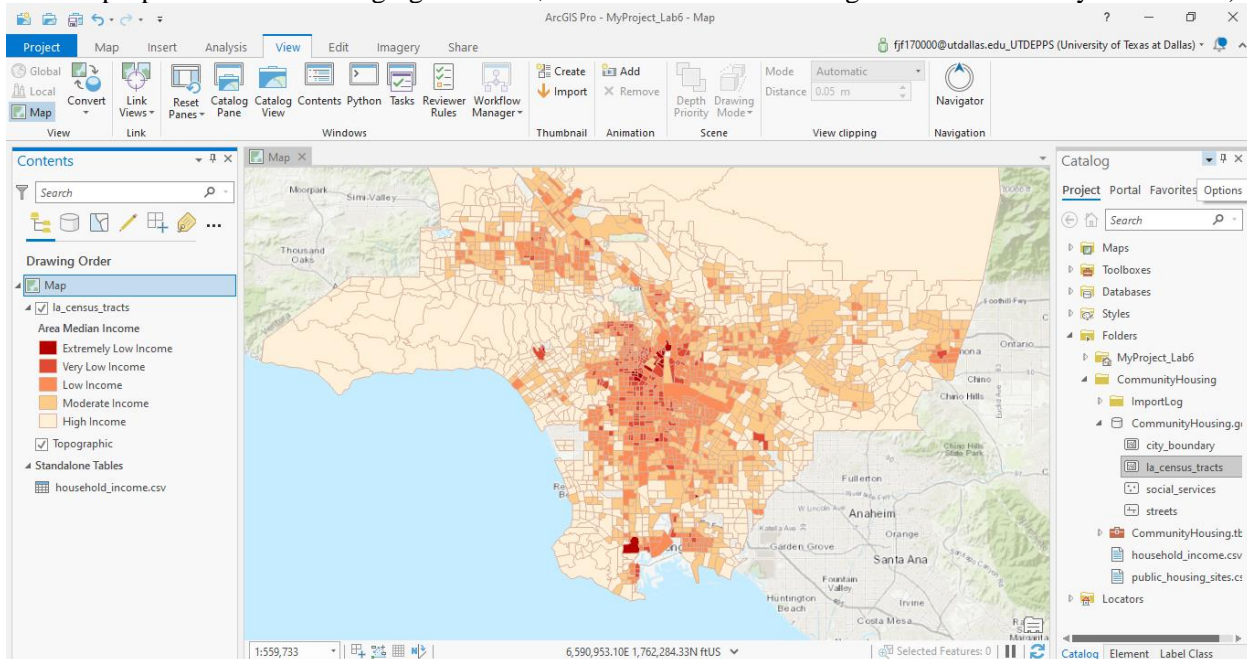
S1: Los Angeles census tracts according to Area Median Income (graduated colors).

   S2. Get a screen capture for your result of the "On Your Own" task under the "Symbolize using graduate colors" section. Include it in your report.
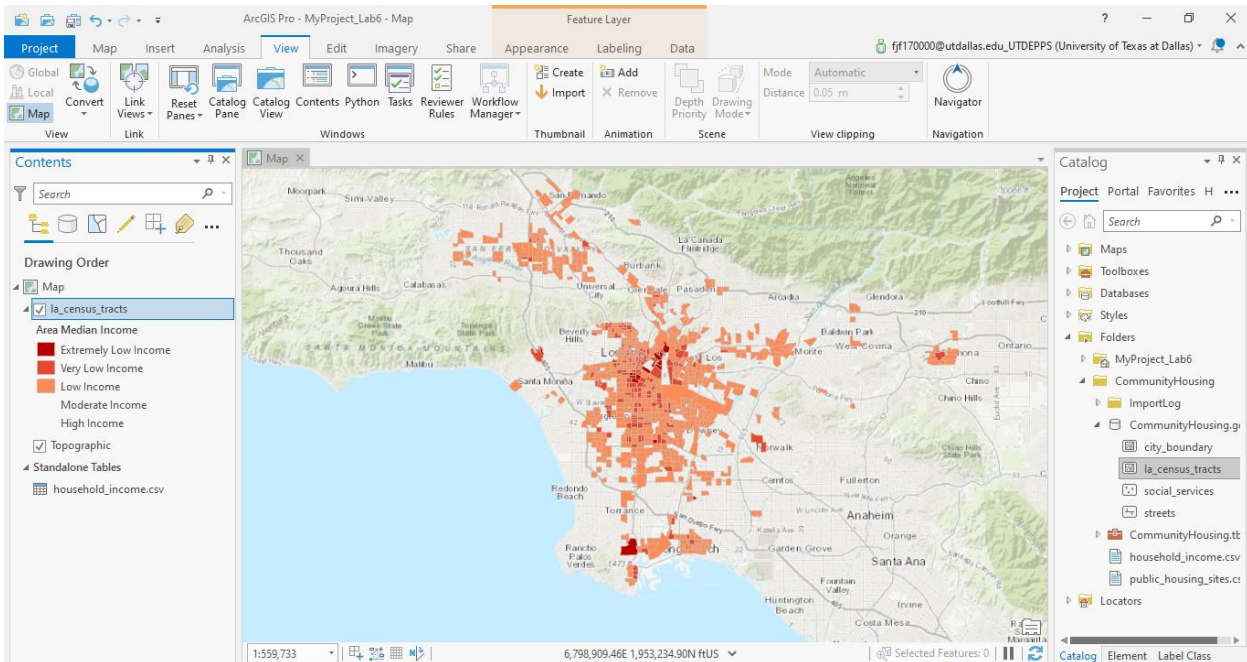
Symbology adjustment (S2): no fill and no outline for Moderate and High-Income categories.

2. Exercise 7B (20%)
    S3. After step 7 under the "Geocode addresses" section, capture the screen and include it in your report.
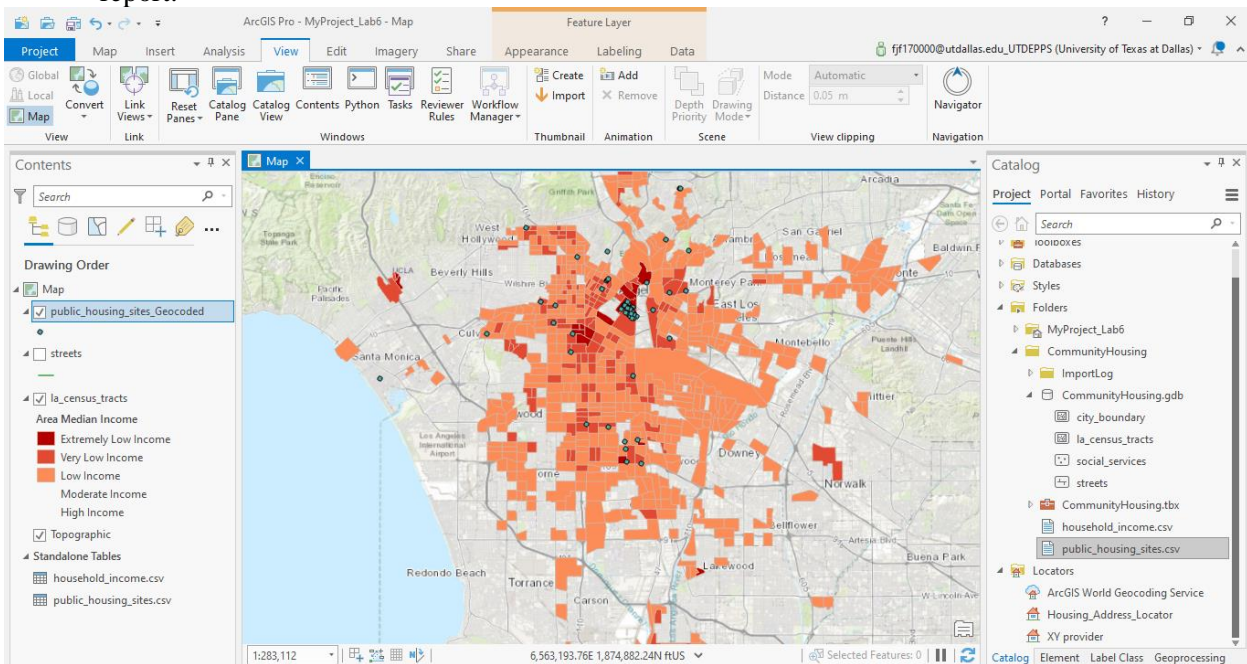
S3: Public housing sites feature class is added with geocoding.

    S4. After step 17 under the "Rematch addresses" section, get a screen capture of the attribute table of the Public_Housing_Sites layer with the 10 least matching scores (you can sort the table in a descending order based on the matching scores) and include it in your report. The interface of the *Rematch Addresses* dialog in the book (the 1st edition) is slightly different because of the ArcGIS Pro version difference.

S4: Attribute table of the Public_Housing_Sites layer with the 10 least matching scores.

3. Exercise 7C (40%)

S5. After step 12 under the "Create buffers" section, capture the screen and include it in your report.
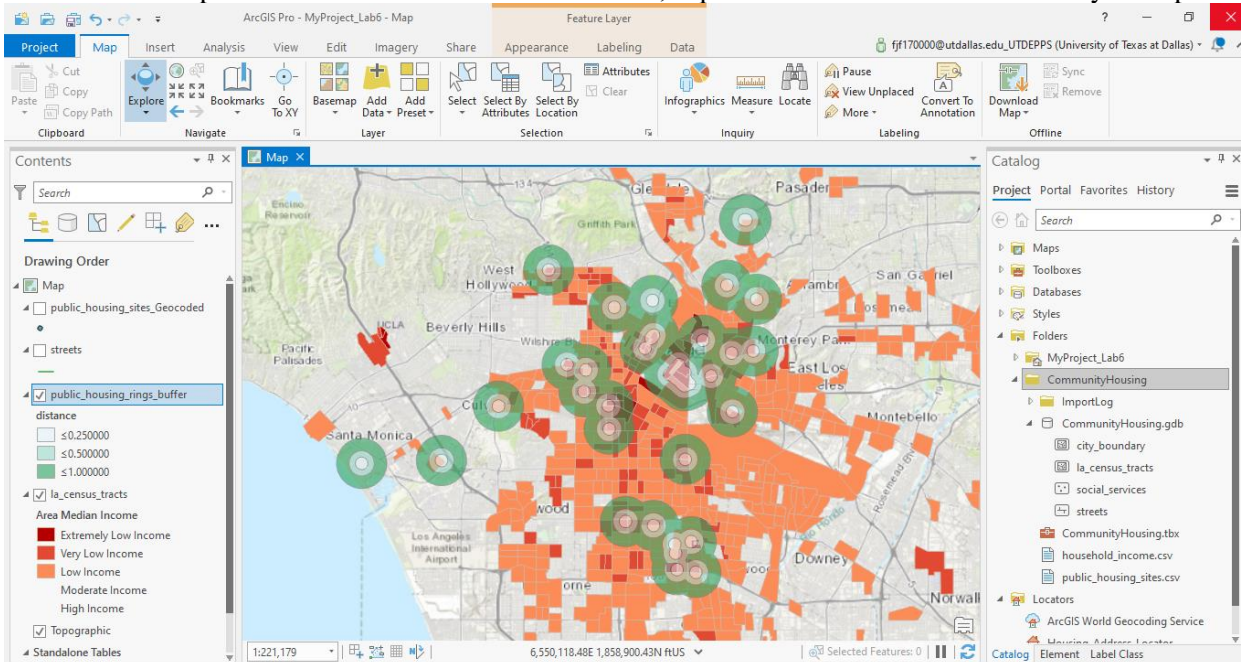
S5: Public Housing Rings buffer creation (with distances of 0.25, 0.5, and 1 mile) in Los Angeles city.

S6. After step 4 under the "Clip features" section, capture the screen and include it in your report.
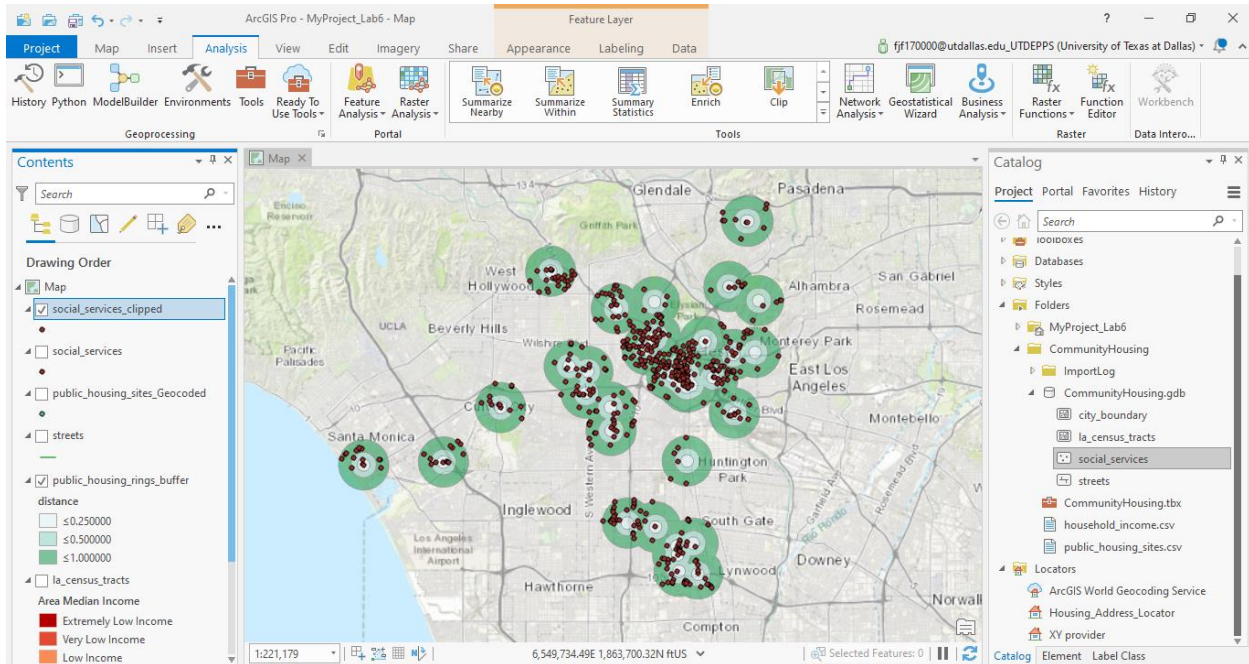
S6: Using clip features: all the social services that fall within the boundary of the public housing buffer layer are shown.

Q1. What is the closest social service site to the Pueblo Del Rio public housing site? It is the question at step 8 under the "Calculate distances" section.

Q1: The closest social service site to the Pueblo Del Rio Public Housing Site is Slauson Senior Citizen Center.
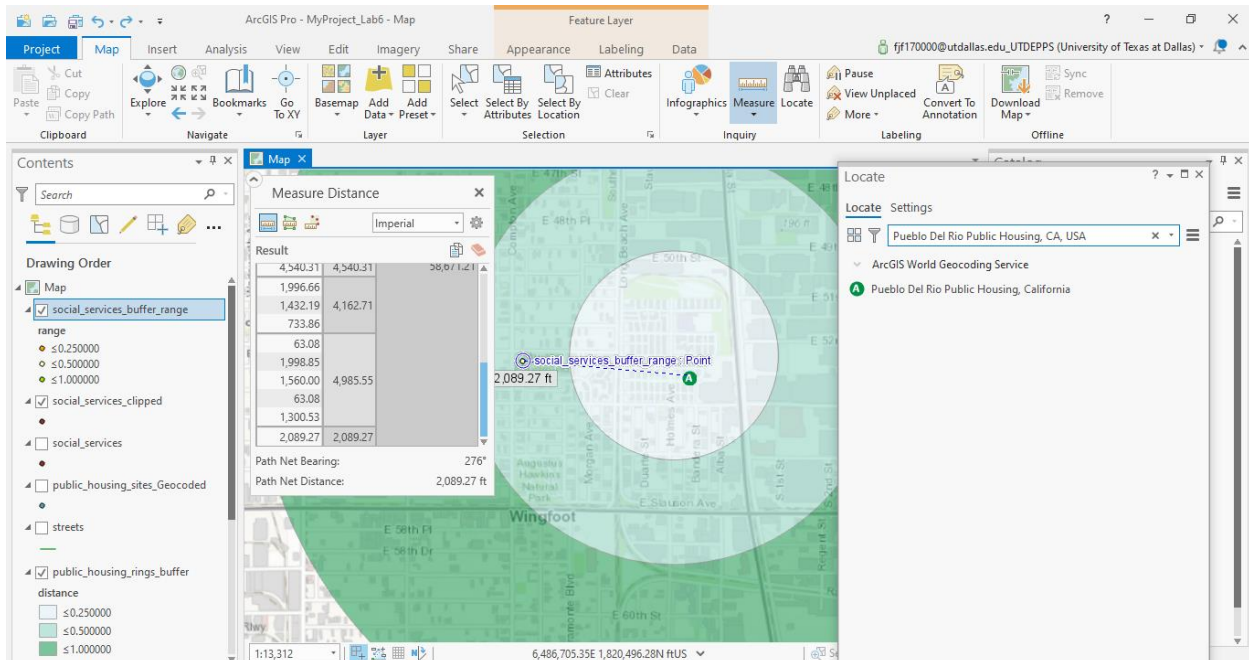
S7. After step 3 under the "Dissolve features" section, capture the screen and include it in your report.
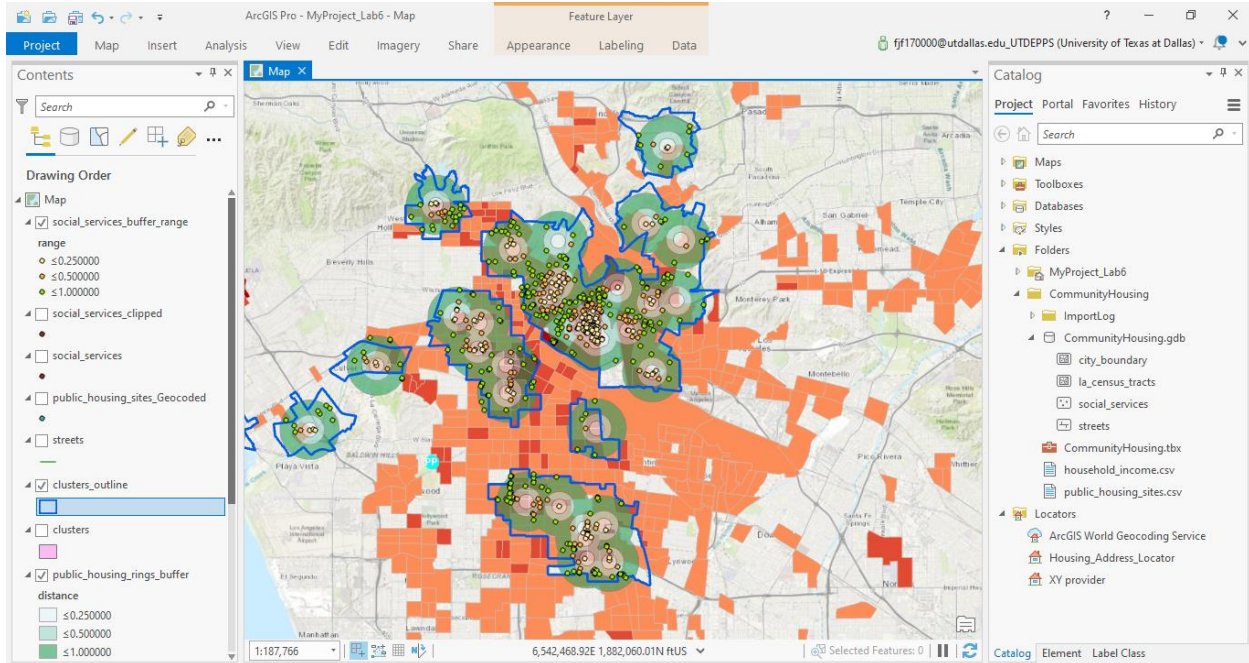
Use of dissolve feature (S7): census tracts are dissolved in the cluster to make visible just the tract boundaries outlines (in blue).

S8. After step 7 under the "Intersect layers" section, capture the screen and include it in your report.
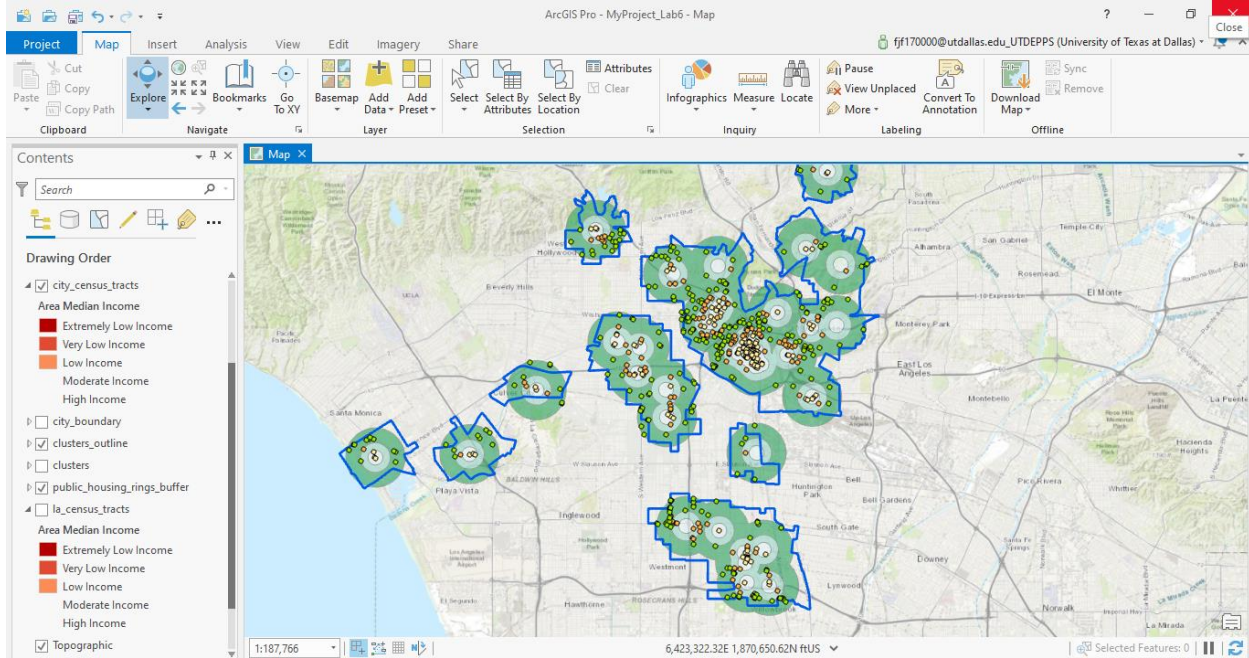
S8: Intersection of layers City_Boundary and LA_Census_Tracts and import of symbology from LA_Census_Tracts.
NOTE: I followed the complete procedure, but I did not get the output as it can be verified in the screenshot where City_Census_Tracts with the imported symbology is selected.

4. Additional Tasks (20%)
- Goal: to create a map that shows the number of toxic waste sites for each state.

- Data:
    - EPASites: a point feature class containing the locations of toxic waste sites
    - States48: a polygon feature class containing the boundaries of the 48 states in the contiguous United States
- Note:
    - Unlike the crime point feature class in Lab05, the attribute table of EPASites does not have a field for states. Hence, you need to generate the state information based on the locations of the waste sites (i.e., use spatial join).
    - Note that if you set the polygon layer as primary table (Target features in the Spatial Join dialog, a Join Count field will be generated automatically containing the number of matching records. Also it should be cautiously used if you need other fields in a joined table; that is, a point layer may need to be a primary table.
    - Please use a proper classification method, include a title, legend, and your name on the map.

Exercise 4: Map attached in Blackboard Management System.

5. Extra points (10%)
- Goal: to create a map that shows the number of toxic waste sites for the 9 Census divisions.
    - One requirement is to label the **full division names** on the map (these division names can be found at http://www2.census.gov/geo/pdfs/maps-data/maps/reference/us_regdiv.pdf)
- Data: EPASites and States48 feature classes
    - The attribute table of States48 feature class has a field for the 9 Census divisions.
- Note:
    - Two simple ways are:
        1. Create a census division feature class with the DISSOLVE function, and then conduct spatial join (i.e., similar to the above additional task).

        OR
        2. When you use DISSOLVE function, use a processed States48.shp file: that is, one with # of toxic waste sites for each state. DISSOLVE function has an option to conduct simple statistics for columns. The summation can be conducted when you use DISSOLVE function.

Exercise 5: Map attached in Blackboard Management System.

Data
The data are installed in T:\ywchun\GISC6381\Labs\Data. Or you can download the data from). You may copy the files in your flash drive to do your exercises.

How to obtain screen captures
If you cannot use commercial software to capture screenshots, you can use a windows function.
By pressing Print Screen key in your keyboard, you can capture screenshots (but it seems nothing happens). The easy way to see the captured screen is to open a favorite word processing program and create a new document and then press Ctrl + V in your keyboard which will paste the captured screen in the document. If you press Alt + Print Screen, you will get a screen capture of a selected window.

Log Out and Wrap Up
- Following items should be included in your report:
    - Screen shots at the specific step and their short descriptions
    - Answers to the questions

- o   Kindly repeat the questions in your report. It will be greatly helpful when we grade labs.
- Do not forget to log out after you finish your assignment.
- Late submission will be penalized for 10% per day being late. Late submission after one week since the due date will not be graded.

<div style="border:1px solid #000; padding:10px; text-align:center;">

Lab 07: GIS Analysis II

(Due: 03/23/2020, 7:00pm)

</div>

Student: Federico Ferrero

Objective: To explore and understand ArcGIS Online and ArcGIS Pro

Reference: Exercises in Chapter 8 of *Getting to know ArcGIS Pro*

Task:
This exercise covers exercises in Chapter 8 in our textbook, *Getting to Know ArcGIS Pro*. You must go through all the steps for each exercise and answer the questions that are on this exercise assignment sheet. In addition, you need to get screen captures of your work and include them in your report.

1. Exercise 8A (20%)
    S1. After step 4 under the "Create a kernel density" section, capture the screen and include it in your report.
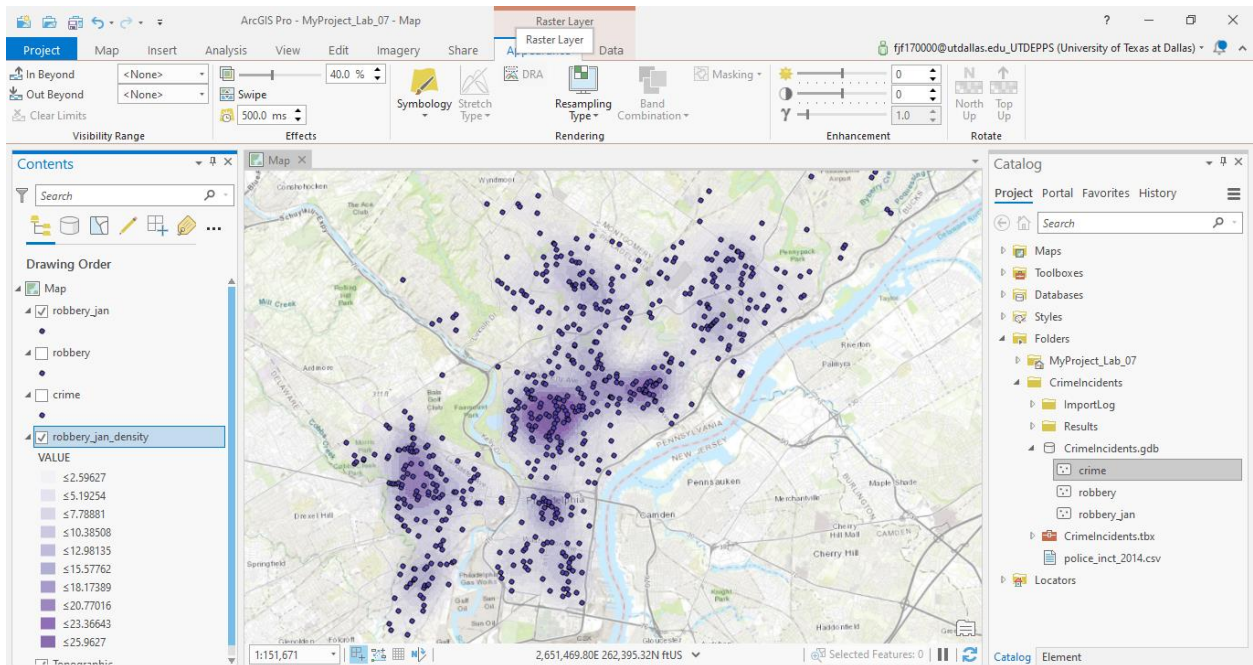
S1. Kernel density map (with 40% transparency): robberies in City of Philadelphia (January, 2014).

    S2. Complete the "On Your Own" task for <u>theft in July, 2014</u>. Get a screen capture and include it in your report.
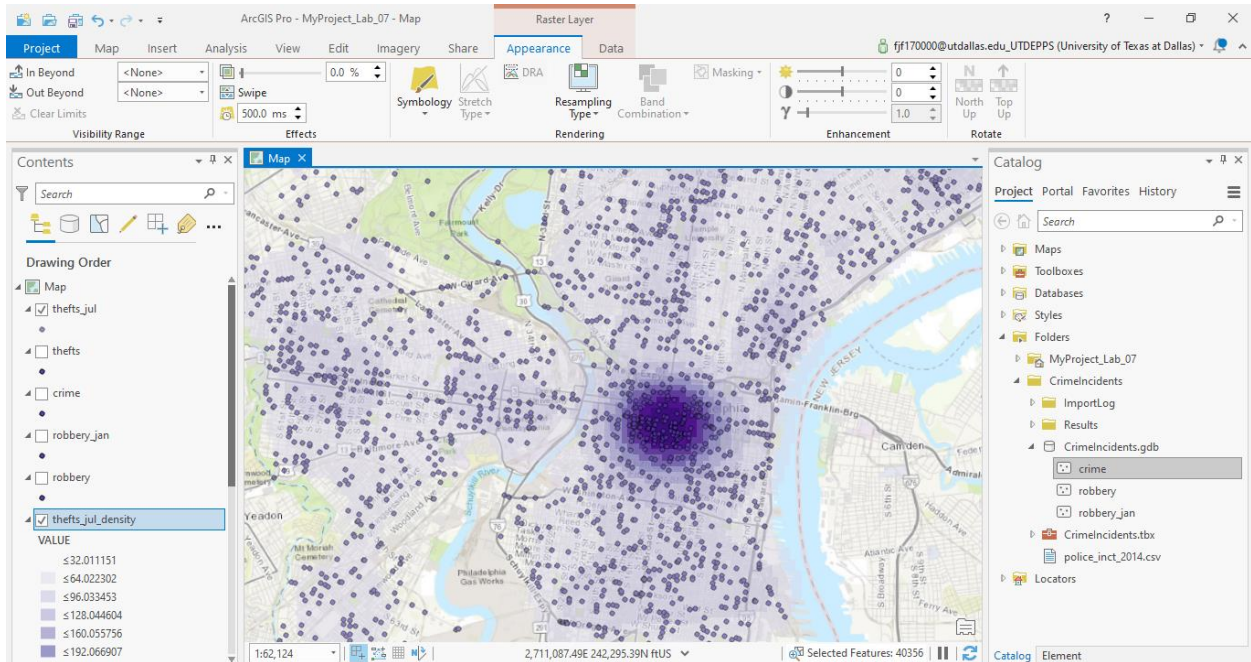
S2. Kernel density map (with 40% transparency): thefts in City of Philadelphia (July, 2014).
NOTE: The category "thefts" includes: "Thefts", "Thefts from vehicle", and "Motor vehicle theft".

2. Exercise 8B (50%)
    S3. After step 5 under the "Run the Optimized Hot Spot Analysis tool" section, capture the screen and
        include it in your report.
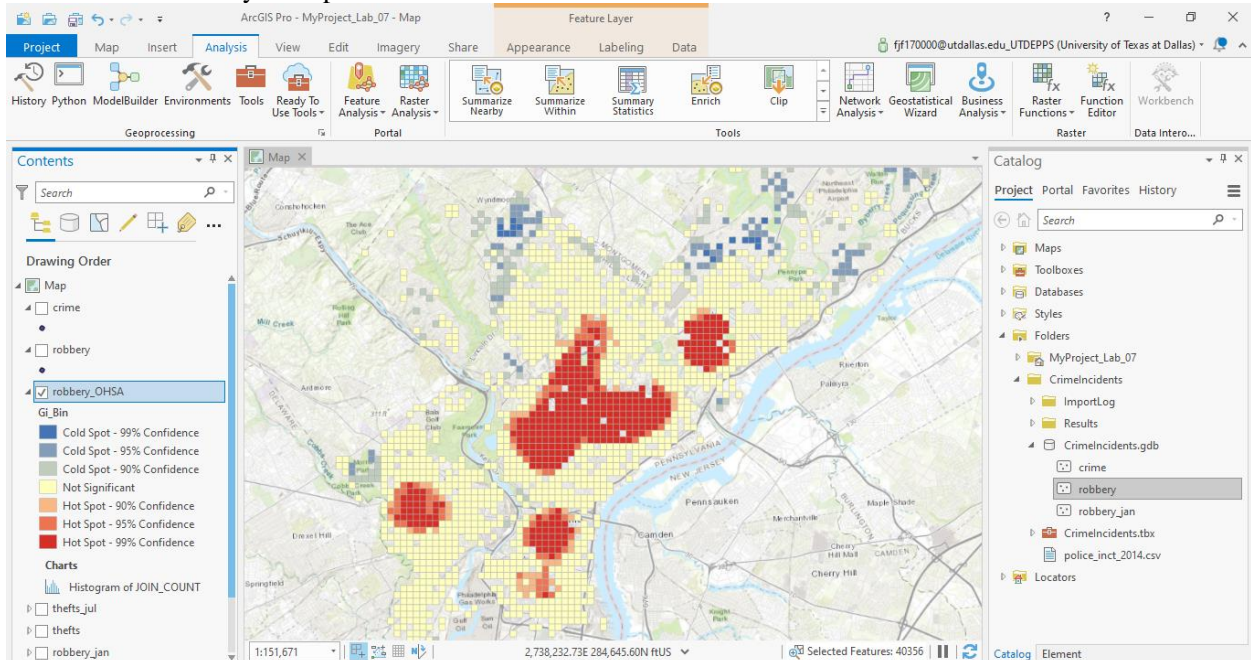
S3. Optimized Hot Spot Analysis considering robberies in City of Philadelphia: statistically significant hot
spots (in red) and cold spot of robberies (in blue).

    Note: Skip step 2 under the "Visualize a space-time cube" section and directly go to the step 3 to remove
        "WorldElevation3D/Terrain3D" as shown in the second figure on the page.

S4. After step 6 under the "Visualize a space-time cube" section, capture the screen and include it in your report.
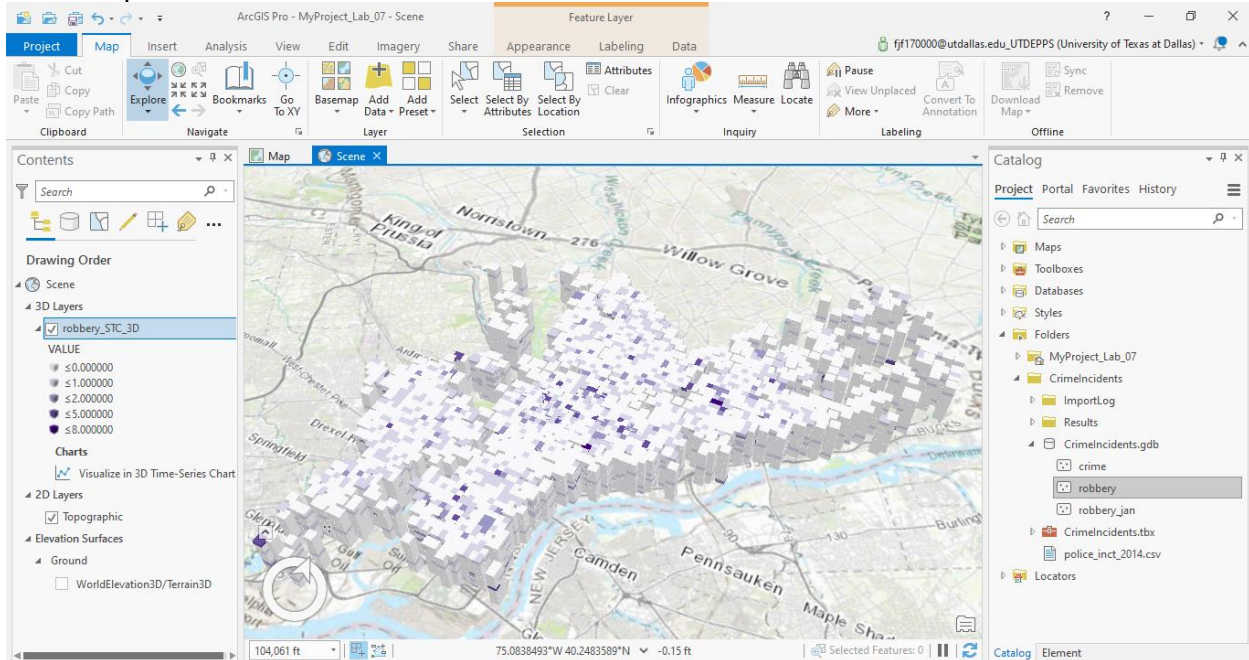
S4. Visualization of a space-time cube: City of Philadelphia robbery incident count at each location per month (2014).
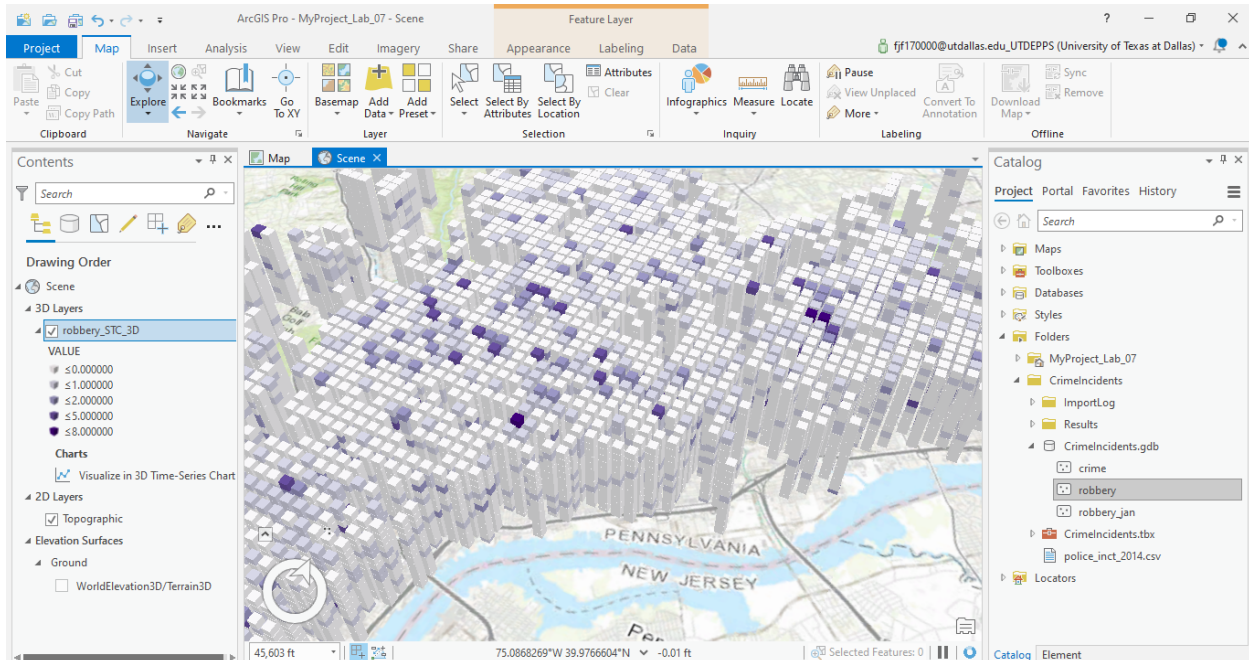
S4. Visualization of a space-time cube: City of Philadelphia robbery incident count at each location per month (2014) with zoom.
NOTE: Each bar is subdivided in 12 months of the year and darker intervals show higher counts.

S5. After step 8 under the "Run the Emerging Hot Spot Analysis tool" section, capture the screen and include it in your report.
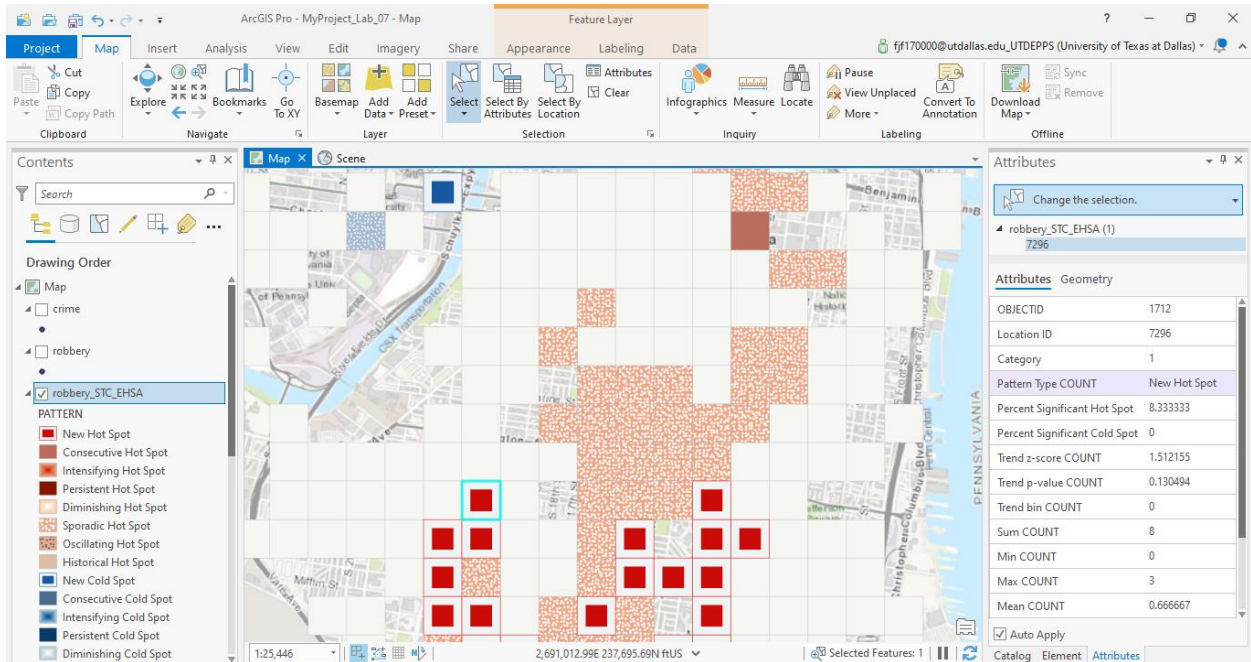
S5. Emerging Hot Spot Analysis considering robberies in City of Philadelphia (2014): New Hot Spot selected with its specific information on the right panel.

S6. After the "On Your Own" under the "Run the Emerging Hot Spot Analysis tool" section, capture the screen and include it in your report.
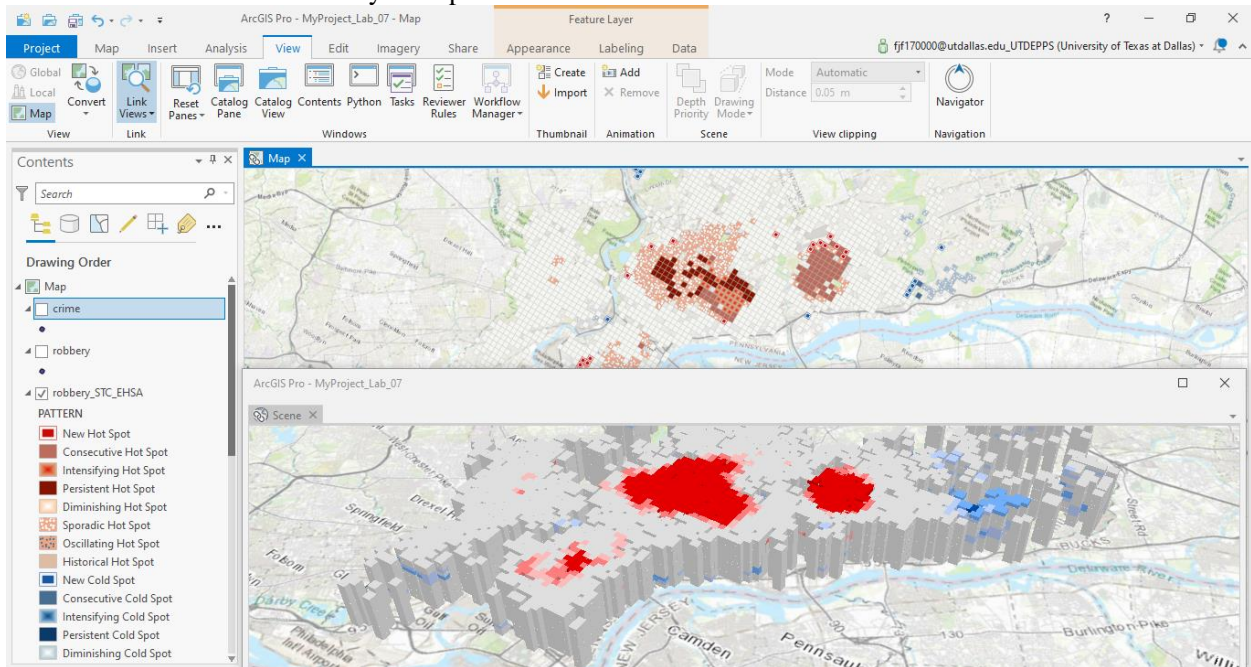
S6. Coordinated view with Link Views function: Emerging Hot Spot Analysis considering robberies in City of Philadelphia (2014) in 2D view (above) and 3D view (below).

3. Exercise 8C (20%)

Note: Steps 7-8 under the "Switch to a local view" ask to click the "Extent" tab and check the "Clip layers to extent" check box. This option may not be available in the newest ArcGIS Pro interface. You can set it the other way as the figure shown below:
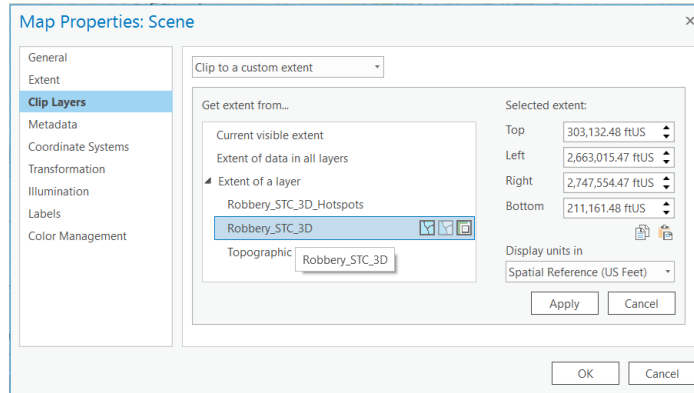
S7. After step 9 under the "Switch to a local view" section, capture the screen and include it in your report.
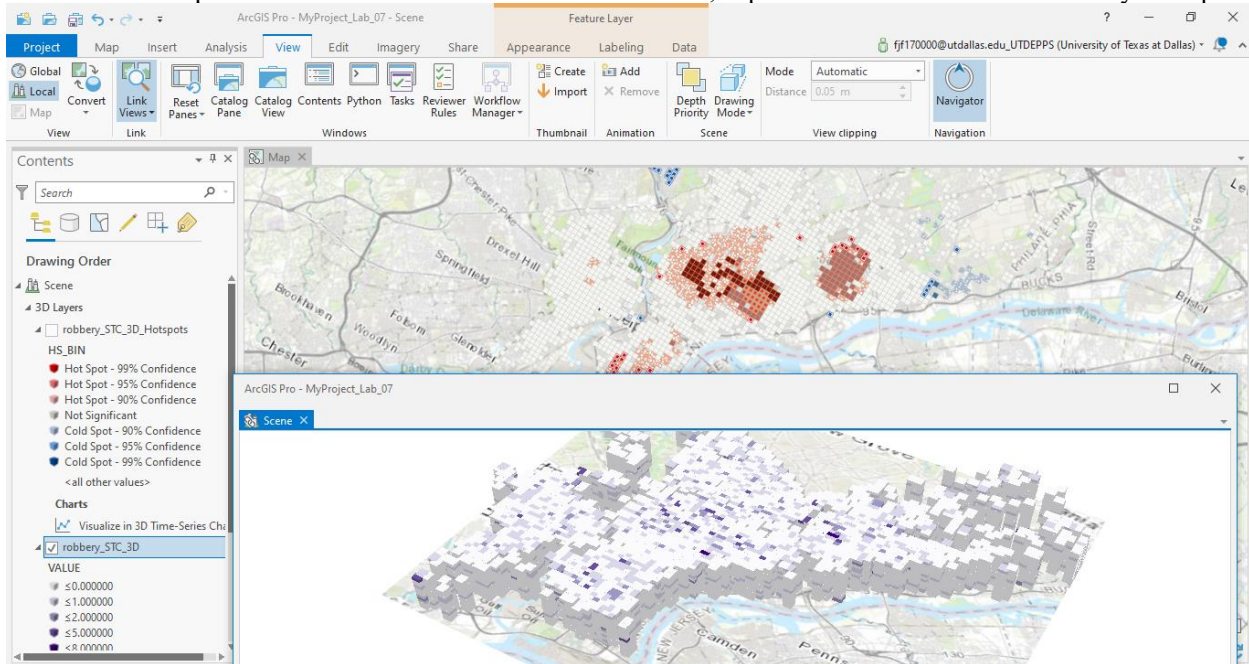
S7. Switching to a local view: the custom extent is calculated from the robbery_STC_3D layer in order to isolate the area of interest (map shown on the bottom).

S8. After step 15 under the "Change 3D visualization styling" section, capture the screen and include it in your report.
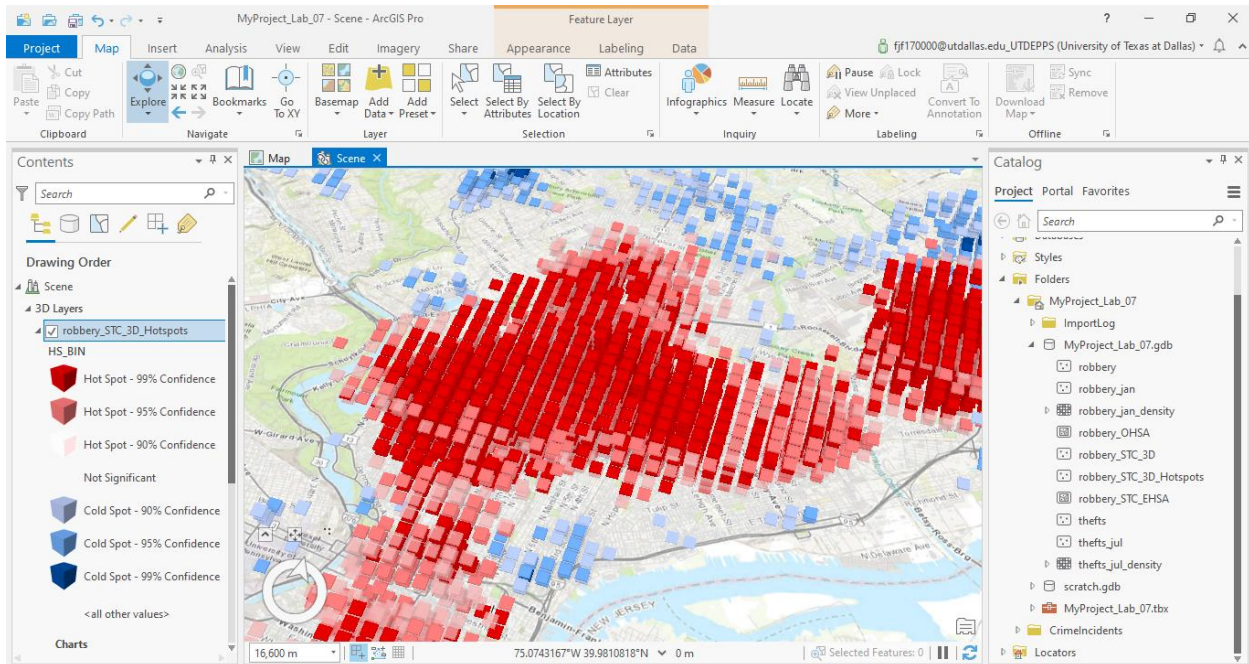
S8. Changing 3D visualization styling on robbery_STC_3D_Hotspots layer.

4. Exercise 8D (10%)

    S9. After step 4 under the "Animate using the Range slider" section, capture the screen and include it in your report.
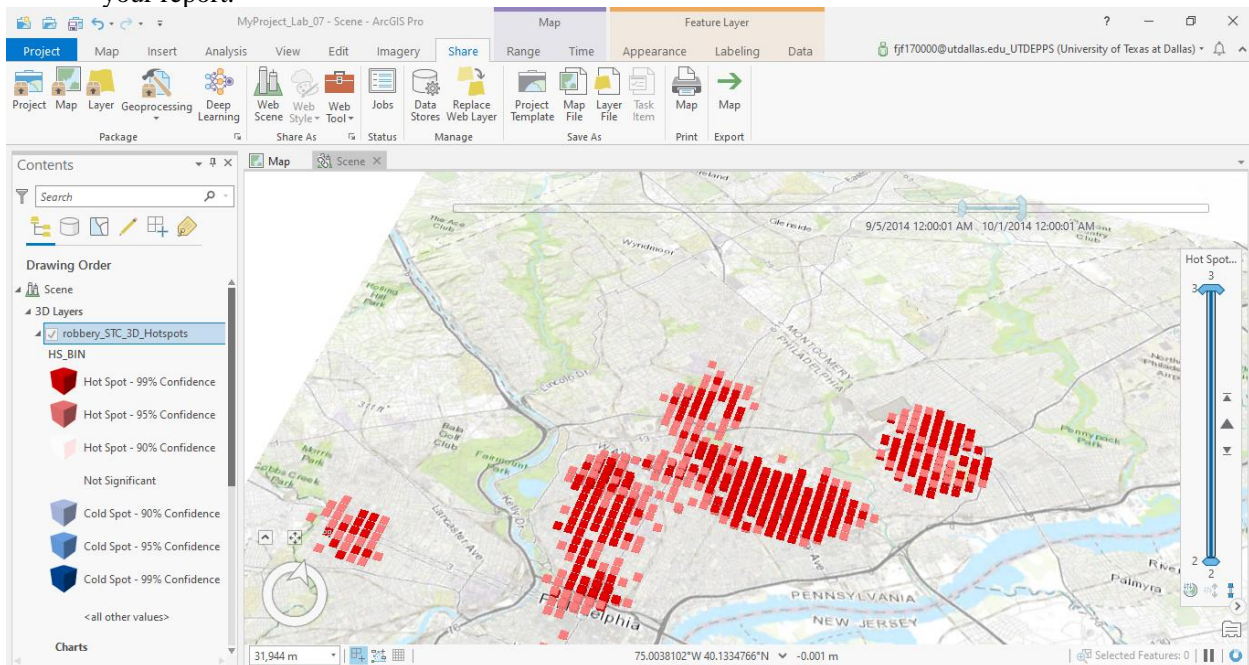
S9. Animation using Time slider (horizontal bar) and Range slider (vertical bar): Animation of the robberies in City of Philadelphia (2014) by month and showing only hot spots (range minimum of 2 and maximum of 3).

5. **Extra** points (20%)

    Suppose that you need to find candidate areas for a landfill site in Dallas County. Any candidate area should meet the following criteria:

1) within the boundaries of Dallas County,
2) at least 3 miles away from any retail site,
3) at least 3 miles away from any hospital,
4) within 3 miles from a highway,
5) the current land use should be "Agricultural land" or "Barren Land", and
6) the size of continuous area (i.e., a polygon) should be bigger than 5 square miles.

What is the **total candidate area** (square miles) for the landfill site in Dallas County? Create a map that shows candidate areas, please include a proper legend, scale bar, a title, a north arrow, and your name on the map. Data for this task is available under the Lab07_Extra folder.

The total candidate area for the landfill site in Dallas County is equal to **39.58**625393983729168 **square miles** (1103601421.83636 square foot).

FEDERICO FERRERO

Total candidate area for landfill sites in Dallas County
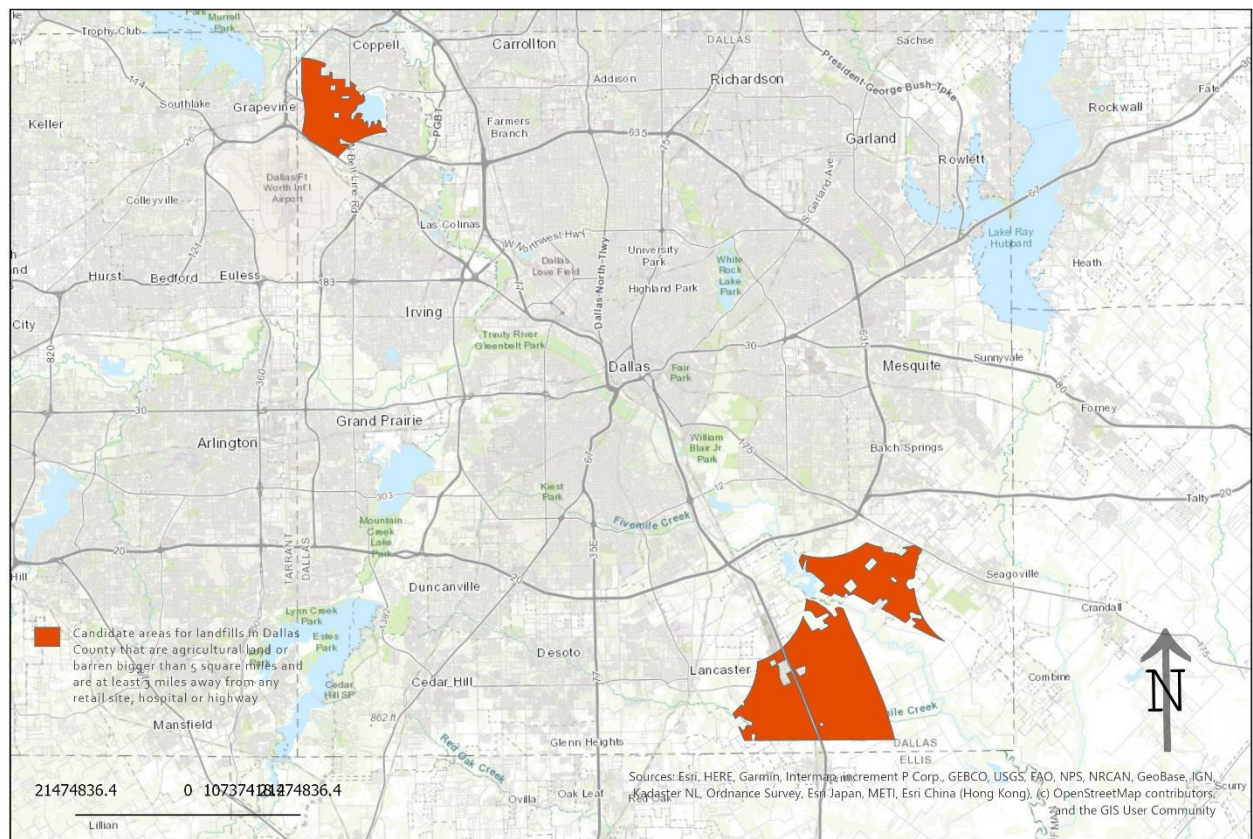
To create a map, please change the ArcGIS Pro from data view to layout view, and add a proper title, legend and your name. Then go to the file menu, select export map, name the output map properly and save it as JPEG file. Finally, please put all your answers, screen captures and maps together on one word/pdf document. Please don't submit a project file (.arpx), because they won't be open without the associated data.

NOTE: You will get this extra credit only for the correct answer with a proper map (i.e., no partial point will be given).

Data
The data are installed in T:\ywchun\GISC6381\Labs\Data. Or you can download the data from). You may copy the files in your flash drive to do your exercises.

How to obtain screen captures
If you cannot use commercial software to capture screenshots, you can use a windows function.
By pressing Print Screen key in your keyboard, you can capture screenshots (but it seems nothing happens). The easy way to see the captured screen is to open a favorite word processing program and create a new document and then press Ctrl + V in your keyboard which will paste the captured screen in the document. If you press Alt + Print Screen, you will get a screen capture of a selected window.

Log Out and Wrap Up
- Following items should be included in your report:
  - Screen shots at the specific step and their short descriptions
  - Answers to the questions
  - Kindly repeat the questions in your report. It will be greatly helpful when we grade labs.
- Do not forget to log out after you finish your assignment.
- Late submission will be penalized for 10% per day being late. Late submission after one week since the due date will not be graded.

Lab 08: Collaborative mapping & Projection

(Due: 04/06/2020, 7:00pm)

Student: Federico Ferrero

Objective: To explore and understand ArcGIS Online and ArcGIS Pro

Reference: Exercises in Chapter 6 of *Getting to know ArcGIS Pro*

Task:
This exercise covers exercises in Chapter 6 in our text book, *Getting to Know ArcGIS Pro*. You must go through all the steps for each exercise and answer the questions that are on this exercise assignment sheet. In addition, you need to get screen captures of your work and include them in your report.

1. Exercise 6A (20%)
   S1. After step 5 in "Publish features" section, capture the screen (i.e., the analysis result) and include it in your report.
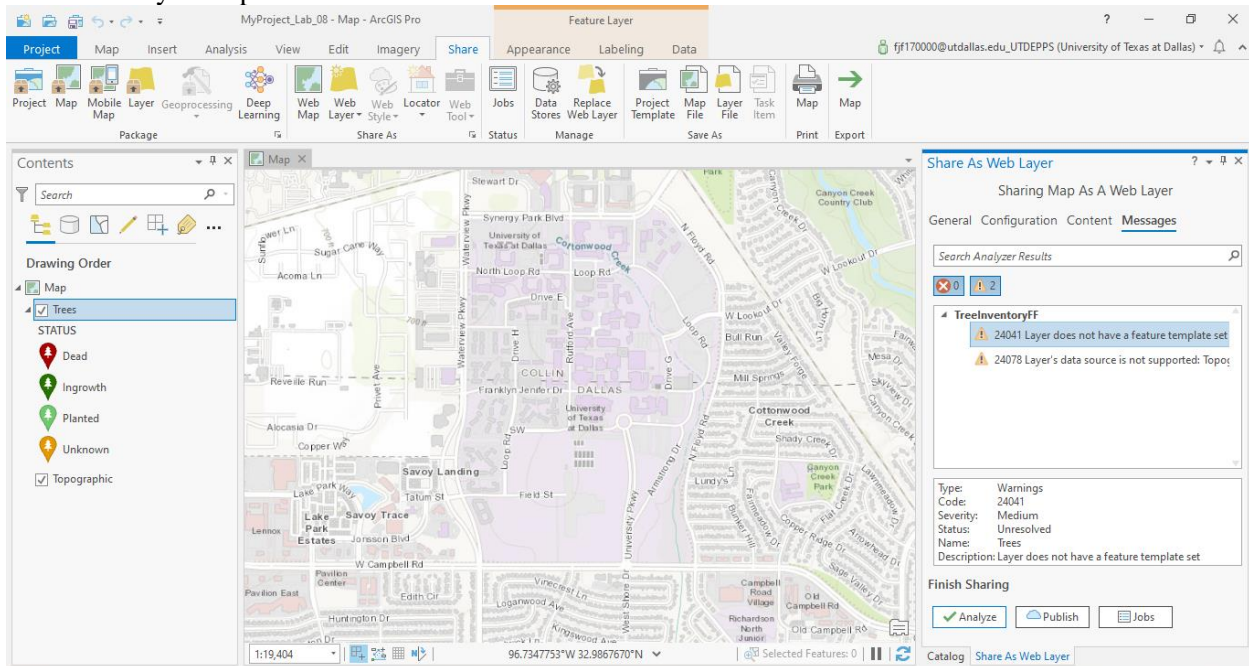
S1: Publishing features: analysis results obtained.

2. Exercise 6B (40%)
   S2. After step 9 in "Create a map" section, capture the screen and include it in your report. Also indicate your study area in your report (e.g., Richardson, Texas).
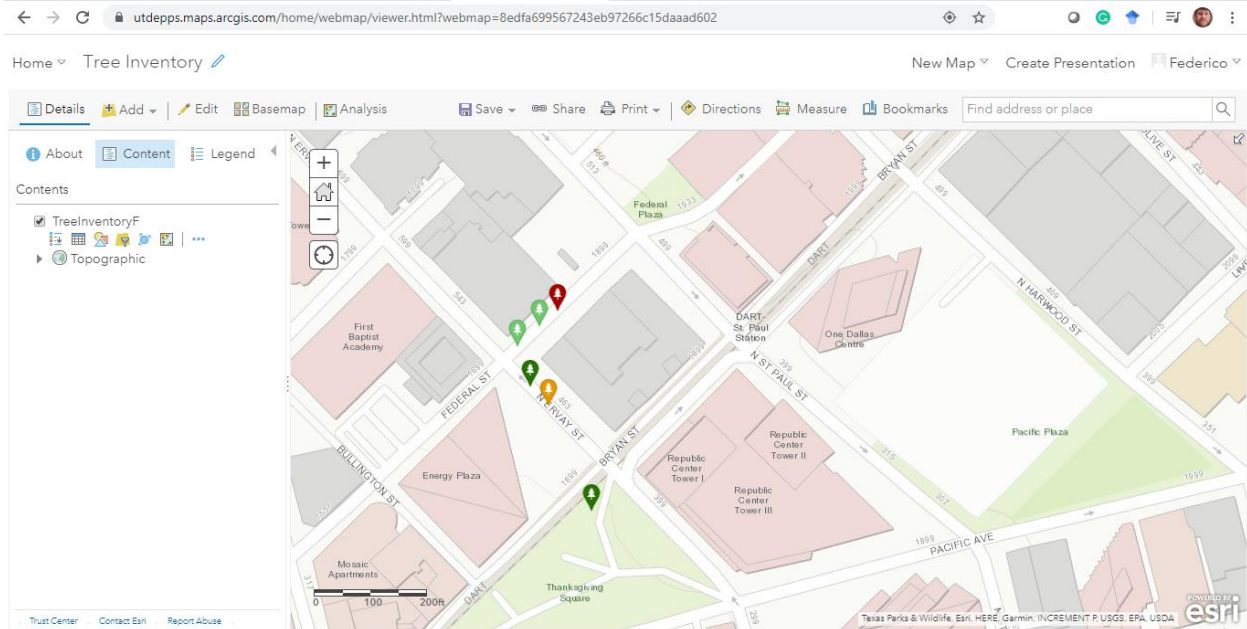
S2: Tree inventory. Area of Study: Downtown Dallas, Texas.

S3. After step 8 in "Set up additional data display options" section, capture the screen and include it in your report.
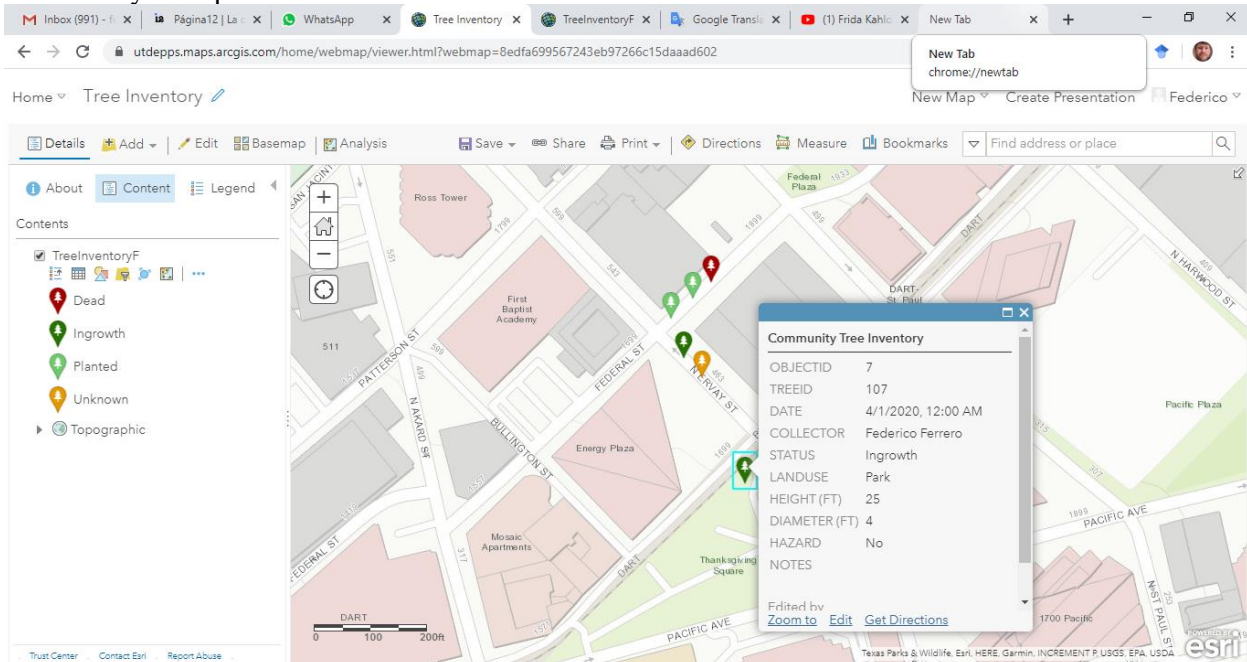
S3: Configuration of pop-up windows: demonstration of pop-up window for a selected tree in Downtown Dallas Area.

3. Exercise 6C (20%)
   S4. After step 12 in "View the map in ArcGIS Pro" section, capture the screen and include it in your report.
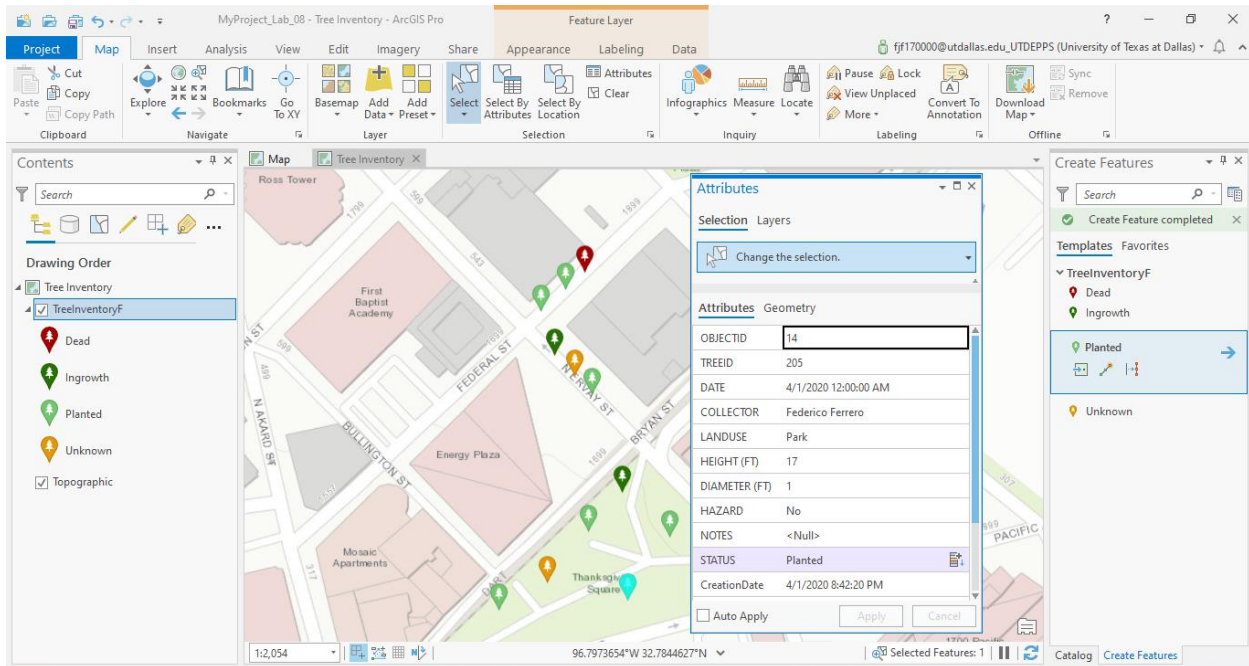
S4. View the Tree Inventory map in ArcGIS Pro: a selected tree with its attributes showed in a pop-up window.

4. Display x, y coordinates (20%)
You will visualize x, y coordinates of 10 cities in Texas as points in ArcGIS Pro. The x, y coordinates are in Texas_Cities.csv, and Counties feature class in Texas.gdb has county boundaries. Please copy these files on your local drive.

- Create a new ArcGIS Pro project.
- Add Counties feature class and Texas_Cities.csv in a map.
- Right-click on Texas_Cities.csv in the Contents and then click *Display XY Data*.
- In the Geoprocessing dialog, set parameters as shown in the right figure.
- Click run.

- Repeat the above steps with *Texas_Cities_NAD83* for output feature class and *GCS_North_American_1983* for Coordinate System.

- Change the symbol of *Texas_Cities_NAD83* (or the other layer) so that their symbols can be well distinguished.
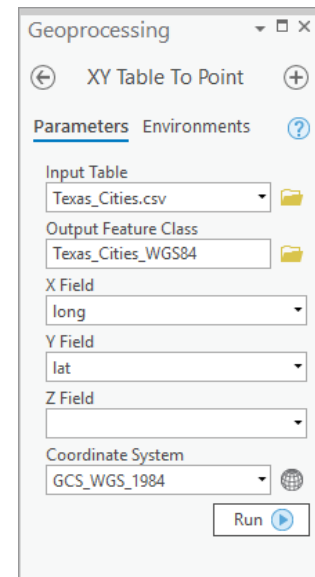
S5. Capture the screen and include it in your report.
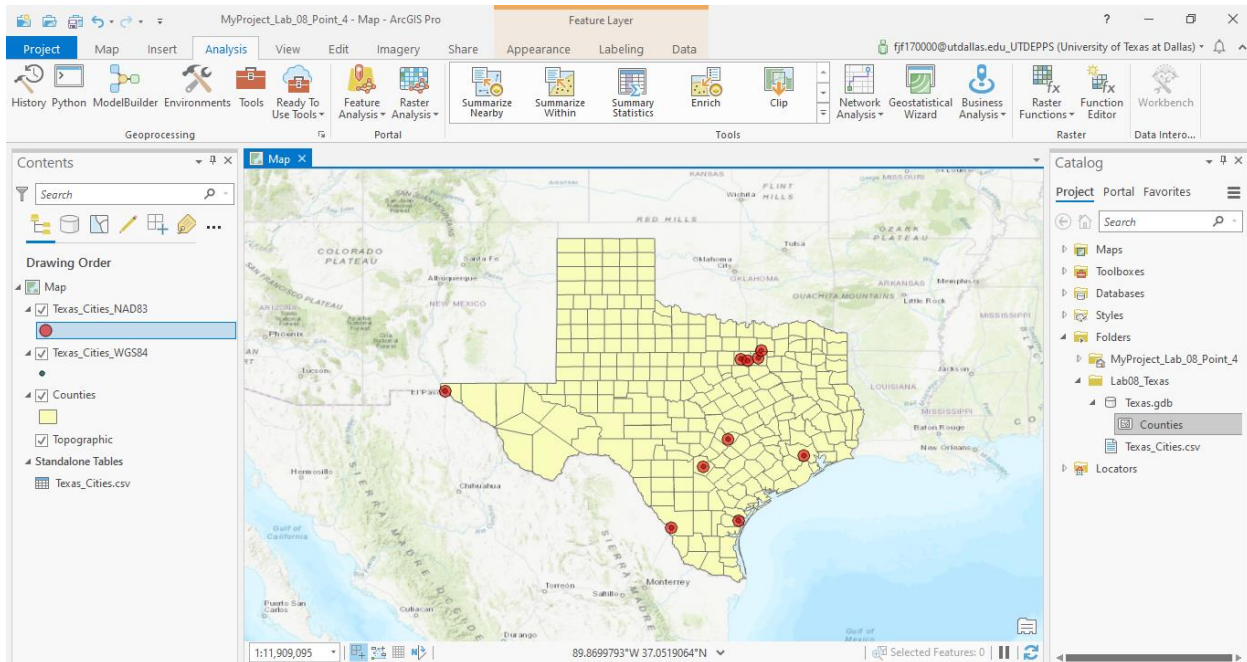
S5. Display X Y coordinates: use of WGS84 (blue points) and NAD83 (bigger transparent pink points).

- Zoom in to Dallas until you see that the two points (one based on WGS 84 and the other based on NAD83) are not at a same point (about 1:50 in scale).
- Measure the distance between the two points. You can see that they are about 0.95 meter away from each other.

Note that the coordinates are prepared based on WGS 84. So, the points displayed based on NAD83 are not accurate.

Q1. Please find the amount of the error (i.e., distance) for Dallas when the coordinates are visualized based on GCS_North_American_1927. (Geographic coordinate system → North America → USA and territories → NAD 1927)
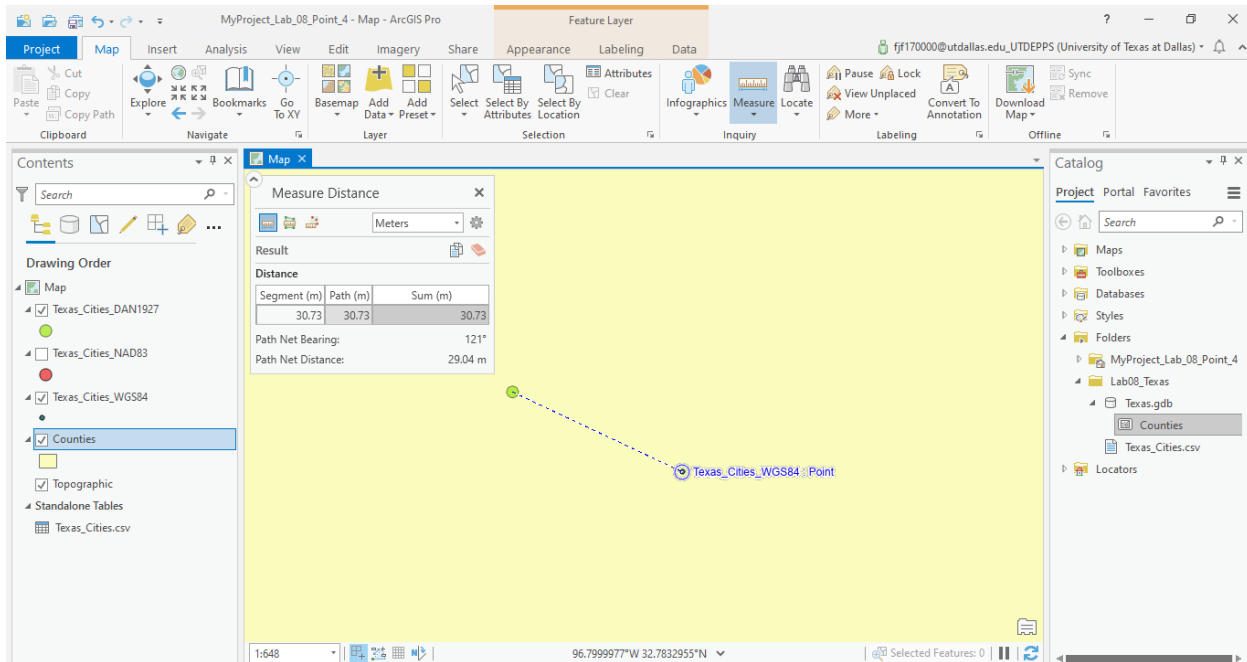
Q1. Having as a reference WGS 84, the amount of the error for Dallas when the coordinates are
visualized based on GCS North American 1927 is **30.73 meters** (as it can be checked in the
above screenshot).

5. Extra task: Georeferencing (20%)
You will make a scanned raster image georeferenced, *Plano_School_Attendance_Zone2012-13.png*.
This image shows the school attendance zones of the three senior high schools in Plano, TX. A detail
map can be found at the Plano Independent School District web site
(https://www.pisd.edu/cms/lib/TX02215173/Centricity/domain/1115/maps/18-
19_maps/Plano_School_10302018_FINAL.pdf). The layer that you are going to use for location
reference is a street shapefile, *TRANS_ROADS_PUB_line.shp*. A map coordinate system is defined
using a map projection (a method by which the curved surface of the earth is portrayed on a flat
surface).

To get help about georeferencing, see **Fundamentals of georeferencing a raster dataset** in the ESRI
Help (https://pro.arcgis.com/en/pro-app/help/data/imagery/georeferencing-a-raster-to-a-referenced-
layer.htm). Create **4 control points** and use the **first order polynomial transformation**. Click the
save button after the georeferencing. Submit a screen capture of your result with your name on it (i.e.,
a screen capture which show how the two layers align to each other). Also open the .pgwx file with
Notepad (a **.pgwx** file is generated after the georeferencing in the source image folder), and please
include the values and **the meaning of each value** in your report (refer to lecture note and the web site
through the above link)
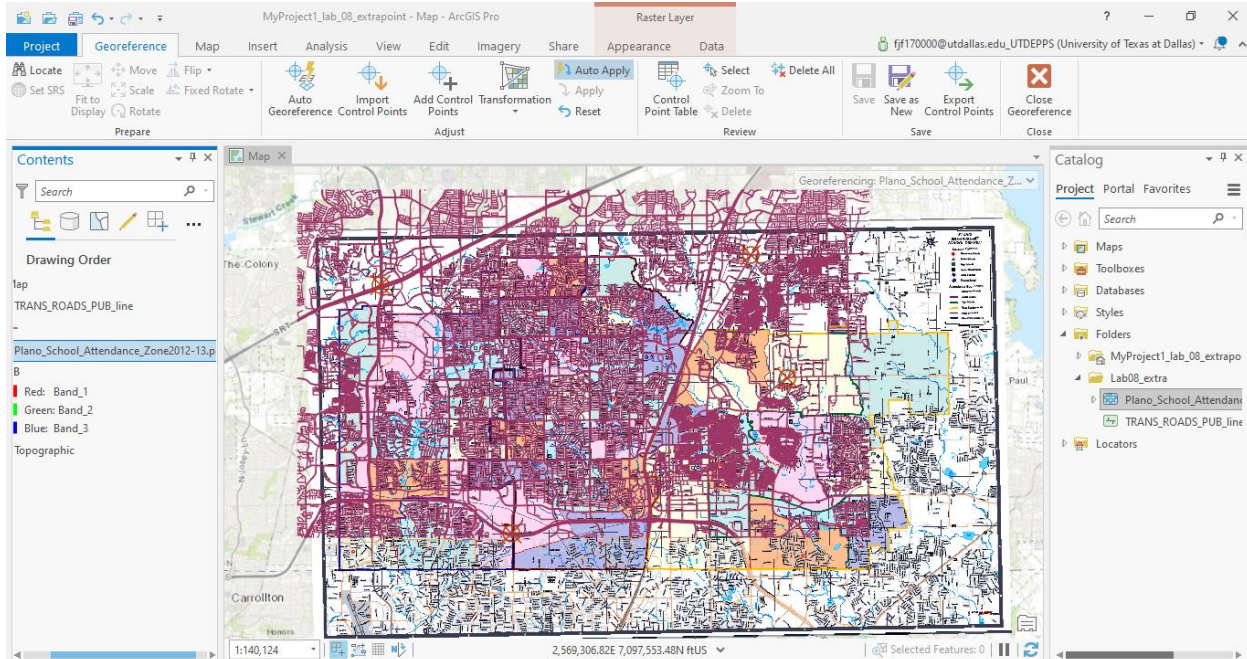
Georeferencing a raster dataset: alignment of the two layers through 4 control points.

Following the exercise, the .pgwx file obtained (georeferencing file) includes:

A = 63.1290608732646987
D = -0.0620623932957620611
B= 0.237351252440372834
E= -62.9287779811084746
C= 2471937.73610297451
F= 7093264.60619990621

Knowing that in order to calculate y' and x' corresponding to the coordinate space (from the image space) we consider:
■ **x' = Ax + By + C**
■ **y' = Dx + Ey + F**

Where:
• x is column count in image space
• y is row count in image space
• x' is horizontal value in coordinate space
 • y' is vertical value in coordinate space

Considering that:
• A is width of cell in map units
• B is a rotation term
• C is the x' value of the center of the upper-left cell
• D is a rotation term
• E is negative height of cell in map units
• F is the y' value of the center of the upper-left cell

Data
The data are available on eLearning. Please download the data files on your local machine. In addition, they are also located in T:\ywchun\GISC6381\Labs\Lab8.

How to obtain screen captures
If you cannot use commercial software to capture screenshots, you can use a windows function.
By pressing Print Screen key in your keyboard, you can capture screenshots (but it seems nothing happens). The easy way to see the captured screen is to open a favorite word processing program and create a new document and then press Ctrl + V in your keyboard which will paste the captured screen in the document. If you press Alt + Print Screen, you will get a screen capture of a selected window.

Log Out and Wrap Up
- Following items should be included in your report:
  - Screen shots at the specific step and their short descriptions
  - Answers to the questions
  - Kindly repeat the questions in your report. It will be greatly helpful when we grade labs.
- Do not forget to log out after you finish your assignment.
- Late submission will be penalized for 10% per day being late. Late submission after one week since the due date will not be graded.

Lab 09: Creating and editing spatial data
(Due: 04/13/2020, 7:00pm)

Federico Ferrero

Objective: To explore and understand ArcGIS Online and ArcGIS Pro

Reference: Exercises in Chapter 4 of *Getting to know ArcGIS Pro*

Task:
This exercise covers exercises in Chapter 4 in our text book, *Getting to Know ArcGIS Pro*. You must go through all the steps for each exercise and answer the questions that are on this exercise assignment sheet. In addition, you need to get screen captures of your work and include them in your report.

1. Exercise 4A (30%)
　　S1. After step 16 in "Convert shapefiles to geodatabase feature classes" section, capture the screen and include it in your report.
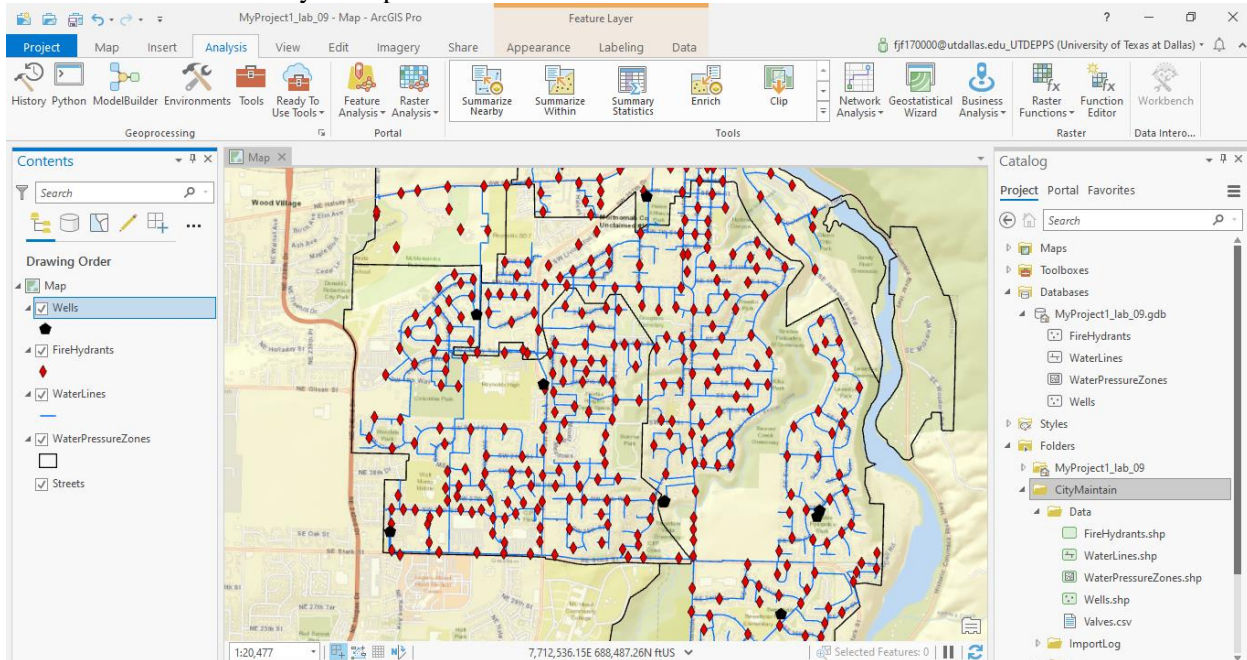
S1. Conversion of shapefiles to geodatabase feature classes: final graphic outputs and zoom to the Wells layer.

　　S2. After step 7 in the "Map x,y points" section, capture the screen and include it in your report.
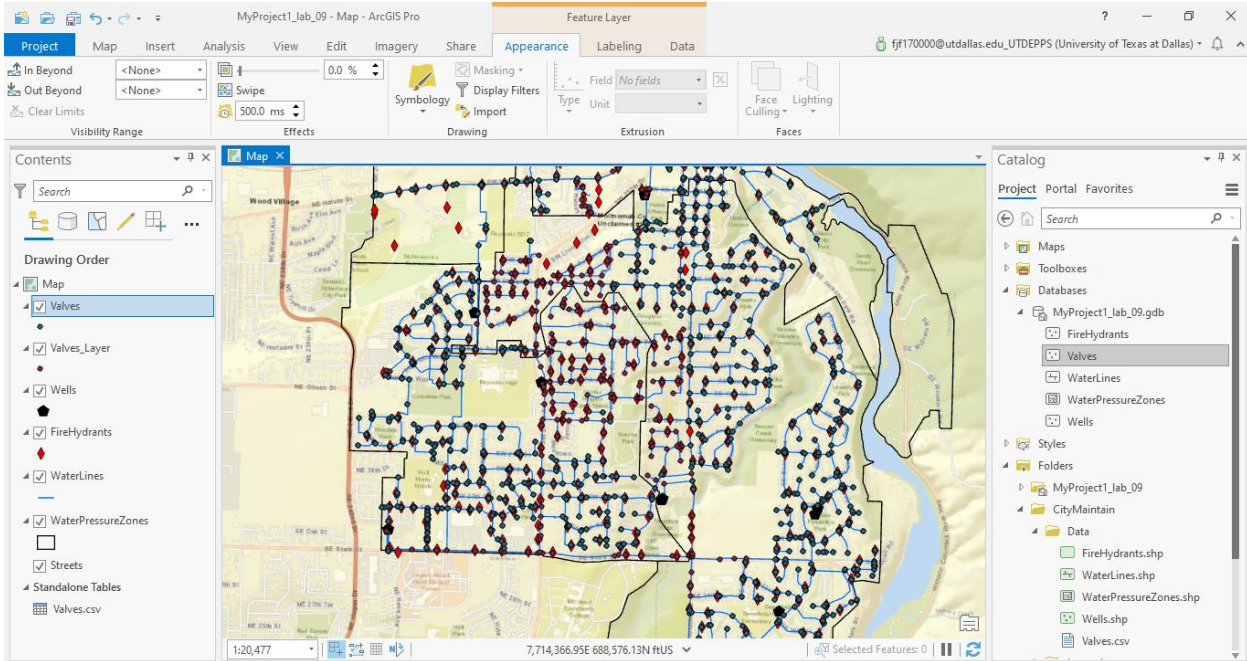
S2. The feature class Valves is added to the project geodatabase and to the map.
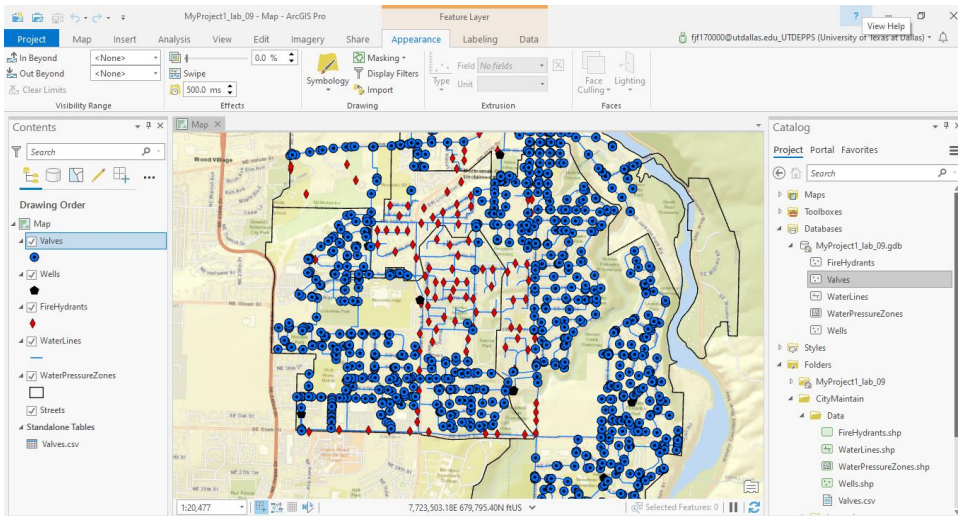
Valves_layer is removed from Content pane and Valves symbol is change to Circle 4 in blue
NOTE: I present this additional screenshot with the final result of the section "Map x,y points" just in case the numeration in edition of my book does not coincide with the numeration referred in this lab instructions.

2. Exercise 4B (15%)
    S3. After the "On Your Own" in "Create a line feature" section, capture the screen and include it in your report.
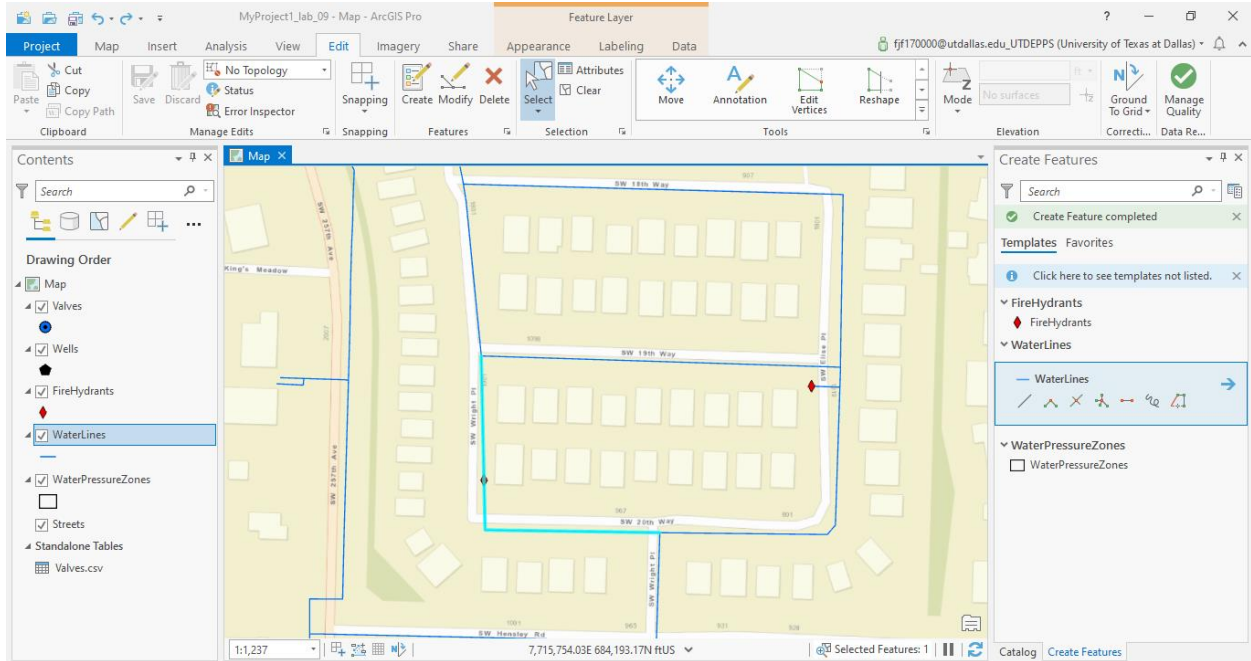
S3. Creation of a line feature: Water lines at SW Wright Pl and SW20th Way with distance of 58.5 ft and deflection of 0 dd.
NOTE: In comparison to the book instructions, valves in this zone were not available although the layer was turned on. Therefore, I connected only the hydrant.

3. Exercise 4C (30%)
    S4. After step 4 in "Modify lines and points" section, capture the screen and include it in your report.
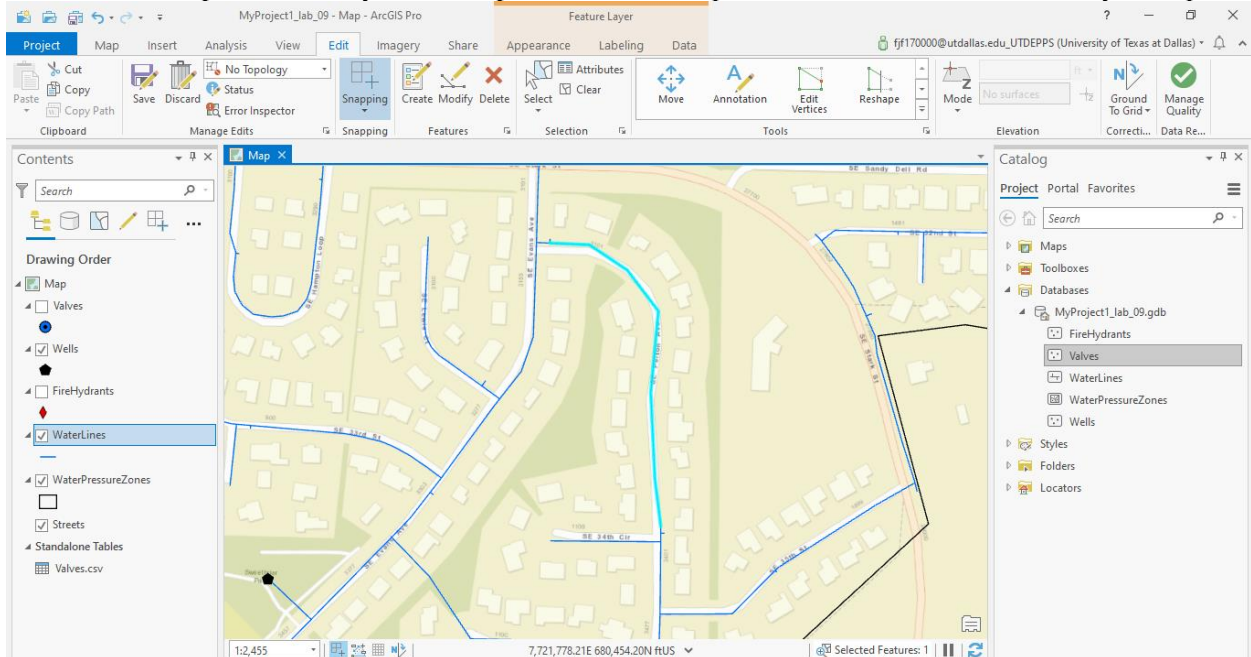
S4. Modification of line and points at SE Pelton Avenue: final result.

S5. After step 10 in "Add map notes" section, capture the screen and include it in your report.
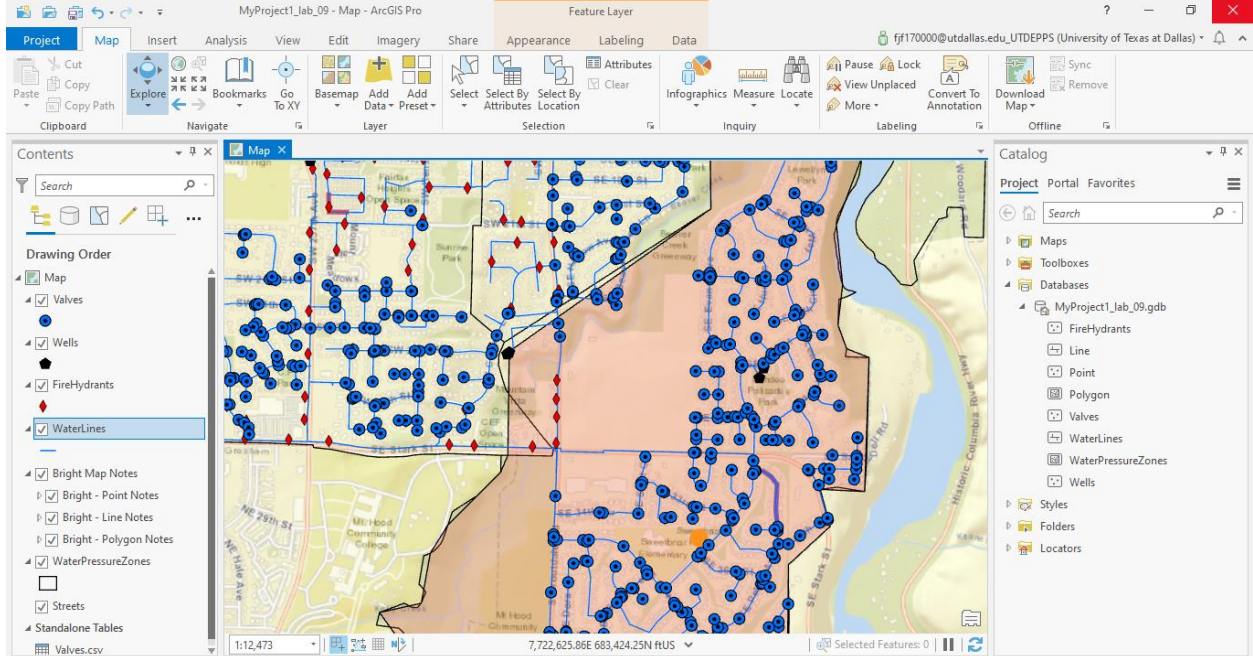
S5. Addition of map notes: red line for the creation of a new water line, purple line for the correction of a preexistent water line, circle in orange for a well deletion, polygon in red for the new water pressure zone resulted from splitting and merging old zones.
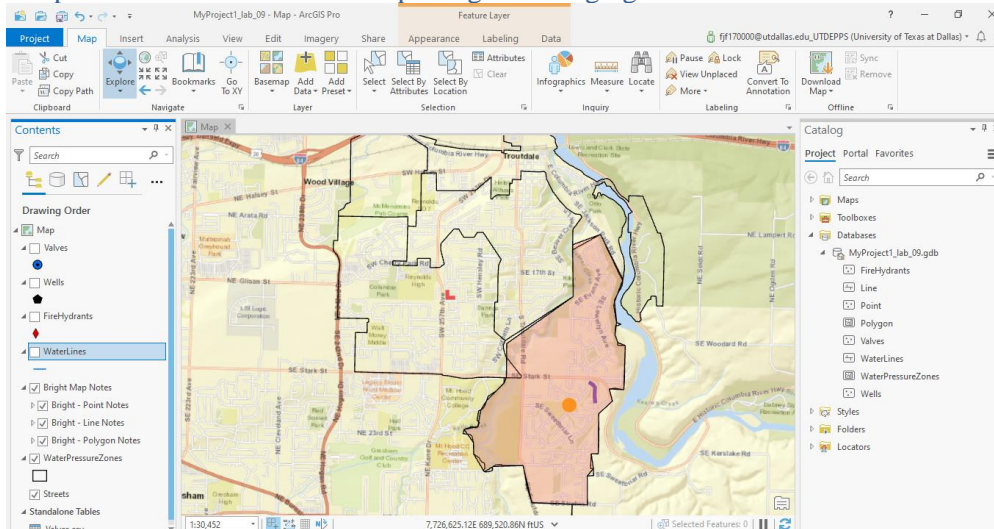
(To better visualization of above map notes)

4. Additional task (25%)

You will create a polygon shapefile or a feature class for the school attendance zones of the three senior high schools in Plano, TX. The boundaries are briefly highlighted in the below figure. A detailed map can be found on the Plano Independent School District website:
https://www.pisd.edu/cms/lib/TX02215173/Centricity/domain/1115/maps/18-19_maps/Plano_School_10302018_FINAL.pdf

Goal:

1. You need to create a new shape file and do the on-screen digitization using the image file that you georeferenced in lab8 (Just in case, the georeferenced image is provided in the lab data folder).
2. You also need to add additional attributes for those three polygons as:
   - Name: the name of the senior high school within each polygon
   - Principal: the principal names
   - Enrollment: the number of enrolled students
   - Mascot: the school mascots
   - Year: the year opened
   - Color: the school color
   - Area: the sizes of the polygons
   - Cent_x: the x coordinates of their centroids
   - Cent_y: the y coordinates of their centroids

School information are available on this website (https://www.pisd.edu/Page/1417). You need to specify the school type as "senior high school" and then go to each individual school to obtain the information. Please submit a screen capture of these polygons with the provided road network shapefile and your name on it, and include a screen capture of their attributes. Please also submit your polygon shapefile in ZIP file format. You would lose points for sliver polygons between these polygons.
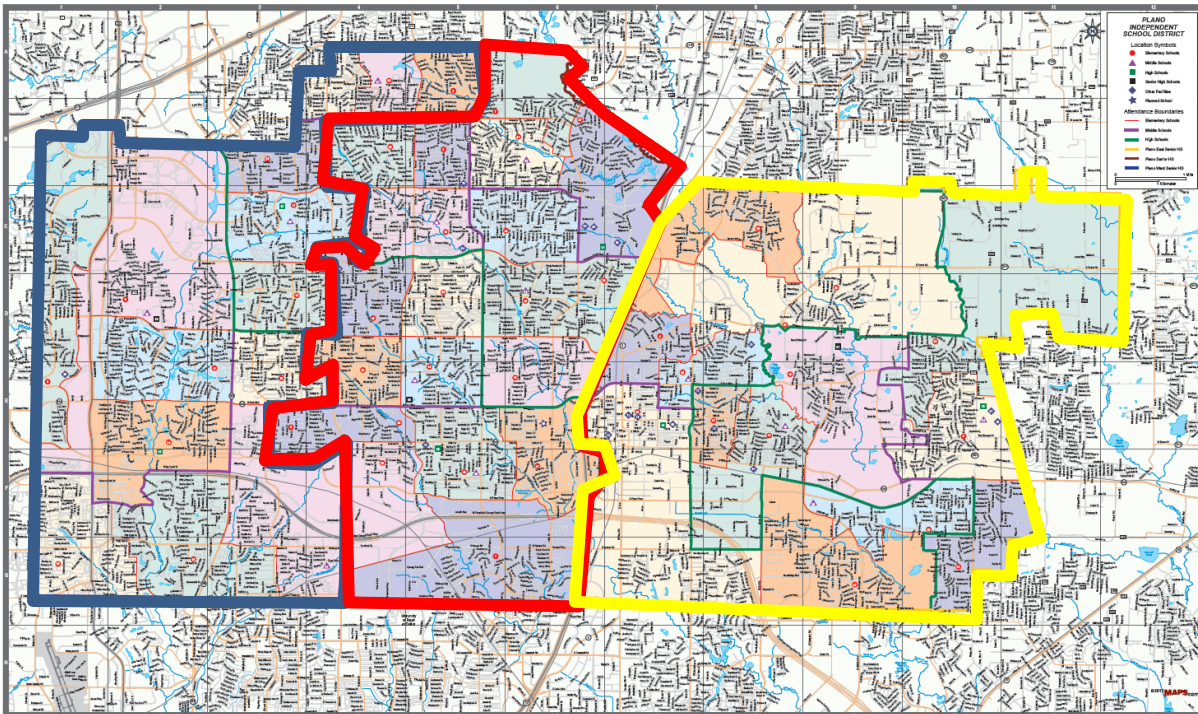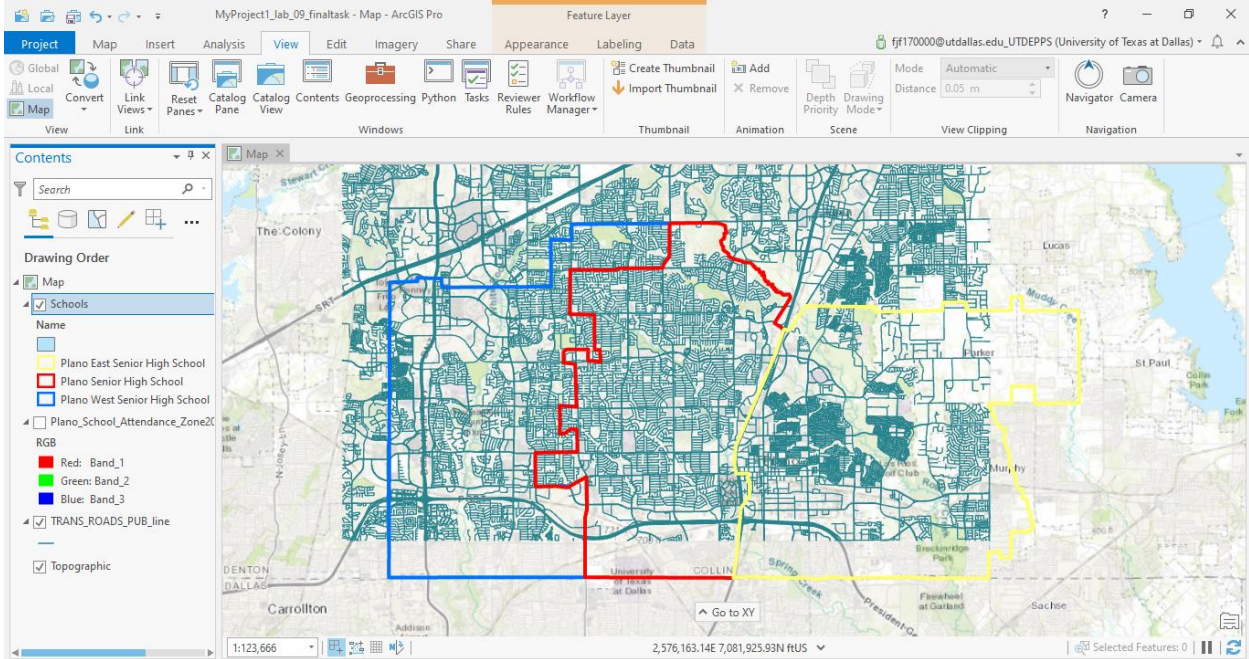
Creation of 3 polygons for the school attendance zones of the three Senior High Schools in Plano, Texas and the provided road network shapefile.
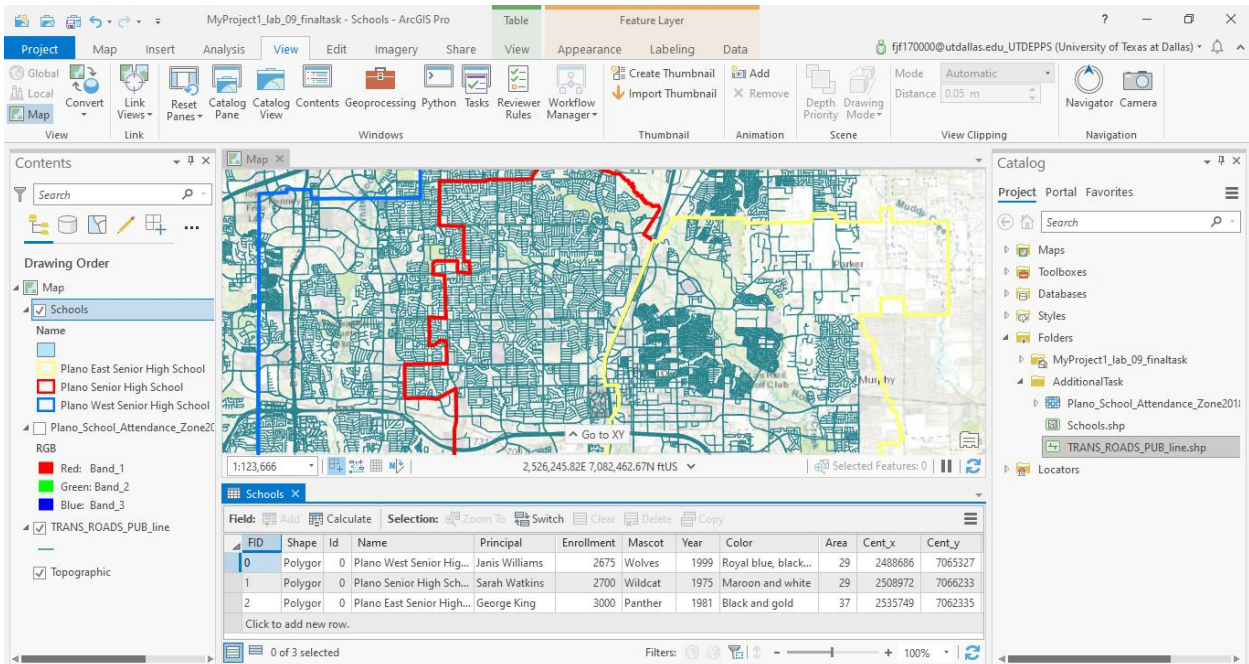
Data completed in attribute table for each one of polygons of the school attendance zones of the three Senior High Schools in Plano, TX.
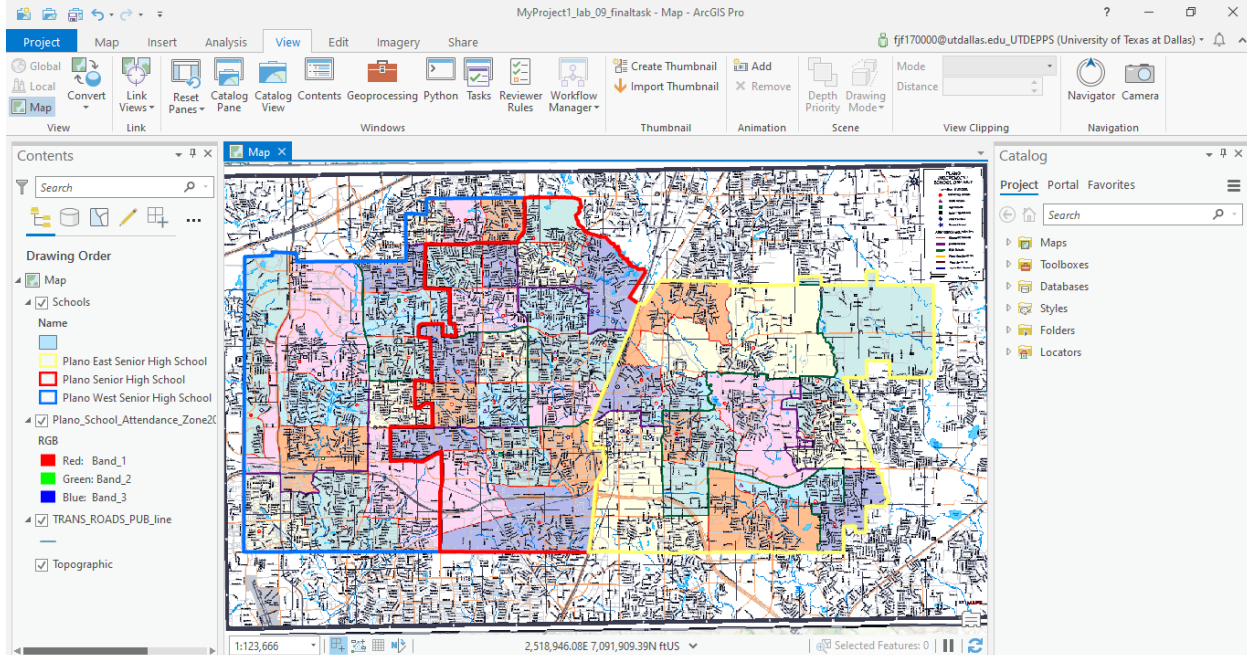
Creation of 3 polygons for the school attendance zones of the three Senior High Schools in Plano, Texas and the provided RGB image.

Data
You can download the data from eLearning.

How to obtain screen captures
If you cannot use commercial software to capture screenshots, you can use a windows function.
By pressing Print Screen key in your keyboard, you can capture screenshots (but it seems nothing happens).
The easy way to see the captured screen is to open a favorite word processing program and create a new document and then press Ctrl + V in your keyboard which will paste the captured screen in the document.
If you press Alt + Print Screen, you will get a screen capture of a selected window.

Log Out and Wrap Up
- Following items should be included in your report:
  - Screen shots at the specific step and their short descriptions
  - Answers to the questions
  - Kindly repeat the questions in your report. It will be greatly helpful when we grade labs.
- Do not forget to log out after you finish your assignment.
- Late submission will be penalized for 10% per day being late. Late submission after one week since the due date will not be graded.

Lab 10: Surface analysis and Geocoding

(Due: 04/20/2020, 7:00pm)

Objective: To explore and understand ArcGIS Online and ArcGIS Pro

Reference: Exercises in Chapter 9 of *Getting to know ArcGIS Pro*

Task:
This exercise covers exercises in Chapter 9 in our text book, *Getting to Know ArcGIS Pro*. You must gothrough all the steps for each exercise and answer the questions that are on this exercise assignment sheet. In addition, you need to get screen captures of your work and include them in your report.

1. Exercise 9A (20%)
    S1. After step 7 in "Converting a line feature to a polygon feature" section, capture the screen and include it in your report.
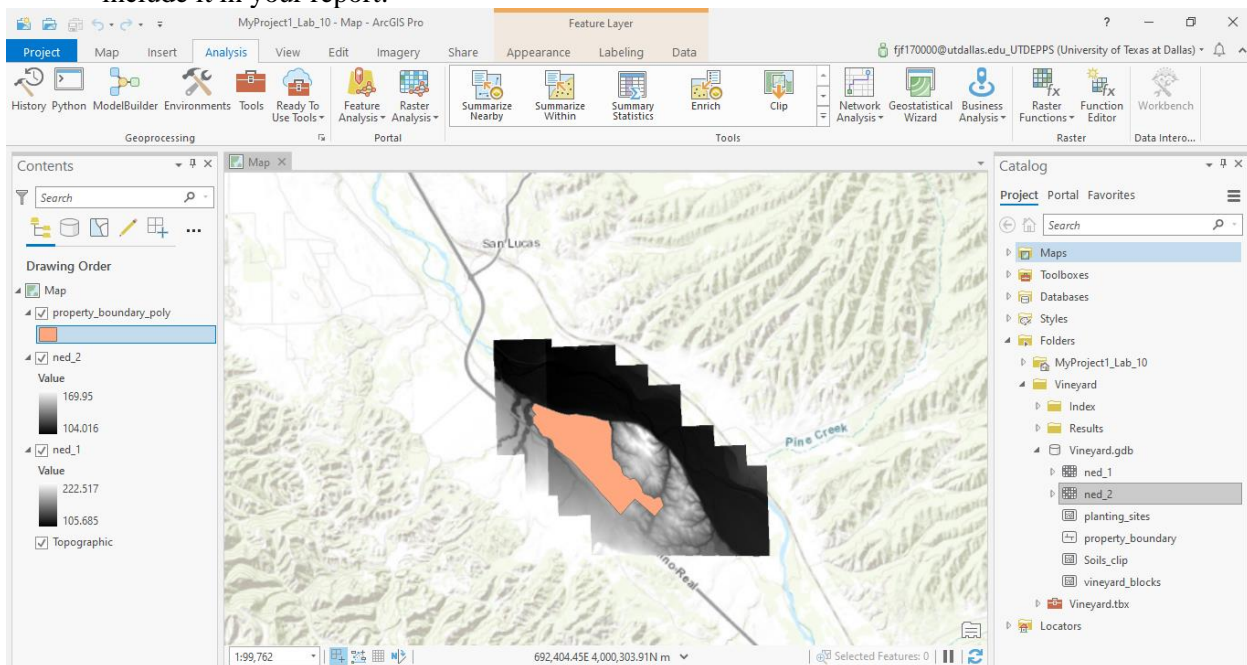
S1. Converting a line feature to a polygon feature: in orange the new polygon layer (vineyard property).

    S2. After step 3 in "Merge raster" section, capture the screen and include it in your report.
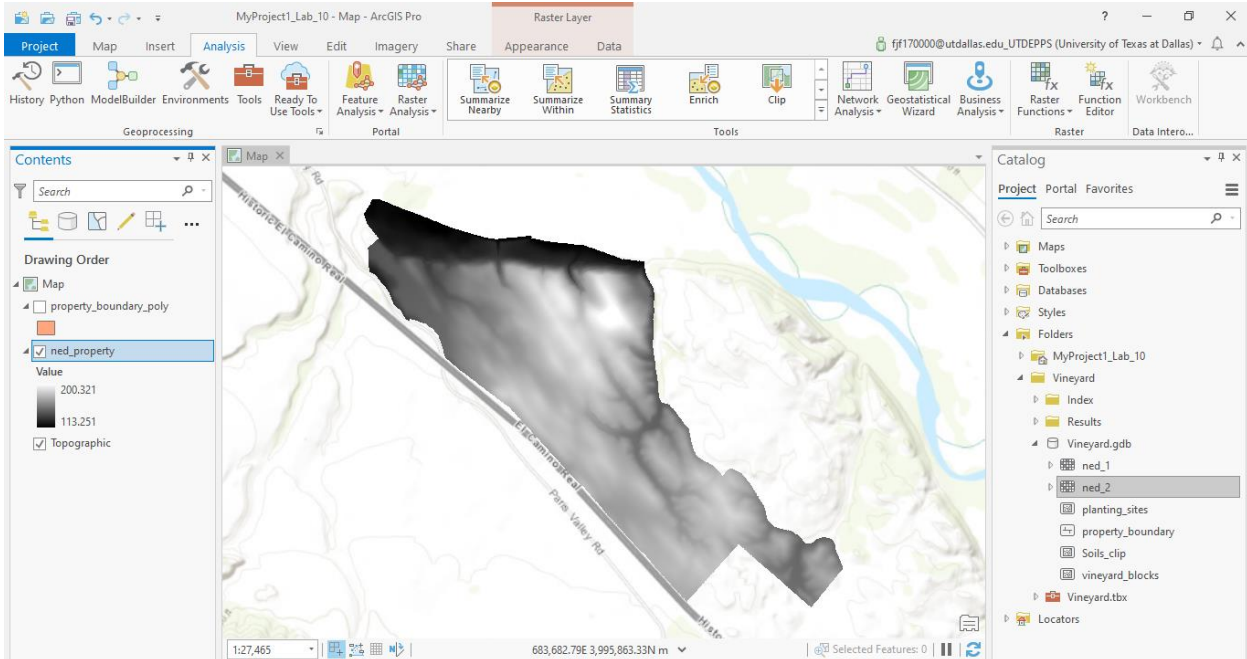
S2. Merging two rasters in one to have the raster of the vineyard property.

2. Exercise 9B (60%)

S3. After step 4 in "Derive an aspect surface" section, capture the screen and include it in your report.
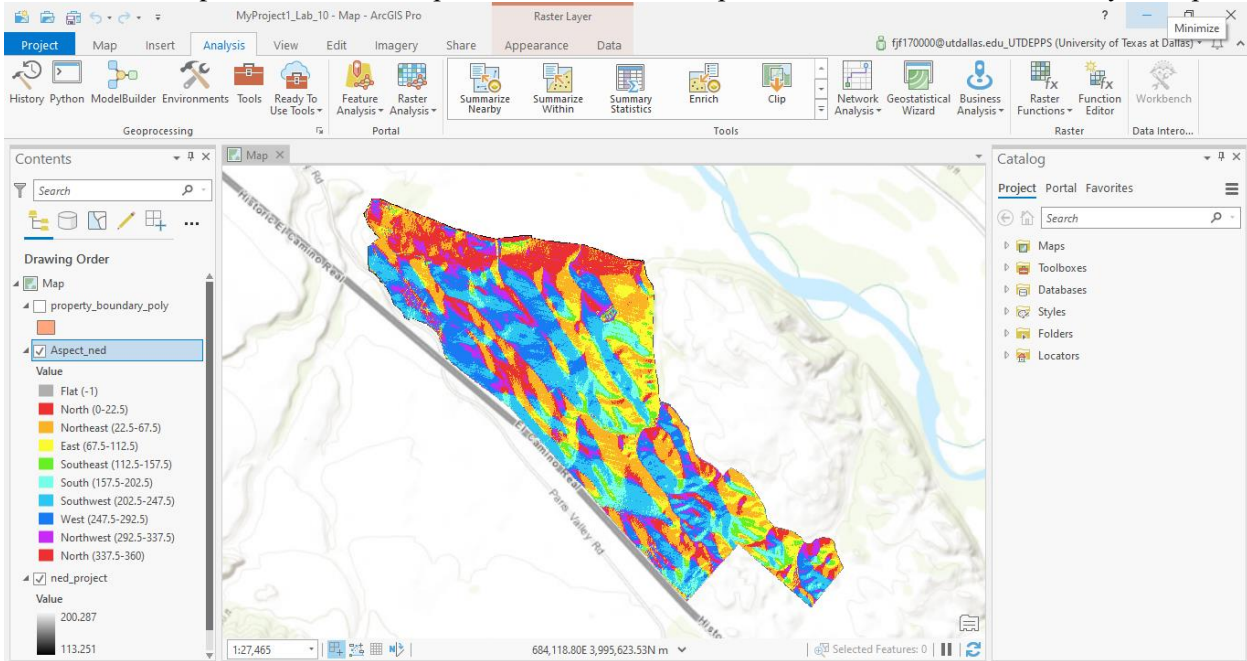
S3. Aspect surface of the vineyard.

S4. After step 8 in "Derive a slope surface" section, capture the screen and include it in your report.
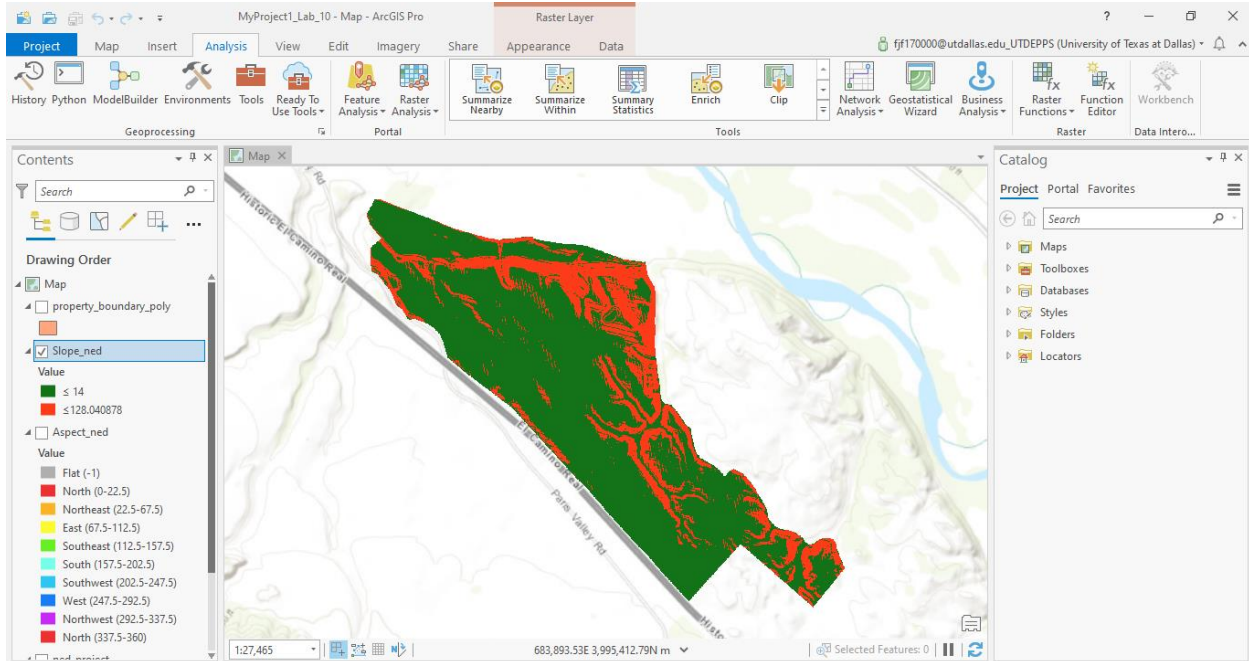
S4. Slope surface: green for =<14 degrees and red for >14 degrees of slope.

    S5. After step 6 in "Derive a hillshade surface" section, capture the screen and include it in your report.
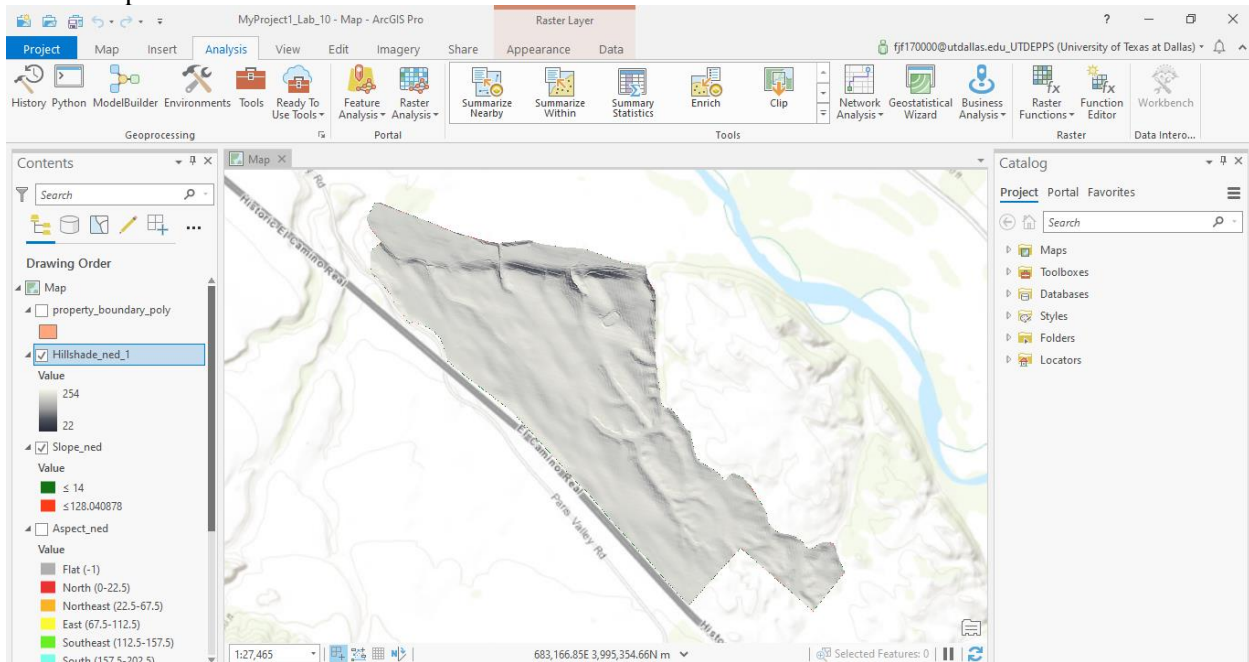
S5. Hillshade surface: illuminated and shadow areas at 2:00 pm in mid-September, 2015 in King City California.

    S6. After step 7 in "Derive a hillshade surface" section, capture the screen and include it in your report.
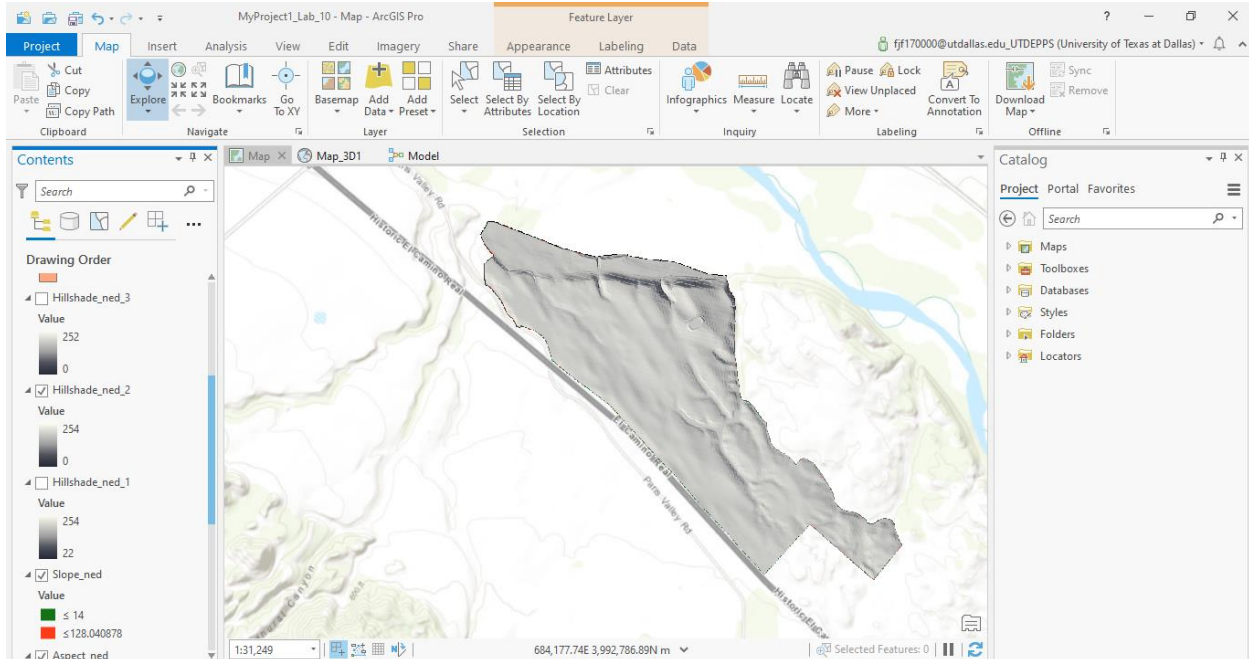
S6A. Hillshade surface: illuminated and shadow areas at 3:00 pm in mid-September, 2015 in King City California.
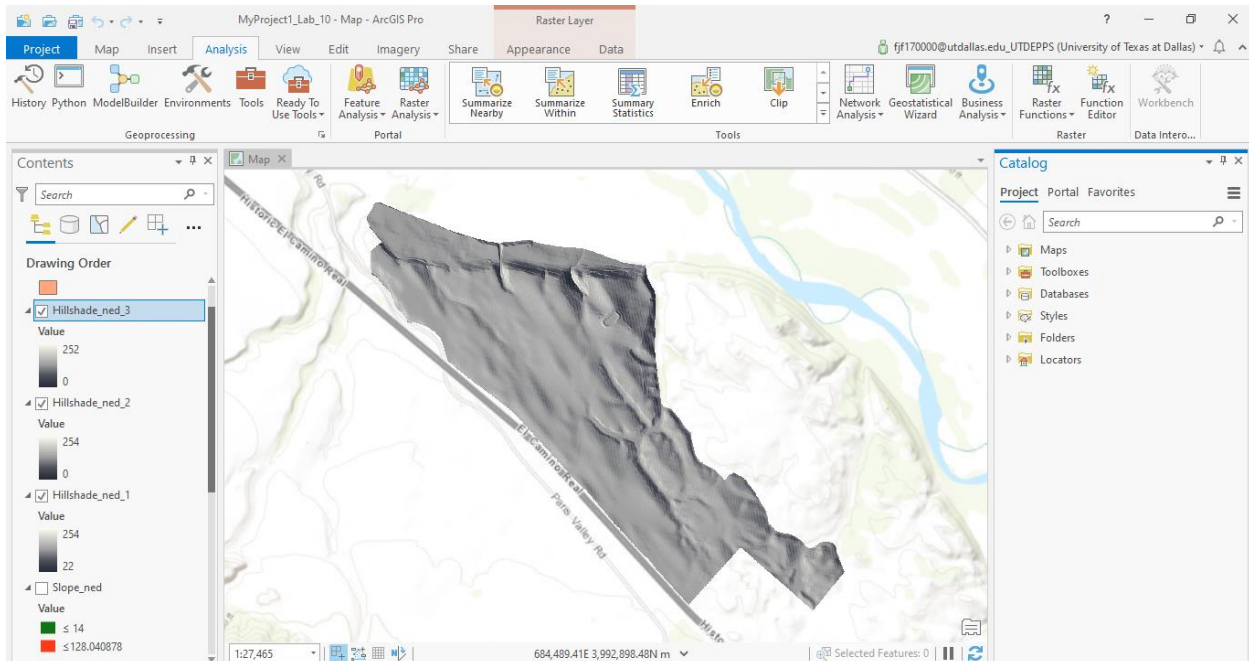
S6B. Hillshade surface: illuminated and shadow areas at 4:30 pm in mid-September, 2015 in King City California.

Q1. Answer to the four questions after step 3, 4, 5, 7 in "Visually compare analysis outputs" section.
Q1.
-Step 3: How many planting sites contain mostly low-slope (less than 14 percent) topology?
-Three.

-Step 4: How many potential planting sites include at least some land that faces south, southeast, or southwest?
-Four.

-Step 5: Are any of the potential planting sites in shadow at 2:00 p.m. in mid-September?
- No, they are not.

-Step7: Can you identify a planting site that meets the slope and aspect criteria and also has decent sun exposure at 4:30 p.m., thus revealing the best site to plant the new vineyard?
-Yes, the one in the top left is the one that best meets the criteria.

3. Exercise 9C (20%)

S7. After step 7 in "combine criteria rasters" section, capture the screen and include it in your report.
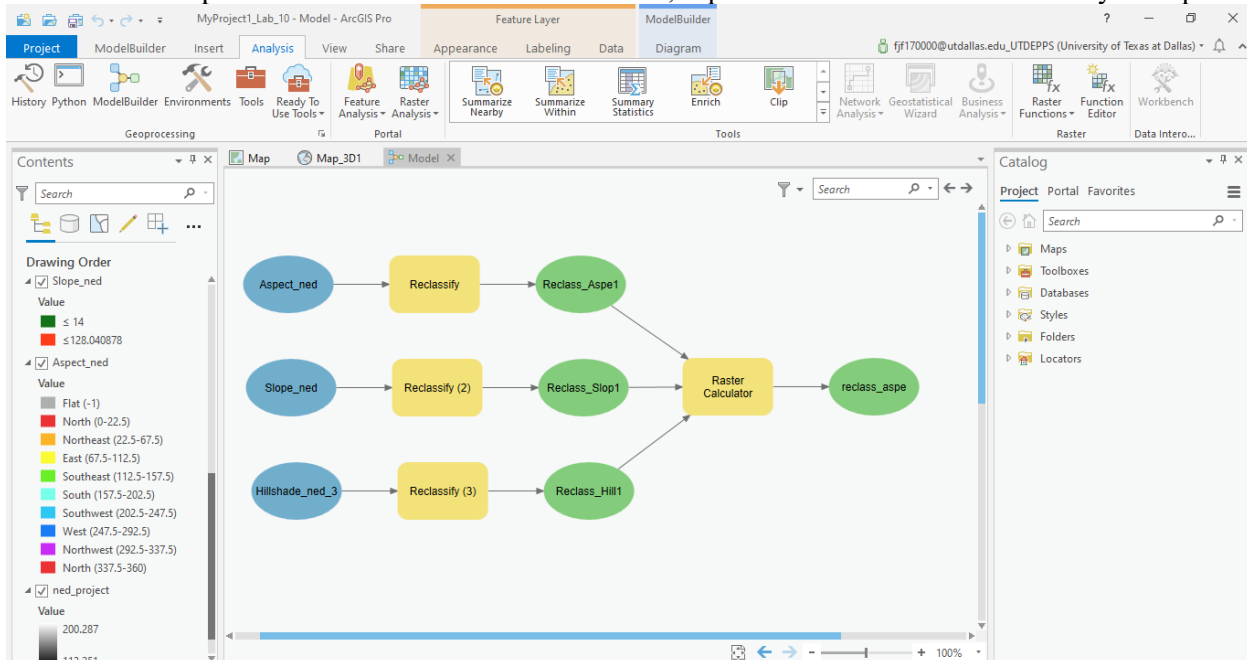
S7. Combining criteria rasters (aspect_ned, slope_ned, and hillshade_ned_3) using Raster Calculator: visualization of the model.

S8. After step 13 in "combine criteria rasters" section, capture the screen and include it in your report.
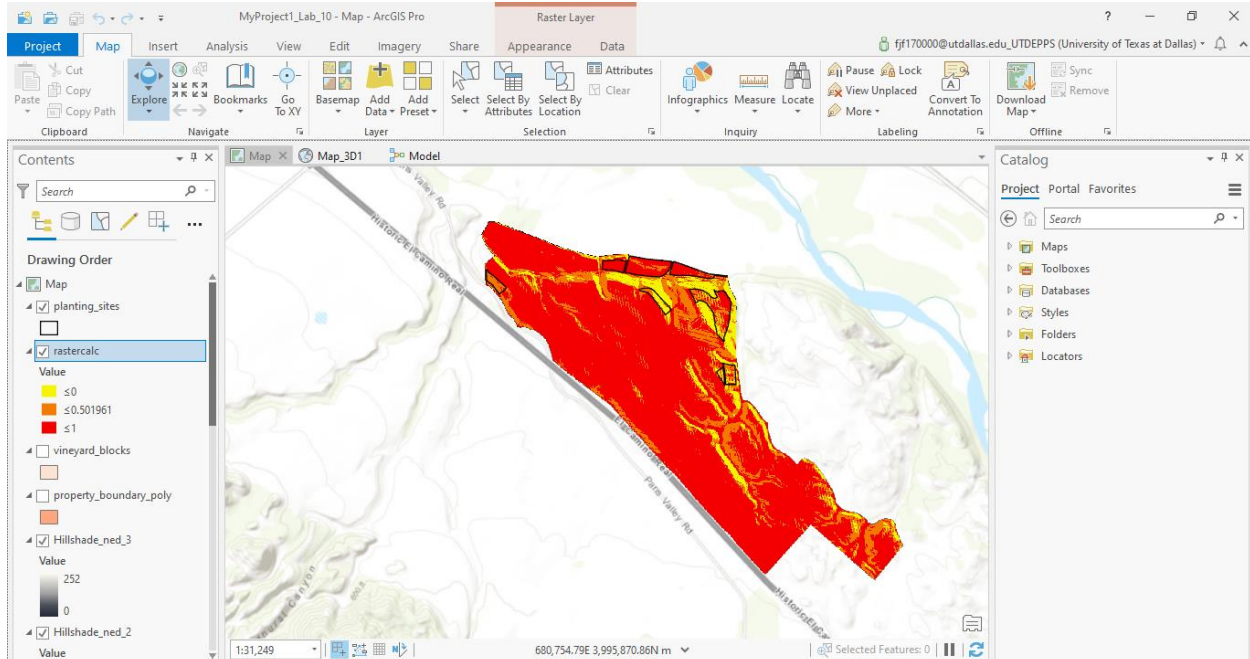
S8. Combining criteria rasters (aspect_ned, slope_ned, and hillshade_ned_3) using Raster Calculator: output raster with symbology edited.

4. **Extra Credit** (10%)

You will create a surface with a DEM from the USGS web site. Visit http://viewer.nationalmap.gov/basic/ and download a 7.5 minute DEM (1:24,000 scale) for Mount St. Helens which is in southern Washington (above Portland, Oregon).

- As in the below figure, select **Elevation Products (3DEP)** and then **All Subcategories** Also select **1 x 1 degree** in Data Extent group.
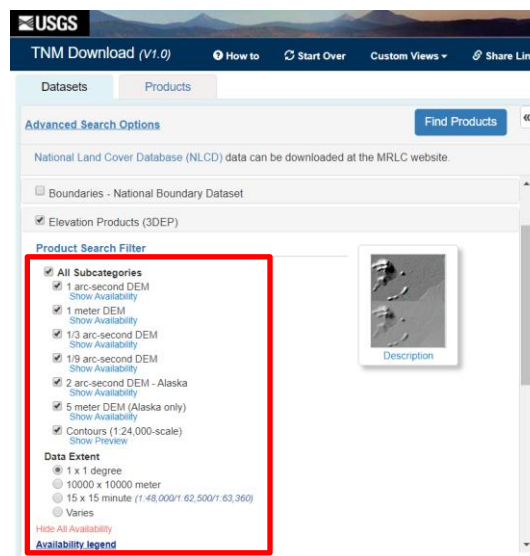
- In the menu above the map zone on the right of the window, select **Map Indices** and choose **7.5 Minute** so that the boundaries of the map index will appear in the map.

- Select **Use Map** and **Coordinate**s. You need to specify two coordinate pairs as the vertices of an AOI like in the below figure. Then click Draw AOI.

- Click **Find Products** button on the top of the left column.
- In the "Available Products (3DEP)" window, choose **USGS NED 1 arc-second n47w123 1 x 1 degree ArcGrid 2018** near the bottom of the list and click Add item to the Cart icon (🛒+). (Note that its file size is 42.27MB).
- Then click **View Cart** button on the top and then click **Download** in the cart.
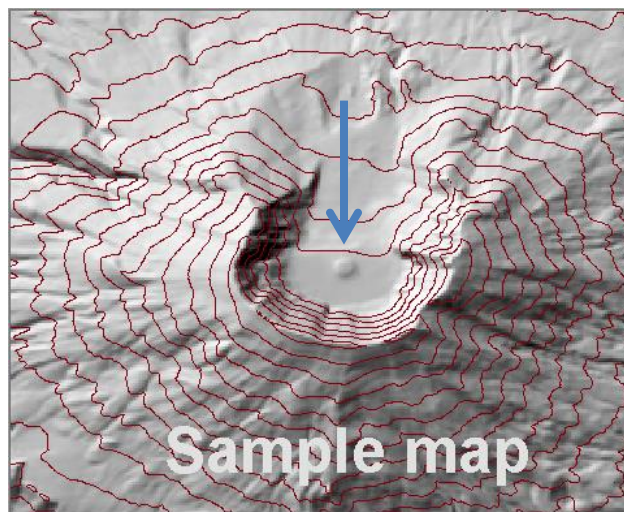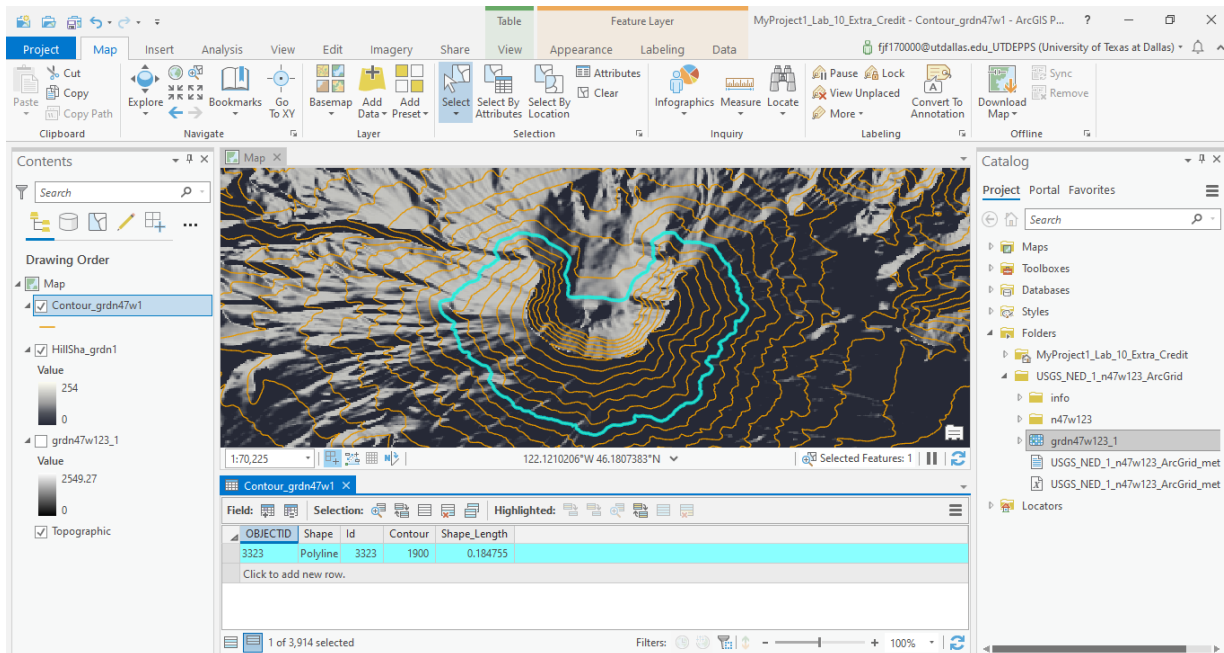
Create a hillshade surface and contours:
- If necessary, create a new map and add the DEM in ArcGIS Pro.
- Create a hillshade using *Hillshade (Spatial Analysis Tool)* in the Geoprocessing pane (note that if you want, you can choose different values for azimuth and Altitude).
- Create a contour layer using *Contour (Spatial Analysis Tool)*. Please use **100** for Contour Interval.

S9. Zoom in to Mount St. Helens volcano and get a screen capture with contours and hillshade, with your name on it (similar to the below figure). Include this screen capture in your report.
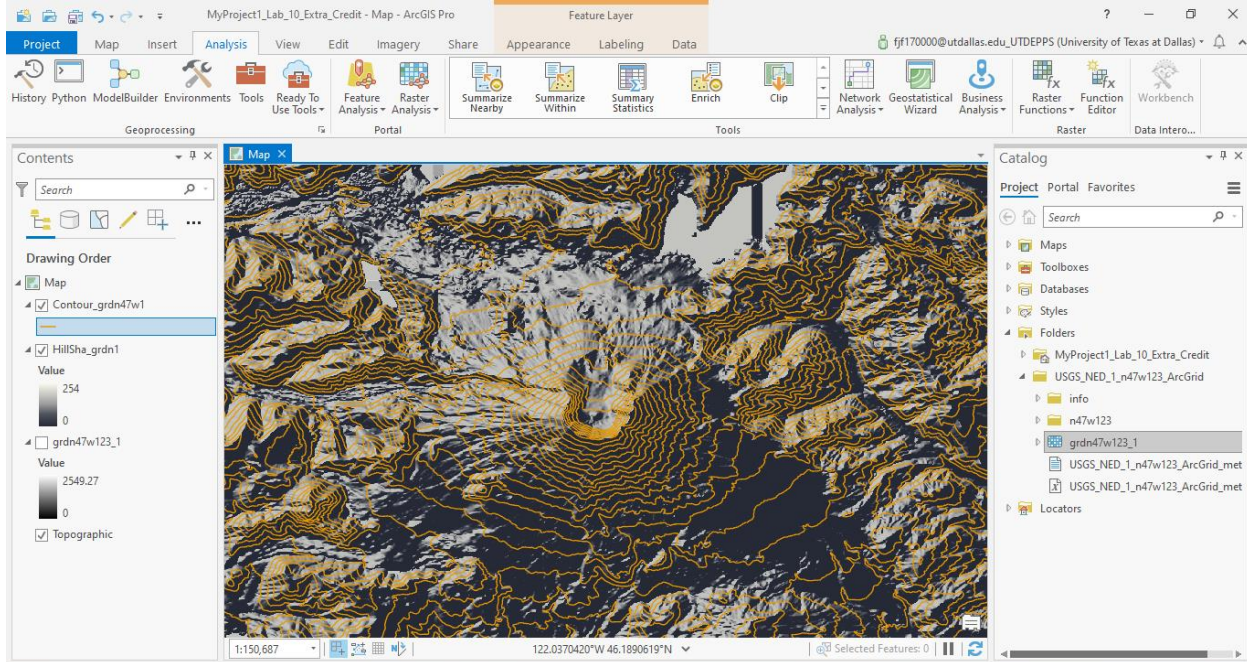
S9. Zoom in Mount St. Helens volcano: contours and hillshade.

Q2. What is the elevation of the contour line which is the closest to the center of the crater (e.g., the contour pointed by the arrow in the below figure)?

Q2. As can be seen in the attribute table below, the elevation of the contour line which is the closest to the center of the crater equals 1900.

Sample map

Data
You can download the data from elearning.

How to obtain screen captures
If you cannot use commercial software to capture screenshots, you can use a windows function.
By pressing Print Screen key in your keyboard, you can capture screenshots (but it seems nothing happens).
The easy way to see the captured screen is to open a favorite word processing program and create a new document and then press Ctrl + V in your keyboard which will paste the captured screen in the document.
If you press Alt + Print Screen, you will get a screen capture of a selected window.

Log Out and Wrap Up
- Following items should be included in your report:
    - Screen shots at the specific step and their short descriptions
    - Answers to the questions

- o   Kindly repeat the questions in your report. It will be greatly helpful when we grade labs.
- Do not forget to log out after you finish your assignment.
- Late submission will be penalized for 10% per day being late. Late submission after one week since the due date will not be graded.

Lab 11: Creating maps

(Due: 05/04/2020, 7:00pm)

Federico Ferrero

Objective: To explore and understand ArcGIS Online and ArcGIS Pro

Reference: Exercises in Chapter 10 of *Getting to know ArcGIS Pro*

Task:
This exercise covers exercises in Chapter 10 in our text book, *Getting to Know ArcGIS Pro*. You must go through all the steps for each exercise and answer the questions that are on this exercise assignment sheet. In addition, you need to get screen captures of your work and include them in your report.
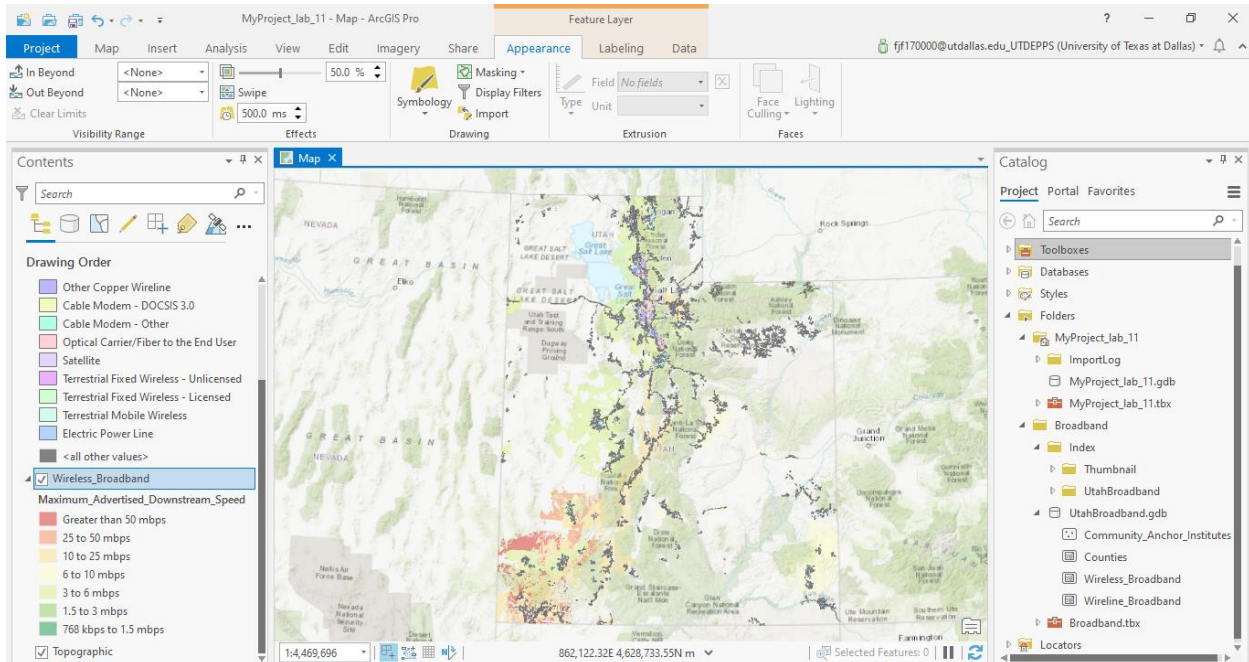
1. Exercise 10A (20%)
    S1. After step 7 in the "Create a definition query" section, capture the screen and include it in your report.
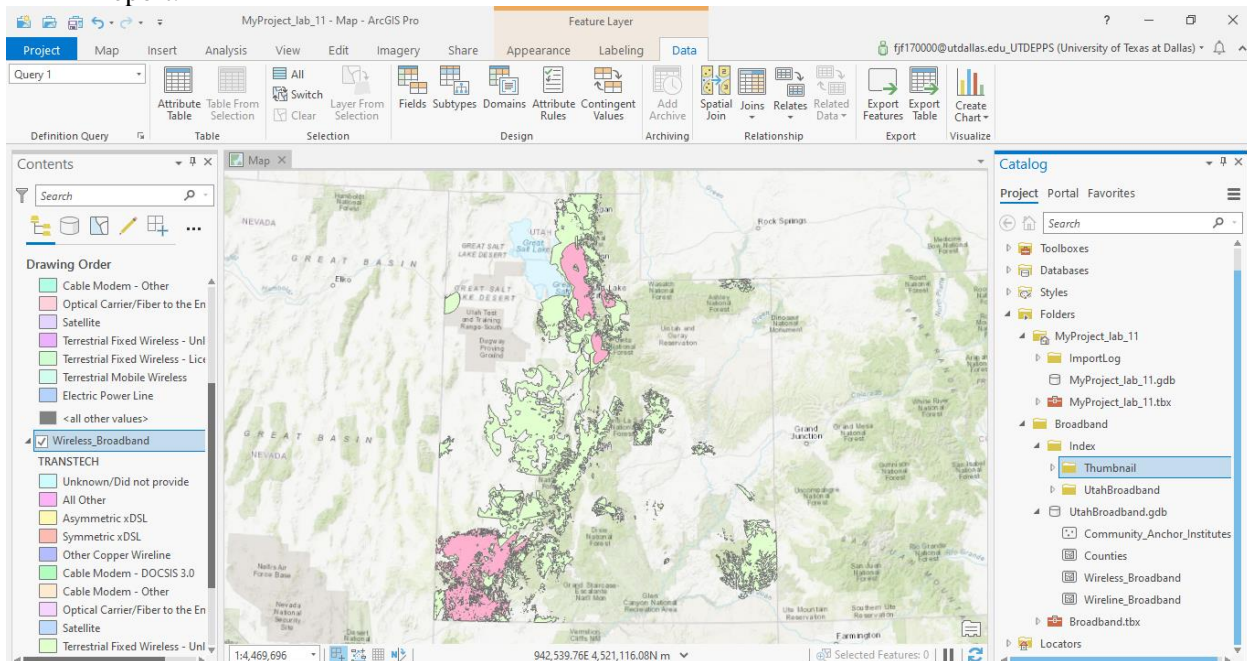
S1. Wireless broadband layer result after isolate only fixed wireless technology areas (Query: technology transmission is = 71 or =70).

    S2. After step 14 in the "Fine-tune the symbology" section, capture the screen and include it in your report.
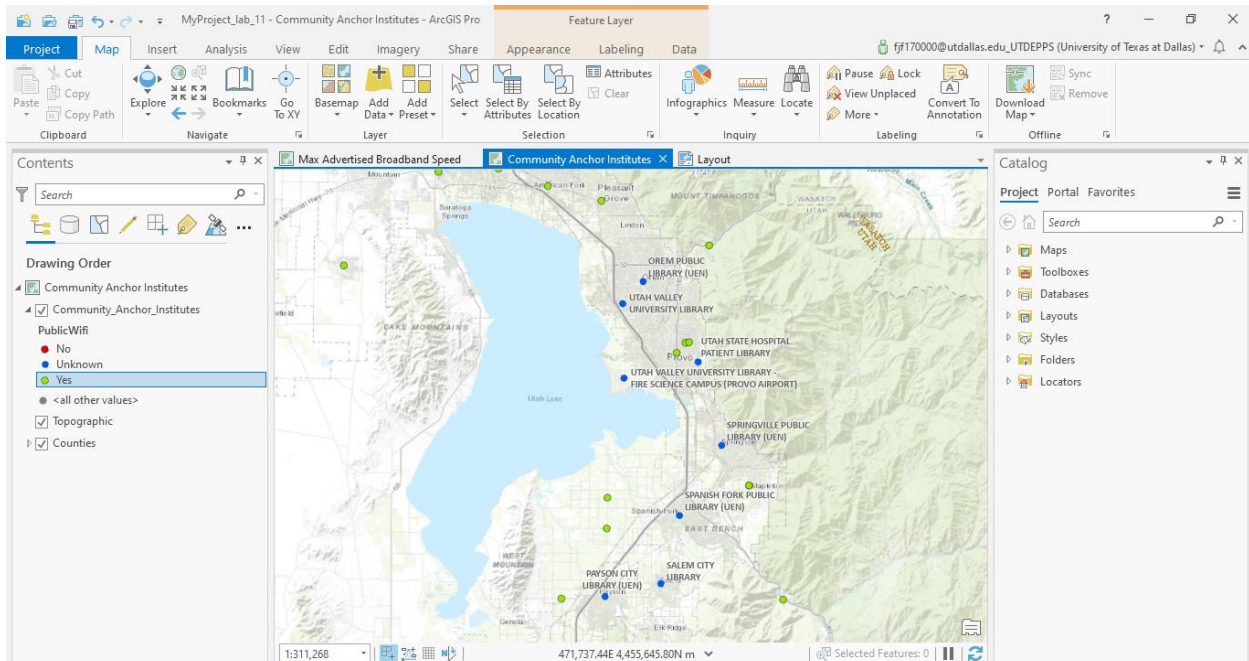
S2. Fine-tune the symbology: areas with wireline broadband are more clearly now as well as the difference between wireline and wireless broadband (transparent color).
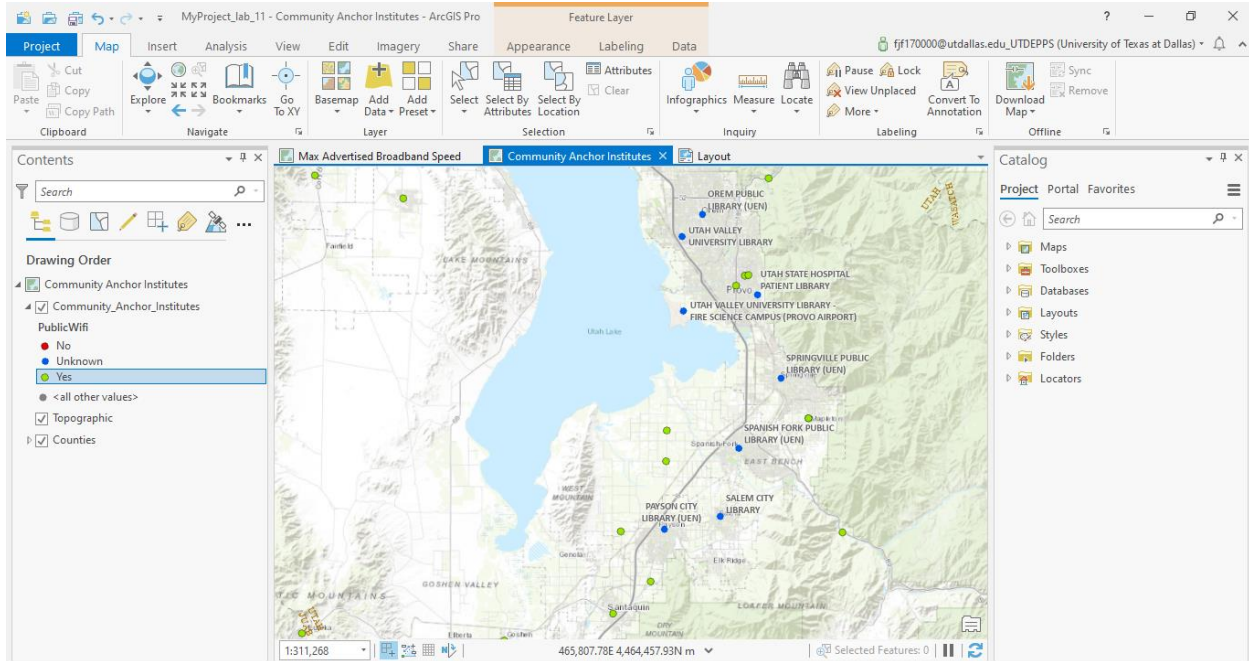
2. Exercise 10B (20%)
    S3. After step 6 in the "Label features using the Maplex Label Engine" section, capture the screen and include it in your report.
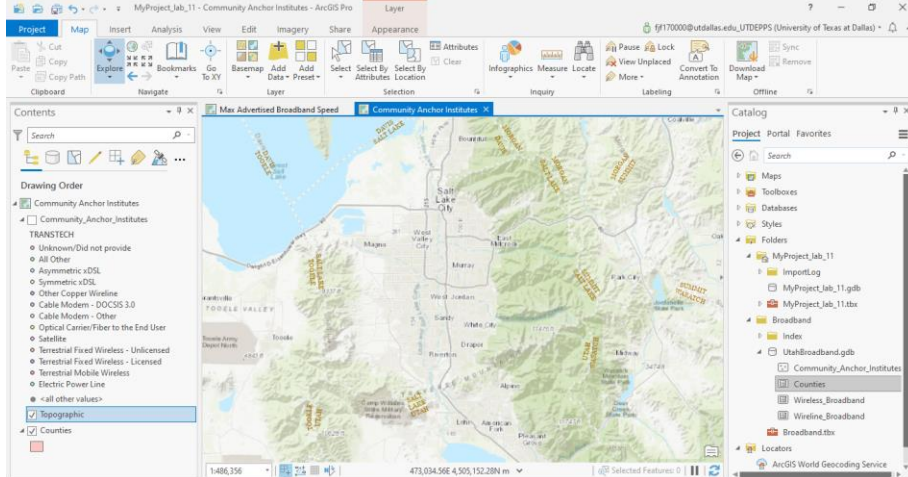

S3. Libraries with unknown public WiFi are only named.

    S4. After step 17 in the "Label features using the Maplex Label Engine" section, capture the screen and include it in your report.
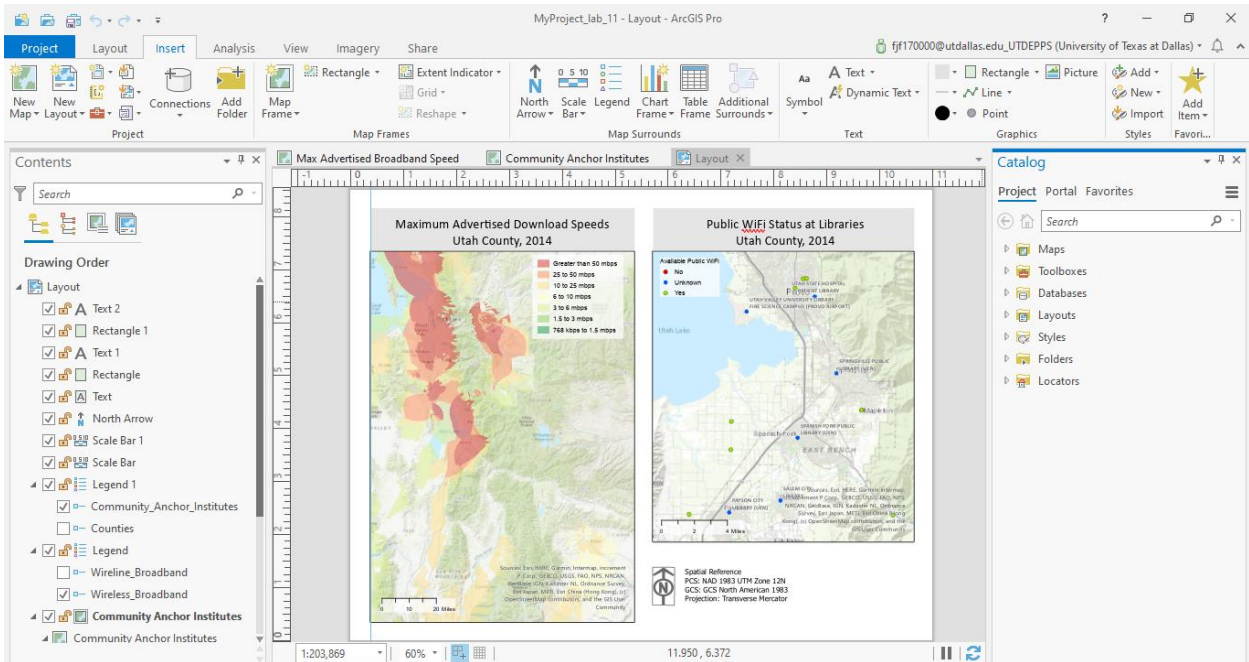
S4. Edition result of Library labels (central zone of the map) and County labels (up-right in this image).

Detail of County labels edition result.

3. Exercise 10C (40%)
    S5. After step 10 in the "Insert dynamic text, a title, and rectangles" section, capture the screen and
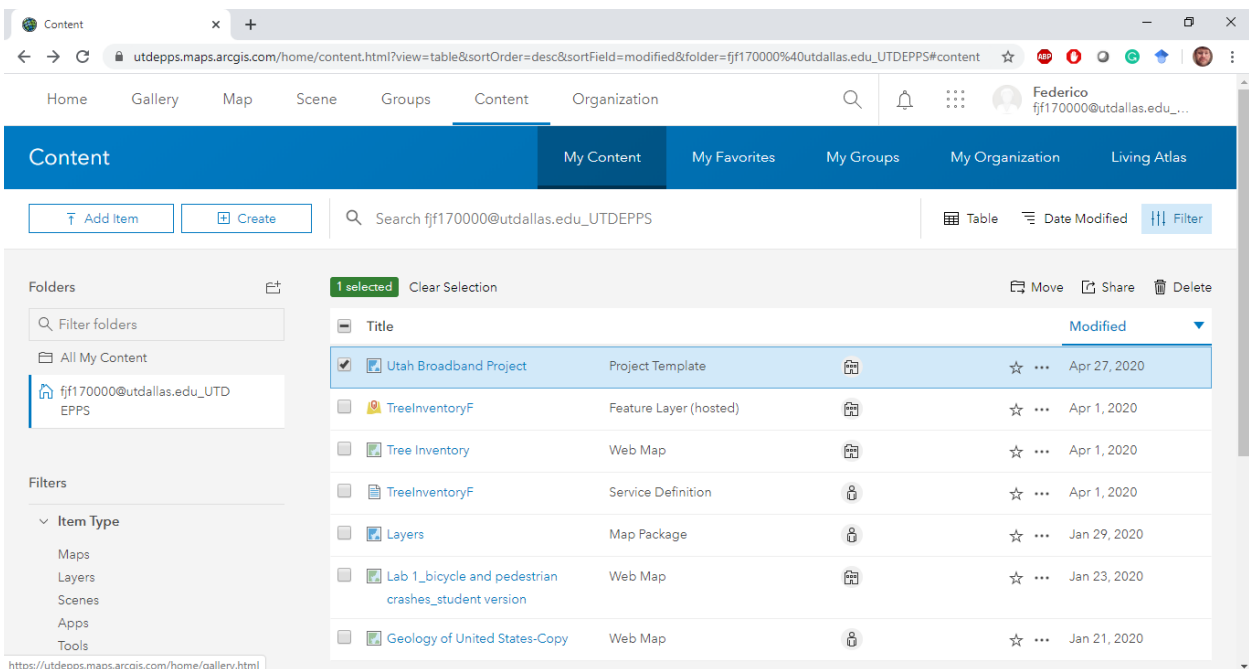   include it in your report.

S5. Creation of map layout: final result.

4. Exercise 10D (20%)

Q1. Submit the PDF that you created at step 4 in the "Export a layout to a PDF" section as a separate file (do not include it in your report).

S6. After "On your Own" step in the "Package and share a project template" section, capture the screen and include it in your report.

S6. Utah Broadband Project template shared in ArcGis Online.

S6. Utah Broadband Project template shared in ArcGis Online.

5. Extra task (20%)
Create a map of population change rates in Texas from 2011 to 2016 at the county level. Some information and rudiments are as below:

- Use the equation for population change rates: $(Pop_{2016} - Pop_{2011})/Pop_{2011}$.
- Download appropriate datasets from the US Census Bureau web site (e.g., Boundary shapefiles are available at: https://www.census.gov/cgi-bin/geo/shapefiles/index.php; Demographic data is available at: https://data.census.gov/cedsci/).
- Make a professional map that you can create: an informative and visually pleasing map.
- Include map elements and necessary information.
- Export your map in a separate PDF (do not include it in your lab report) and submit it.

Data
You can download the data from eLearning.

How to obtain screen captures
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By pressing Print Screen key in your keyboard, you can capture screenshots (but it seems nothing happens). The easy way to see the captured screen is to open a favorite word processing program and create a new document and then press Ctrl + V in your keyboard which will paste the captured screen in the document. If you press Alt + Print Screen, you will get a screen capture of a selected window.

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Maximum Advertised Download Speeds
Utah County, 2014

Greater than 50 mbps
25 to 50 mbps
10 to 25 mbps
6 to 10 mbps
3 to 6 mbps
1.5 to 3 mbps
768 kbps to 1.5 mbps

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

0   10   20 Miles
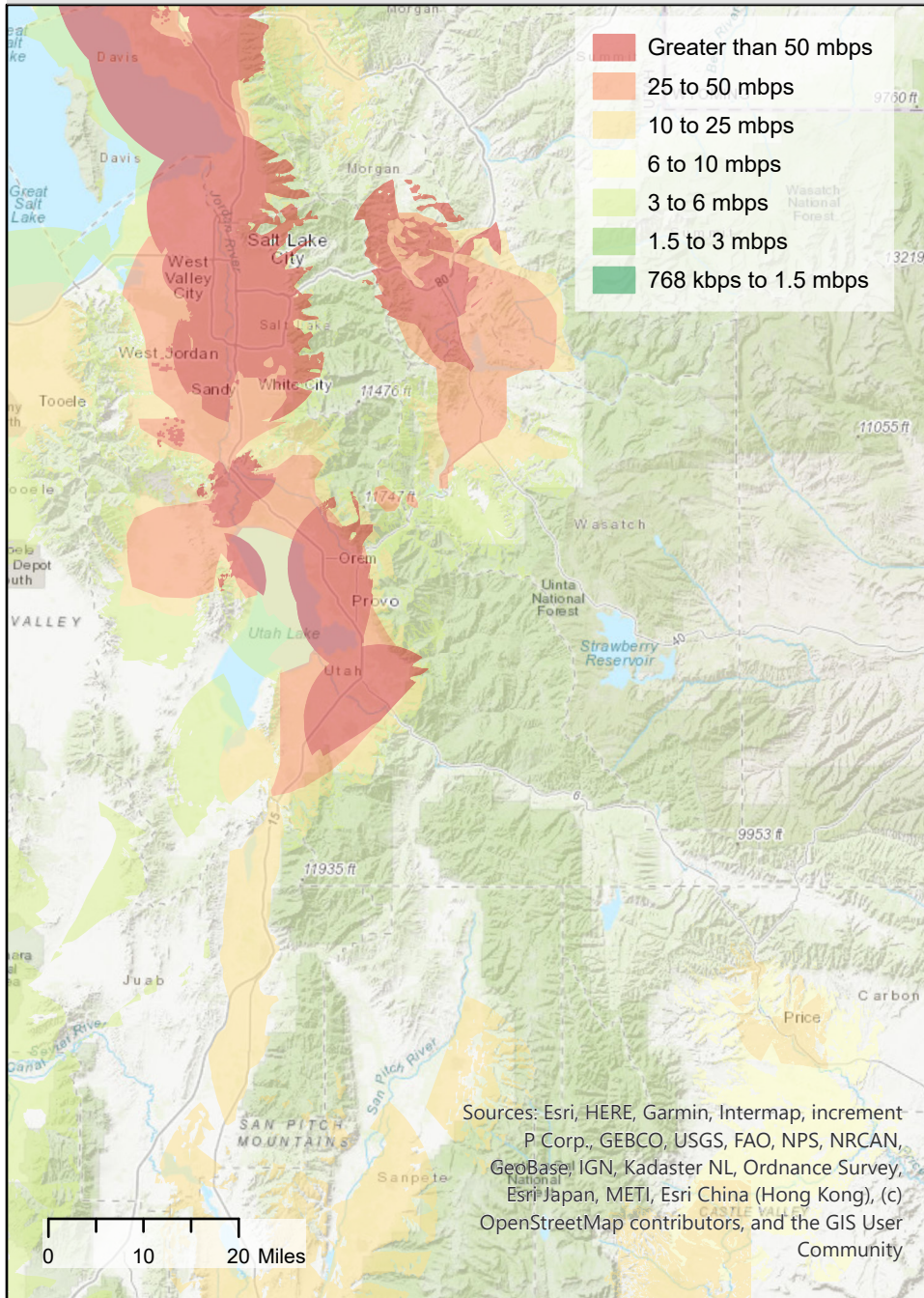
Public WiFi Status at Libraries
Utah County, 2014

Available Public WiFi

No
Unknown
Yes

UTAH STATE HOSPITAL PATIENT LIBRARY
UTAH VALLEY UNIVERSITY LIBRARY - FIRE SCIENCE CAMPUS (PROVO AIRPORT)

SPRINGVILLE PUBLIC LIBRARY (UEN)

SPANISH FORK PUBLIC LIBRARY (UEN)

SALEM CITY LIBRARY

PAYSON CITY LIBRARY (UEN)

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

0   2   4 Miles

Spatial Reference
PCS: NAD 1983 UTM Zone 12N
GCS: GCS North American 1983
Projection: Transverse Mercator