



G R E A T P L A I N S  
IDeA | Clinical and  
Translational Research

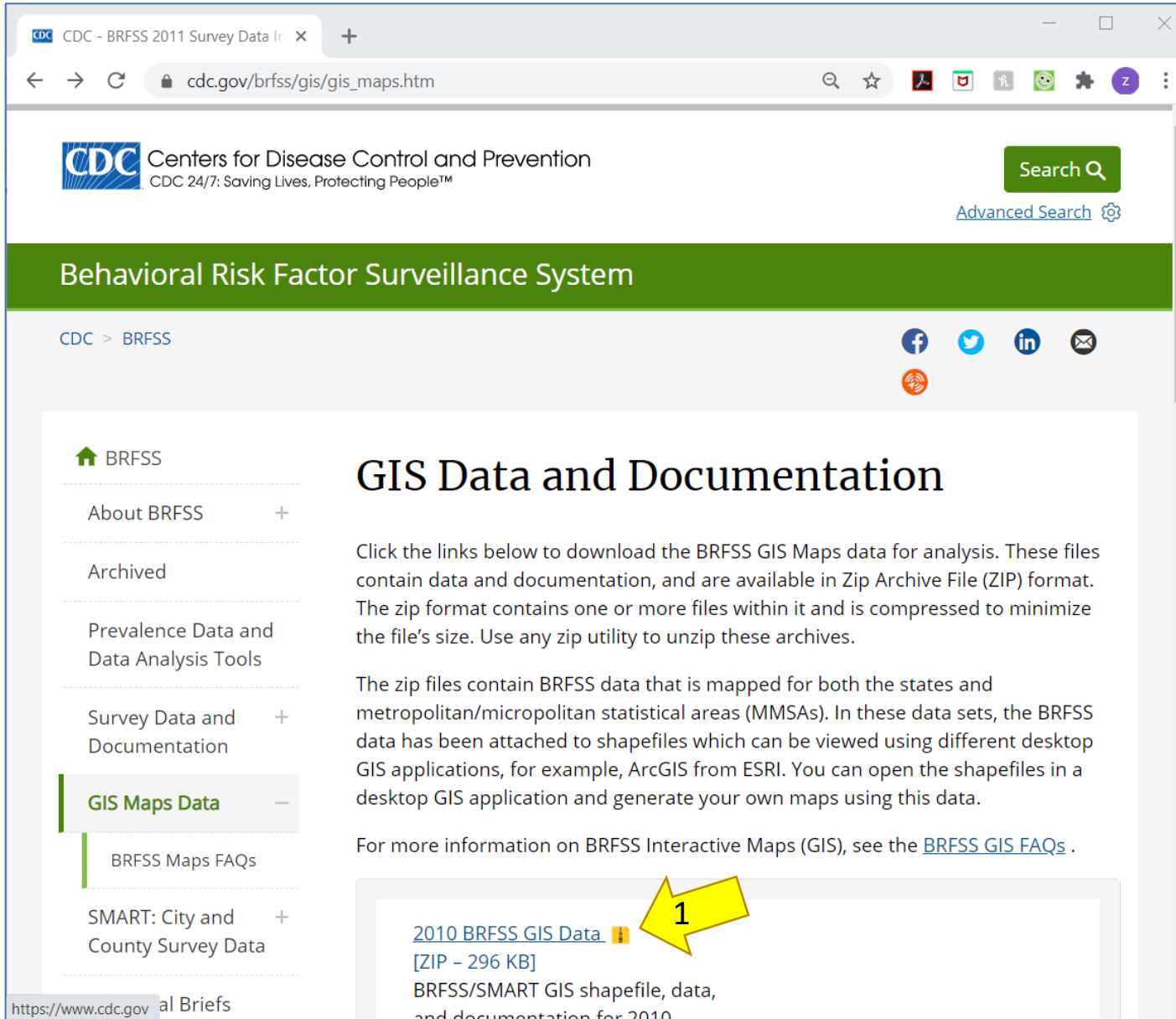
# **BRFSS GIS Maps**

## **Tutorial for Creating Maps in ArcGIS Pro**

# INTRODUCTION

- BRFSS provides GIS maps data for analysis available in ZIP file format
- The zipped file contains the shapefile (map) with attached data and documentation
- The data is mapped for both states and metropolitan/micropolitan statistical areas (MMSAs)
- The latest geographical data available is for the year 2010
- To follow this tutorial, a desktop GIS application is needed. This tutorial will use ArcGIS Pro from ESRI

# BRFSS – Downloading GIS data



The screenshot shows the CDC BRFSS GIS Data page. The header includes the CDC logo and the text "Centers for Disease Control and Prevention CDC 24/7: Saving Lives, Protecting People™". The main heading is "Behavioral Risk Factor Surveillance System". The left sidebar contains a menu with "BRFSS" selected, and sub-items: "About BRFSS", "Archived", "Prevalence Data and Data Analysis Tools", "Survey Data and Documentation", "GIS Maps Data" (highlighted), "BRFSS Maps FAQs", "SMART: City and County Survey Data", and "al Briefs". The main content area is titled "GIS Data and Documentation" and contains text about downloading BRFSS GIS Maps data in ZIP format. A yellow arrow labeled "1" points to the link "2010 BRFSS GIS Data [ZIP - 296 KB]".

CDC - BRFSS 2011 Survey Data In x +

cdc.gov/brfss/gis/gis\_maps.htm

CDC Centers for Disease Control and Prevention  
CDC 24/7: Saving Lives, Protecting People™

Search Q

Advanced Search

Behavioral Risk Factor Surveillance System

CDC > BRFSS

BRFSS

About BRFSS +

Archived

Prevalence Data and Data Analysis Tools

Survey Data and Documentation +

**GIS Maps Data -**

BRFSS Maps FAQs

SMART: City and County Survey Data +

al Briefs

## GIS Data and Documentation

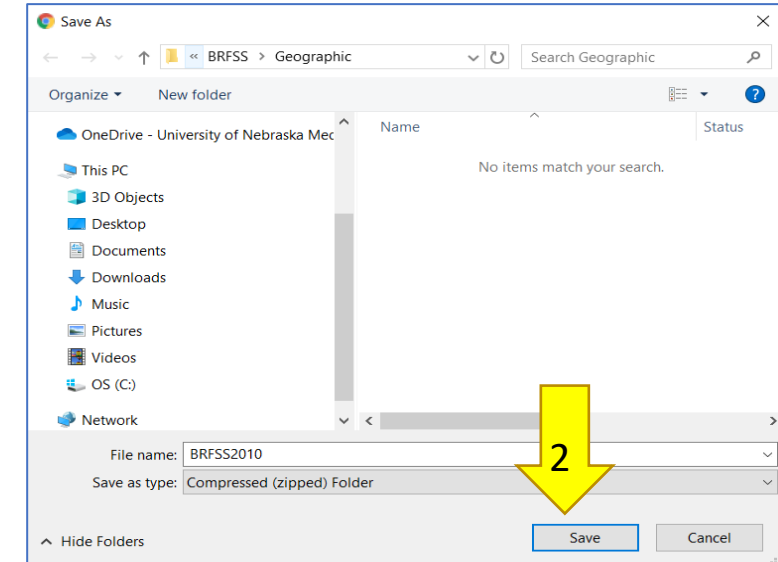
Click the links below to download the BRFSS GIS Maps data for analysis. These files contain data and documentation, and are available in Zip Archive File (ZIP) format. The zip format contains one or more files within it and is compressed to minimize the file's size. Use any zip utility to unzip these archives.

The zip files contain BRFSS data that is mapped for both the states and metropolitan/micropolitan statistical areas (MMSAs). In these data sets, the BRFSS data has been attached to shapefiles which can be viewed using different desktop GIS applications, for example, ArcGIS from ESRI. You can open the shapefiles in a desktop GIS application and generate your own maps using this data.

For more information on BRFSS Interactive Maps (GIS), see the [BRFSS GIS FAQs](#).

[2010 BRFSS GIS Data](#) [ZIP - 296 KB]

BRFSS/SMART GIS shapefile, data, and documentation for 2010



Go to

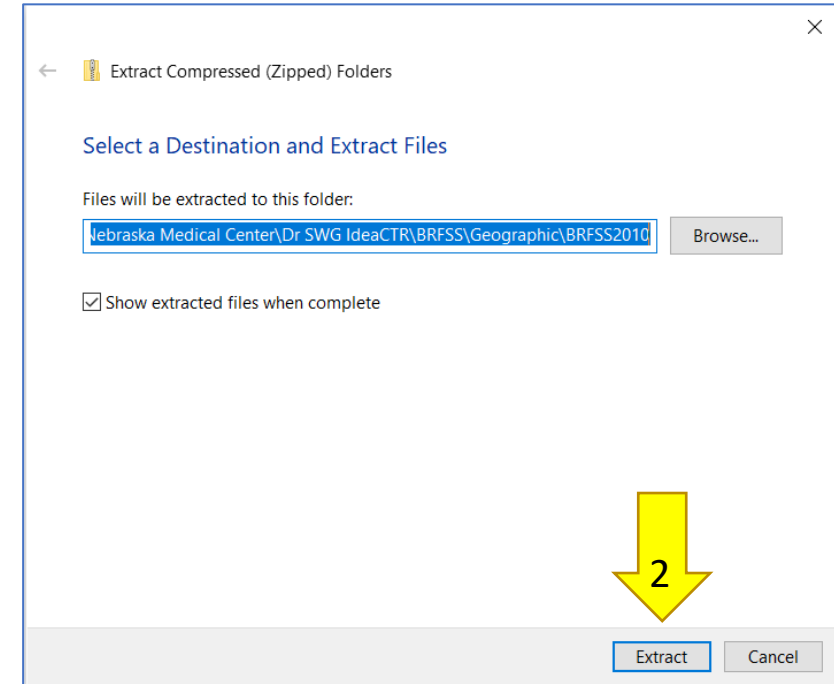
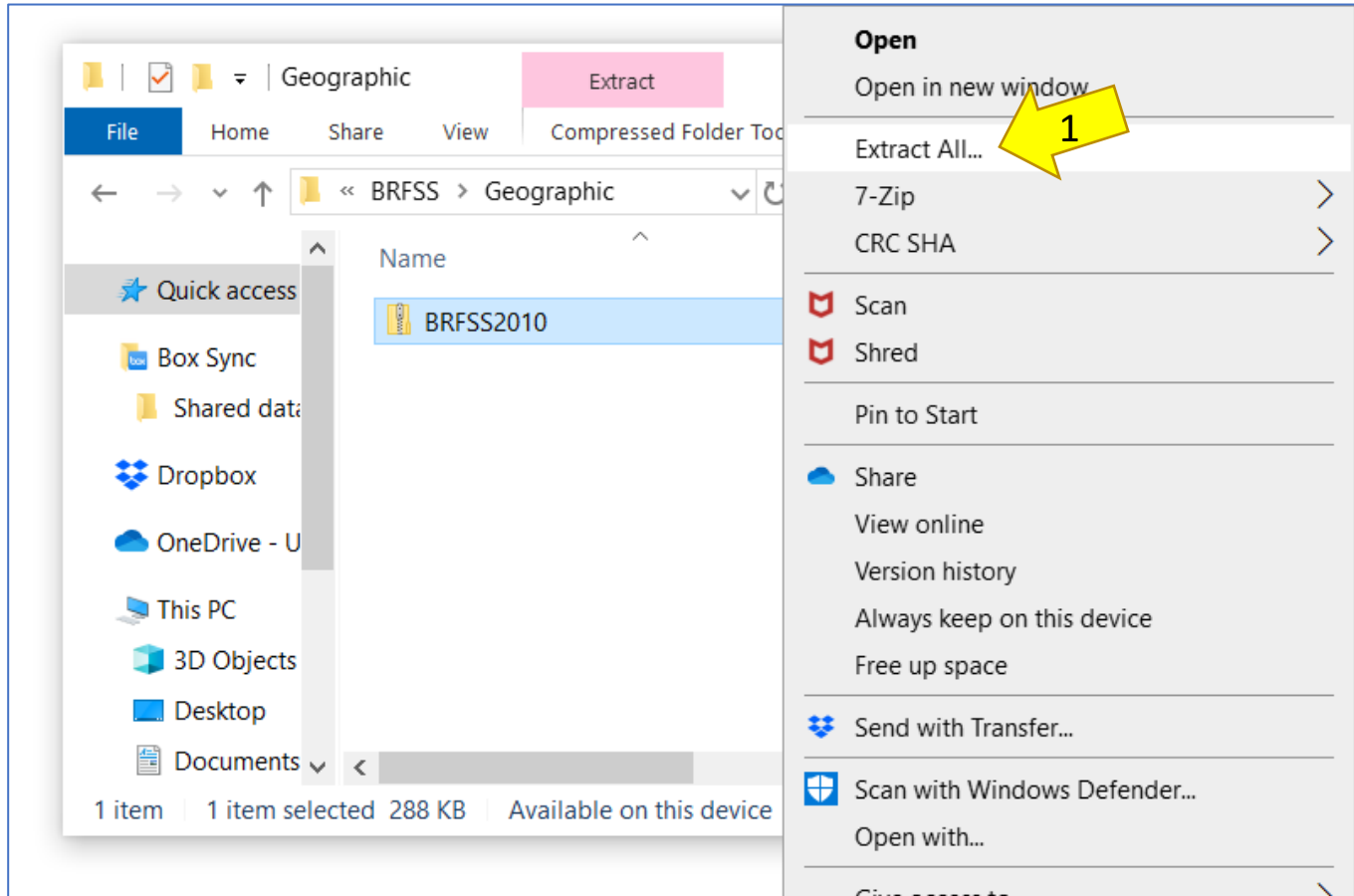
[https://www.cdc.gov/brfss/gis/gis\\_maps.htm](https://www.cdc.gov/brfss/gis/gis_maps.htm)

Click on the "2010 BRFSS GID Data" zip file.

Download and save the zip file to a folder on your computer

For this tutorial, the zip file will be stored in a folder that has been labelled "Geographic"

# BRFSS – Downloading GIS data

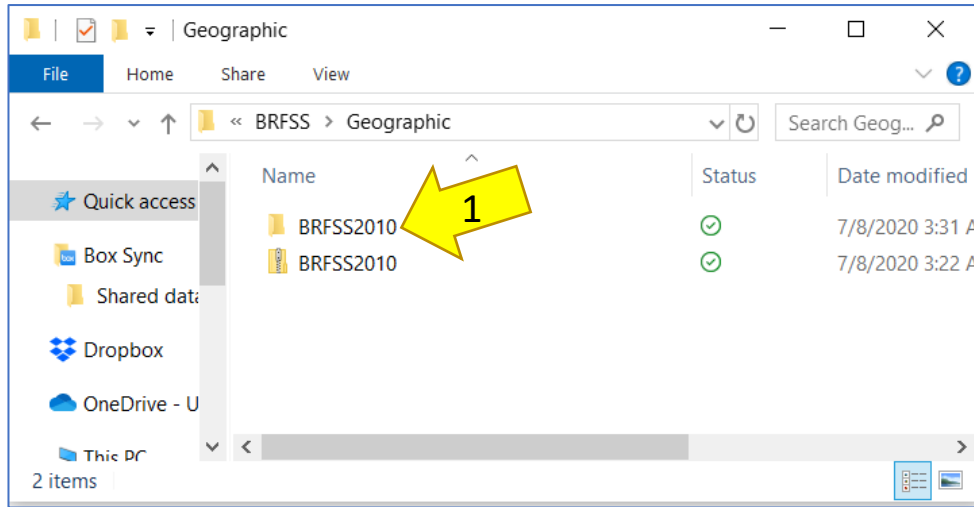


Right click the downloaded zip file and click extract all (you may have different extraction options based on your software)

Click extract and save the extracted folder within the same parent folder that has the zipped folder



# BRFSS – Downloading GIS data

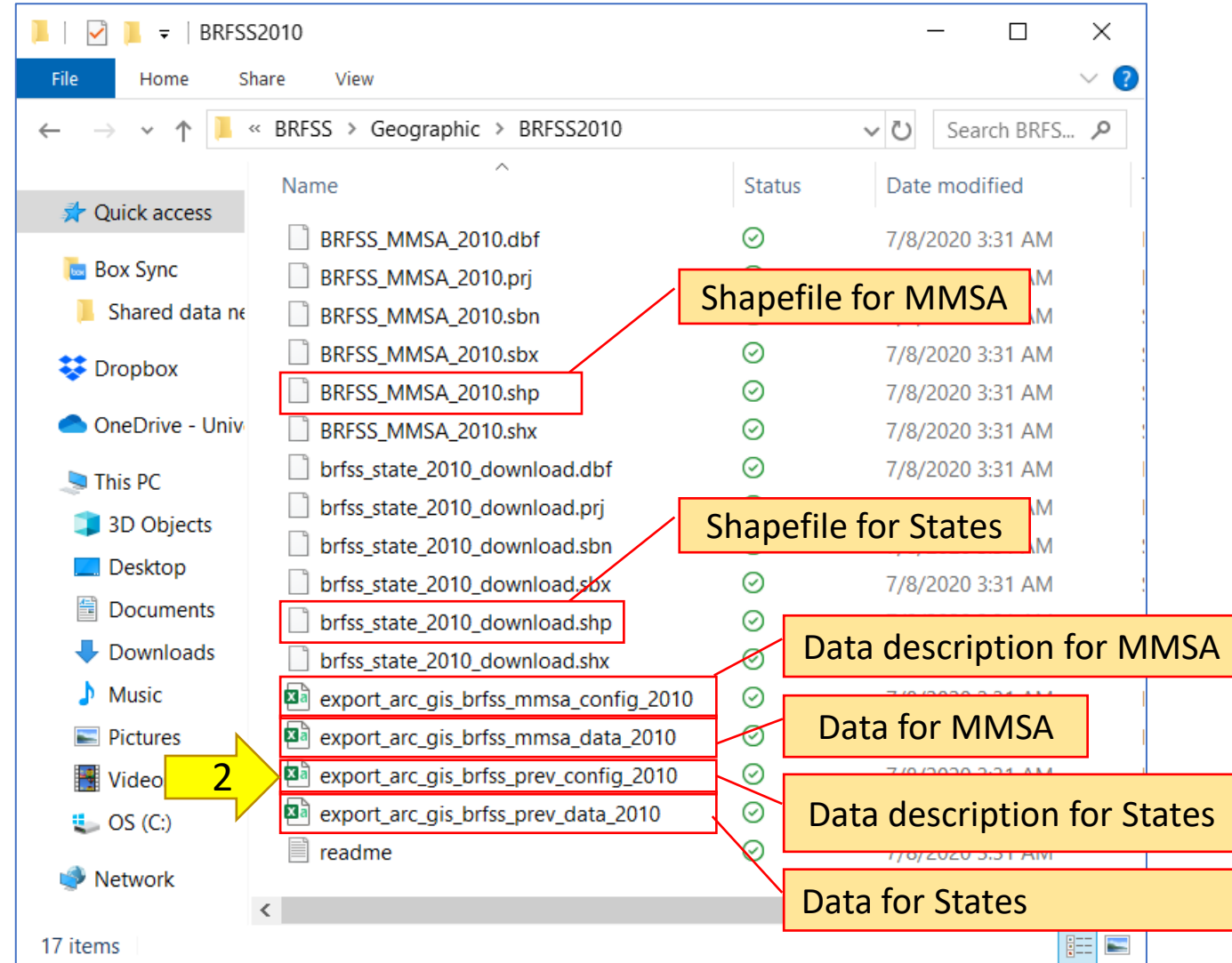


Double click the extracted folder

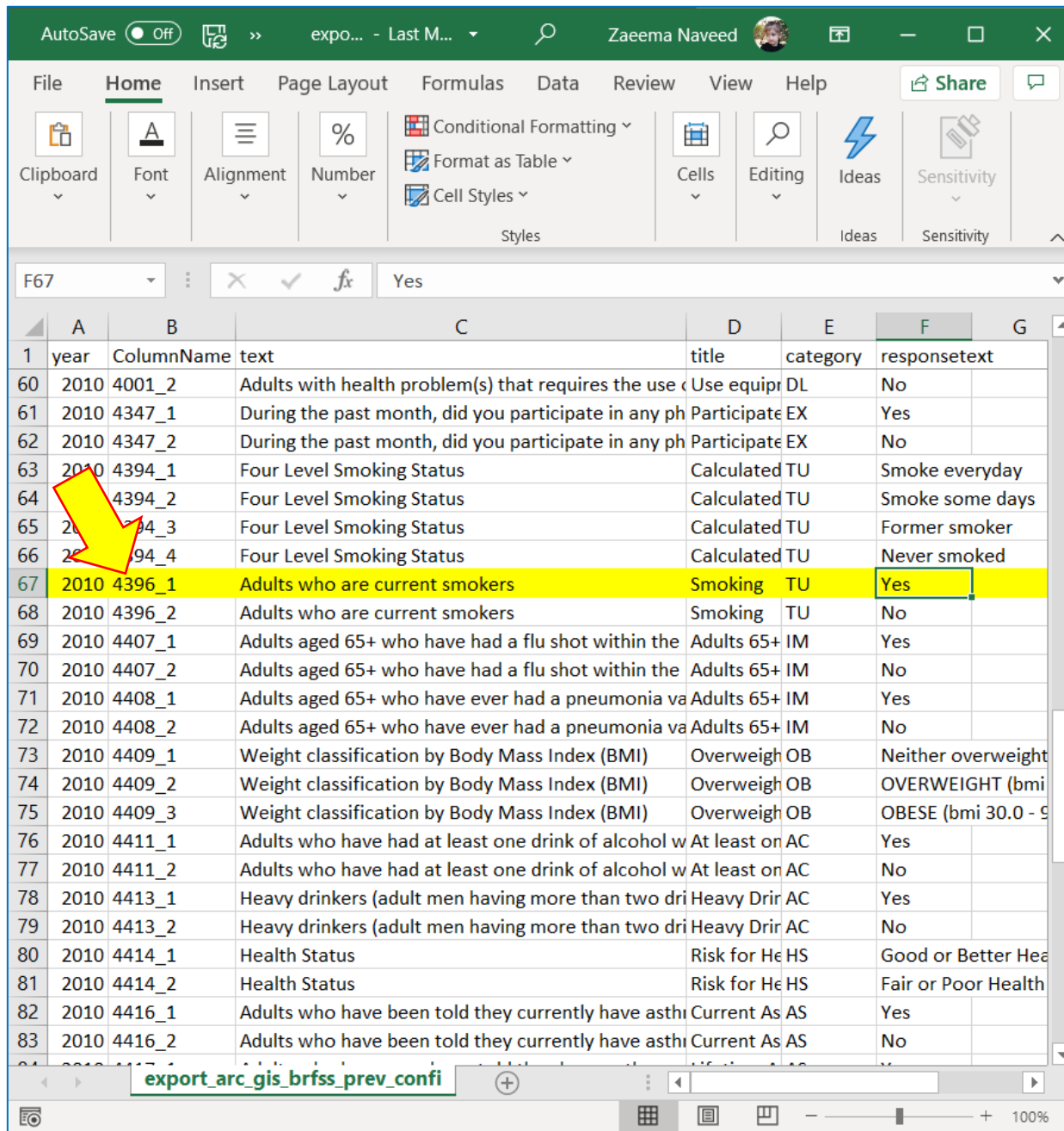
There are several files inside the folder including the shapefiles (maps), datafiles and data description files

The file types are labelled on the right

Double click and open the csv file labelled, “export\_arc\_gis\_brfs\_prev\_config\_2010” (this has data description at state level)



# BRFSS – Downloading GIS data



	A	B	C	D	E	F	G
1	year	ColumnName	text	title	category	responsetext	
60	2010	4001_2	Adults with health problem(s) that requires the use of	Use equip	DL	No	
61	2010	4347_1	During the past month, did you participate in any ph	Participate	EX	Yes	
62	2010	4347_2	During the past month, did you participate in any ph	Participate	EX	No	
63	2010	4394_1	Four Level Smoking Status	Calculated	TU	Smoke everyday	
64	2010	4394_2	Four Level Smoking Status	Calculated	TU	Smoke some days	
65	2010	4394_3	Four Level Smoking Status	Calculated	TU	Former smoker	
66	2010	4394_4	Four Level Smoking Status	Calculated	TU	Never smoked	
67	2010	4396_1	Adults who are current smokers	Smoking	TU	Yes	
68	2010	4396_2	Adults who are current smokers	Smoking	TU	No	
69	2010	4407_1	Adults aged 65+ who have had a flu shot within the	Adults 65+	IM	Yes	
70	2010	4407_2	Adults aged 65+ who have had a flu shot within the	Adults 65+	IM	No	
71	2010	4408_1	Adults aged 65+ who have ever had a pneumonia va	Adults 65+	IM	Yes	
72	2010	4408_2	Adults aged 65+ who have ever had a pneumonia va	Adults 65+	IM	No	
73	2010	4409_1	Weight classification by Body Mass Index (BMI)	Overweigh	OB	Neither overweight	
74	2010	4409_2	Weight classification by Body Mass Index (BMI)	Overweigh	OB	OVERWEIGHT (bmi	
75	2010	4409_3	Weight classification by Body Mass Index (BMI)	Overweigh	OB	OBESE (bmi 30.0 - 9	
76	2010	4411_1	Adults who have had at least one drink of alcohol w	At least on	AC	Yes	
77	2010	4411_2	Adults who have had at least one drink of alcohol w	At least on	AC	No	
78	2010	4413_1	Heavy drinkers (adult men having more than two dri	Heavy Drin	AC	Yes	
79	2010	4413_2	Heavy drinkers (adult men having more than two dri	Heavy Drin	AC	No	
80	2010	4414_1	Health Status	Risk for He	HS	Good or Better Hea	
81	2010	4414_2	Health Status	Risk for He	HS	Fair or Poor Health	
82	2010	4416_1	Adults who have been told they currently have asth	Current As	AS	Yes	
83	2010	4416_2	Adults who have been told they currently have asth	Current As	AS	No	

The sheet has description for all the variables available for mapping

For this tutorial, we will be creating a state-level map for percentage of adult current smokers

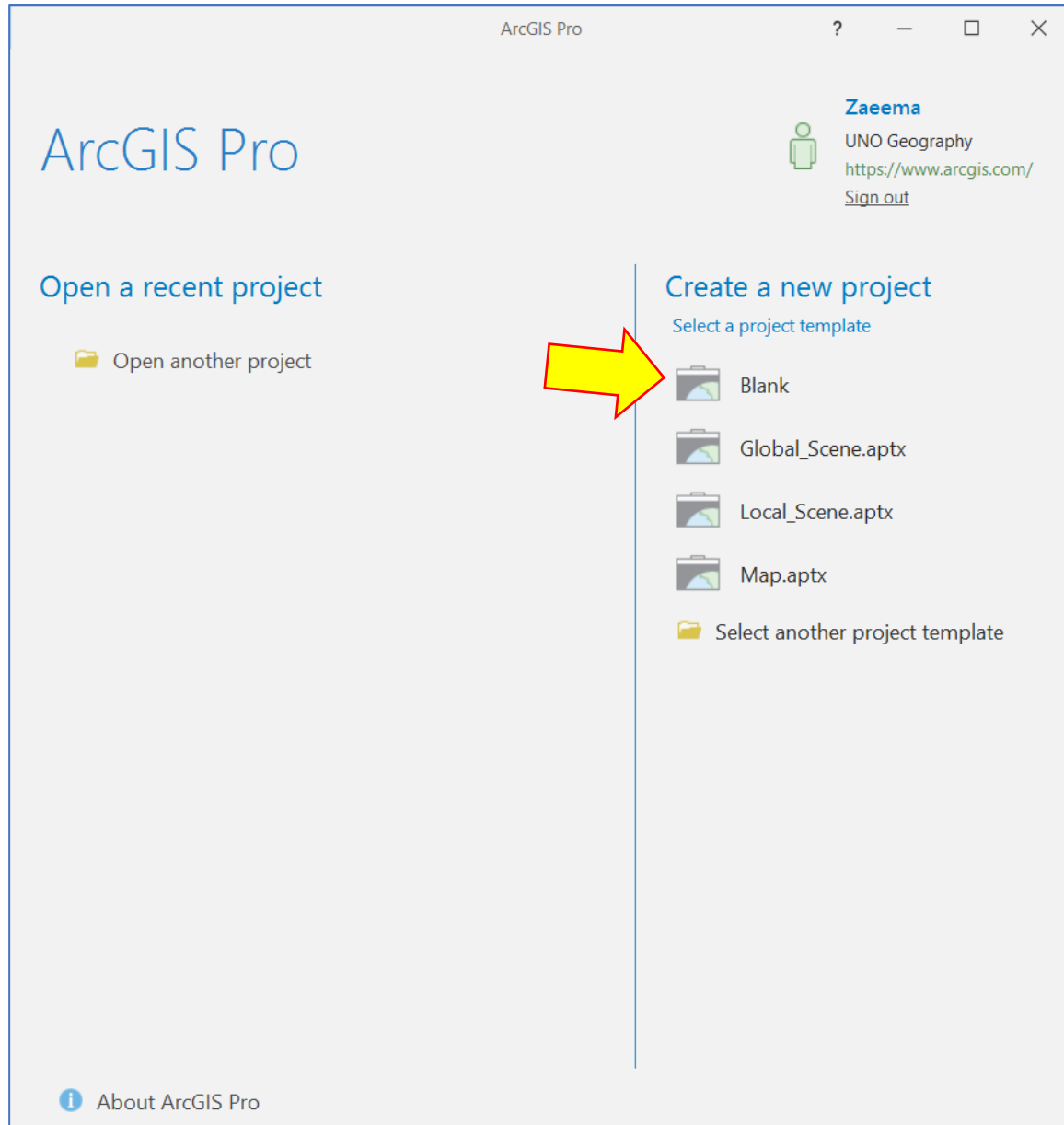
Scroll down and find the variable of interest (current smoking)

Note down the “ColumnName” for the variable of interest

For current smoking status here, the “ColumnName” is “4396\_1”

Close the csv file

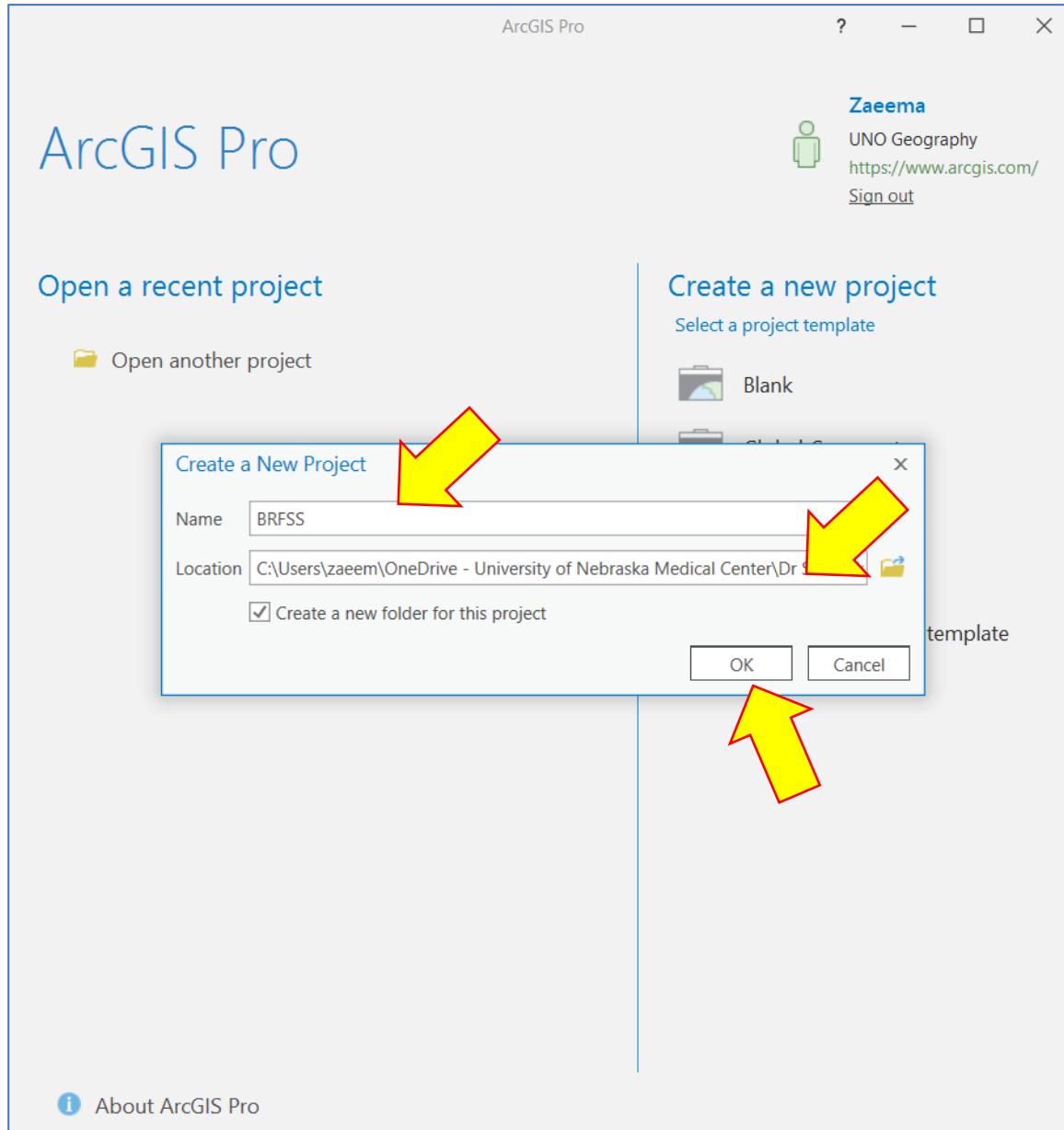
# BRFSS – Creating Map



Open ArcGIS Pro

Under “Create a new project” click “Blank”

# BRFSS – Creating Map

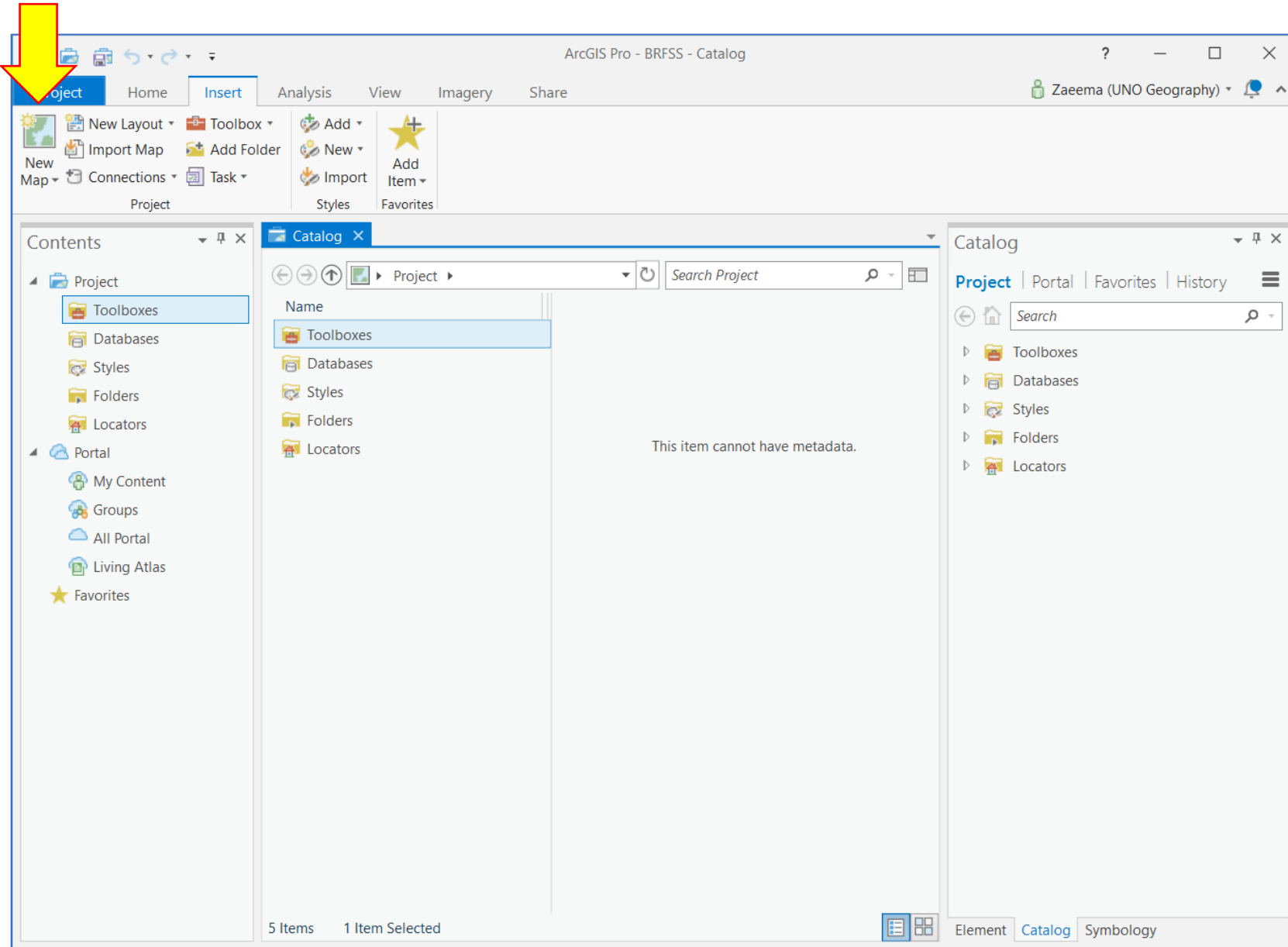


Name your project

Select the location you want save it at

Click “ok”

# BRFSS – Creating Map

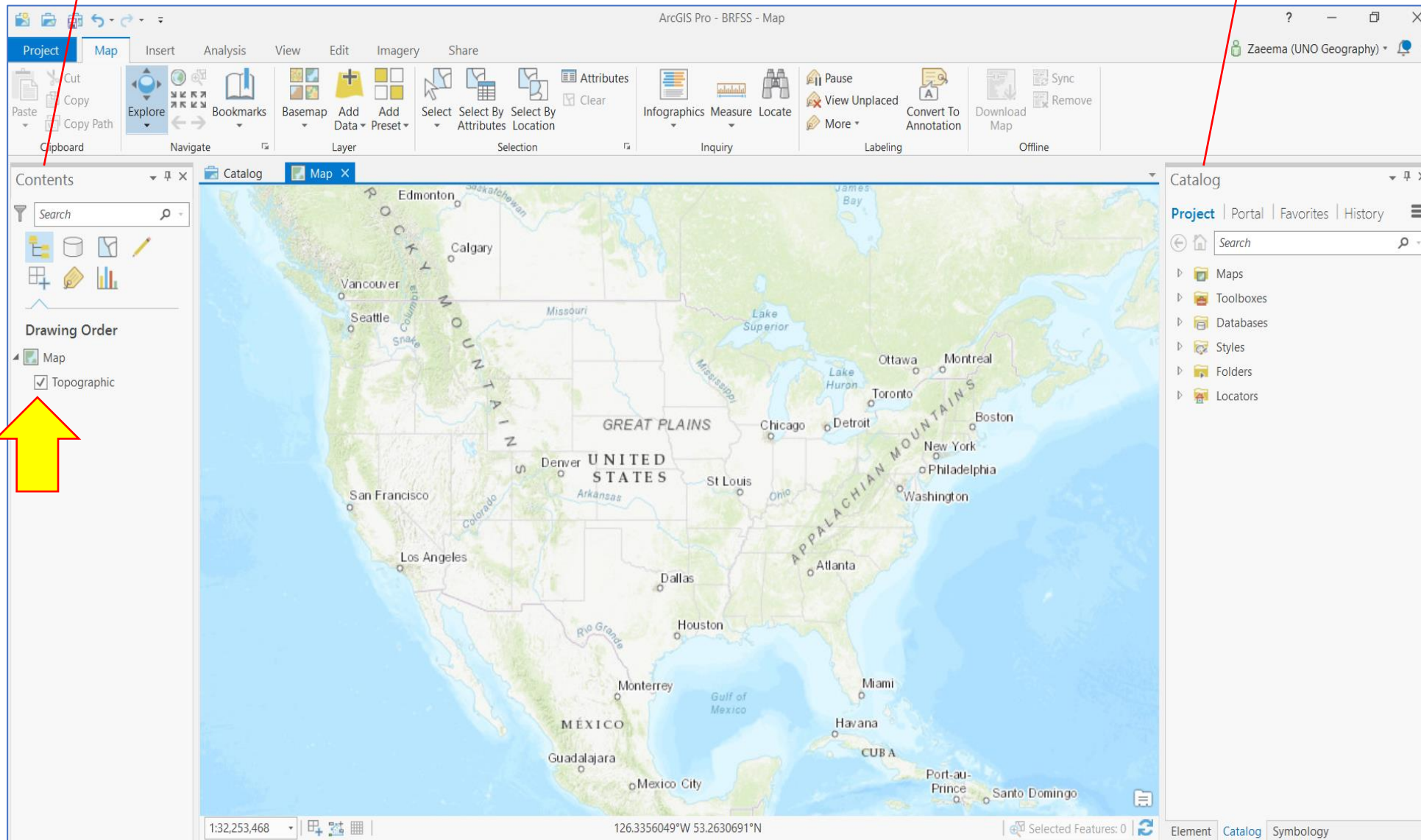


Click “New Map”

# BRFSS – Creating Map

Contents pane

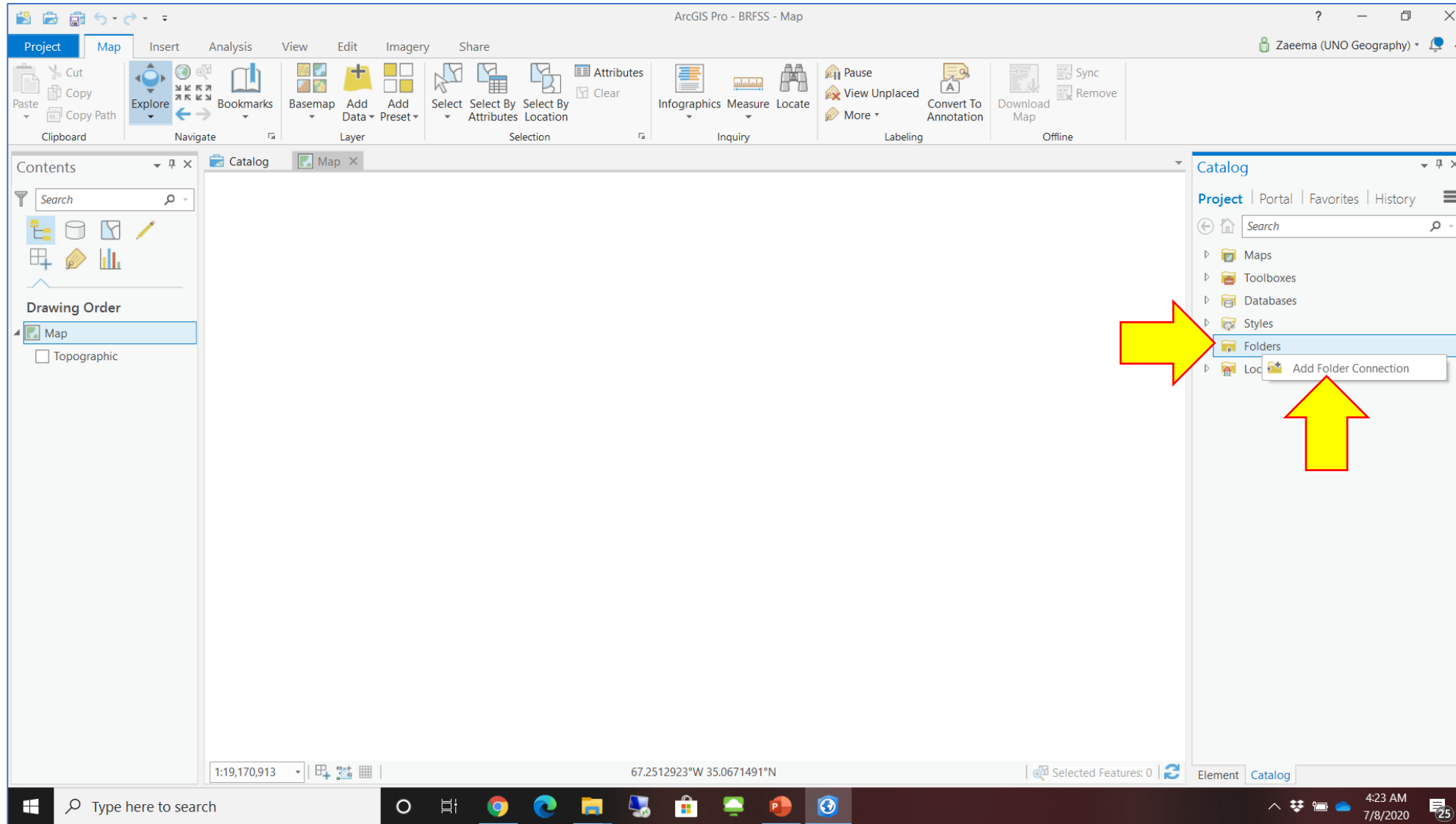
Catalog pane



Uncheck  
“Topographic”

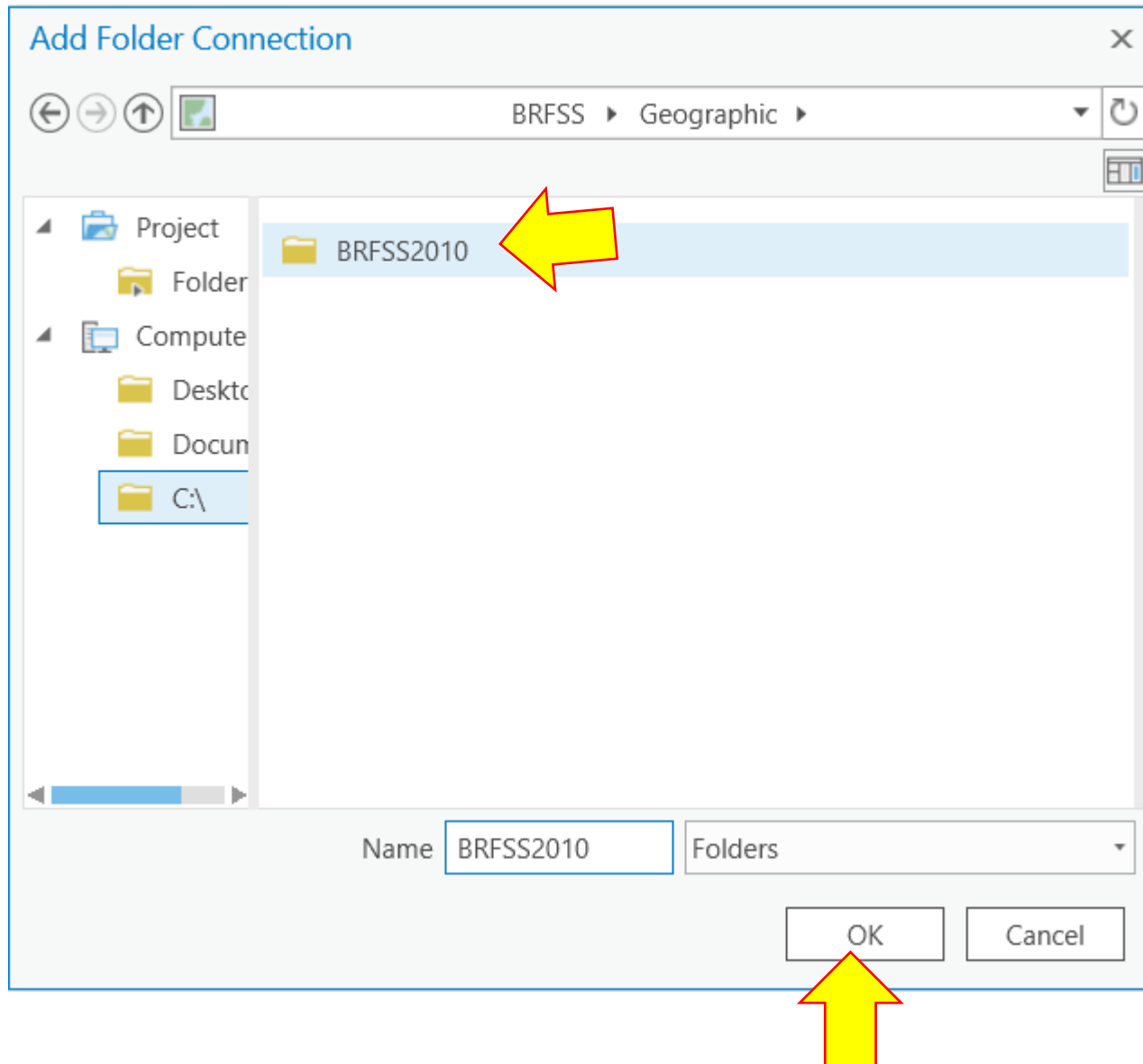


# BRFSS – Creating Map



Under the  
“Catalog” pane,  
right click “Folders”  
and click “Add  
Folder Connection”

# BRFSS – Creating Map

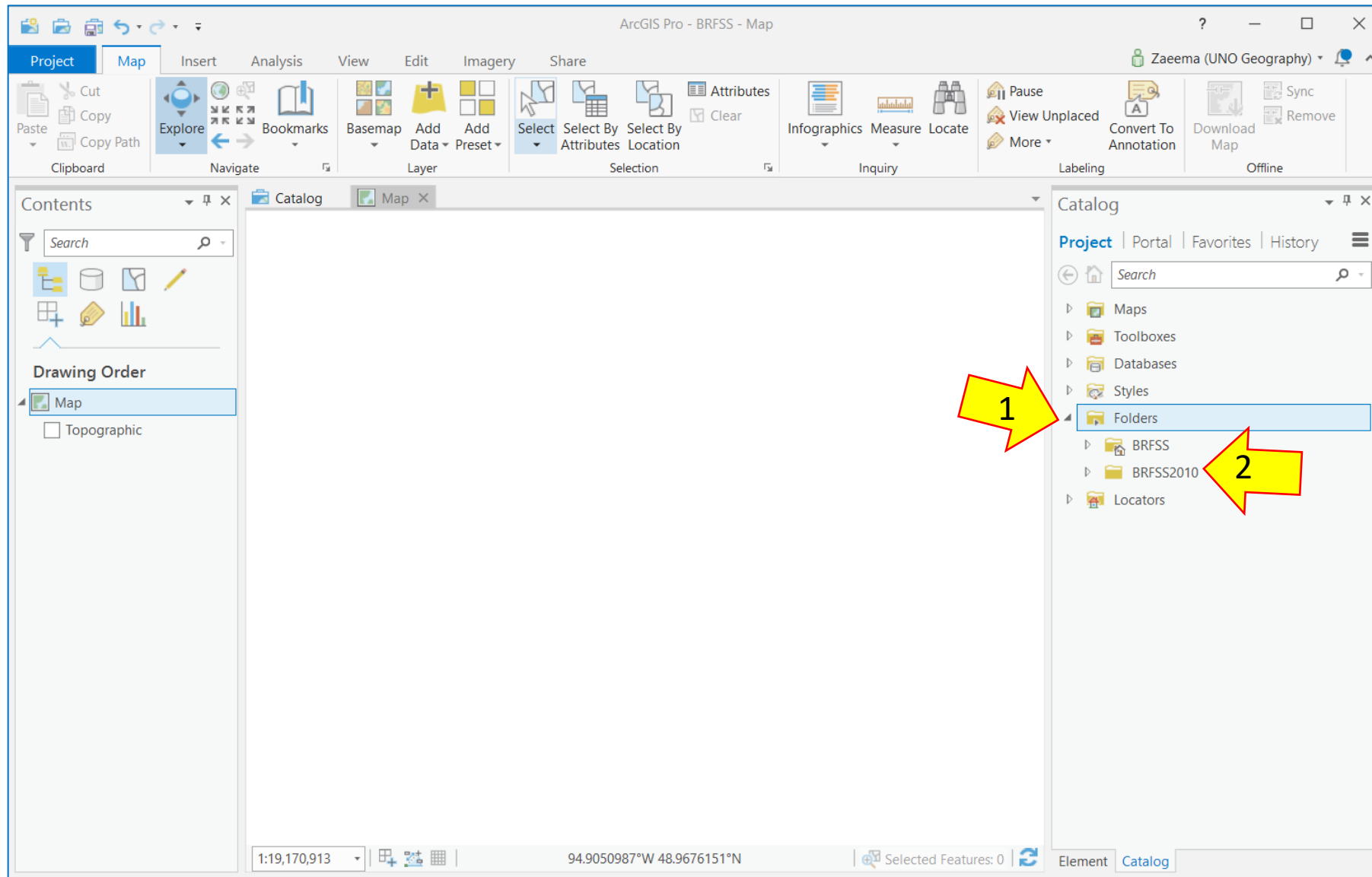


Browse to the folder where you had saved the extracted folder downloaded from the BRFSS website

Single click the extracted folder

Click "OK"

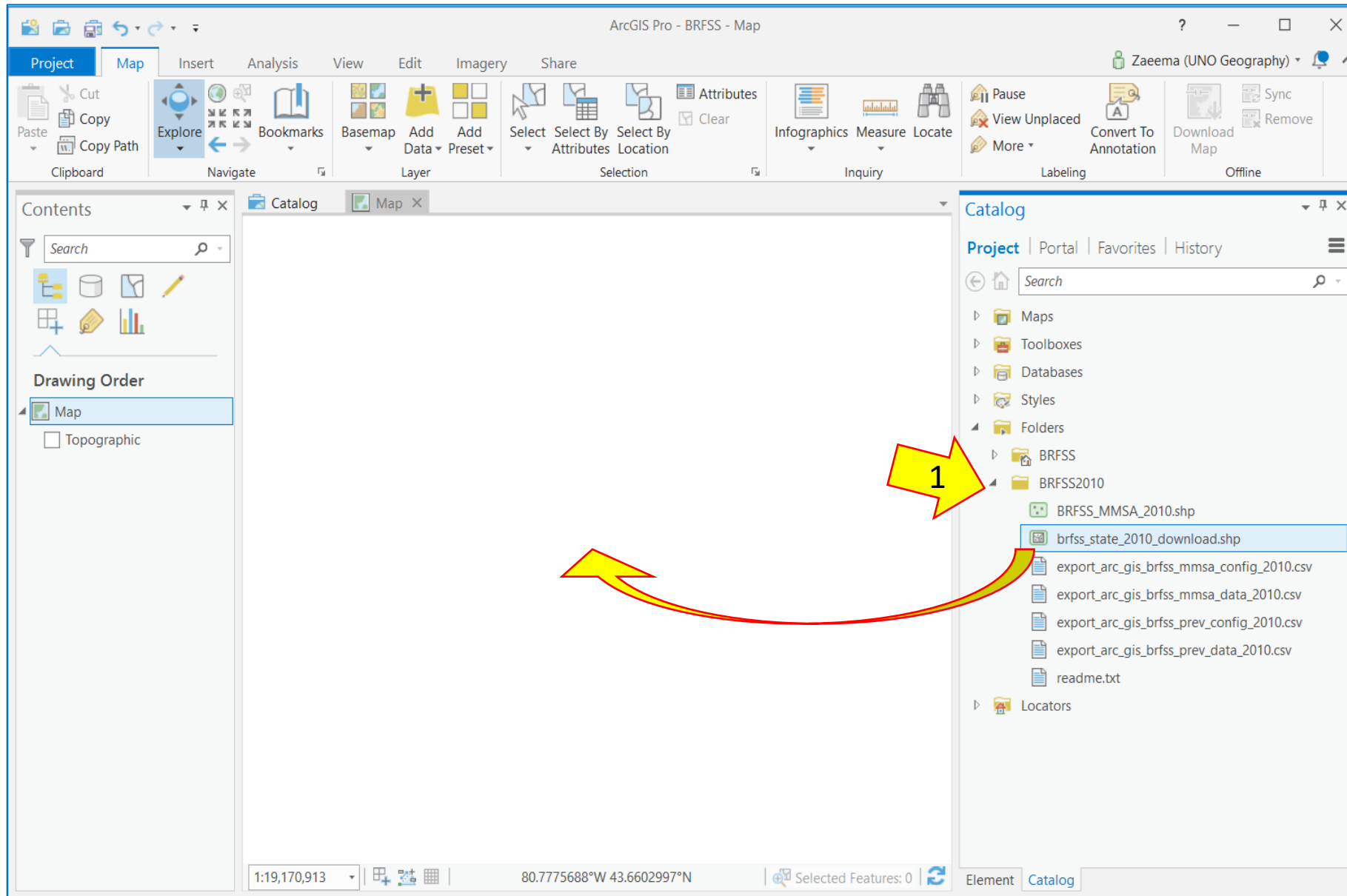
# BRFSS – Creating Map



Drop down the “Folders” tab by clicking the tiny arrow-head on its left side

You should be able to see your BRFSS folder under the folders tab

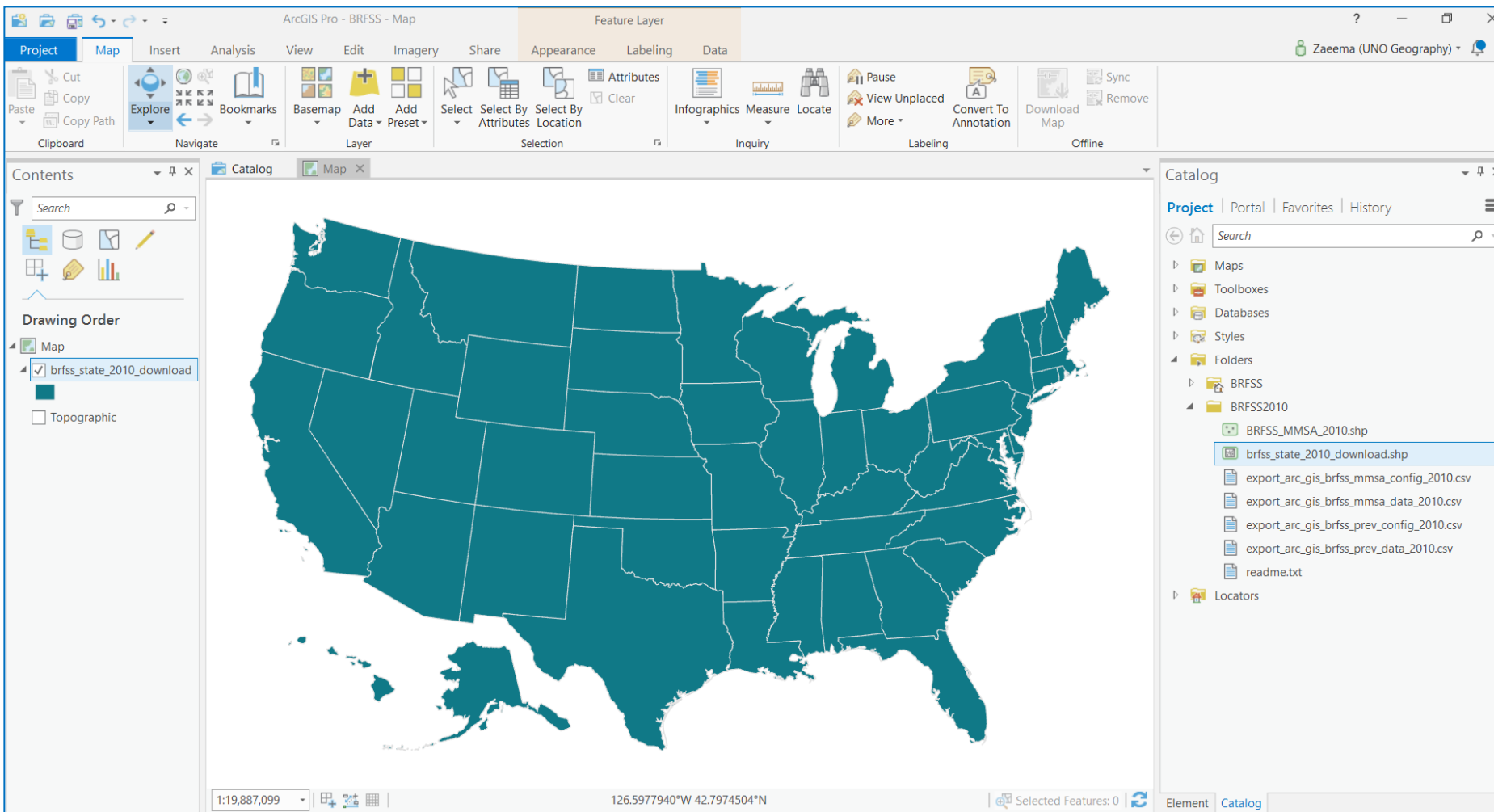
# BRFSS – Creating Map



Drop down the  
“BRFSS2010” folder

Hold the shapefile titled,  
“brfss\_state\_2010\_downloa  
d.shp” and drag and drop it  
in the central white area

# BRFSS – Creating Map

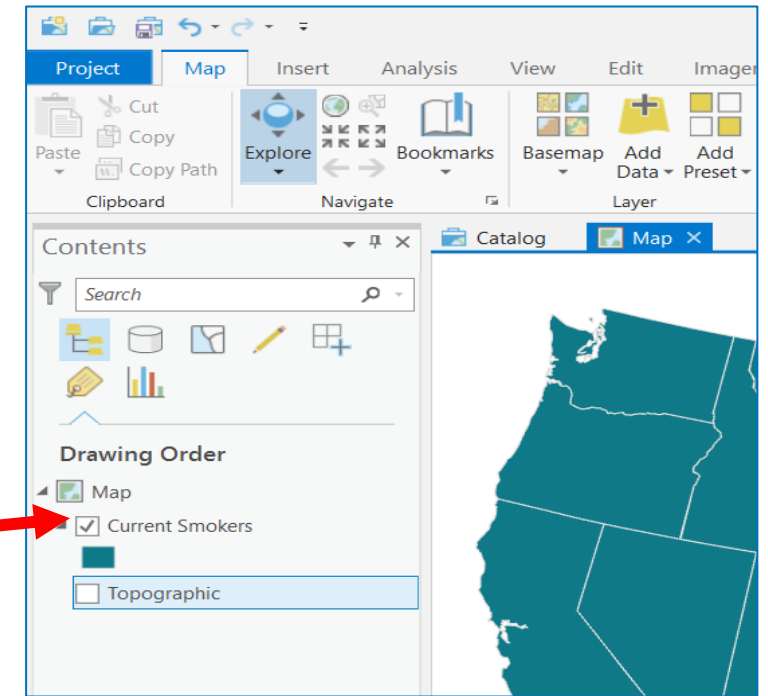
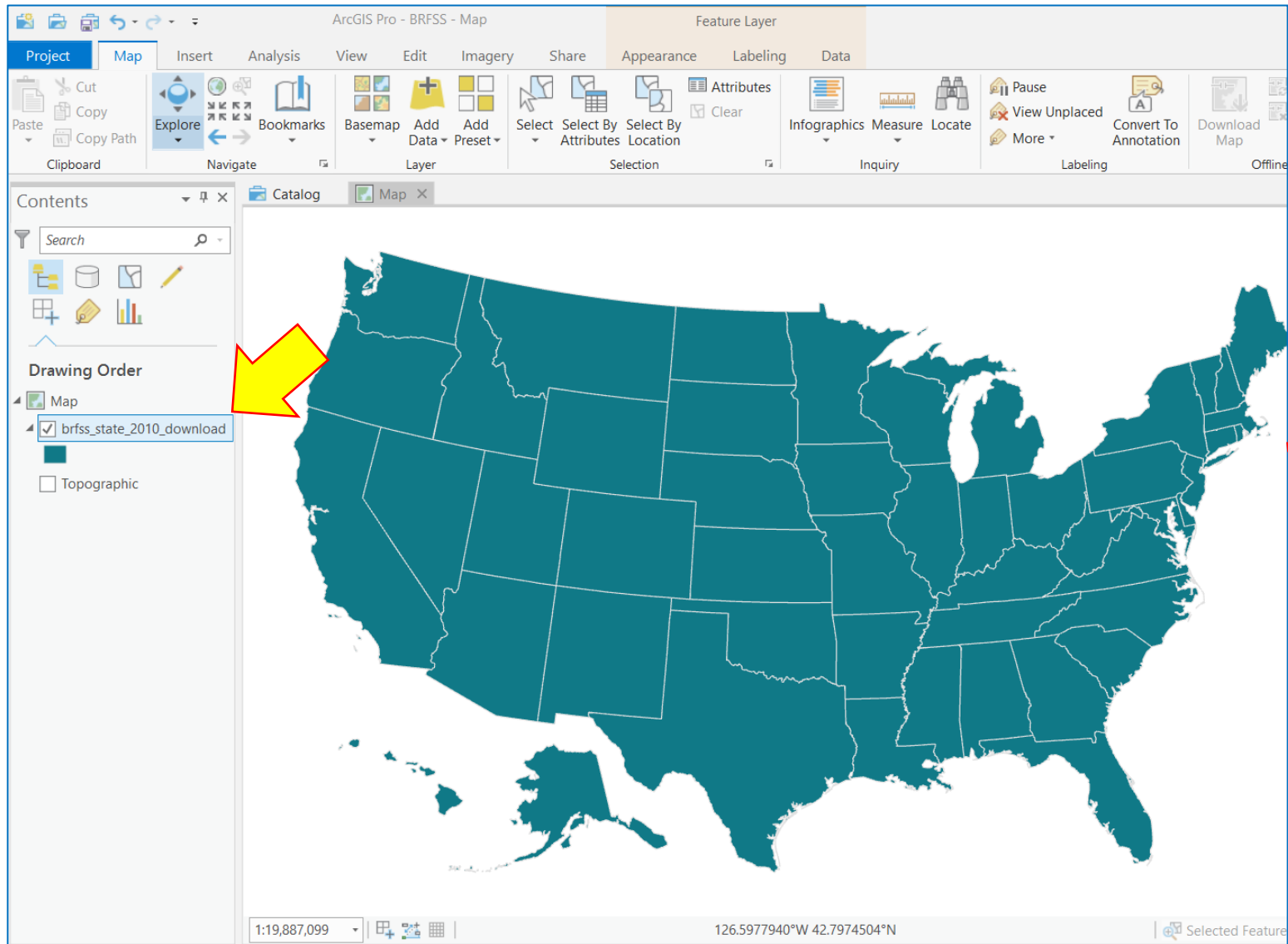


You should be able to see this map

The color of the map may differ

Let us now map the information we need (current smoker percentage)

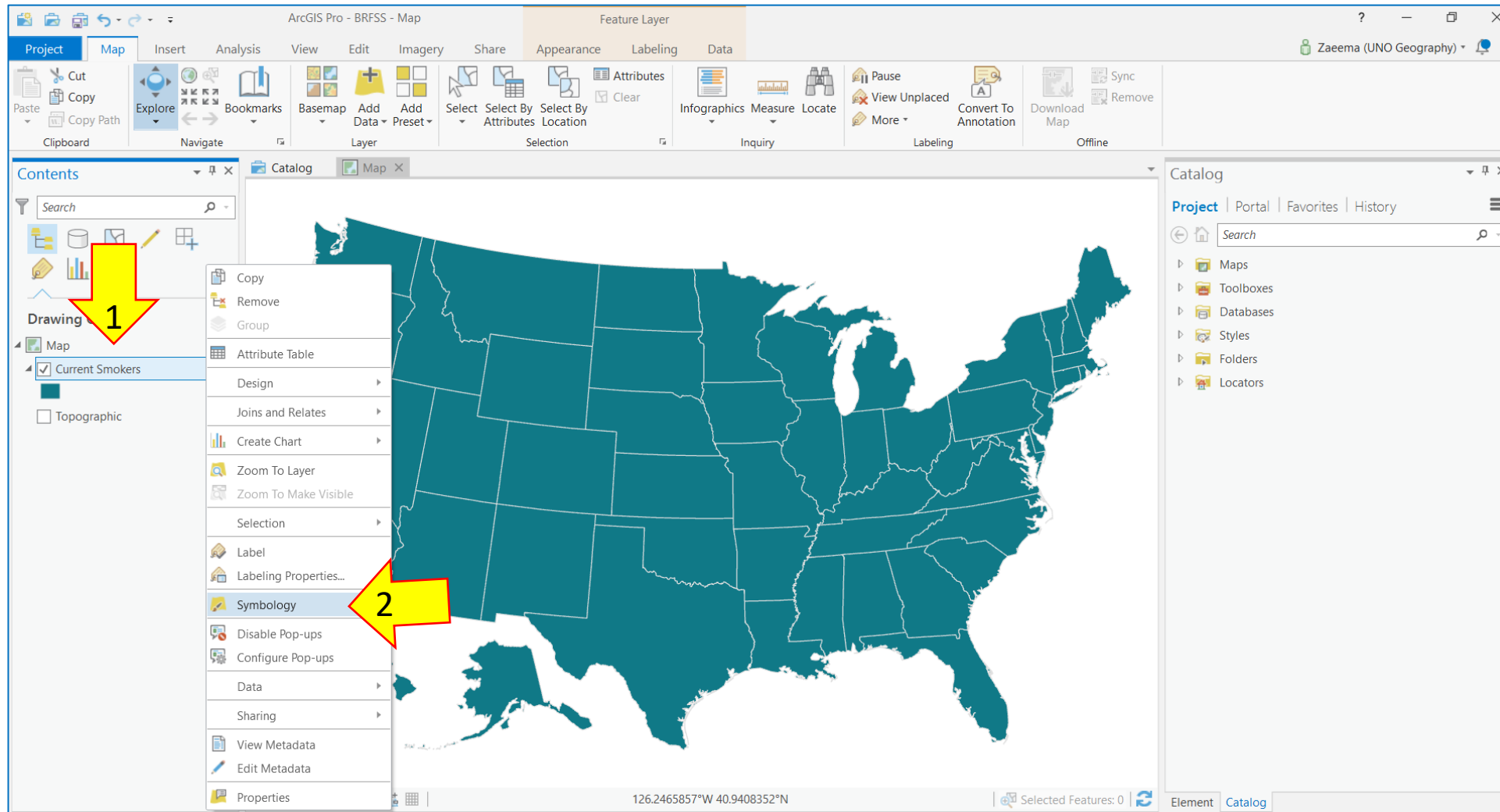
# BRFSS – Creating Map



Under the “Contents” pane,  
single click  
“brfss\_state\_2010\_download”  
and rename it to “Current  
Smokers”

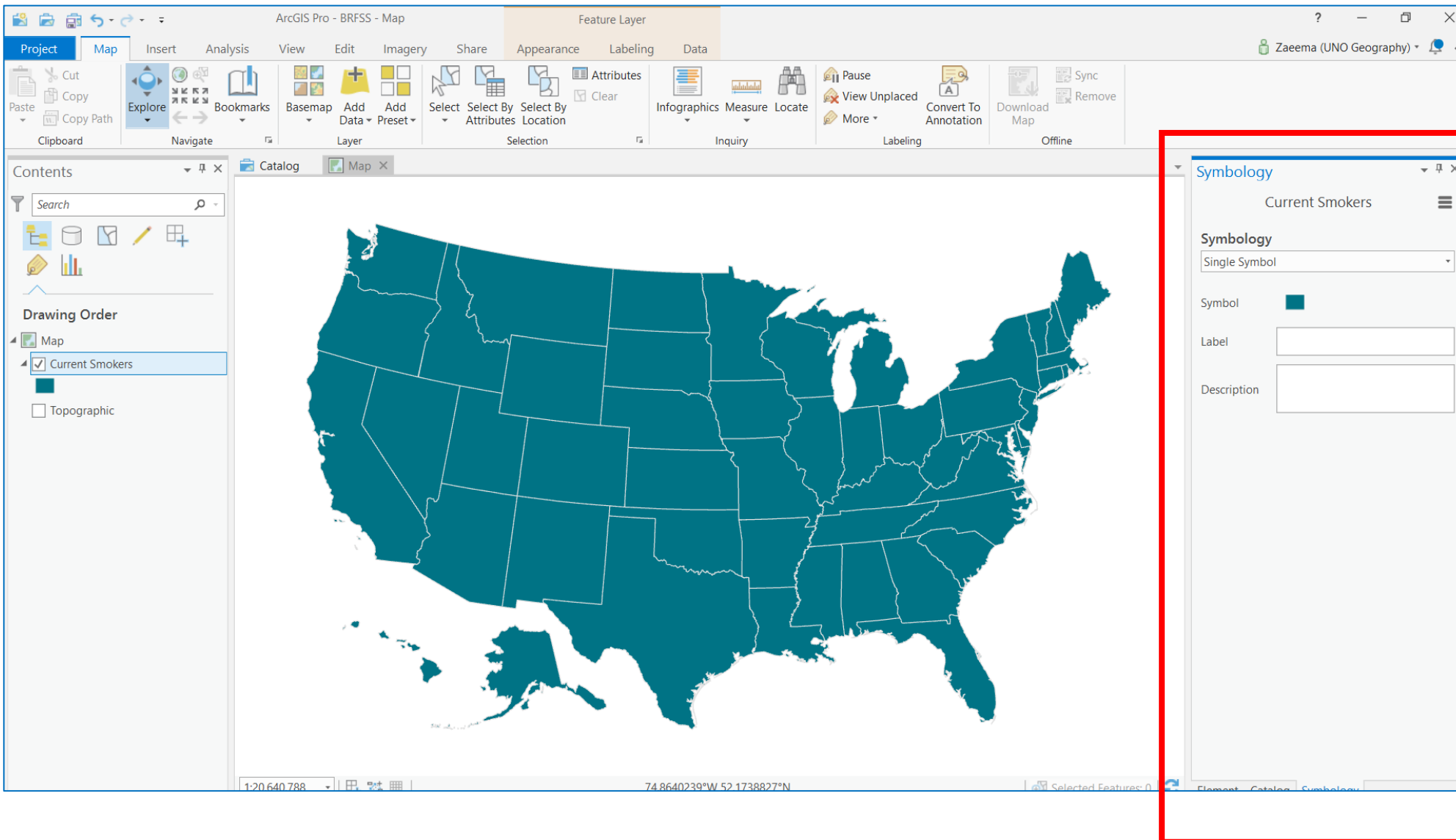


# BRFSS – Creating Map



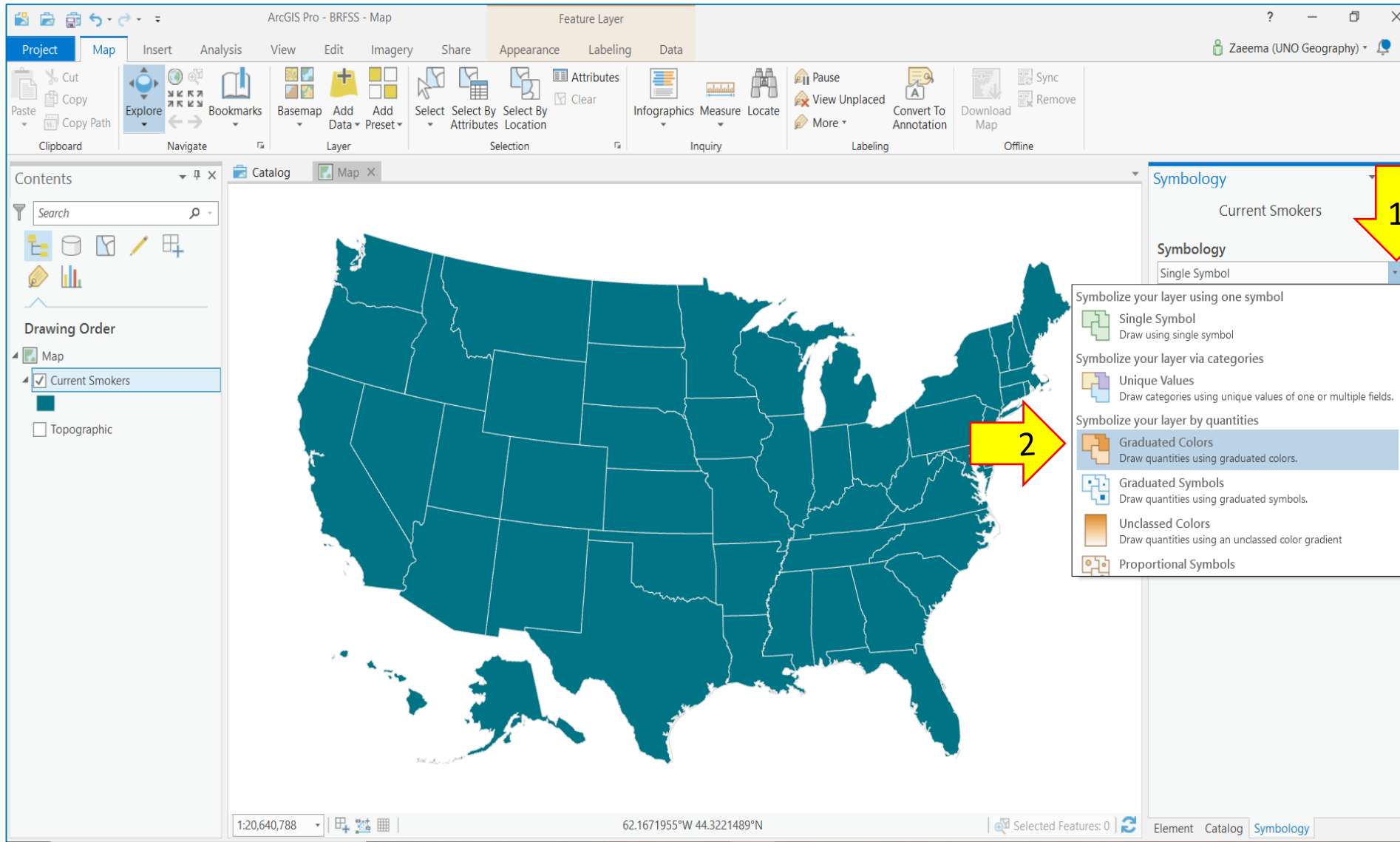
Under the “Contents”  
pane, right click  
“Current Smokers” and  
select “Symbology”

# BRFSS – Creating Map



You should be able to see the “Symbology” pane on top of the “Catalog” pane now

# BRFSS – Creating Map



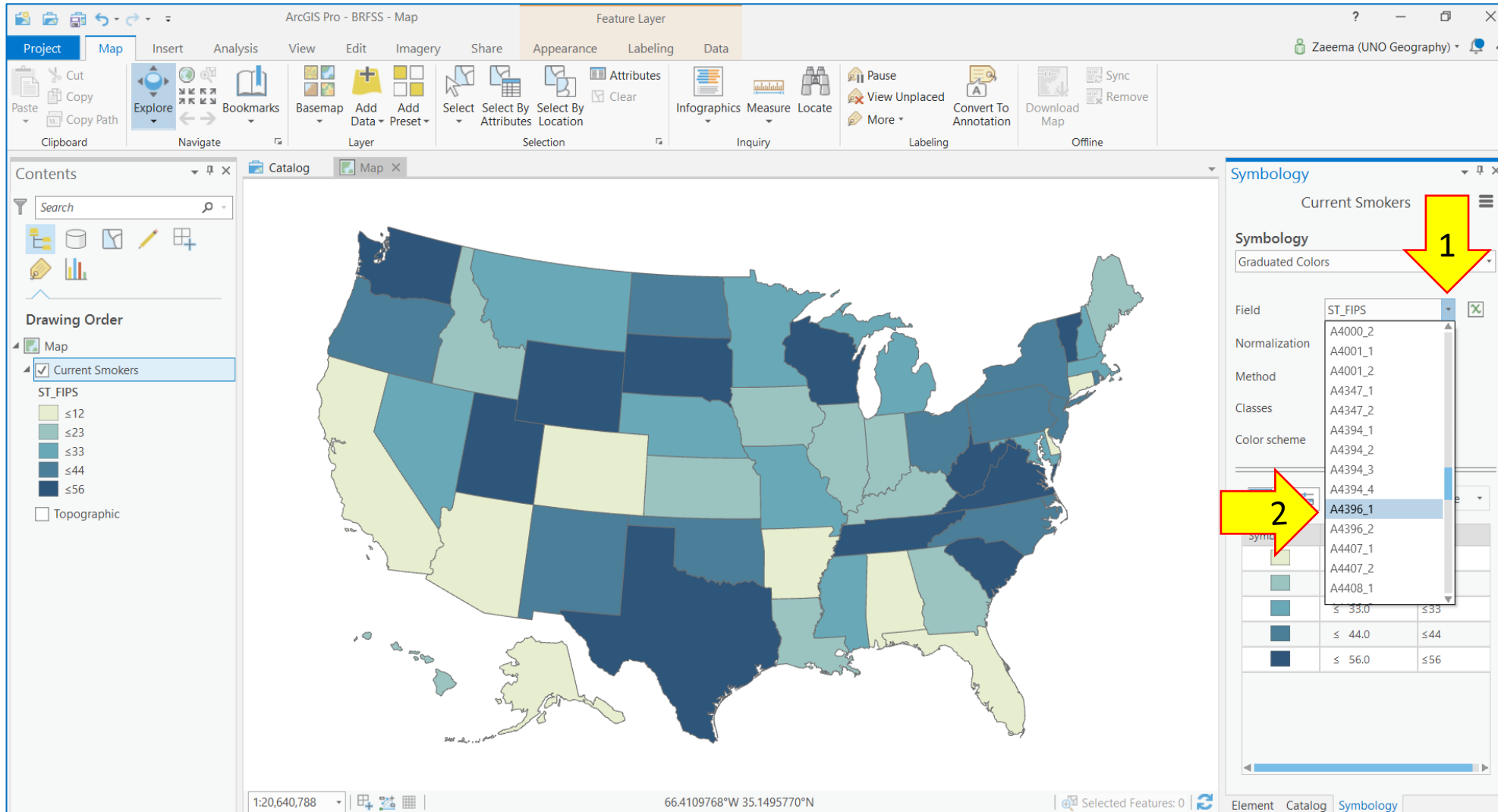
Drop down “Symbology”

There are multiple options and the most commonly used is the “Graduated Colors” where states within a defined range fall in one category and are represented by the same color

On the last slide, the tutorial shows how the different options look like when mapped

For now, click “Graduated Colors”

# BRFSS – Creating Map

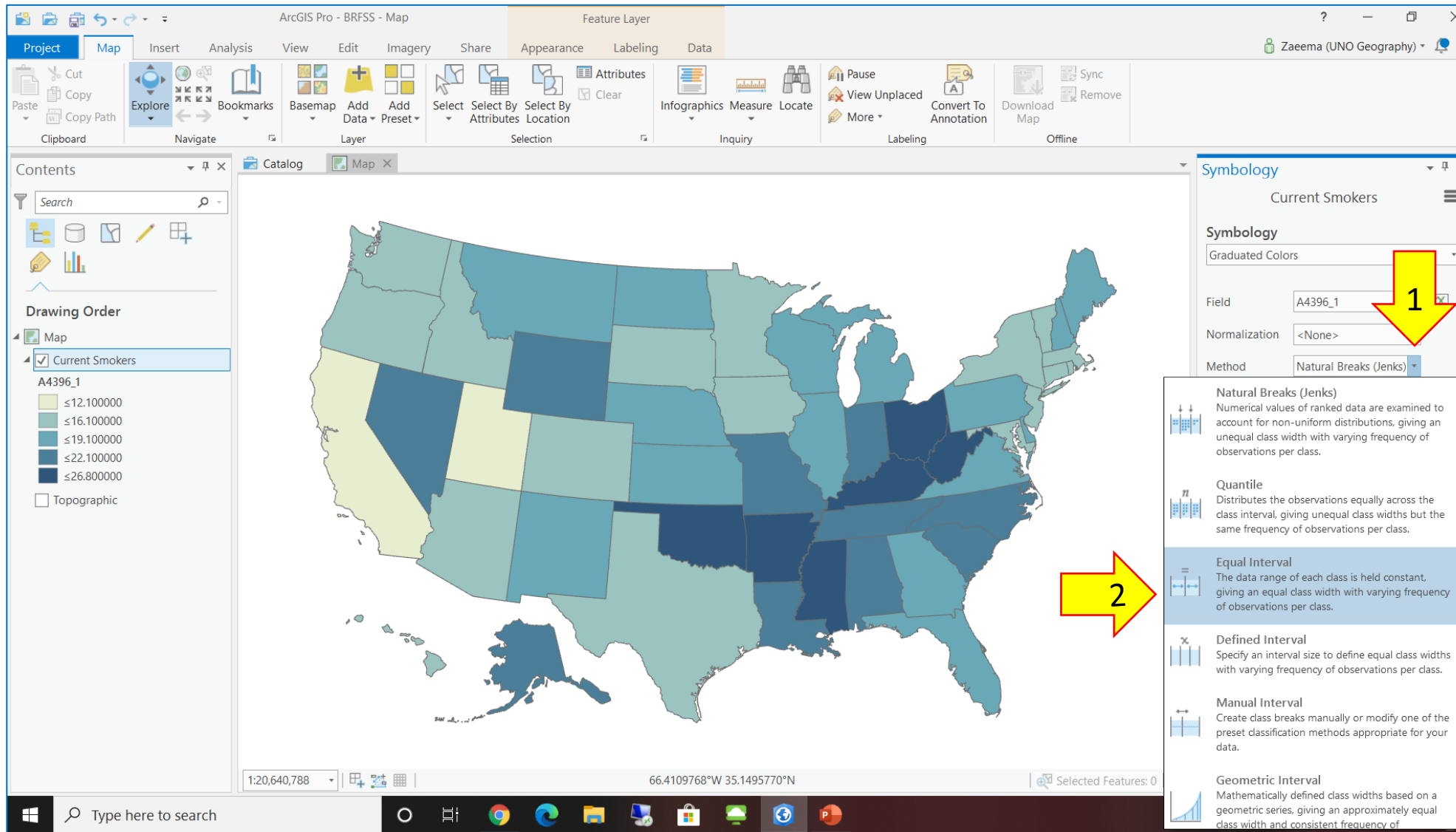


Drop down “Field”

Scroll down to the  
“ColumnName” for  
current smokers that we  
had noted in slide  
number 6 i.e. 4396\_1

Click it

# BRFSS – Creating Map



Drop down “Method”

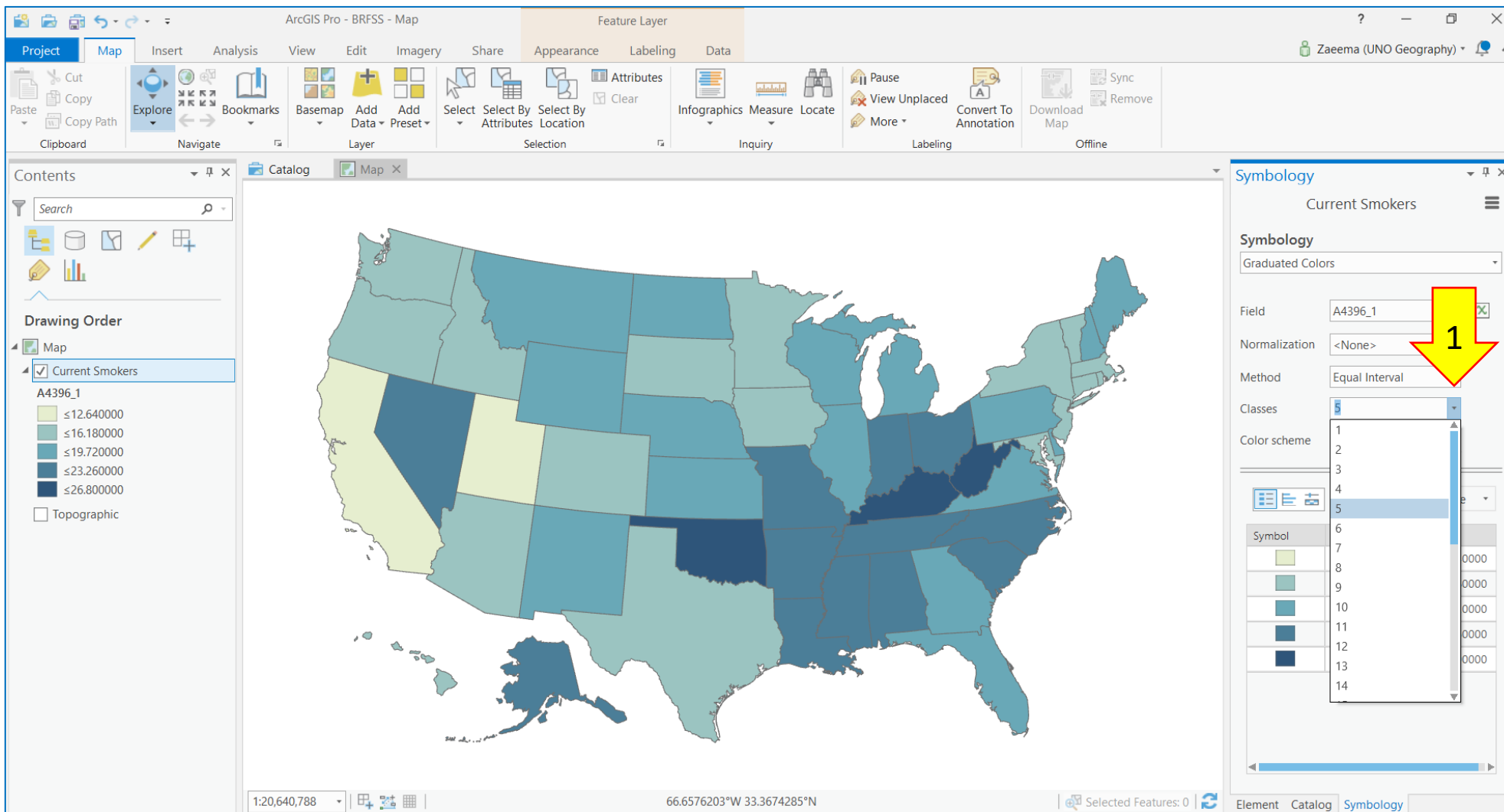
There are different options and the description of each option is written against it

For this tutorial, we will use “Equal Intervals” that divides the range of percentage into groups of equal intervals

User defined range of percentage for each group can be set by using the “Manual interval” method

Click “Equal Interval”

# BRFSS – Creating Map



Drop down “Classes”

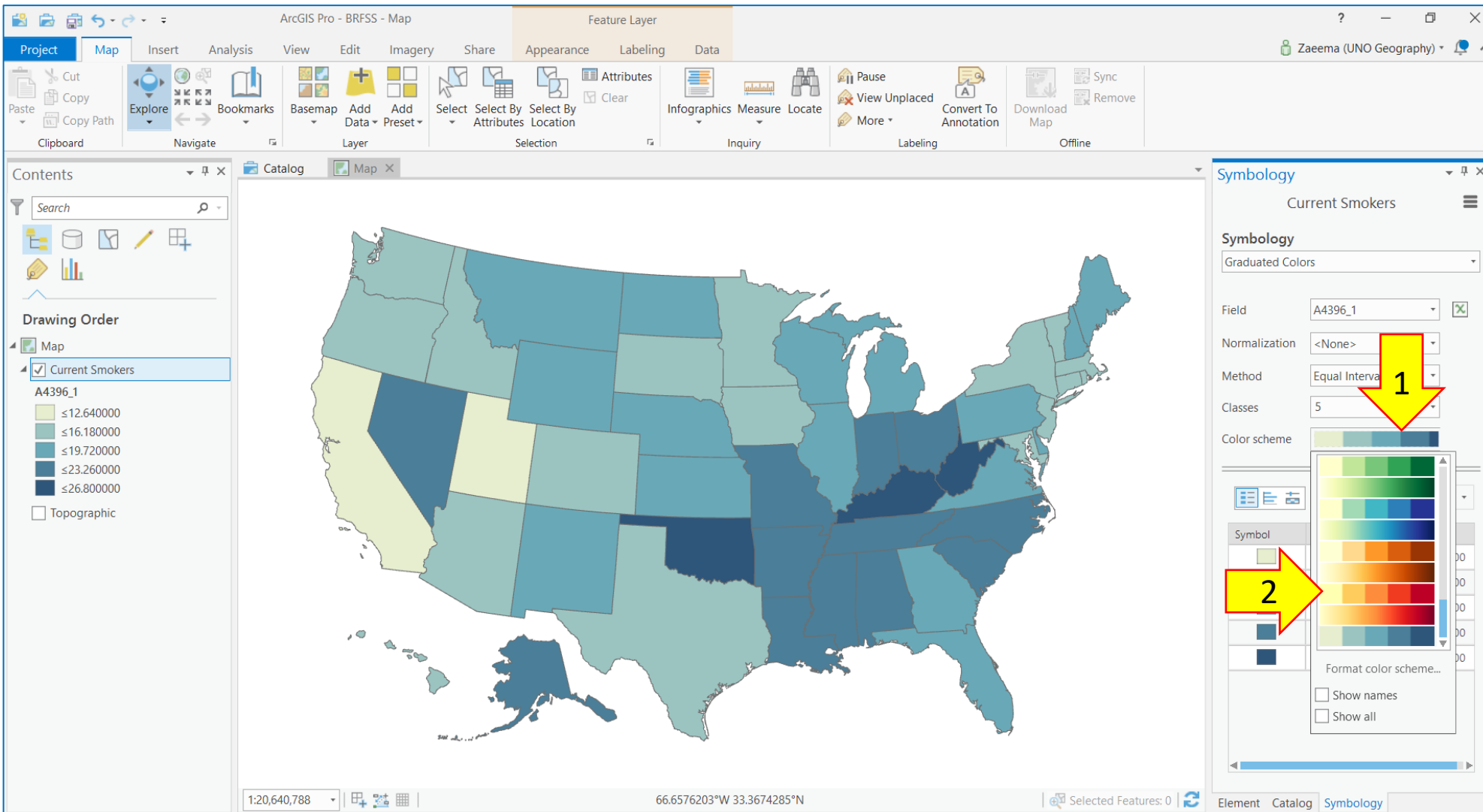
We can choose the number of classes we want to group states into

The default is “5”

For this tutorial, we will keep it at 5



# BRFSS – Creating Map



Click on the color bar in front of “Color scheme”

It drops down to show a variety of color schemes to choose from

For this tutorial, we will select the orange-red scheme to signify states with highest percentage of current smokers with deep red color

Click the orange red color scheme

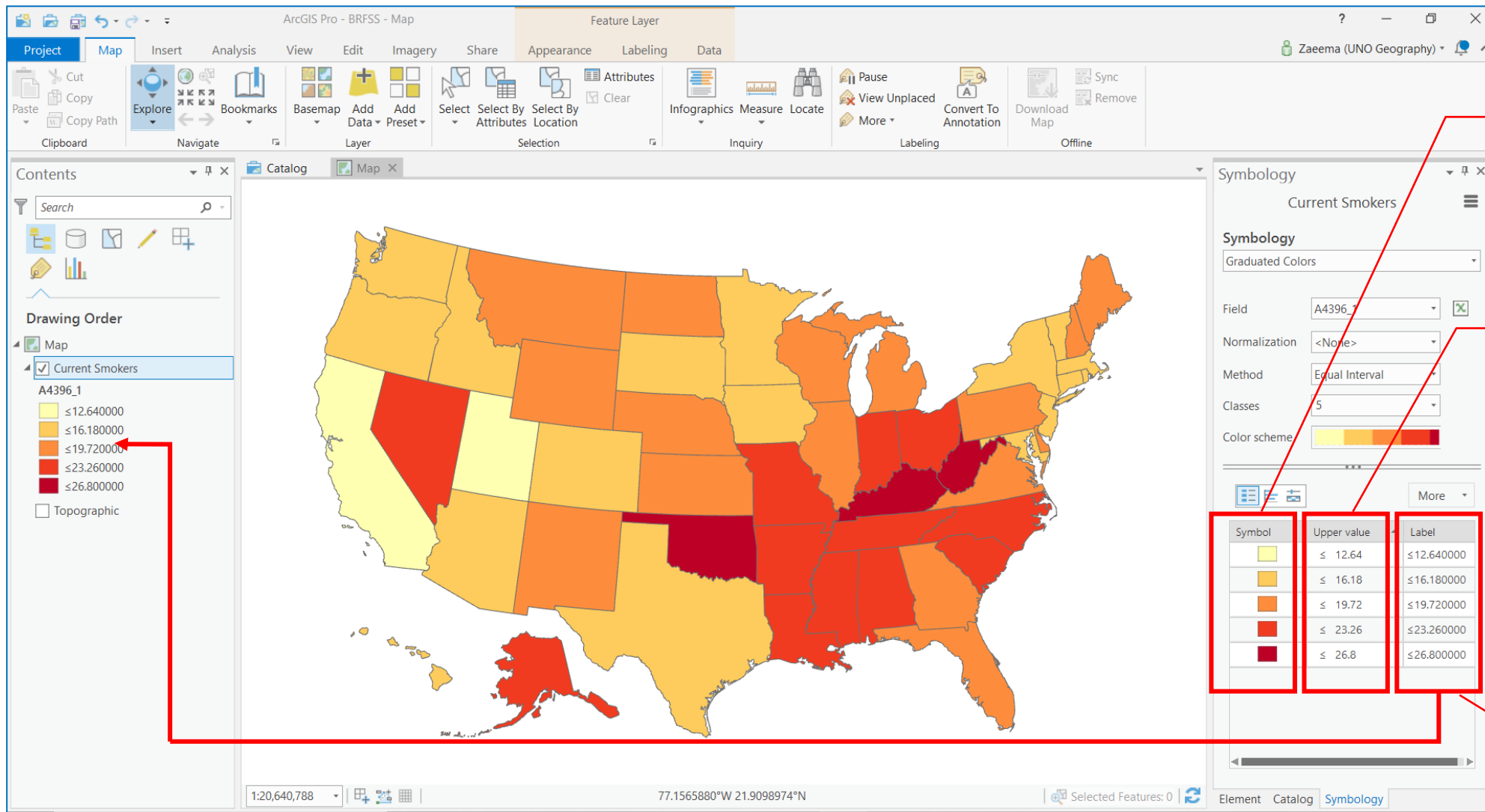
# BRFSS – Creating Map

This is how the map looks

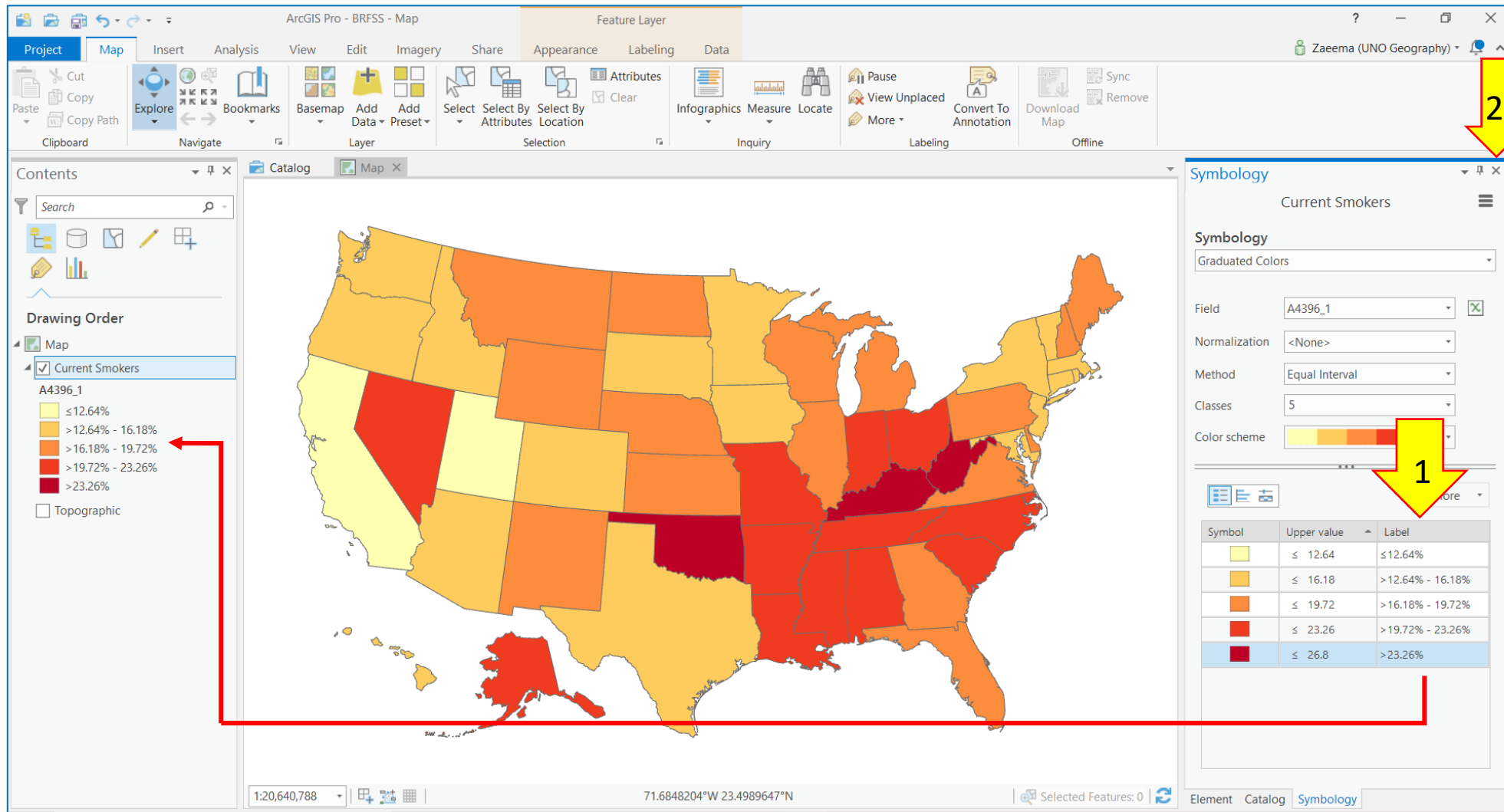
You can further change the color of each group by clicking the colored rectangles here

This shows the cutoff values for the percentages. Note that we have 5 classes as designated and the interval is equal for each class. If we choose to select "Manual Interval" under "Methods", we can set the upper cutoff limits by clicking and changing each group here

These are the labels that appear under the "Contents" pane. We will change them in the next slide



# BRFSS – Creating Map

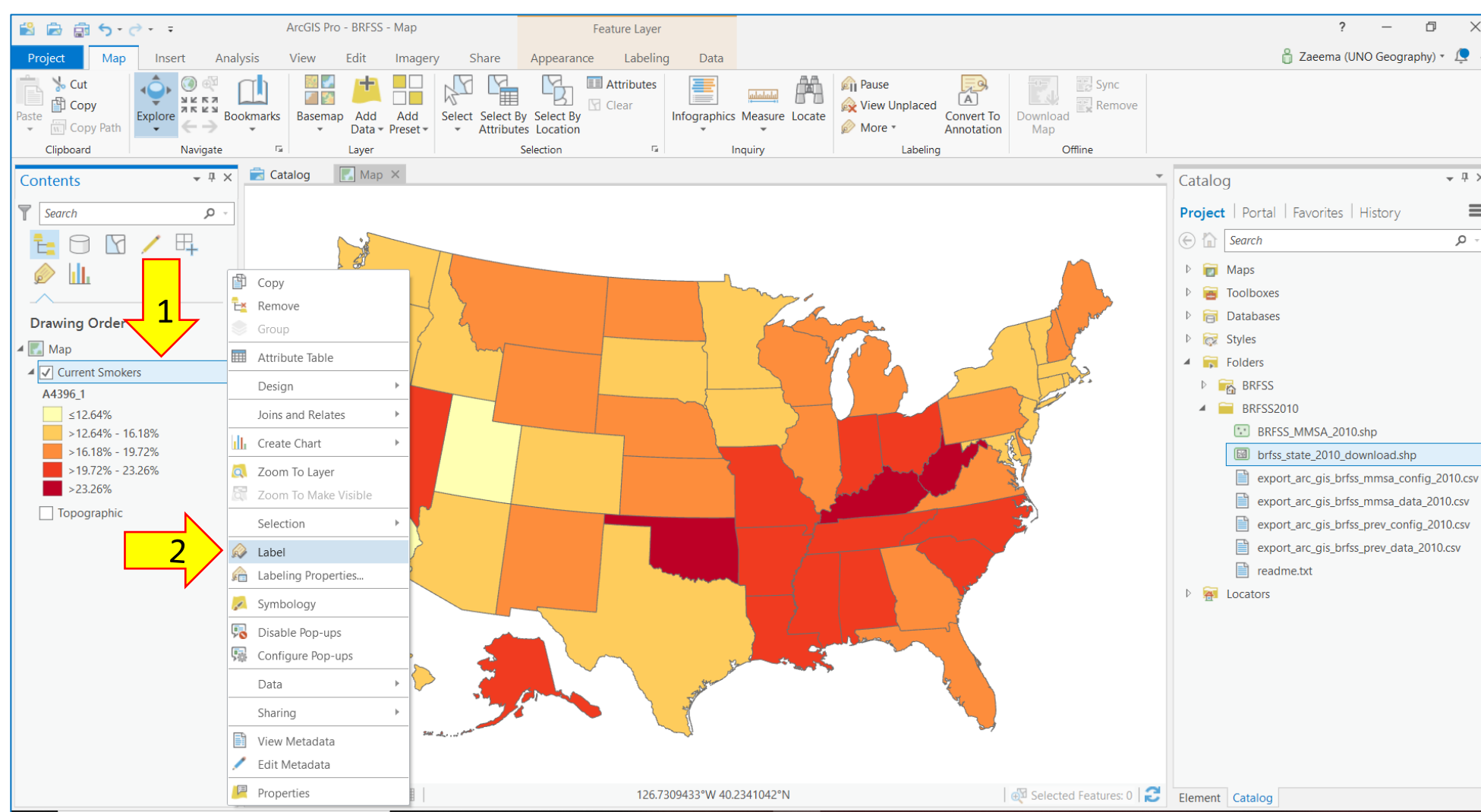


Single click each values under “Label” and change as shown

You will notice a change in labels under the “Contents” pane

Click “x” and close the “Symbology” pane

# BRFSS – Creating Map

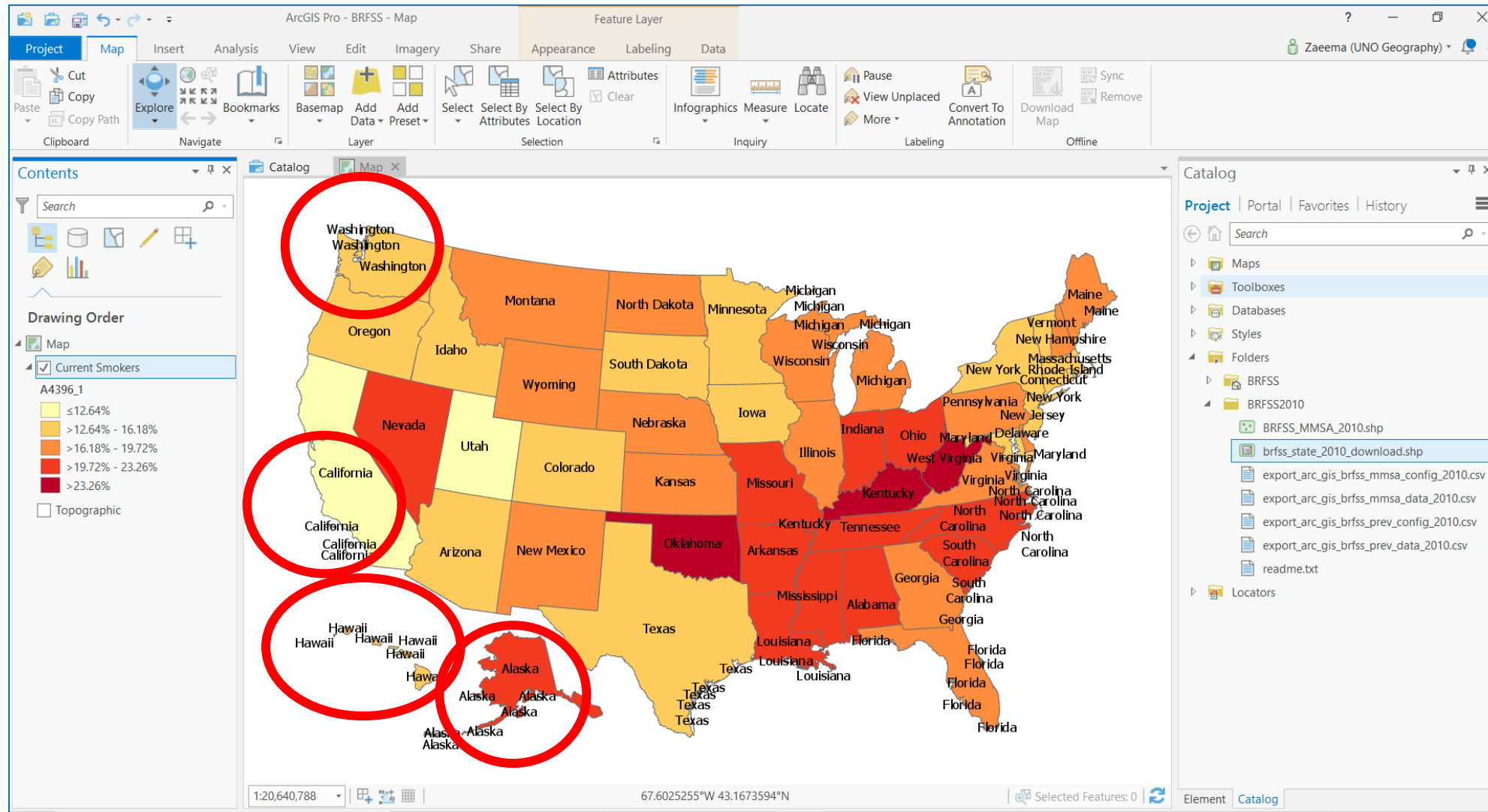


We will now label the states

Right click “Current smokers” under “Contents” pane

Click “Label”

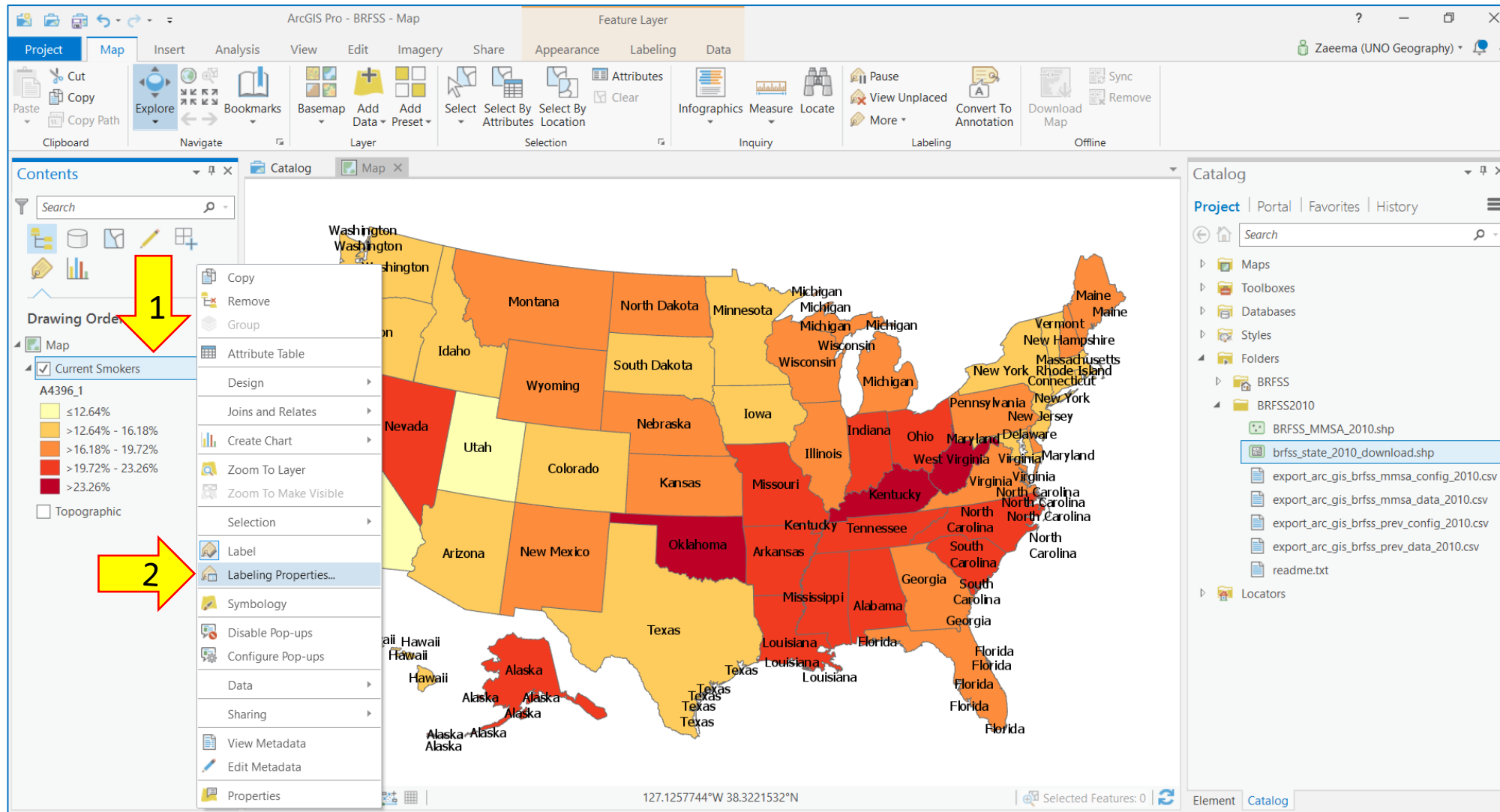
# BRFSS – Creating Map



You will see some states labelled multiple time

Lets us fix this

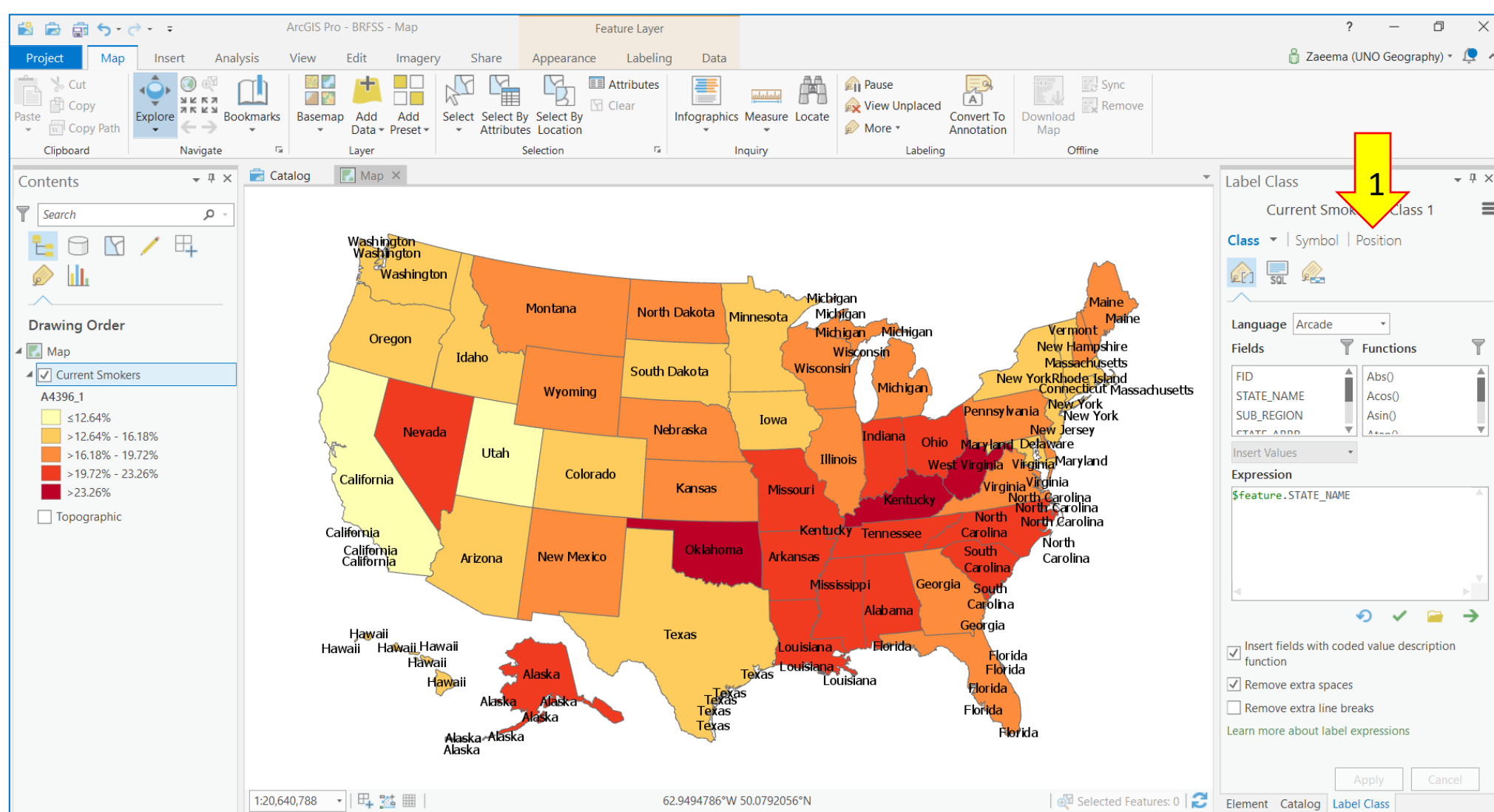
# BRFSS – Creating Map



Right click “Current smokers” and select “Labelling Properties”



# BRFSS – Creating Map



The “Label Class”  
pane is visible over  
the “Catalog” pane

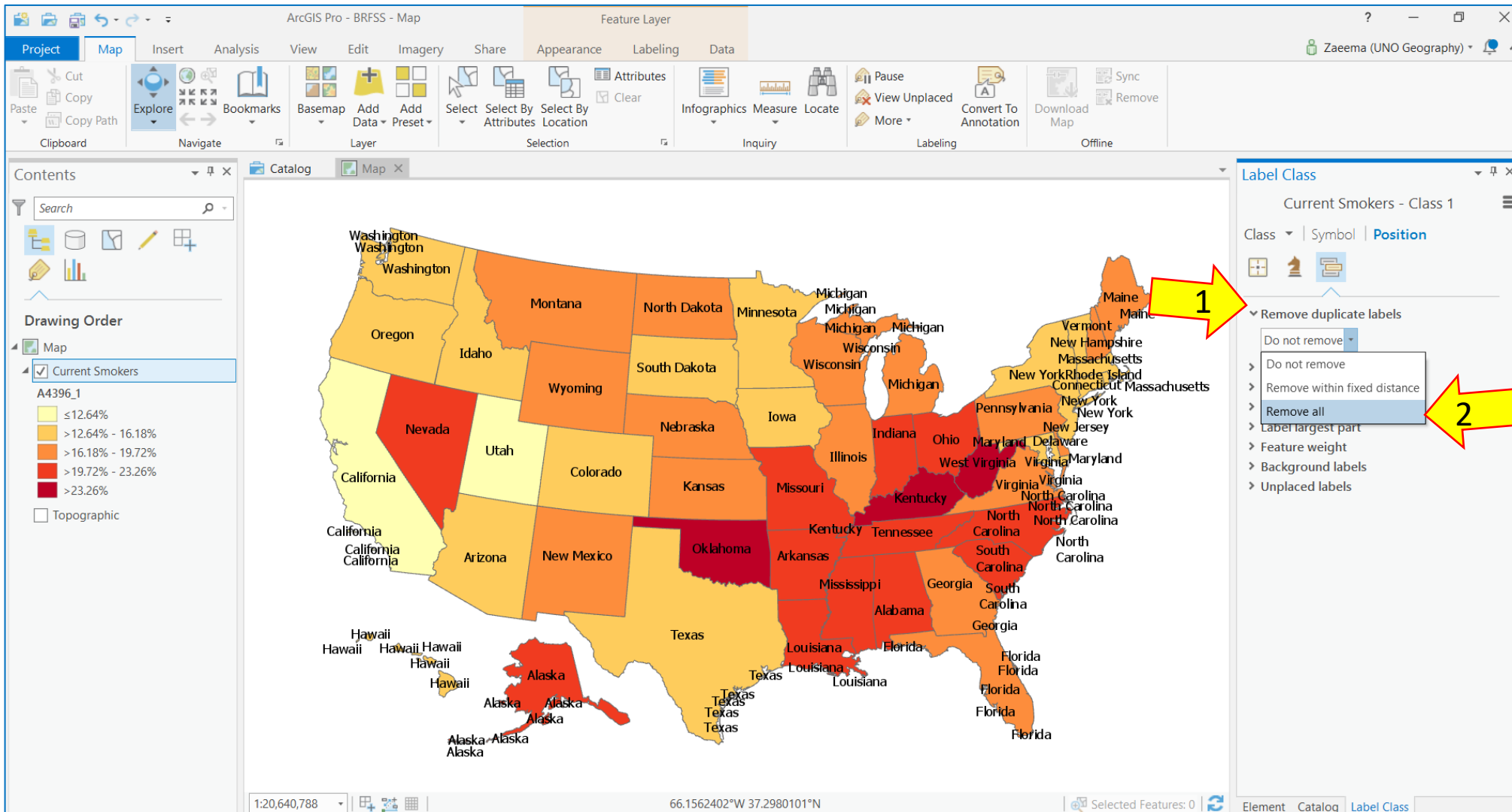
Click “Position”

# BRFSS – Creating Map



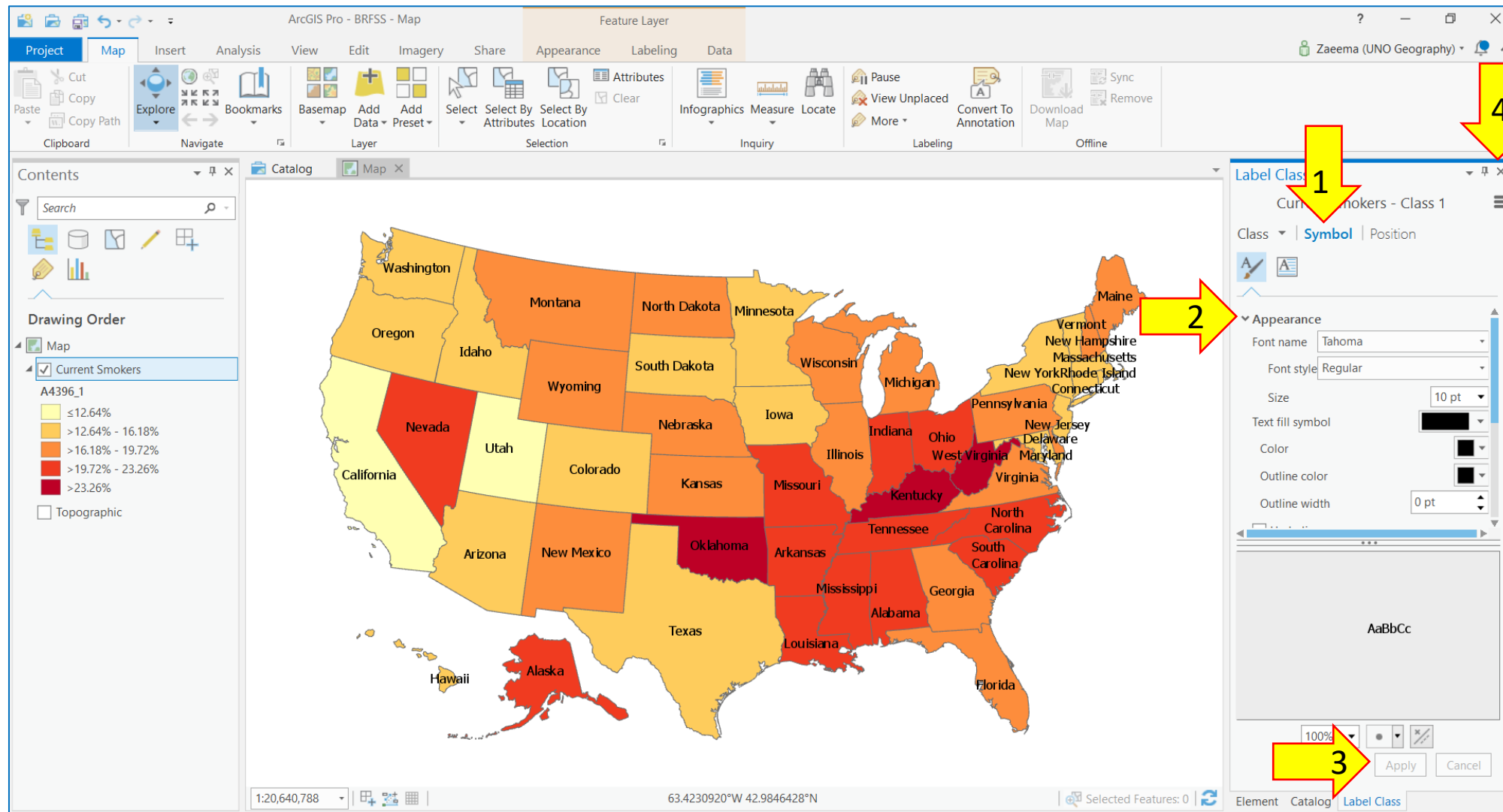
Click the last tab  
under position

# BRFSS – Creating Map



Drop down the  
“Remove duplicate  
labels” tab and select  
“Remove all”

# BRFSS – Creating Map

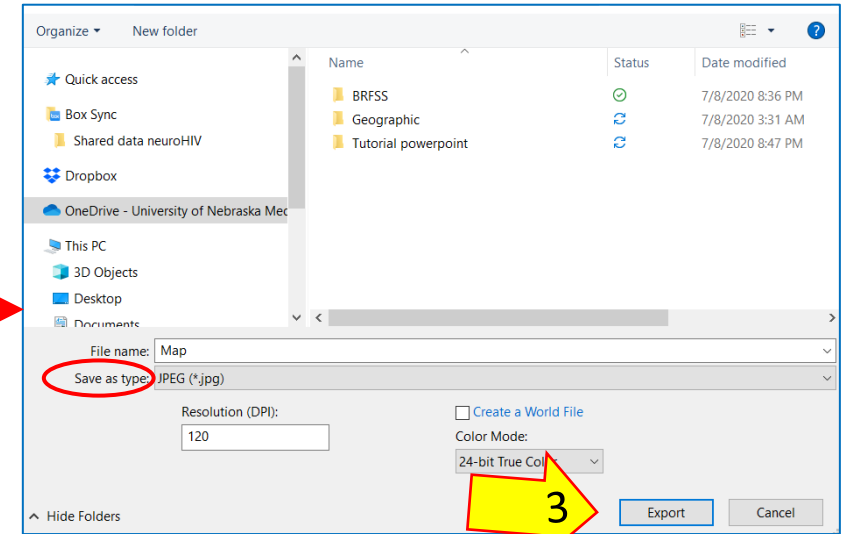
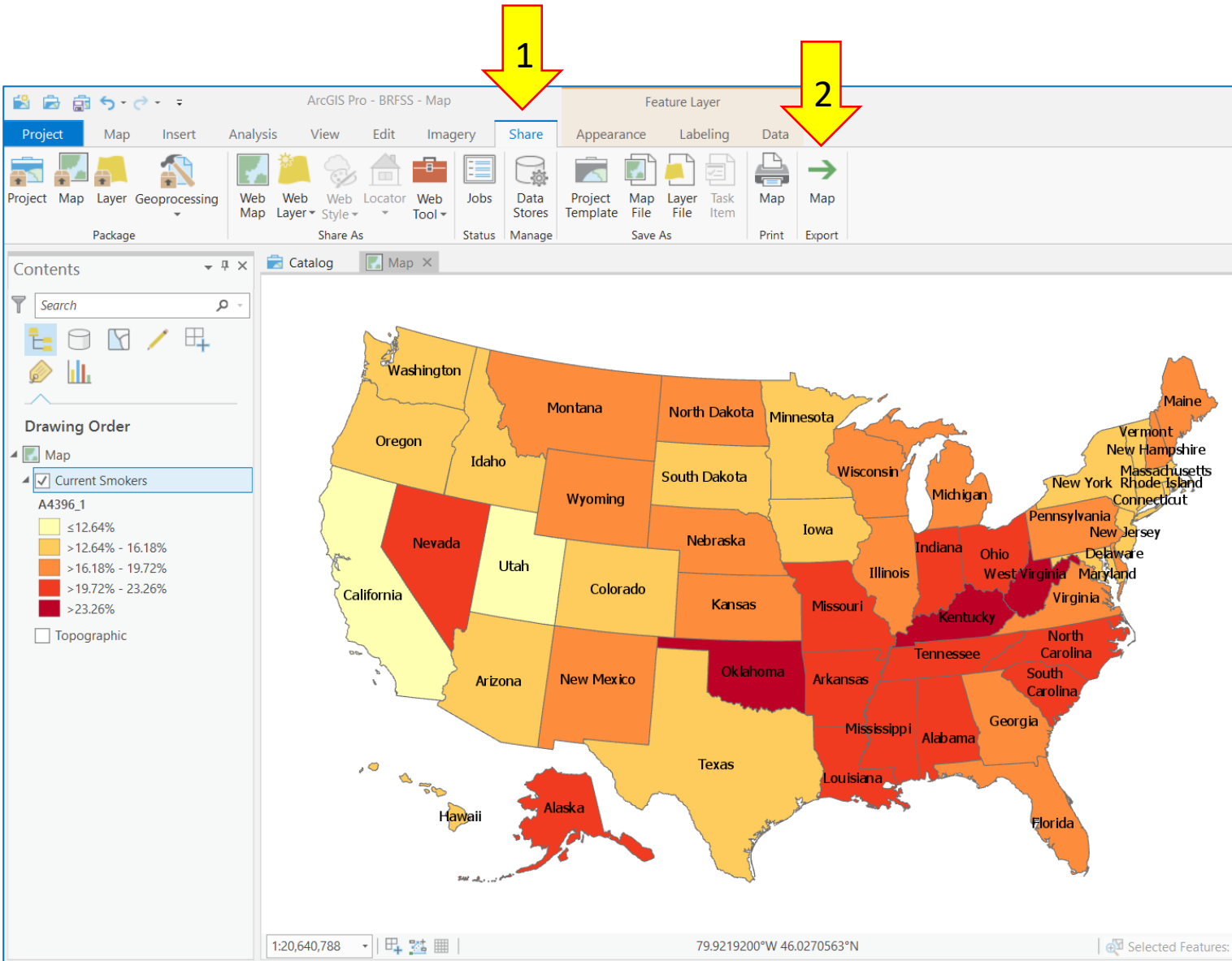


The label font and size can be changed by clicking “Symbol” and dropping down “Appearance”

After selecting the size and font click “Apply” at the bottom

Click “x” and close the “Label Class” pane

# BRFSS – Creating Map



The map can be exported out like this

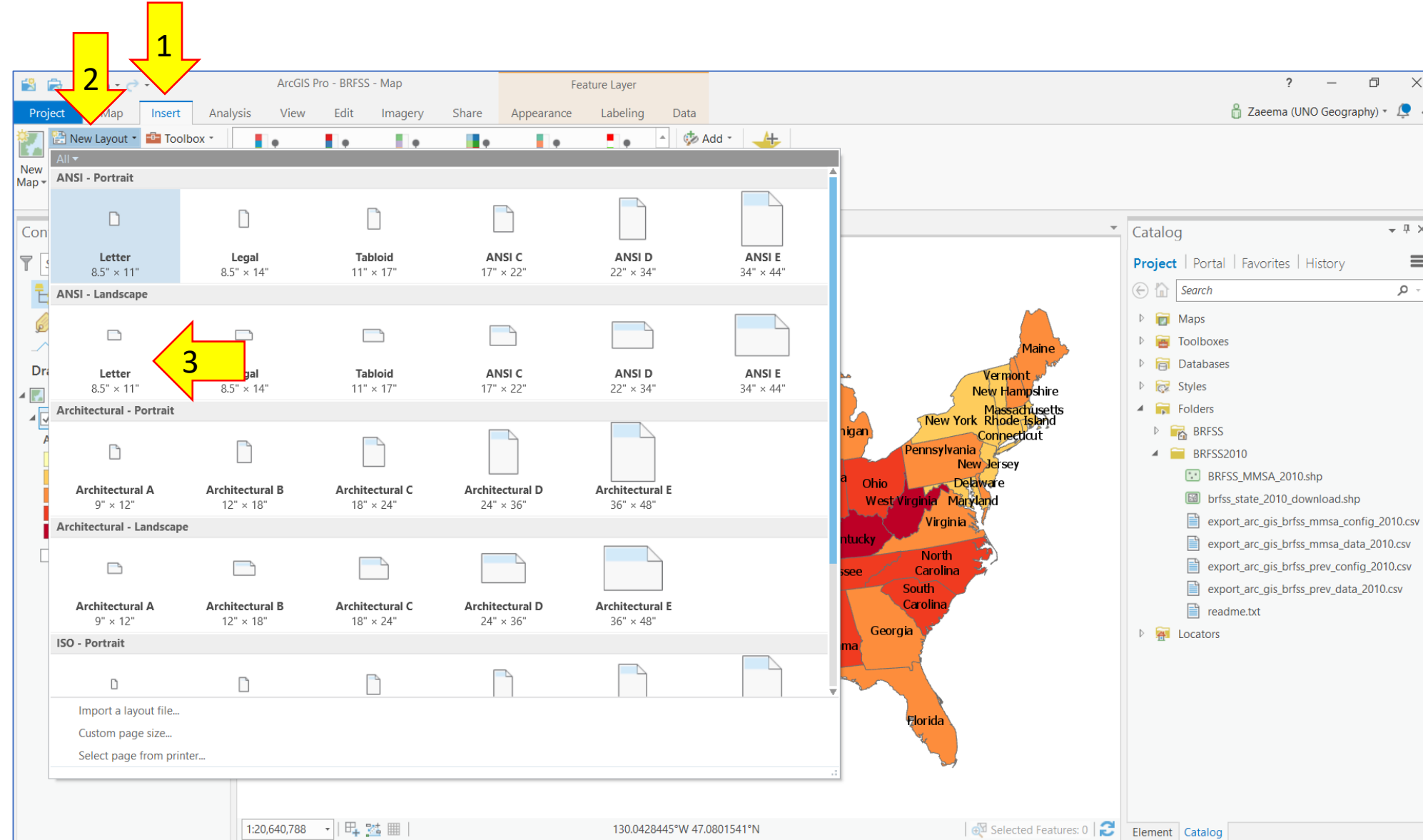
Click “Share”

Click “Map”

Browse the folder and click “Export” and map will be saved as a picture (different formats can be chosen through “save as type”)

The next few slides will demonstrate how to add the title, legend, north arrow and scale bar

# BRFSS – Creating Map

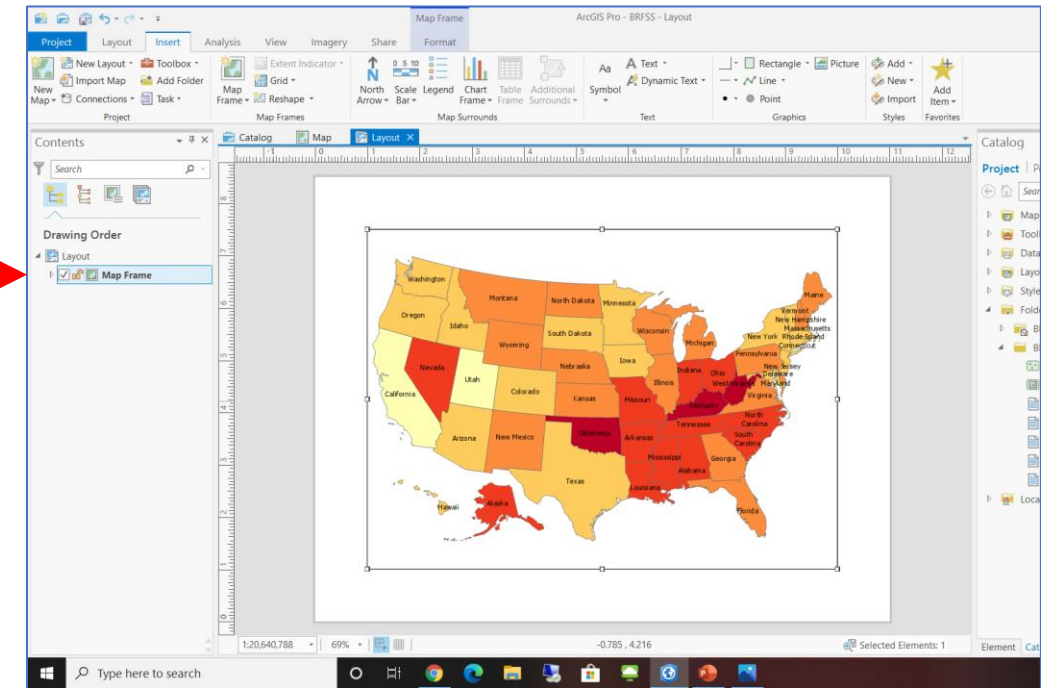
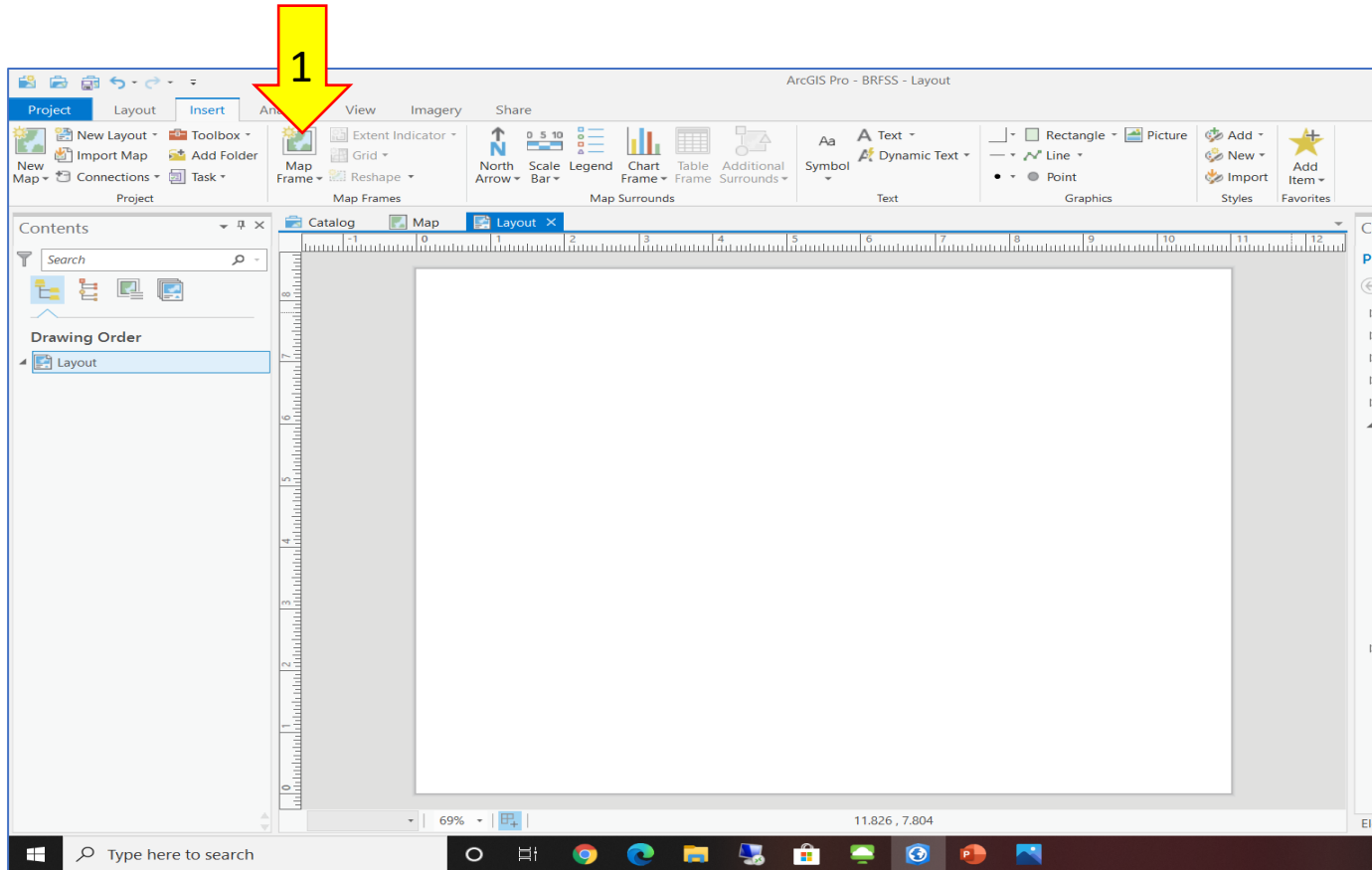


Click "Insert"

Drop down "New Layout"

Select "Letter" with the landscape layout

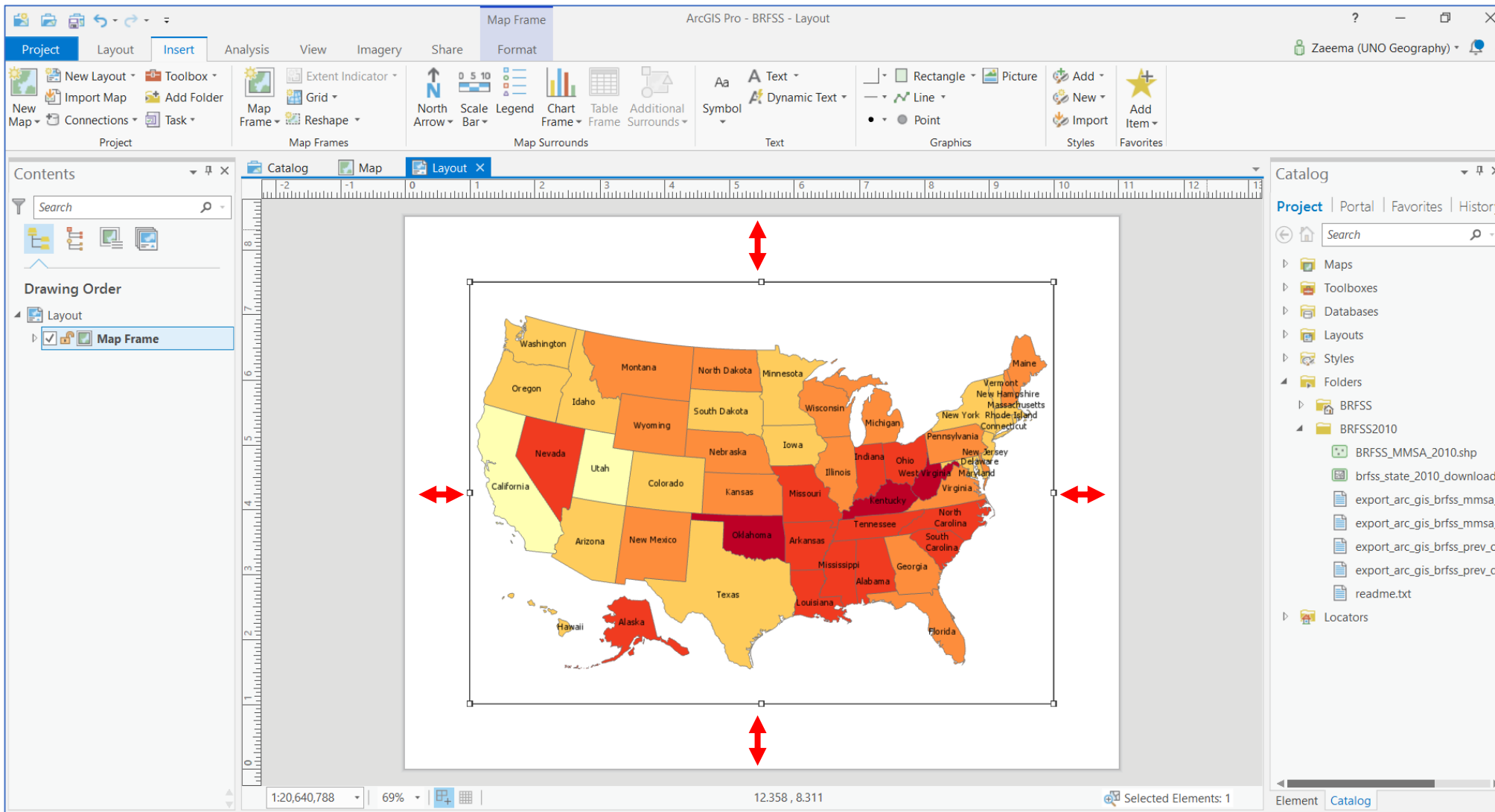
# BRFSS – Creating Map



Click “Map Frame” and the map that was created appears in the layout view



# BRFSS – Creating Map



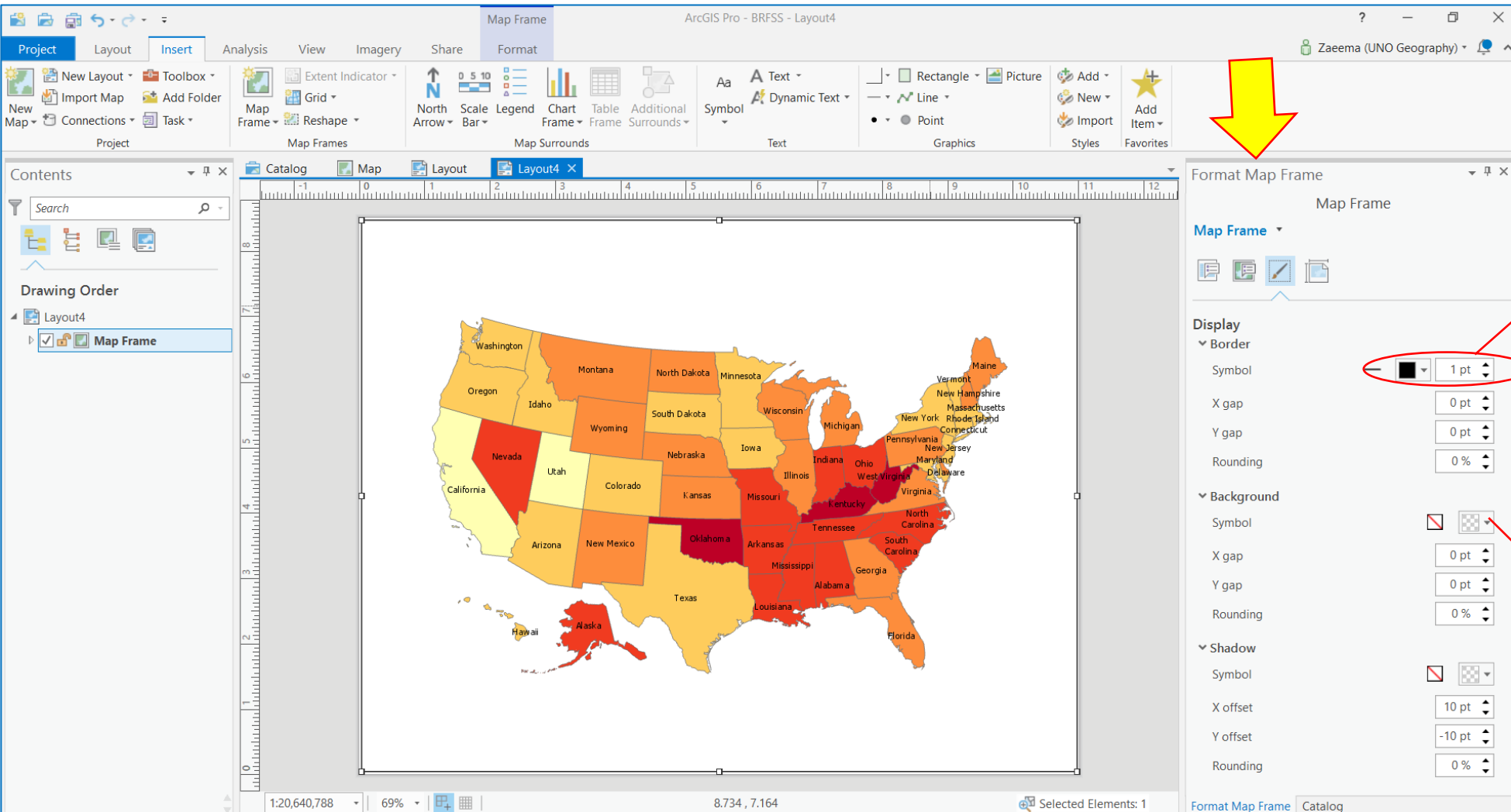
Hold and drag the map frame borders to the edges

# BRFSS – Creating Map

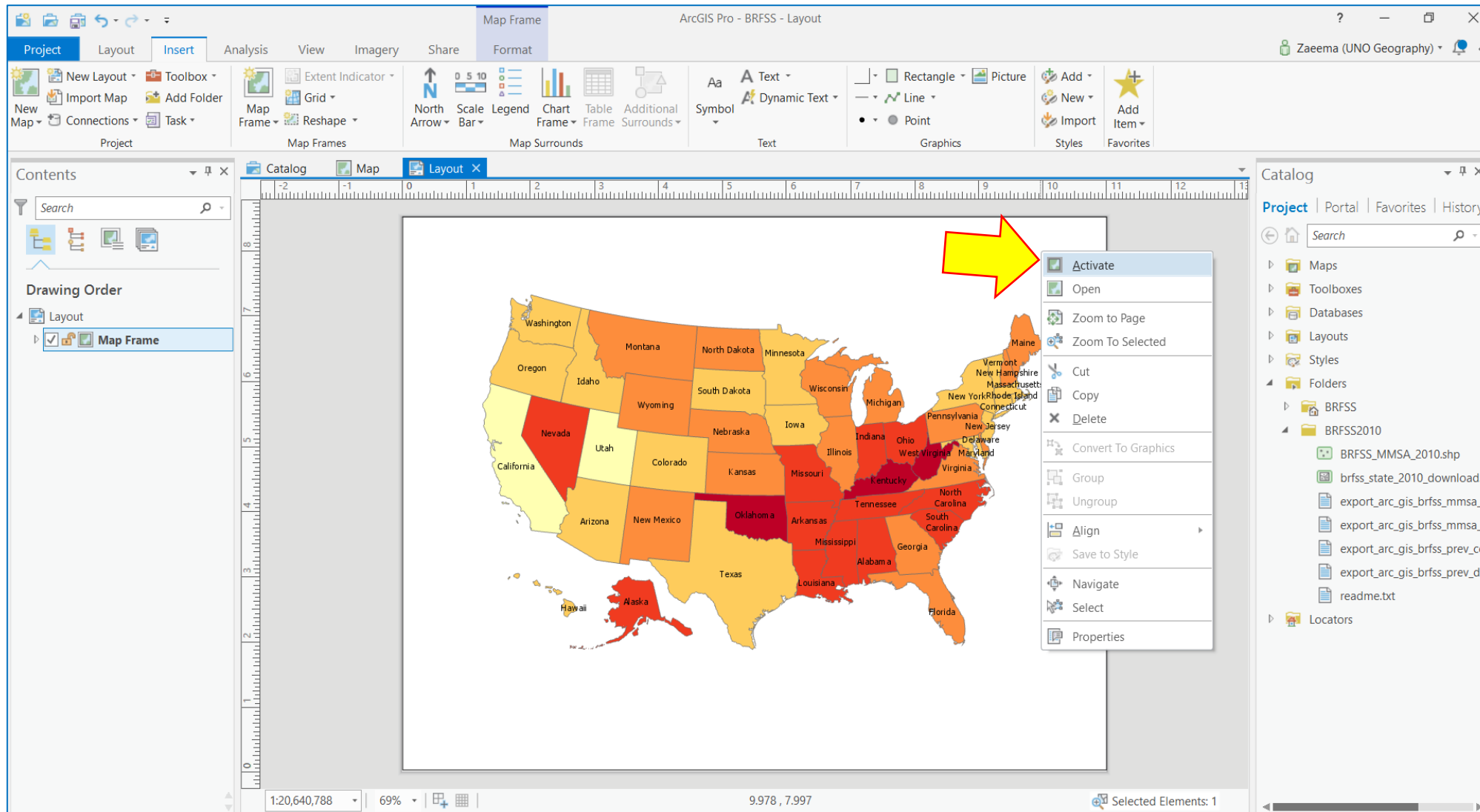
As you drag the map frame borders, the “Format Map Frame” pane appears over the catalog pane

Use these to select the color of the border and the thickness of the border. You can choose to remove the border as well

Drop this down and select a background color for the whole map frame area if desired. For this tutorial, no color will be used



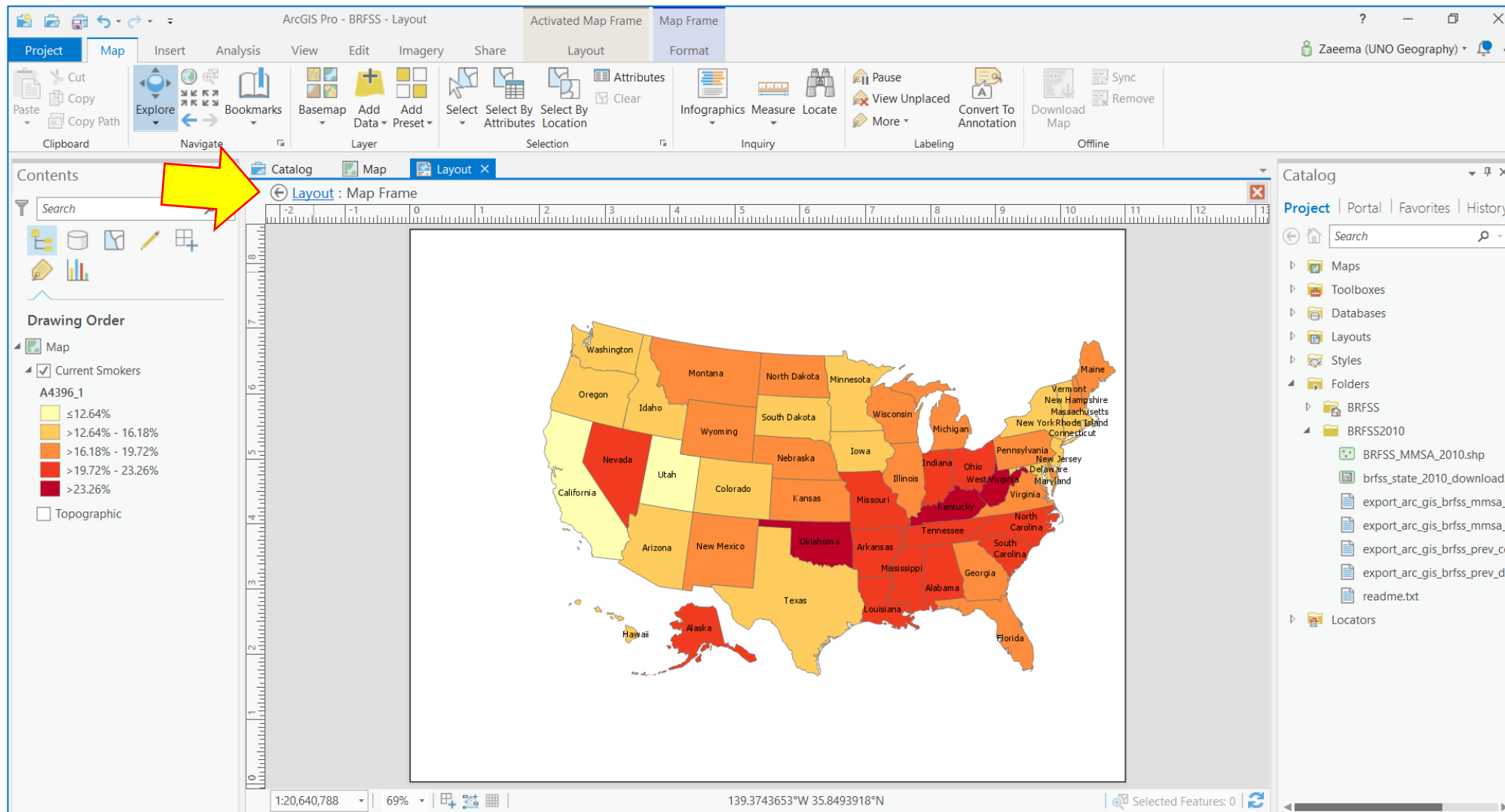
# BRFSS – Creating Map



The position of the map within the white area can be changed by right clicking anywhere inside the white area and clicking “Activate”

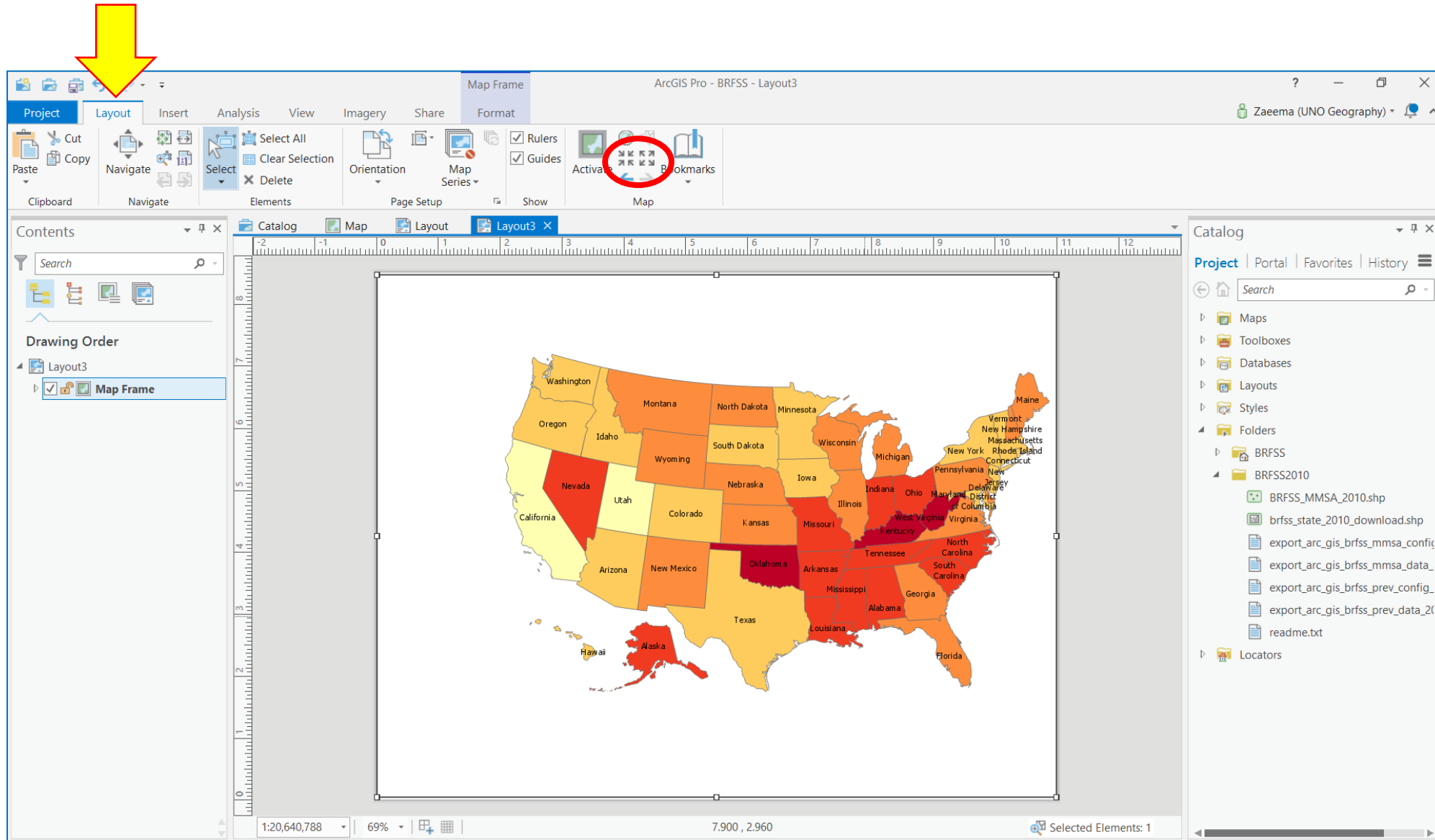
Put the pointer on the map, hold the left mouse button and drag the map to the right to make more space for the legend to be inserted in the lower left corner later

# BRFSS – Creating Map



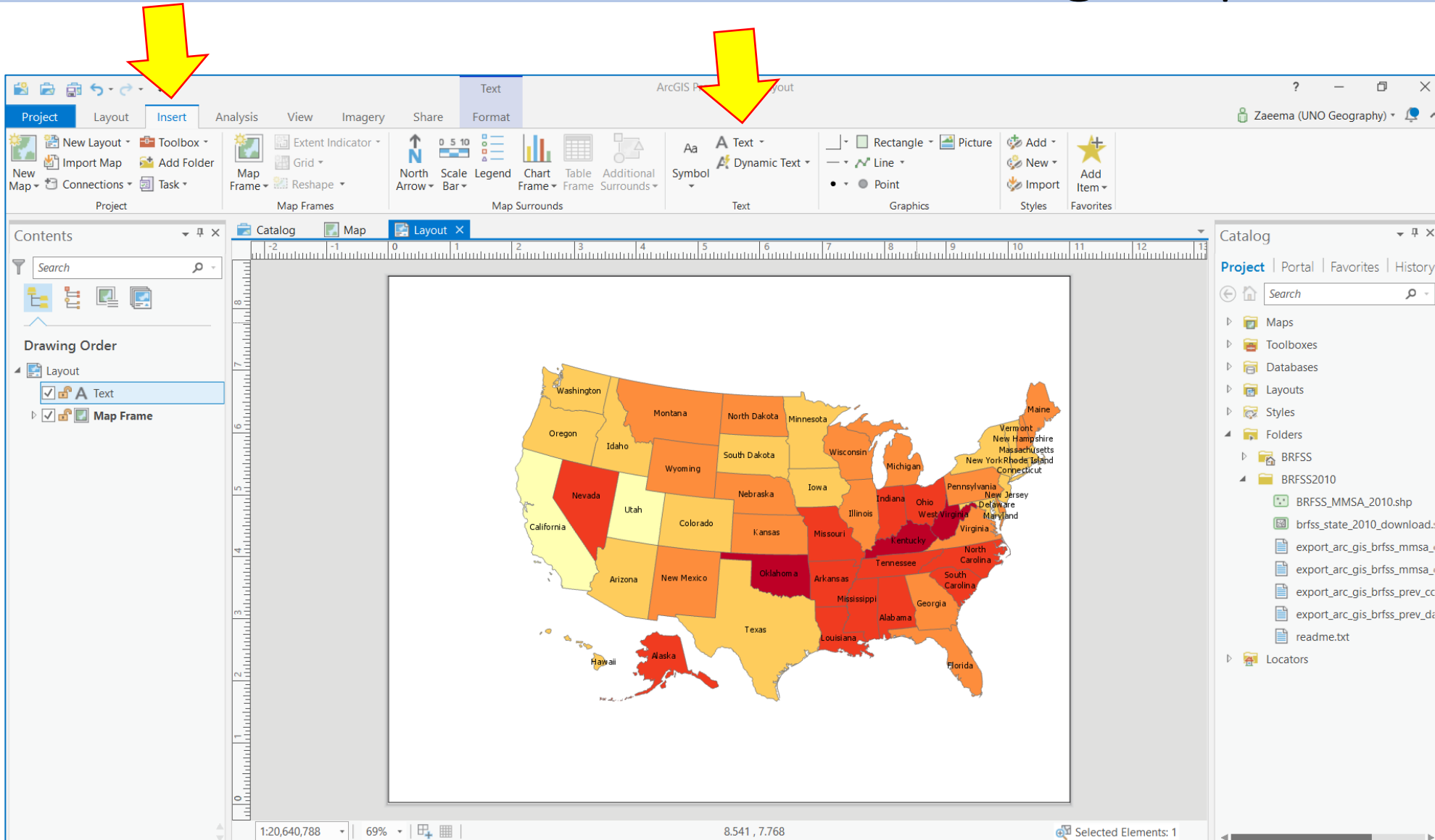
After re-positioning the map, click “Layout” to get back to layout view

# BRFSS – Creating Map



To increase or decrease the size of the map within the map frame go to layout and use the circled buttons.

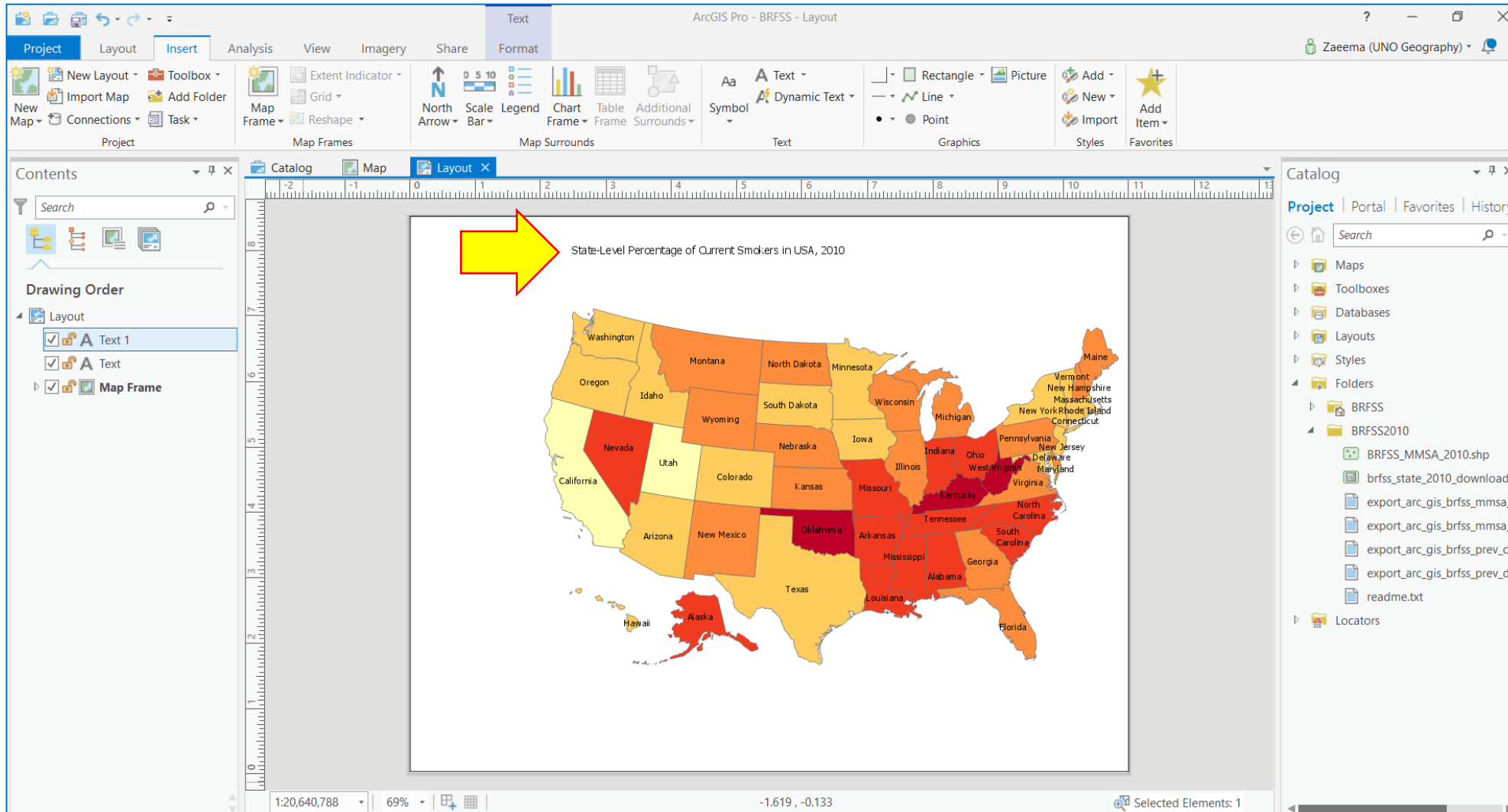
# BRFSS – Creating Map



To insert a title in the map, click “Insert”

Click “Text”

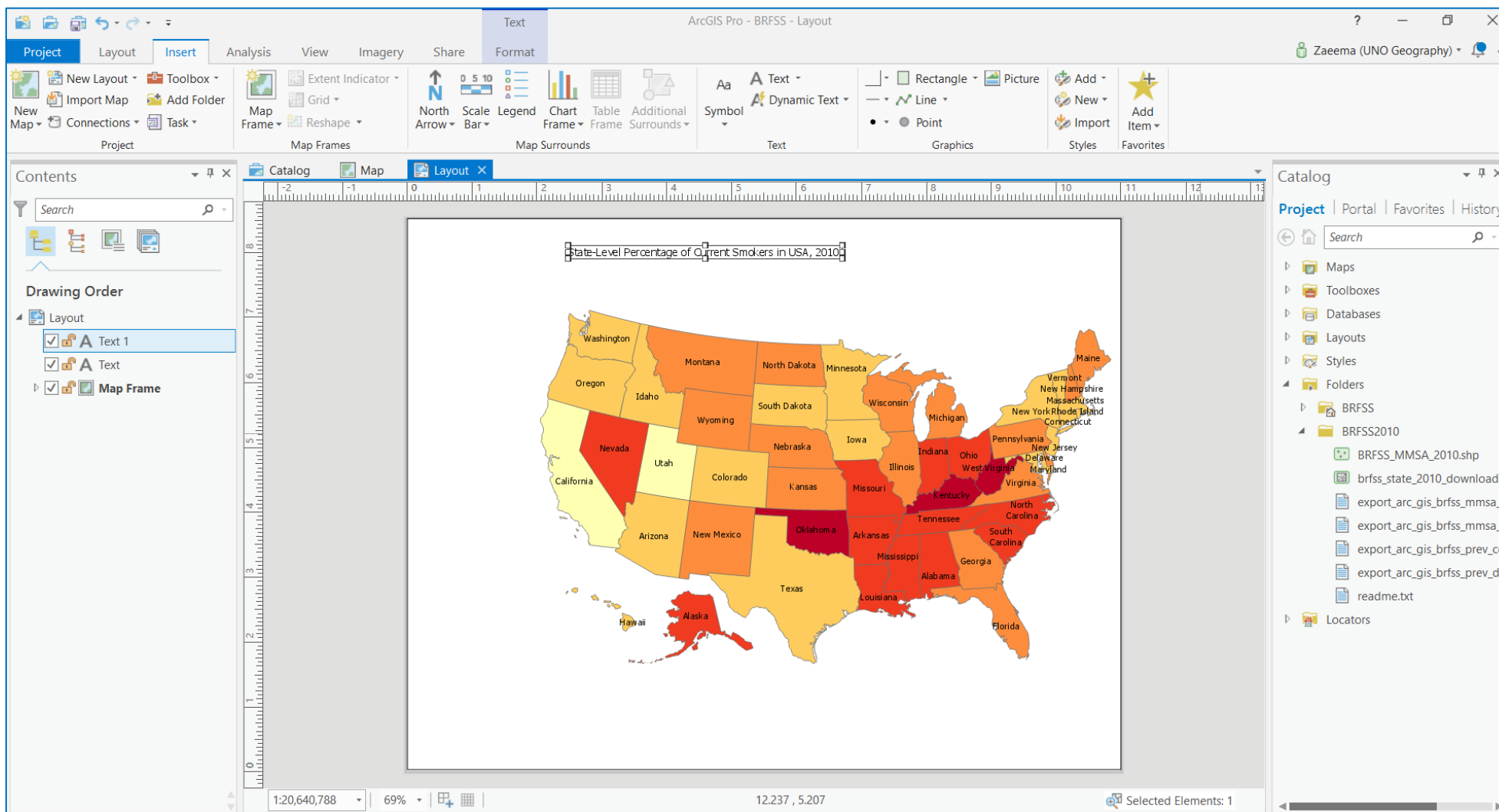
# BRFSS – Creating Map



Bring the cursor on top of the map, left click and enter the title



# BRFSS – Creating Maps\

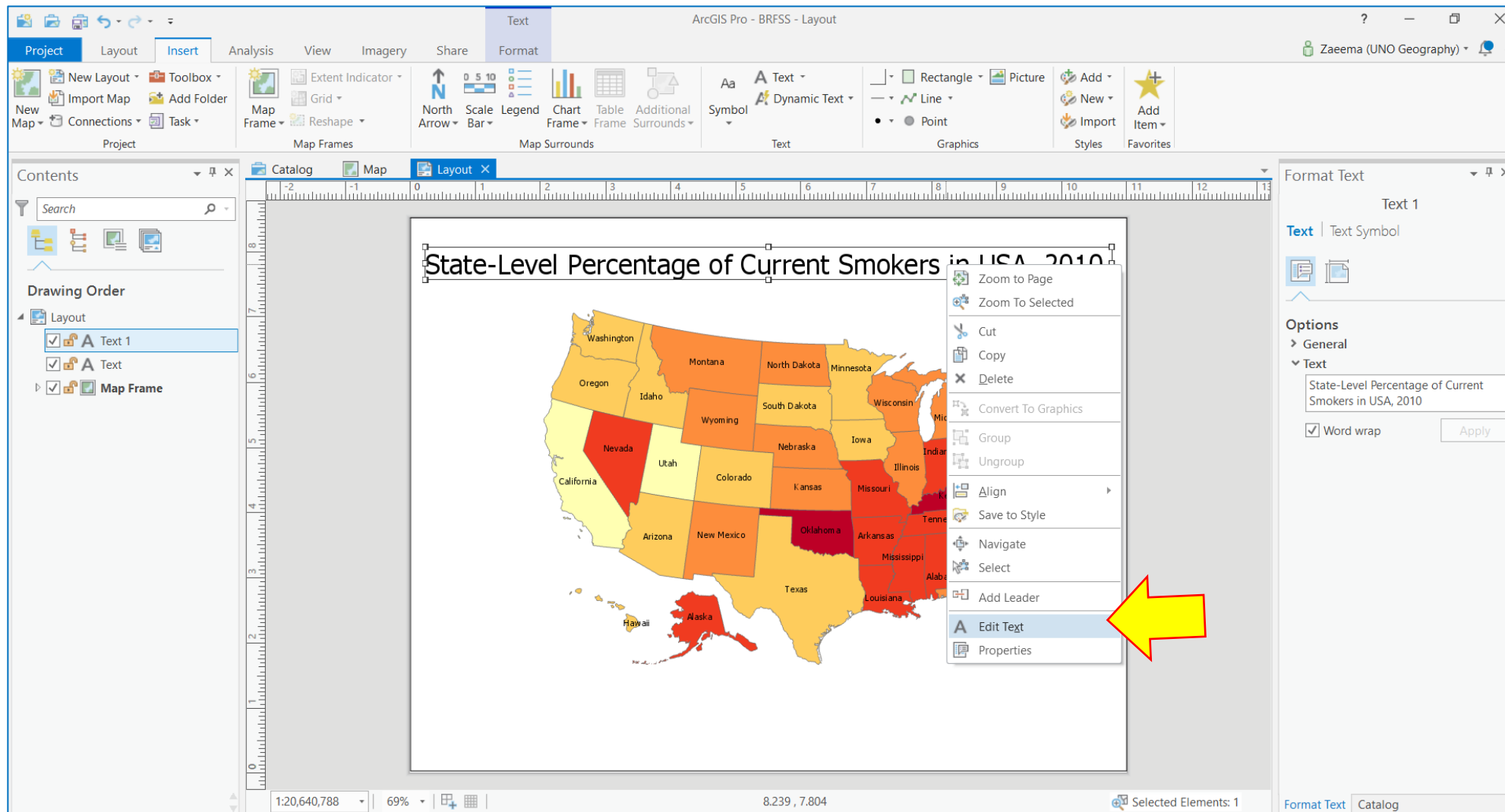


After done entering the title, click anywhere in the white area

A draggable border will appear around the title.

Drag to fix the size and position of the title as desired

# BRFSS – Creating Map



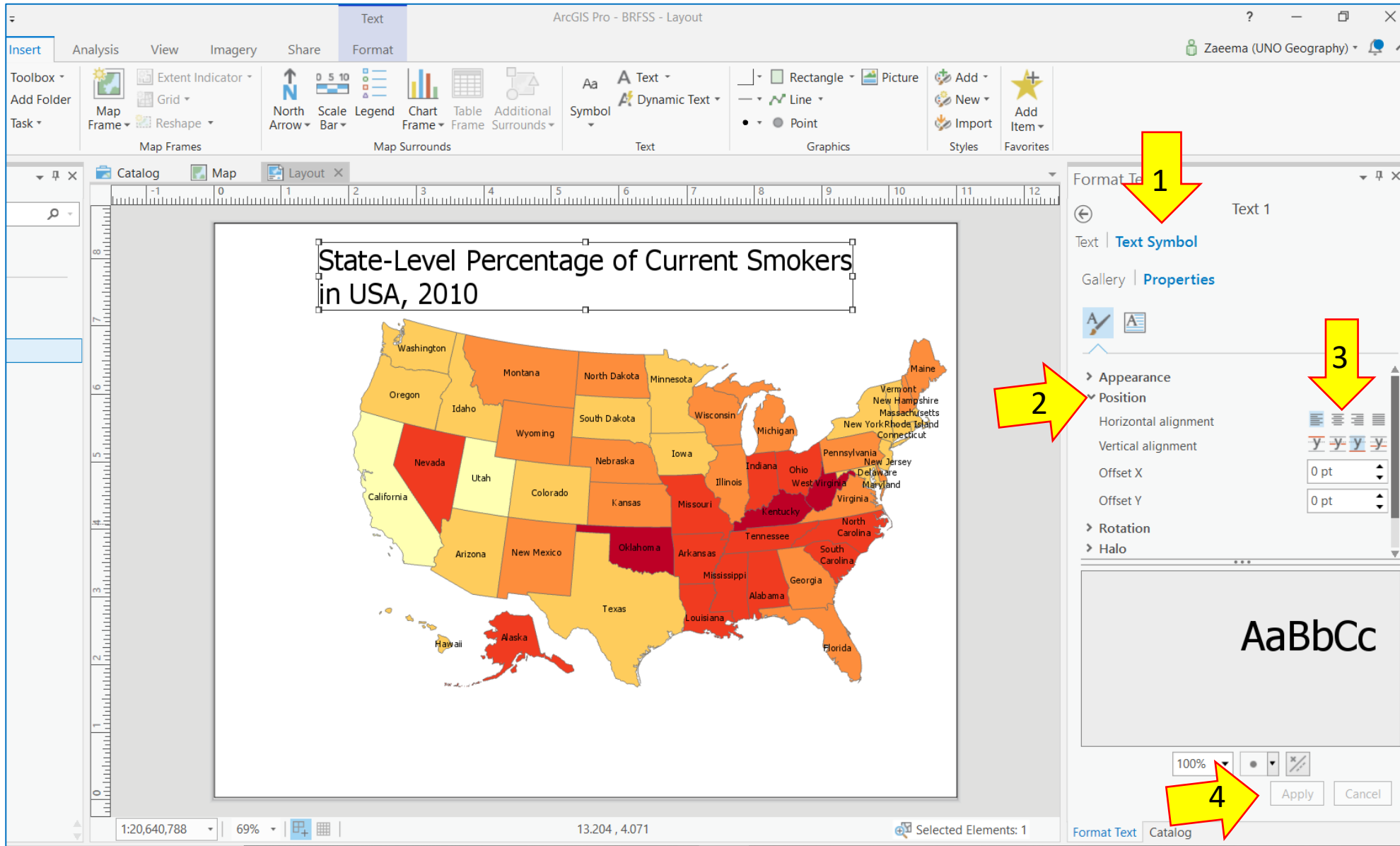
To arrange the title in 2 lines right click the title and click edit text

Put the cursor where you want to start new line within the title and press enter

Click anywhere on the white area and the draggable border appears around the title

Drag it in the center

# BRFSS – Creating Map



While working with the title, the “Format text” pane appears over the “Catalog” pane

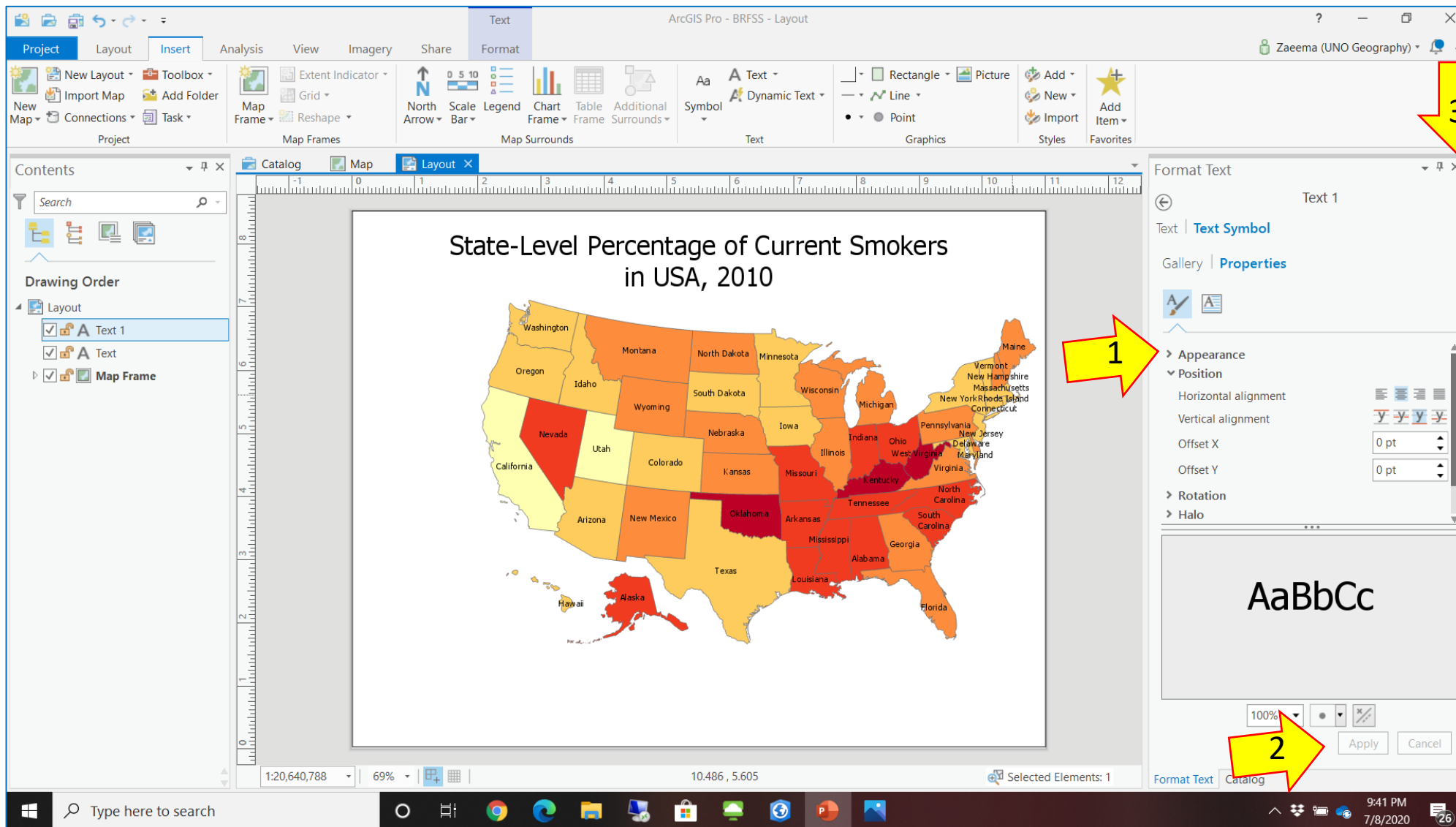
Click “Text Symbol”

Drop down “Position”

Click the centered tab

Click “Apply” at the bottom

# BRFSS – Creating Map



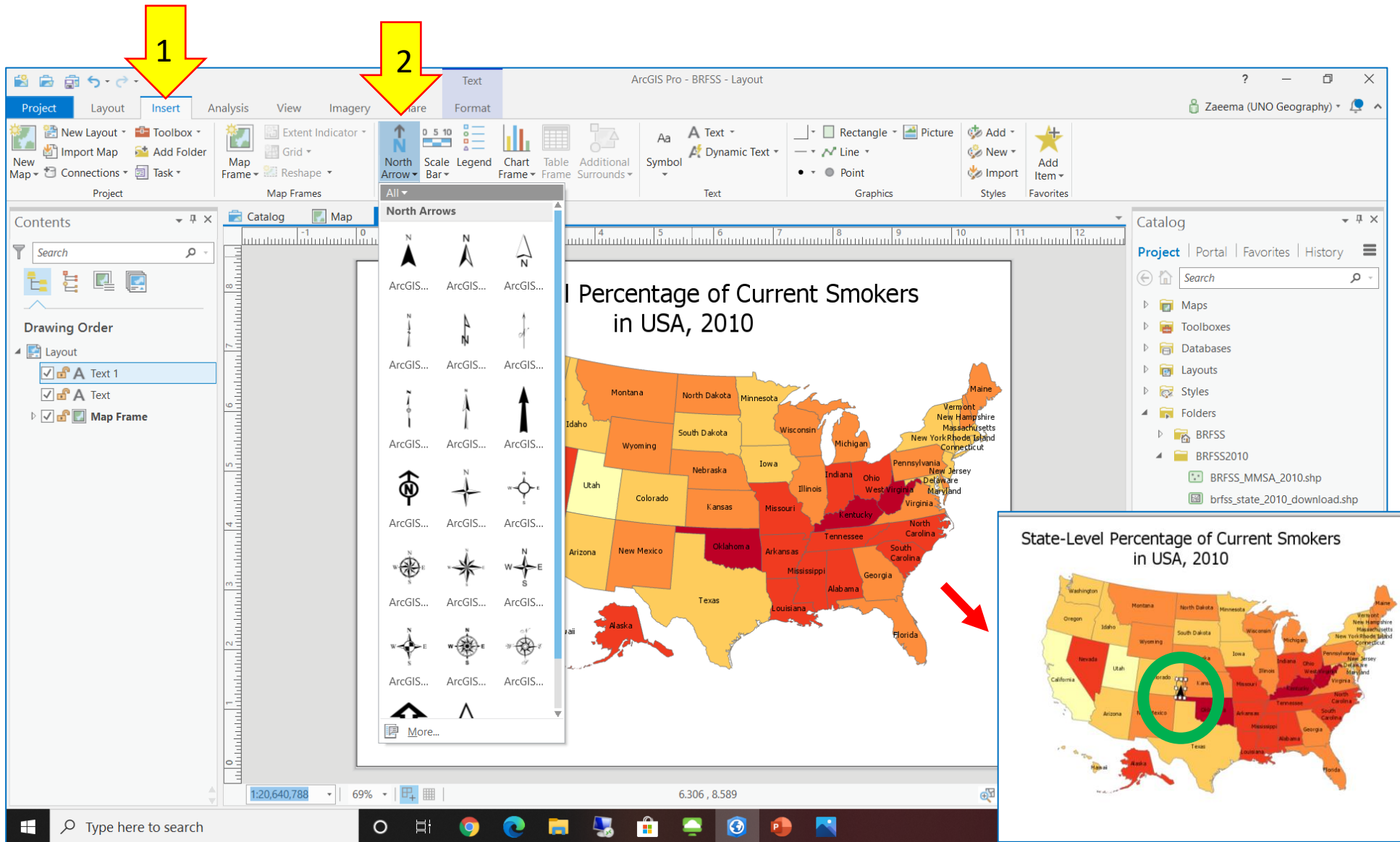
This is how the title looks

The font type and size for the title can be changed by clicking the “Appearance” tab

Click “Apply” each time a change is made

Click “x” and close the “Format Text” pane

# BRFSS – Creating Map



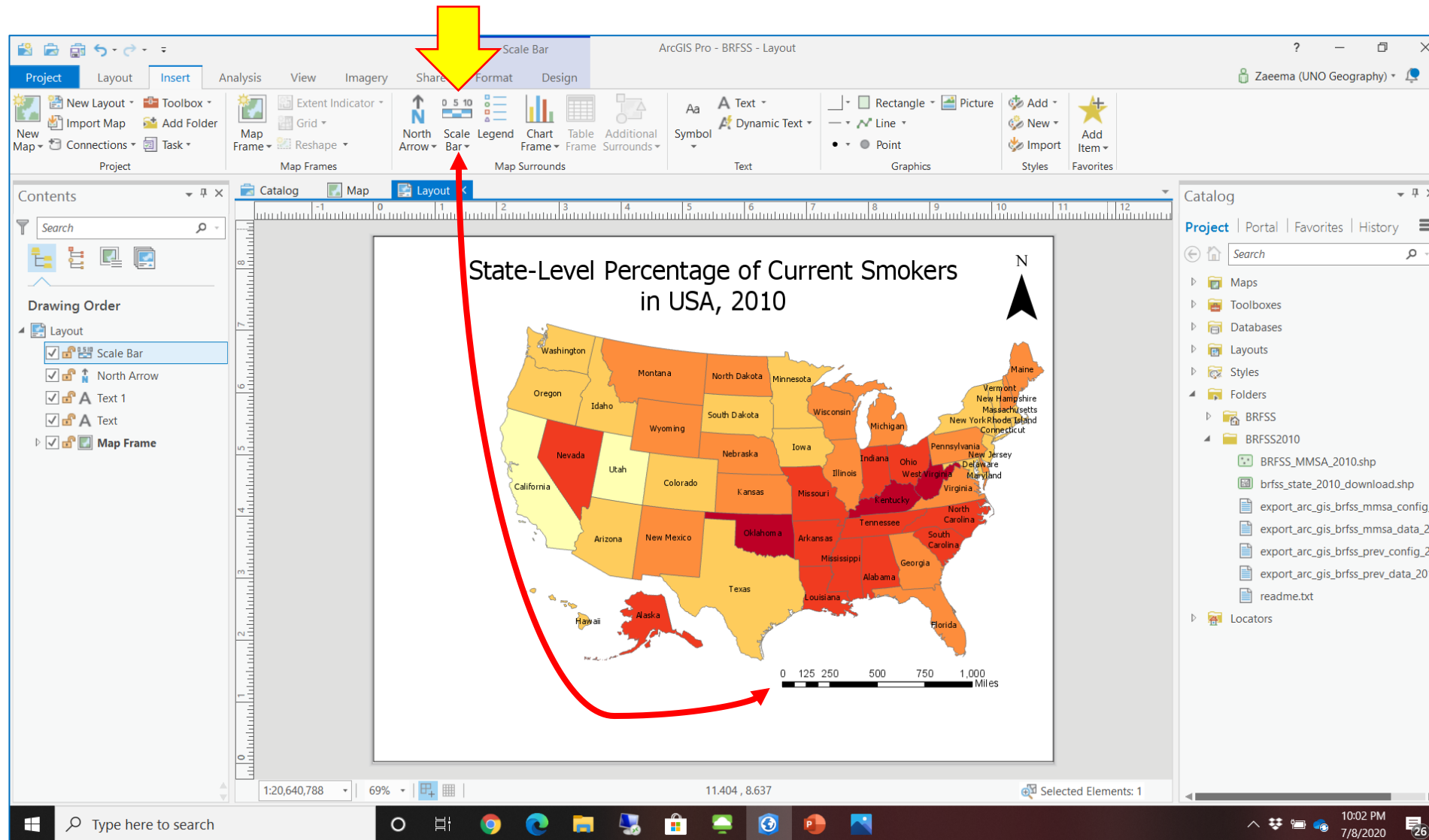
Click "Insert"

Drop down "North Arrow" and choose one

The North arrow will appear in the center of the map. Drag it to the desired position and adjust the size.

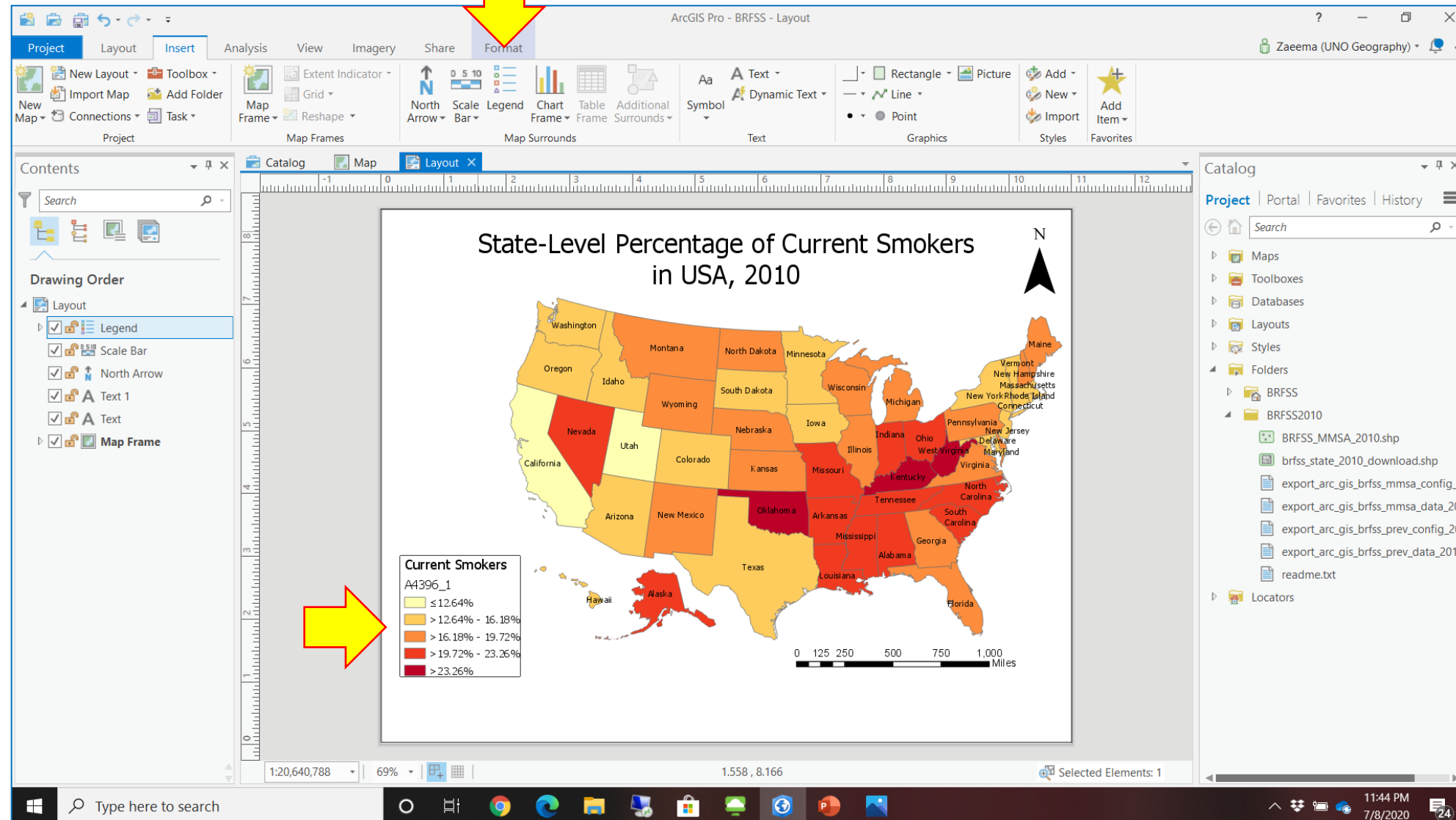
If the draggable borders disappears, just right click on top of the North arrow and they will appear

# BRFSS – Creating Map



Similarly, add the scale bar

# BRFSS – Creating Map

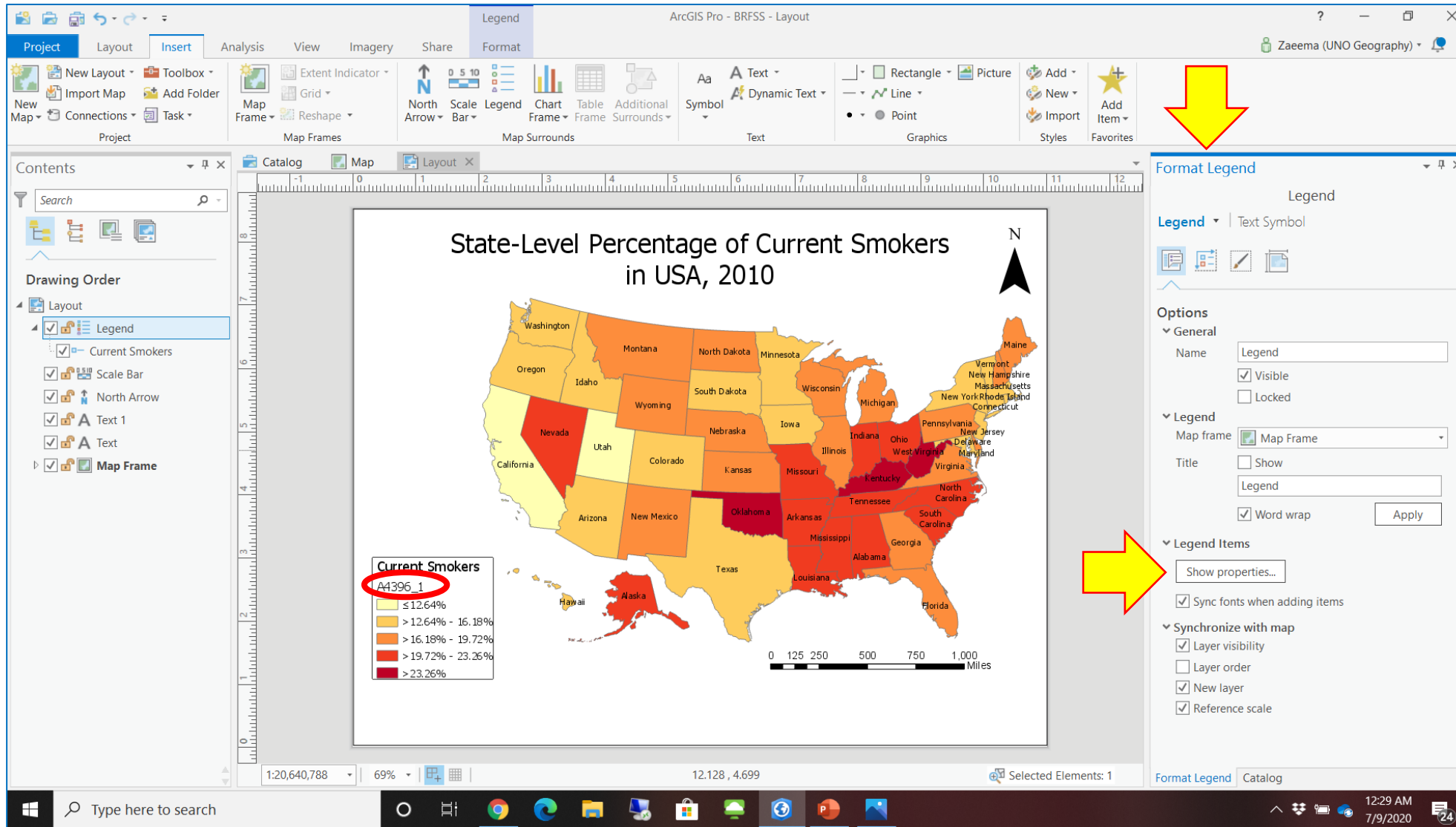


Click legend on the insert tab

Click within the map space you want to insert the legend



# BRFSS – Creating Map



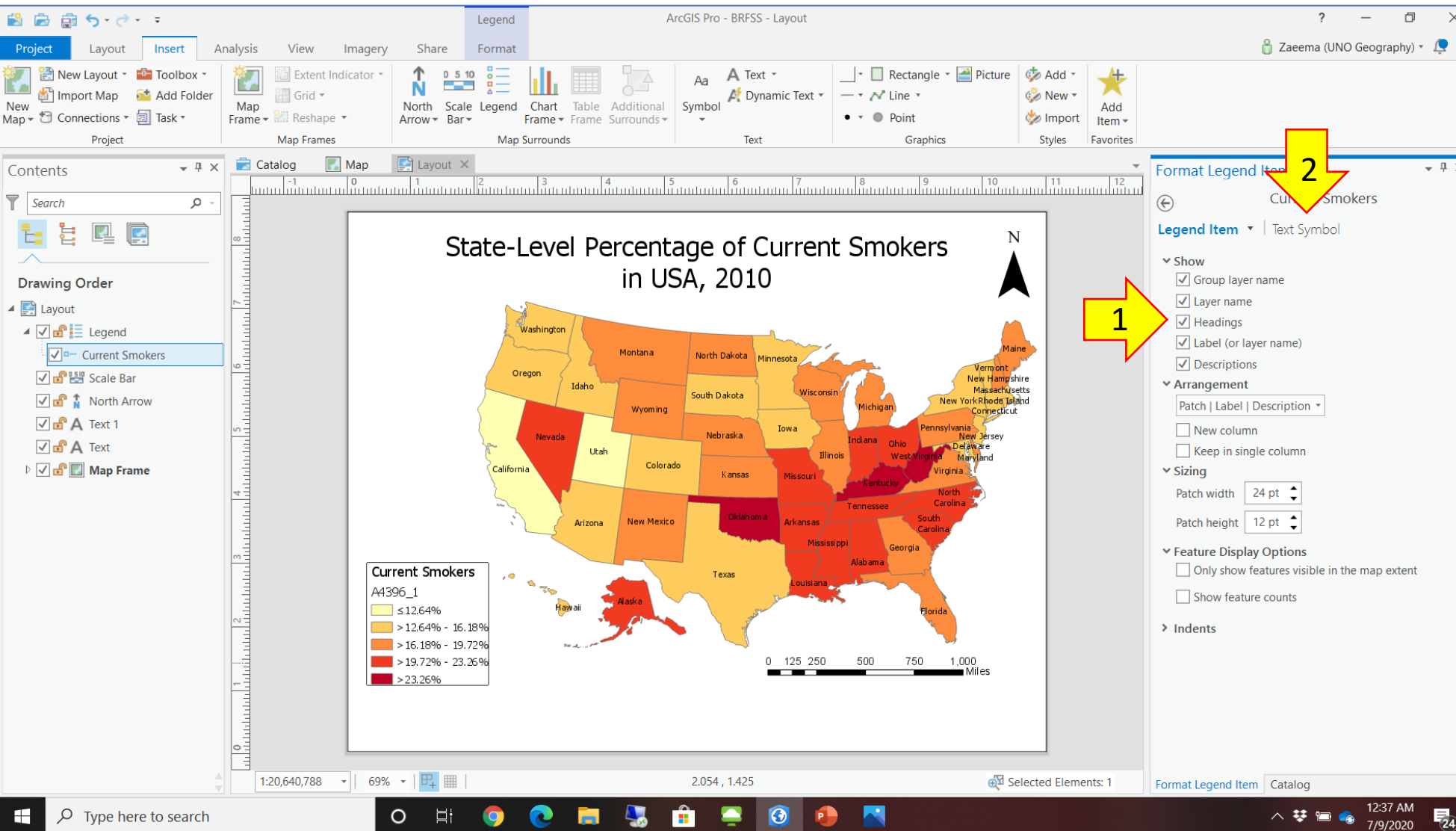
The number  
“A4396\_1” in the  
legend looks weird

To remove it from the  
legend double click  
the legend

“Format Legend”  
pane appears on the  
“Catalog” pane

Click “Show  
properties”

# BRFSS – Creating Map



Uncheck the  
“Headings” tab

Click the “Text  
symbol”

# BRFSS – Creating Map

The screenshot shows the ArcGIS Pro interface with a map titled "State-Level Percentage of Current Smokers in USA, 2010". The map displays the United States with states colored according to the percentage of current smokers. A legend in the bottom-left corner of the map area provides the color key:

Current Smokers	
≤12.64%	Lightest Yellow
>12.64% - 16.18%	Light Orange
>16.18% - 19.72%	Orange
>19.72% - 23.26%	Dark Orange
>23.26%	Red

The "Format Legend" pane on the right is open, showing the "Appearance" tab. The font settings are as follows:

- Font name: Calibri
- Font style: Regular
- Size: 16 pt
- Text fill symbol: Black
- Outline color: Black
- Outline width: 0 pt
- Underline: ☐
- Strikethrough: ☐

The "Apply" button at the bottom of the pane is highlighted with a yellow arrow.

Use the “Appearance” tab to change the size and type of the legend font

Whatever change you make here will apply to the whole legend

Click “Apply”

# BRFSS – Creating Map

State-Level Percentage of Current Smokers in USA, 2010

Current Smokers

- ≤12.64%
- >12.64% - 16.18%
- >16.18% - 19.72%
- >19.72% - 23.26%
- >23.26%

Legend

Legend

Options

Legend Items

Synchronize with map

Format Legend Catalog

To separately increase the size of the legend heading drop down the “Legend” tab

Click “Layer Names”

# BRFSS – Creating Map

State-Level Percentage of Current Smokers in USA, 2010

Current Smokers

- ≤12.64%
- >12.64% - 16.18%
- >16.18% - 19.72%
- >19.72% - 23.26%
- >23.26%

Format Legend

Legend

Layer Names

Gallery | Properties

Appearance

Font name: Calibri

Font style: Bold

Size: 18 pt

Text fill symbol: [Black Box]

Color: [Black Box]

Outline color: [Black Box]

Outline width: 0 pt

☐ Underline

☐ Strikethrough

AaBbCc

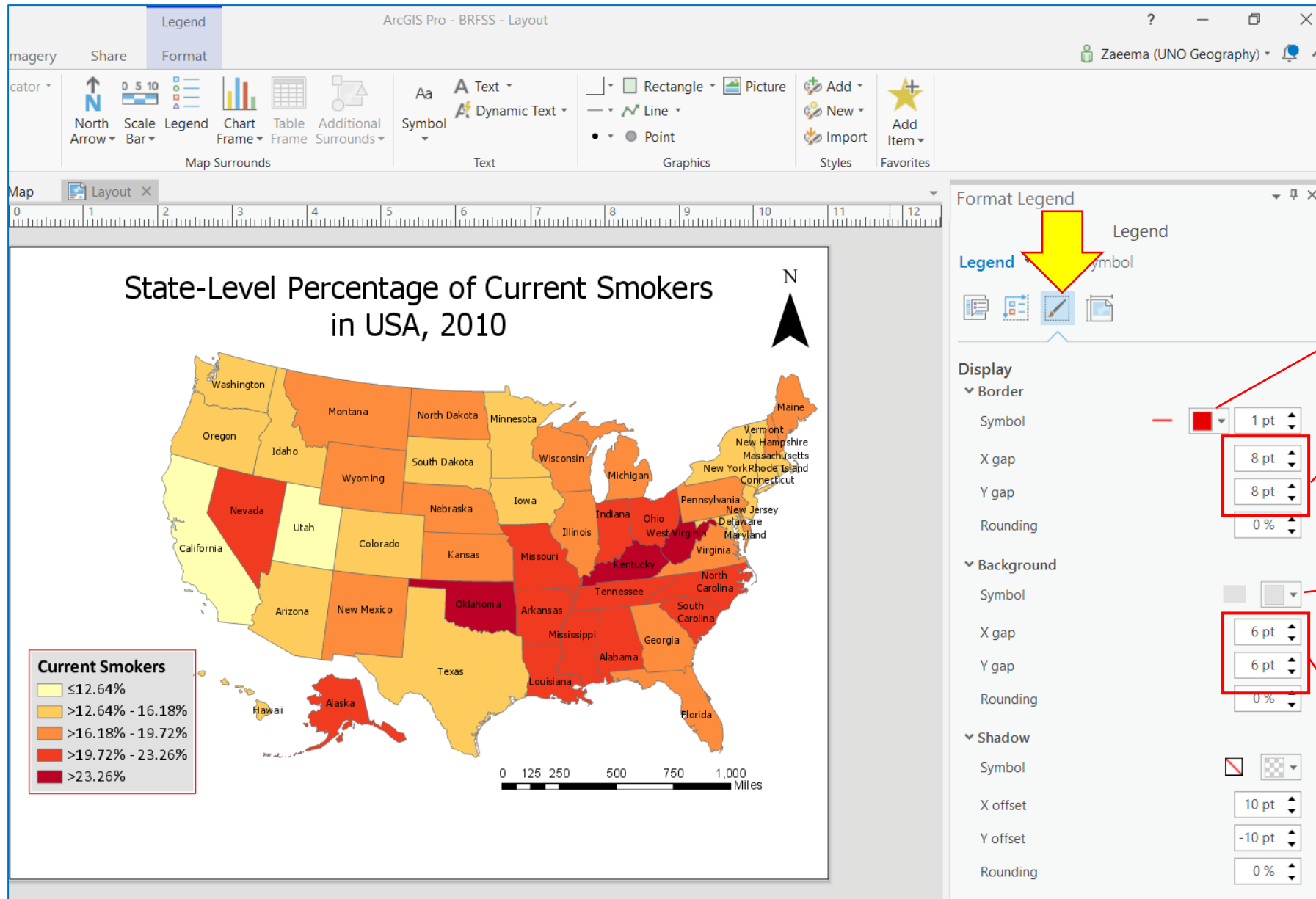
Apply Cancel

Under appearance, set the font style as bold and font size to 18

Click “Apply”

Click the back button

# BRFSS – Creating Map



Click the brush symbol to add a border and background to the legend

Drop down and add a red border

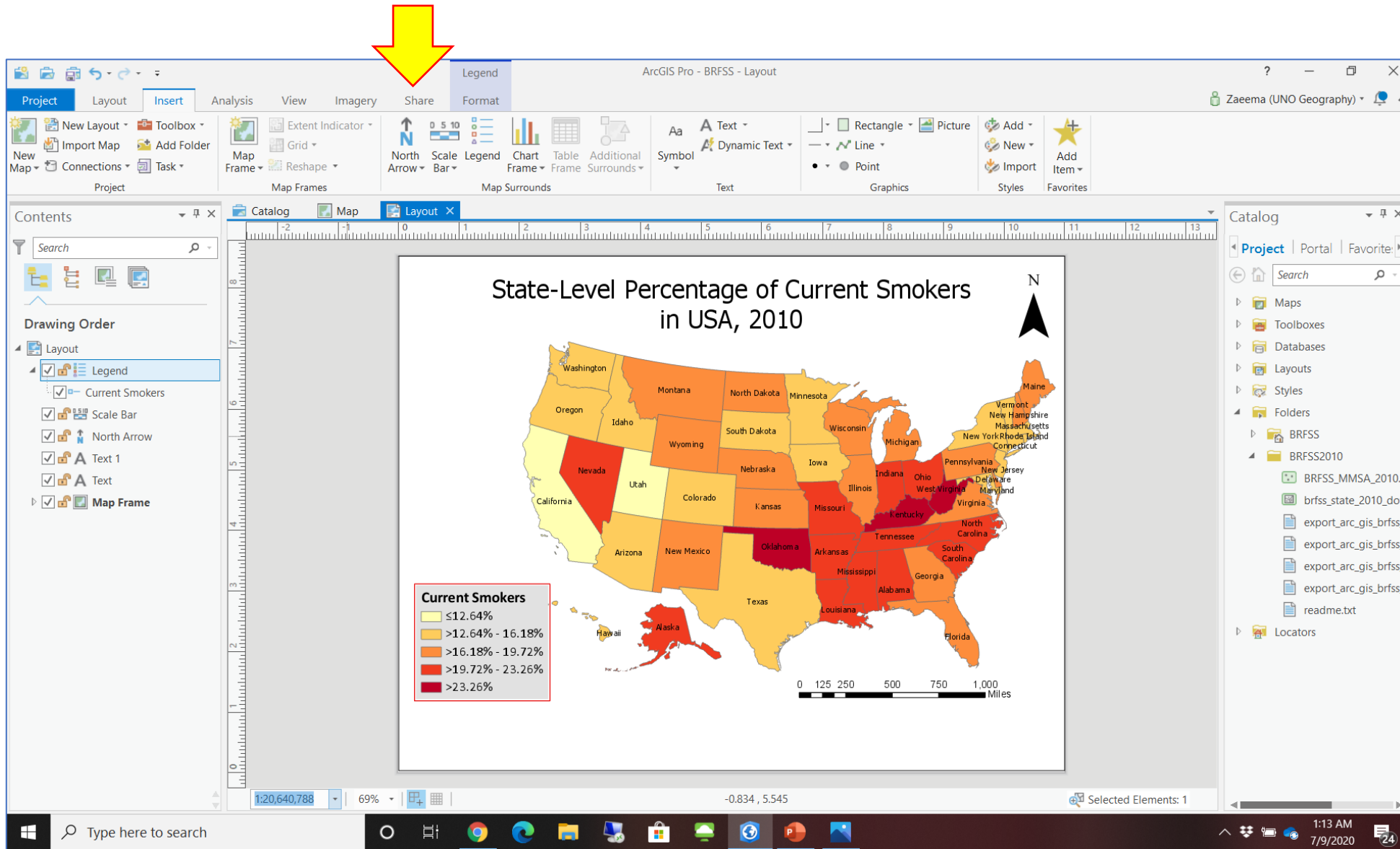
Change these from zero to some bigger numbers to shift the legend text a little away from the border

Drop down and select a grey background for the legend

Change these from 0 to bigger numbers until the background reaches the border



# BRFSS – Creating Map

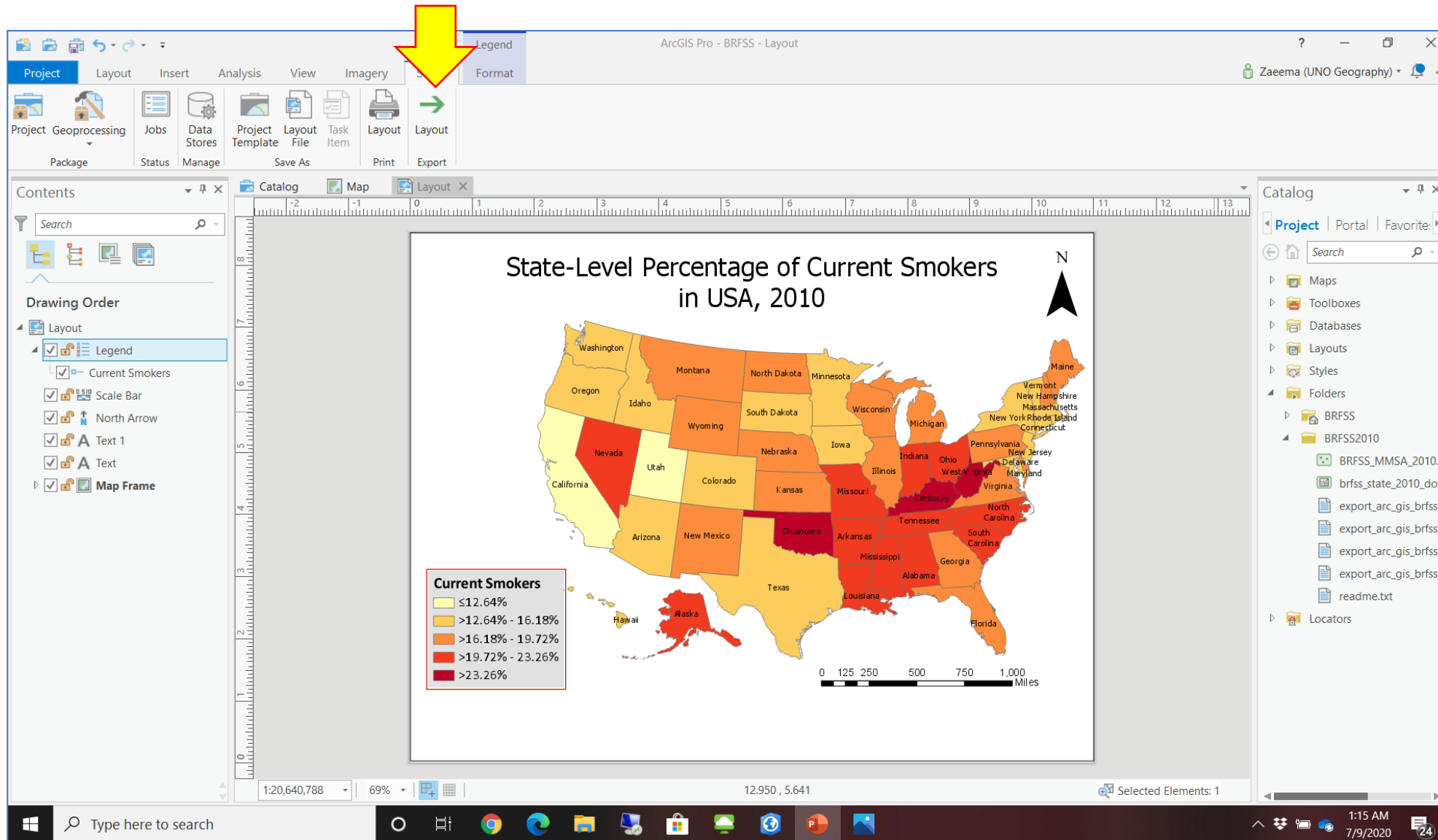


The map is ready

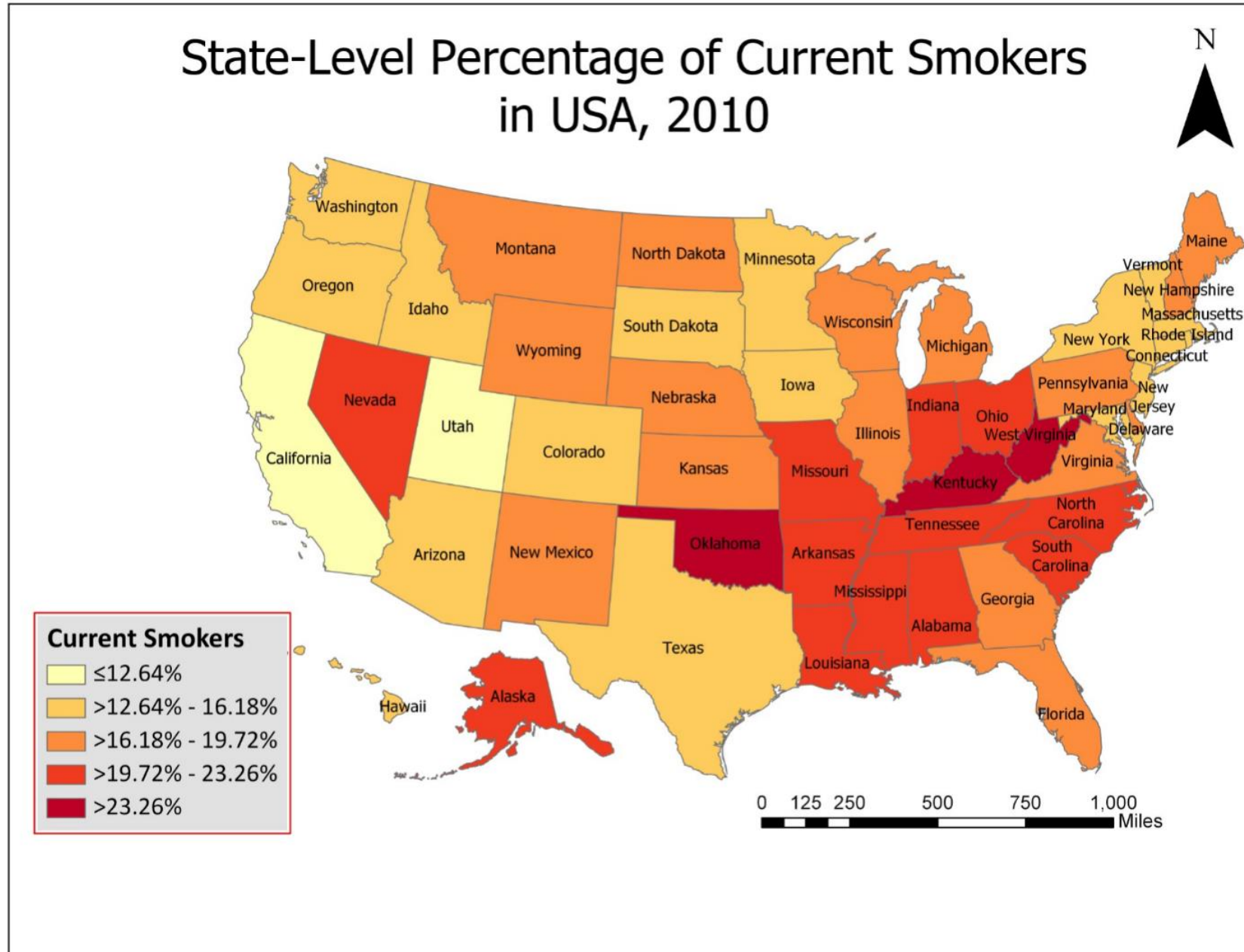
Click “Share” to export the map



# BRFSS – Creating Map

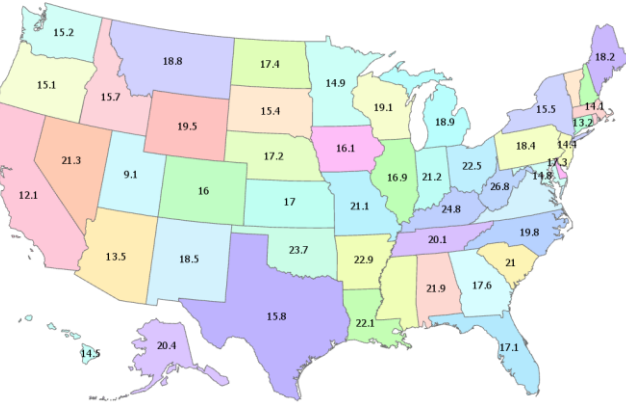


# BRFSS – Creating Map

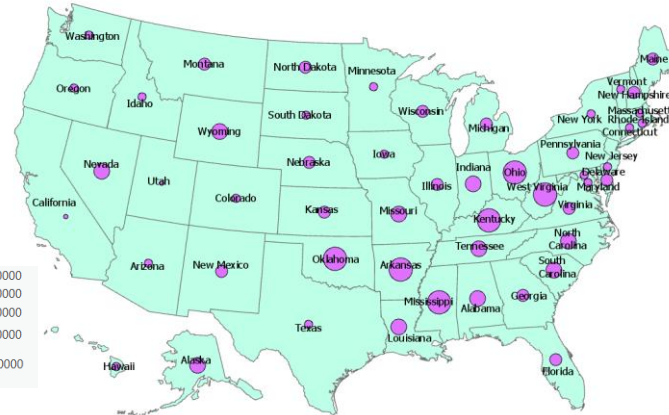


# Different symbology options (as introduced in slide 19)

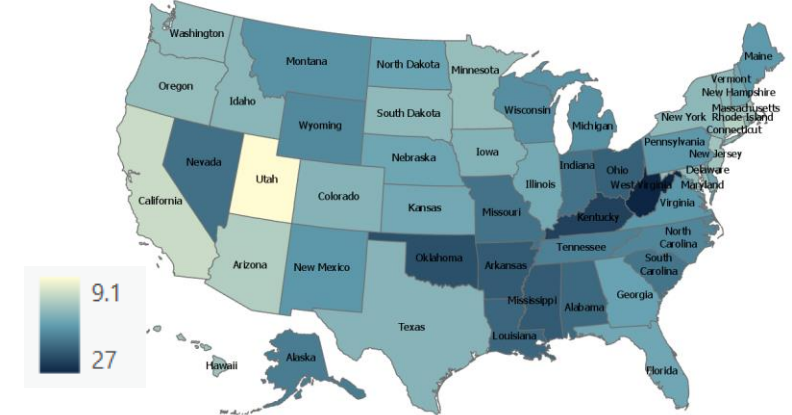
Unique values: Will simply show each state with a different color without any grouping. Use Label properties to put the percentage for each State on the map



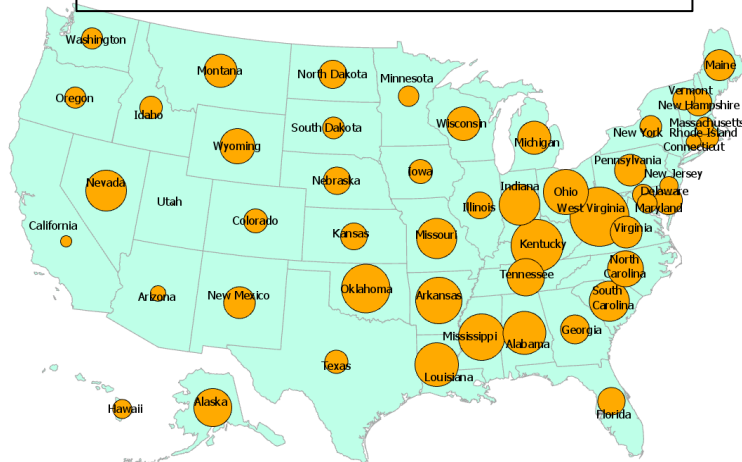
Graduated symbols: Circle size represents each range



Unclassed colors: There are no classes in the legend but just a graduated range



Proportional symbols: Like graduate symbols but circle size in graduate symbols represents the range, while circle size in proportional symbols represents each individual state percentage



Dot density: More useful for population measures. Each dot here represents 1%. The percentage of current smokers in California is 12%, so there will be 12 dots in California





# University of Nebraska<sup>SM</sup> Medical Center

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