Working with Data Frames

In this Chapter you will learn

- What a data frame is and how to adjust its properties such as size and background color
- How to use data frames to create inset maps, rotate your map and create a graticule
- How to control annotation groups in the data frame properties

1. Data Frames

Layers in a map are contained inside a data frame. When you open a new map it only contains one data frame which, by default, is called "Layers". Figure 1 shows the table of contents and the layout of a map document with two data frames. The "Layers" data frame contains the information about earthquakes in Custer County while the "Inset Map" shows where Custer County is located inside Idaho. Note that each data frame appears as its own separate map or "map body" on the layout of the overall map document.

Figure 2 shows the tabs available to you in the data frame properties which can be accessed by right-clicking on the name of the data frame (for example by clicking on the word "Layers") and choosing "Properties". Here is a summary of the controls found on various tabs. We will be using a number of those in the exercises in this chapter.

- The <u>General</u> tab allows to give your data frame a name and specify the units (e.g. feet, meters) used in your map.
- The <u>Data Frame</u> tab allows you set the extent of your map, in other words it controls how many miles your map is across. You can set your extent
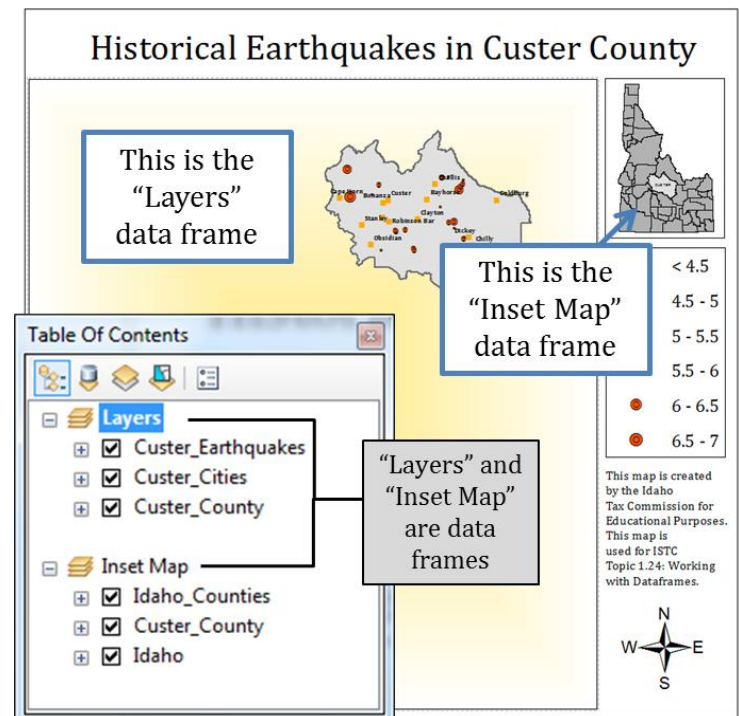

Figure 1. This map has two data frames: "Layers" for the main map body and "Inset Map" for an inset map.
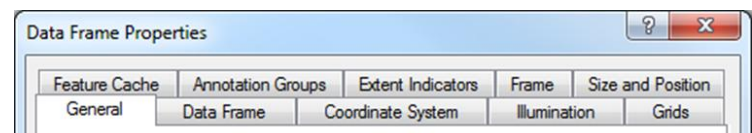

Figure 2. A data frame has a number of properties associated with it that control the look, extent and content of a map.

manually or have it depend on the extent of data contained in your map.

- The coordinate System tab controls the coordinate system in which your map is displayed. Note that it does not change a coordinate system that is associated with a GIS layer, only the way it is displayed on this particular map.
- The Illumination tab can be used to change the angle of the sun when you are displaying a digital elevation model or a hillshade.
- Grids allow you to add meridians and parallels to your map.
- The Feature Cache tab allows you to create caches for specific map extents which speeds up the rate at which ArcMap draws map.
- The Annotation Groups allows you to turn annotation labels on and off.
- The Extent Indicators tab allows you to set the extent of one data frame to match the extent of another. This is a handy feature when you are working with dynamic map books (see ISTC topic 3.13.
- The Frame tab allows you to set the background color, border type and drop shadow for your map. We will experiment with this in this tutorial.
- You can set the size and position of a map on the entire layout on the Size and Position tab. However, usually it is easier to set those parameters by sizing and moving a map body in the layout view using your mouse.

VIDEO

1.24 Changing the data frame projection

2. Changing the data frame projection

The way your map looks depends on the projection that has been set in your data frame. For example, the figure on the right shows you Owyhee County in the IDTM83, Geographic NAD83 and – for fun – in African Sinusoidal projections. Obviously, given the part of the world you are working in, some projections work better than others.


Idaho Transverse Mercator (IDTM83)   Geographic NAD83   African Sinusoidal
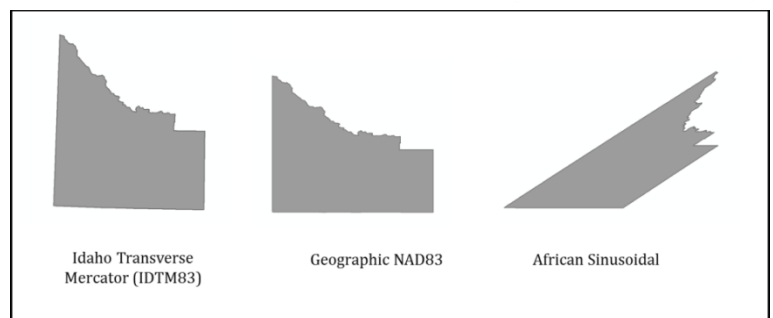
Exercise 1: Changing the projection of your data frame

1. Start ArcMap and open a new map document. Add the shapefile depicting Owyhee County from the Topic1_24 folder.

2. Right-click on the data frame called "layers" (which is the default name for your data frame) in the table of contents as shown on the right. Click on Properties.
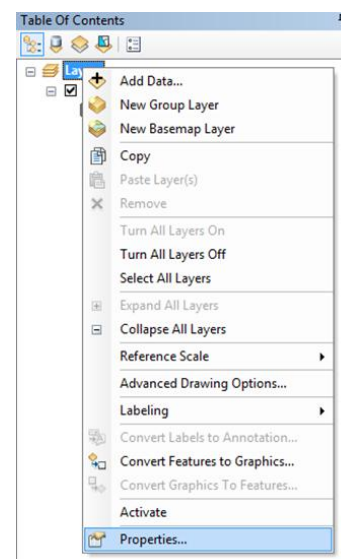
3. Click on the "Coordinate System" tab and you will notice that the coordinate system is set to IDTM 83. ArcGIS typically sets the coordinate system of the data frame to match the coordinate system of the first GIS layer you add to a data frame.

4. Next you will set your data frame to the Geographic NAD83 coordinate system. Do this by clicking on Predefined > Geographic Coordinate Systems > North America > NAD 83 as illustrated below. Then click OK and observe how the shape of Owyhee County changes.
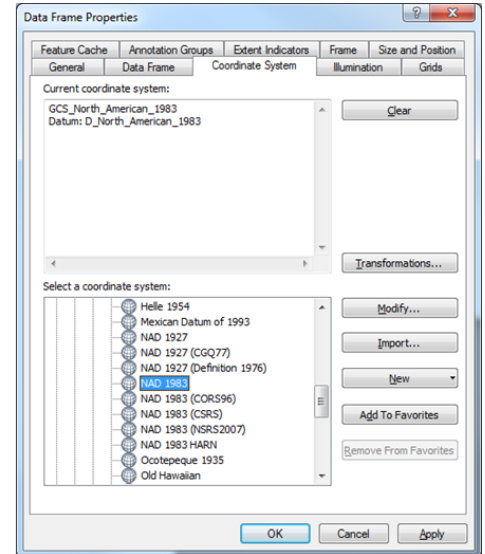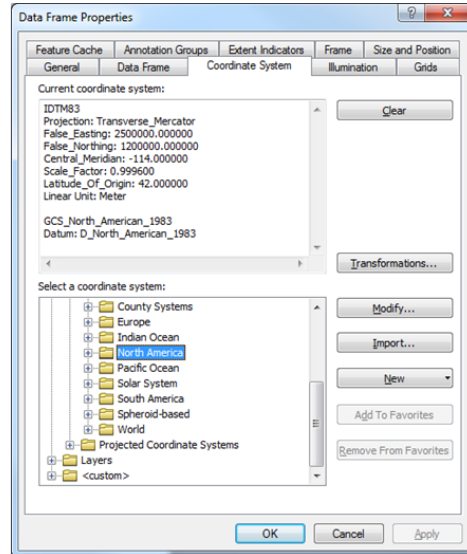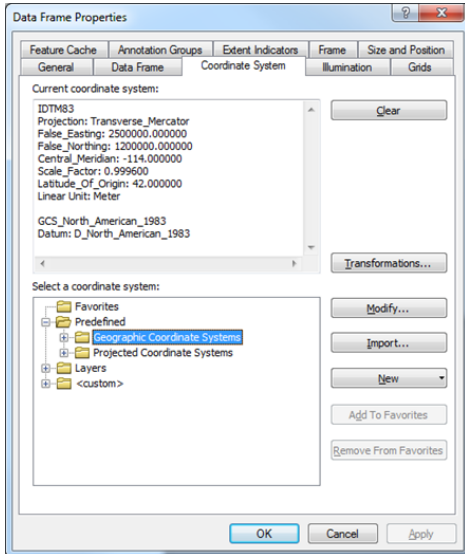

3. Changing the rotation of your map

Sometimes the boundaries displayed in your map don't line up well with the edges of your paper. Here is how you rotate your map.

VIDEO

1.24 Changing the rotation of your map

Exercise 2: Changing the rotation of your data frame

1. Open a new map document in ArcMap and add the Owyhee County shapefile from the Topic1_24 folder.

2. Right-click on the "Layers" data frame and click on properties. You can change the rotation on the "General" tab. The figure on the right shows you how Owyhee County rotates as you type in different values for the rotation. Experiment with the rotation value.


Change the rotation of your map here

Rotation = 0

Rotation = 1

Rotation = 45
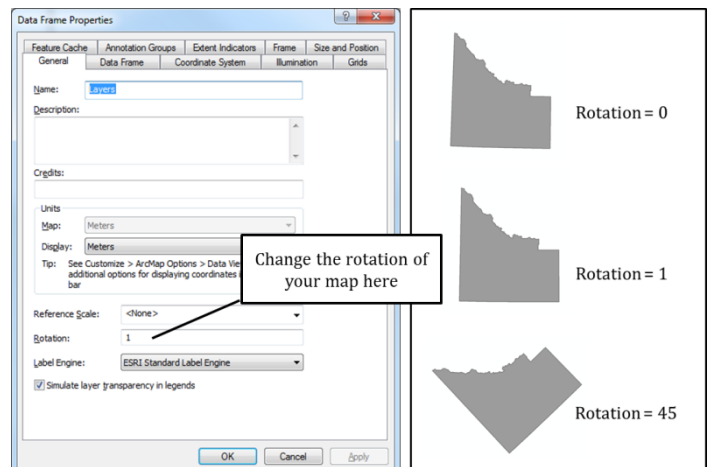
## 4. Adding a new data frame and changing how it is displayed

Exercise 3: Adding a data frame and setting data frame properties

1. Note that all the data is located in the Topic1_24 folder.

2. Open a new map document in ArcMap. Go to File > Page and Print Setup… Use the figure on the right to set the page size to "Letter" which has a width of 8.5 inches and a height of 11 inches.

3. Click OK to close the Page and Print Setup dialog box.

4. Go to the layout view (View > Layout near the top of your screen). You should see your "Layers" data frame on your page.

Select Elements Tool
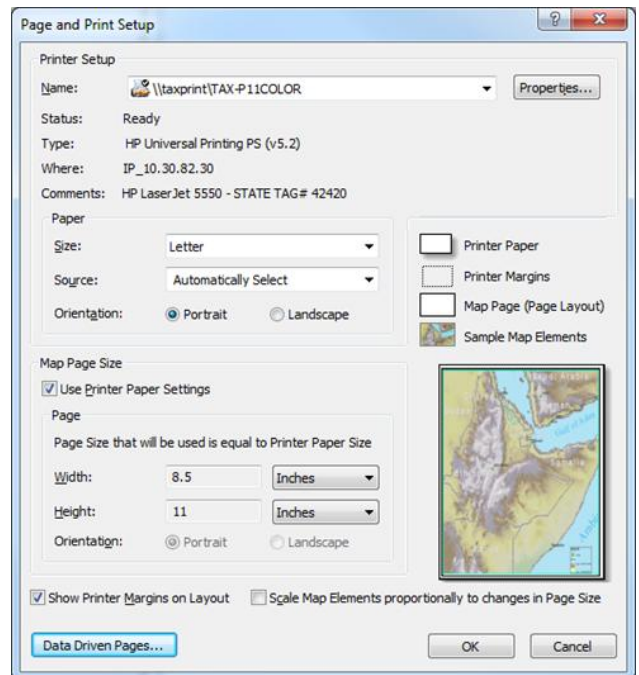
5. Grab the "Select Elements" tool and hover your mouse over a corner of your data frame. Resize your data frame as shown on the bottom of this page.

6. Open the properties for the "Layers" data frame and go to the General tab. Change the name from "Layers" to "Main Map". Note that the name also changes on your page in the Layout view.

Grab corners and resize the data frame called "Layers"

4
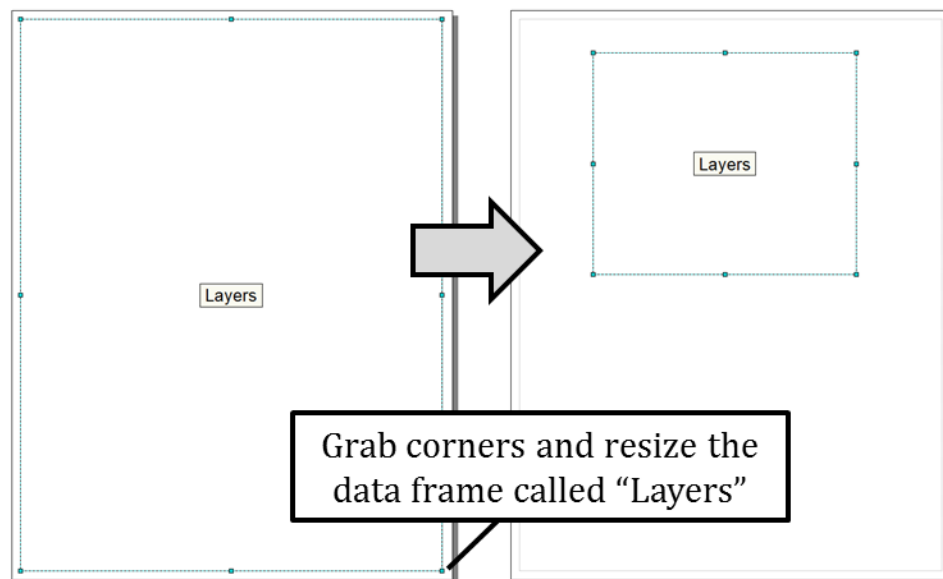
7. Insert a new data frame by clicking "Insert" along the top of your screen and then on "Data Frame" as shown on the right.

8. Right-click on "New Data Frame" in the table of contents to open its properties. Then change the name to "Inset Map".

9. Move and resize your Main Map and Inset Map in the Layout so that they do not overlap. Make the Main Map larger than the Inset Map. For example, you can size the data frames in the same way as shown on the right where the main map is on the top, and the inset map is in the lower-right corner.
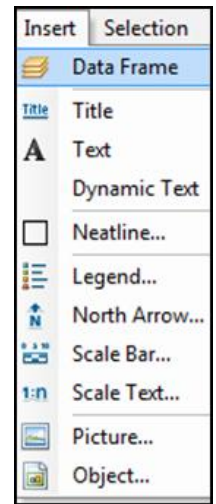
10. Open the properties for the Main Map and go to the Frame tab and select a border your like. Set the background color to "Circular Gradient" and choose a Drop Shadow. Click OK to note the changes in the layout view.

11. (Optional) Change the background color, border and drop shadow for your inset map.

12. Use the Select elements tool and click anywhere in your inset map. Note that "Inset Map" is now displayed in bold font in your table of contents. Click on the "Main Map" in the layout and note that now the "Main Map" is displayed in bold in the table of contents.

13. With the "Main Map" in bold, or **activated**, click the Add Data button and add Custer County.

14. Right-click on "Inset Map" in the table of contents and click "Activate". This is another way to change the focus to a data frame. When we click Add Data now ArcMap will add this layer to the Inset Map data frame. Add the Idaho shapefile.

15. In the layout view click on the Inset map to activate it. Then right-click on the Inset Map data frame and click Add Data. Add the Custer County shapefile.

16. Finally we will resize the inset map. Go to the data frame properties for the inset map and go to the Size and Position tab. Set the Width to 2.5 inches and the Height to 3 inches.

17. Click on the inset map with the Select Elements tool to select it. Then hoover your mouse until it turns into a four-headed arrow. Move your inset map to the right so it lines up with the Main Map. Use your Zoom tools and ensure that Idaho just fits inside the Inset Map. Your map may now look the one shown on the right. Save your map in the intermediate folder.
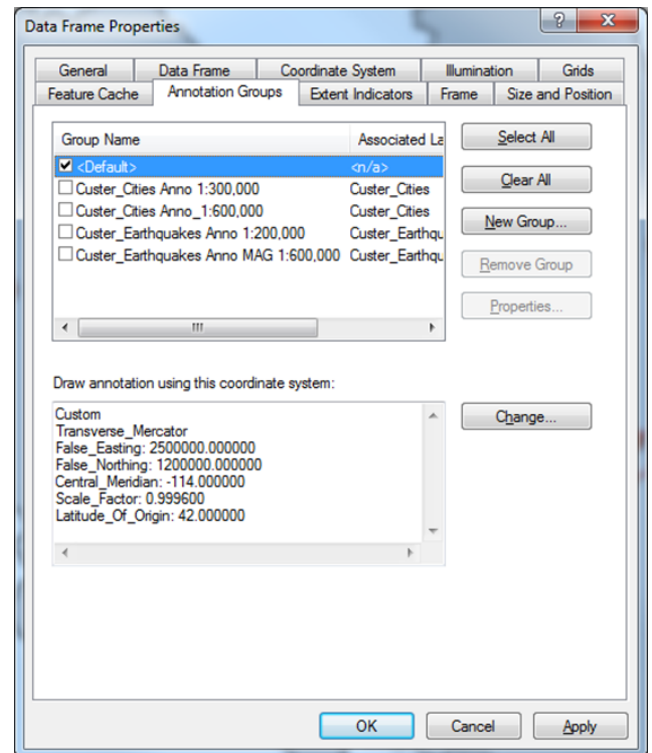
5. Working with annotation groups

Exercise 4: Working with annotation

1. Open the Exercise4_Working_with_Annotation.mxd in the Topic1_24 folder. You can see a map with historical earthquakes and cities in Custer County. However, none of them are labeled.

2. Set the scale of the map to 1:600,000 as shown on the right.

Type 600,000 in this box

3. Open the properties for the Layers data frame and go to the Annotation Groups tab.

4. Note that this map has four annotation groups. There are two groups with labels for the cities in Custer County and two for the earthquakes in Custer County as shown on the right. One of cities annotation groups was generated when the map was at a scale of 1:300,000 and the other at 1:600,000. Let's compare those first by turning both city annotation groups on. Click Apply (this will leave the Data Frame Properties dialog box open) and move the dialog box to the side so you can see your map.

5. Notice that all Cities have two labels. The larger ones were created when the map was set to a scale of 1:600,000 and are easier to read. Zoom to 1:300,000. Which labels seem better now? Zoom to 1:150,000. What do you think?

1:600,000
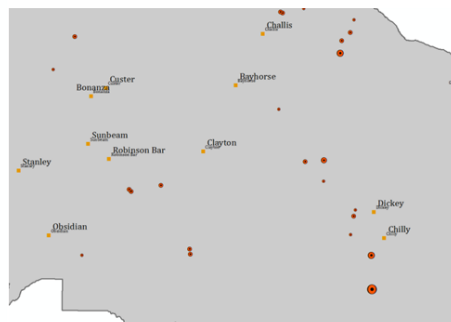
1:300,000
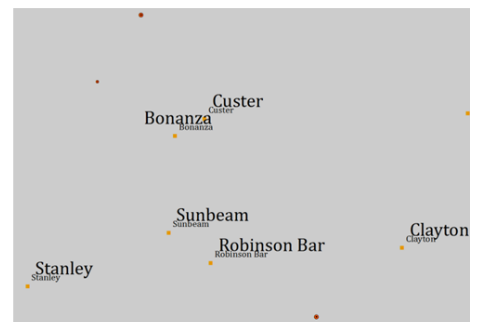
1:150,000

6. Turn both Cities annotation groups off. Zoom to 1:600,000 and turn both annotation groups for the earthquakes layer on. The 1:200,000 scale layer shows both the magnitude of the earthquake as well as the year the quake appeared. Which annotation group works best for 1:600,000? Zoom to 1:200,000. What do you think of the annotation now? When you are done turn all annotation groups off.

7. In the last part of this exercise we will create three annotation groups for the Counties layer for three different scales: 1:600,000, 1:200,000 and 1:50,000.

8. Zoom to 1:600,000 and open the Layer Properties for Custer_County. Go to the Labels tab and set the Label Field to NAME and the font type to Cambria size 10 as shown on the right. Check the box in the top-left corner to display the label on the map. We will use the same font and font size for all three annotation groups.
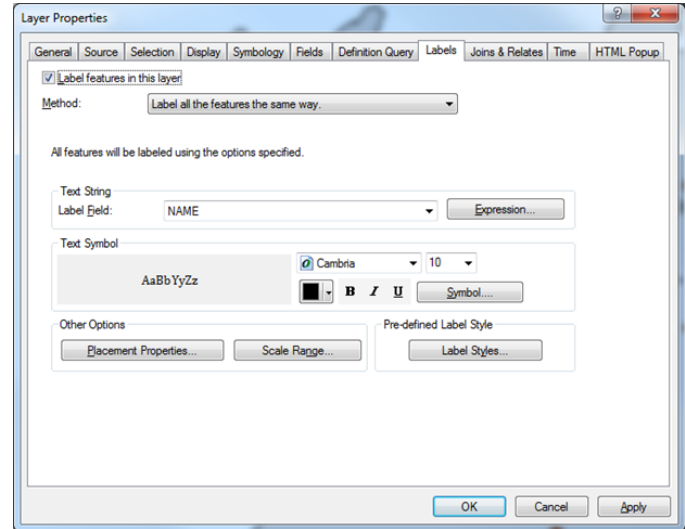
9. Click OK to close the Layer Properties.

10. Right click on the Custer_County layer and select "Convert Labels to Annotation..."

11. Set up annotation in the map as shown on the right.

12. Go to the Annotation Groups tab in the Layers data frame properties and turn off the annotation you just created.

13. Zoom to 1:200,000. Open the Layer Properties for Custer_County and verify that the font is still set to Cambria size 10 on the Labels tab. Check the "Label the features in this layer" to turn on the labels. Click OK to close the Layer Properties.

14. Right-click on Custer_County and select "Convert Labels to Annotation..". Complete the dialog box the same as you did before, except name the Annotation Group "Custer_County_Anno_1:200,000". Click Convert. Then go into the data frame properties and turn this annotation group off as well.
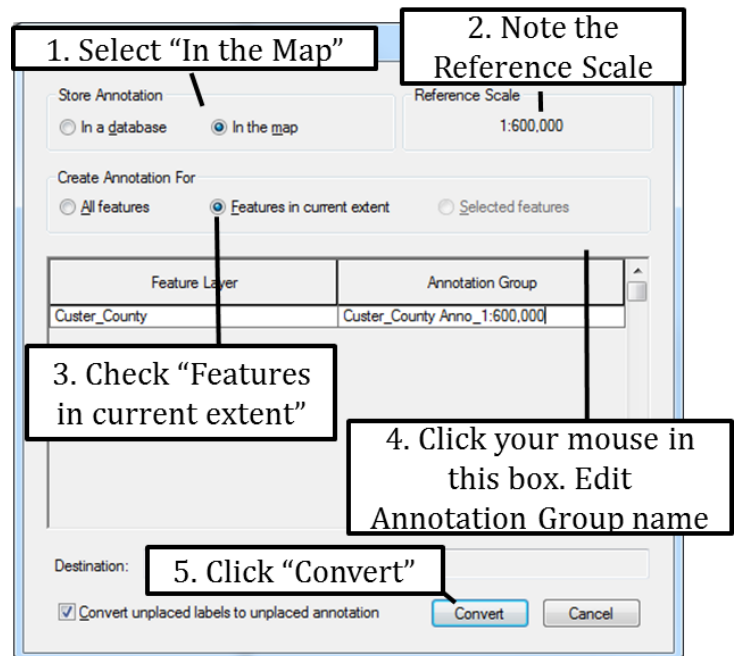
15. Finally, zoom to 1:50,000 and repeat the same process to create an annotation group for Custer_County at this scale.

16. Turn all three Custer_County annotation groups on and compare how each looks at different scales. Recall that all three annotation groups were based on the <u>same settings</u> (i.e. same font and font size) on the Labels tab of the Custer_County layer. The size differences between the three different annotation groups are only a result of the map scale at the time that the annotation was created.

VIDEO

1.24 Creating a Graticule

6. Graticules

Exercise 5: Adding a graticule to your map

1. Open a new map document in ArcMap. Add the USA shapefile from the Topic1_24 folder.

2. Open the "Layers" data frame properties and go to the Grids tab as shown on the right.

3. Click "New Grid". Click "Next" or "Finish" on the following 4 dialog boxes to accept all the default settings to create a graticule. Go to View > Layout View.

4. Use the Select Elements and Zoom tools to size and center the United States, for example to the size and extent shown in the example map below. Note that the graticule that has been added to your map.