Introduction to ArcGIS

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Items to be turned in.

Goals of the Exercise

This exercise introduces you to ArcMap and ArcCatalog. You use these applications to create a map of pan evaporation stations in Texas, and to draw a graph of monthly pan evaporation data measured at these stations. You use ArcCatalog to create a new personal geodatabase and import shapefiles to a feature dataset. The relationship between ArcGIS and MS Word and Excel is demonstrated so that you can create graphs in Excel, maps in ArcGIS and place the result in a Word file as a report for this homework. In this way, you link the spatial location of the observation sites, with the time variation of the water observations data at those sites. You will also use ArcGIS Online to create a web map of evaporation data and save that so that it can be publicly viewed.

Computer and Data Requirements

To carry out this exercise, you need to have a computer, which runs ArcGIS Desktop version 10.3. (This exercise will also work with version 10.2 if you do not have access to 10.3.) You will also need an ESRI Global Account to enable you to login to ArcGIS Online. If you do not already have an ESRI Global Account, go to: https://www.arcgis.com/home/createaccount.html and create one.

In the first part of this exercise using ArcGIS Desktop, you will be working with the following spatial datasets:

1. A polygon shapefile of the counties of Texas, called **Counties**
2. A point shapefile of pan evaporation stations, called **Evap**
3. A polygon shapefile of the state of Texas, called **Texas**

These shapefiles consist of several files (e.g. **evap.dbf, evap.shp, evap.shx).** You can get them from this zip file: http://www.caee.utexas.edu/prof/maidment/giswr2015/Ex1/Ex1Data.zip

You need to establish a working folder to do the exercise on. This can be in any convenient location on the computer you are working on (e.g. C:\Users\dtarb\Ex1).

After you have downloaded the zip file **Ex1Data.zip** double click on the file and you should see Winzip or other zip utility to open the file on your computer (if it doesn't open you'll have to unzip this file on a computer that has a zip utility installed). Extract all files from the zip file to the working folder that you've set up to do this exercise. You should end up with a file list that looks something like this. You may see these data within a sequence of folder names, and if so, click on each folder down through the sequence until you locate the required files.

Name	Date modified	Type	Size
Counties.dbf	9/5/2012 11:41 AM	DBF File	47 KB
Counties	9/5/2012 11:41 AM	PRJ File	1 KB
Counties.sbn	9/5/2012 11:41 AM	SBN File	3 KB
Counties.sbx	9/5/2012 11:41 AM	SBX File	1 KB
Counties.shp	9/5/2012 11:41 AM	SHP File	8,450 KB
Counties.shp	9/5/2012 11:41 AM	XML Document	22 KB
Counties.shx	9/5/2012 11:41 AM	SHX File	3 KB
Evap.dbf	9/5/2012 11:33 AM	DBF File	30 KB
Evap	9/5/2012 11:33 AM	PRJ File	1 KB
Evap.sbn	9/5/2012 11:33 AM	SBN File	1 KB
Evap.sbx	9/5/2012 11:33 AM	SBX File	1 KB
Evap.shp	9/5/2012 11:33 AM	SHP File	2 KB
Evap.shx	9/5/2012 11:33 AM	SHX File	1 KB
Texas.dbf	9/5/2012 11:44 AM	DBF File	1 KB
Texas	9/5/2012 11:44 AM	PRJ File	1 KB
Texas.sbn	9/5/2012 11:44 AM	SBN File	1 KB
Texas.sbx	9/5/2012 11:44 AM	SBX File	1 KB
Texas.shp	9/5/2012 11:44 AM	SHP File	1,058 KB
Texas.shp	9/5/2012 11:44 AM	XML Document	20 KB
Texas.shx	9/5/2012 11:44 AM	SHX File	1 KB

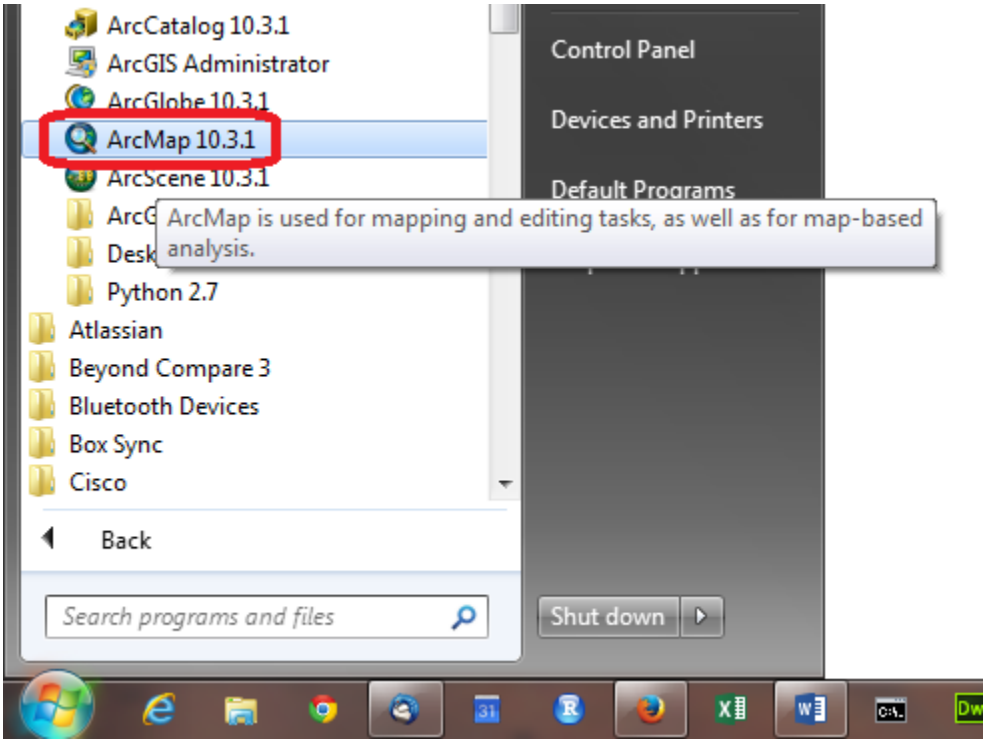
Procedure

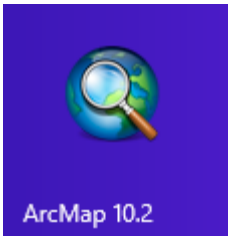
Please note that the following procedure is a general outline, which can be followed to complete this lesson. However, you are encouraged to experiment with the program and to be creative.

1. Viewing Shapefiles in ArcMap

A *shapefile* is a homogenous collection of simple features that includes geometry and feature attributes. The attributes are contained in a dBase table, which allows for the joining with a feature based on the attribute key.

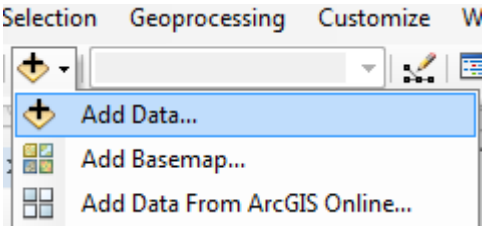
Open **ArcMap** and select the A **new empty map** option. If you are using Windows 7, hit the Start button and you'll see a series of options for ArcGIS. Select ArcMap.



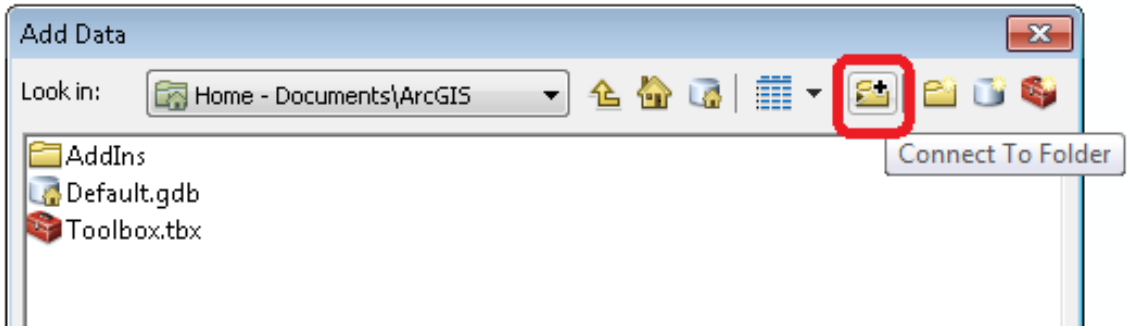
If you are using Windows 8, you'll see 

in your Windows display. If you don't see that, then just type "ArcMap.." and you'll see the program symbol appear.

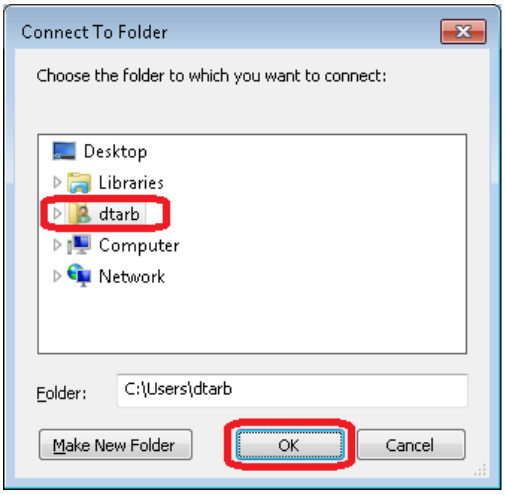
Use the **Add Data** button to add the data for this exercise to the ArcMap display.



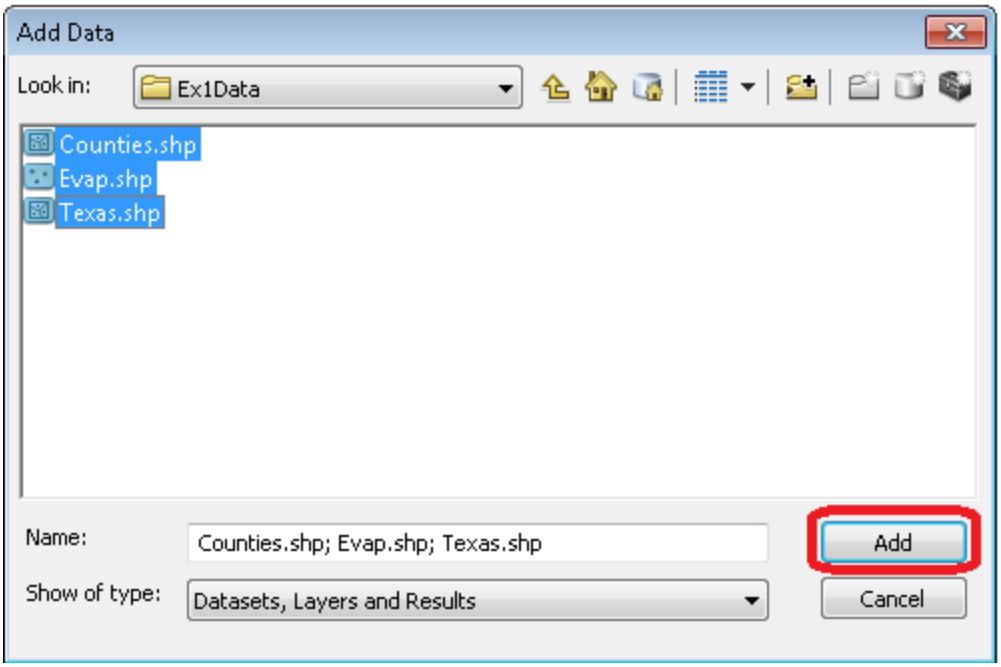
To enable navigation to the folder, which contains the data, first select **Connect to Folder**

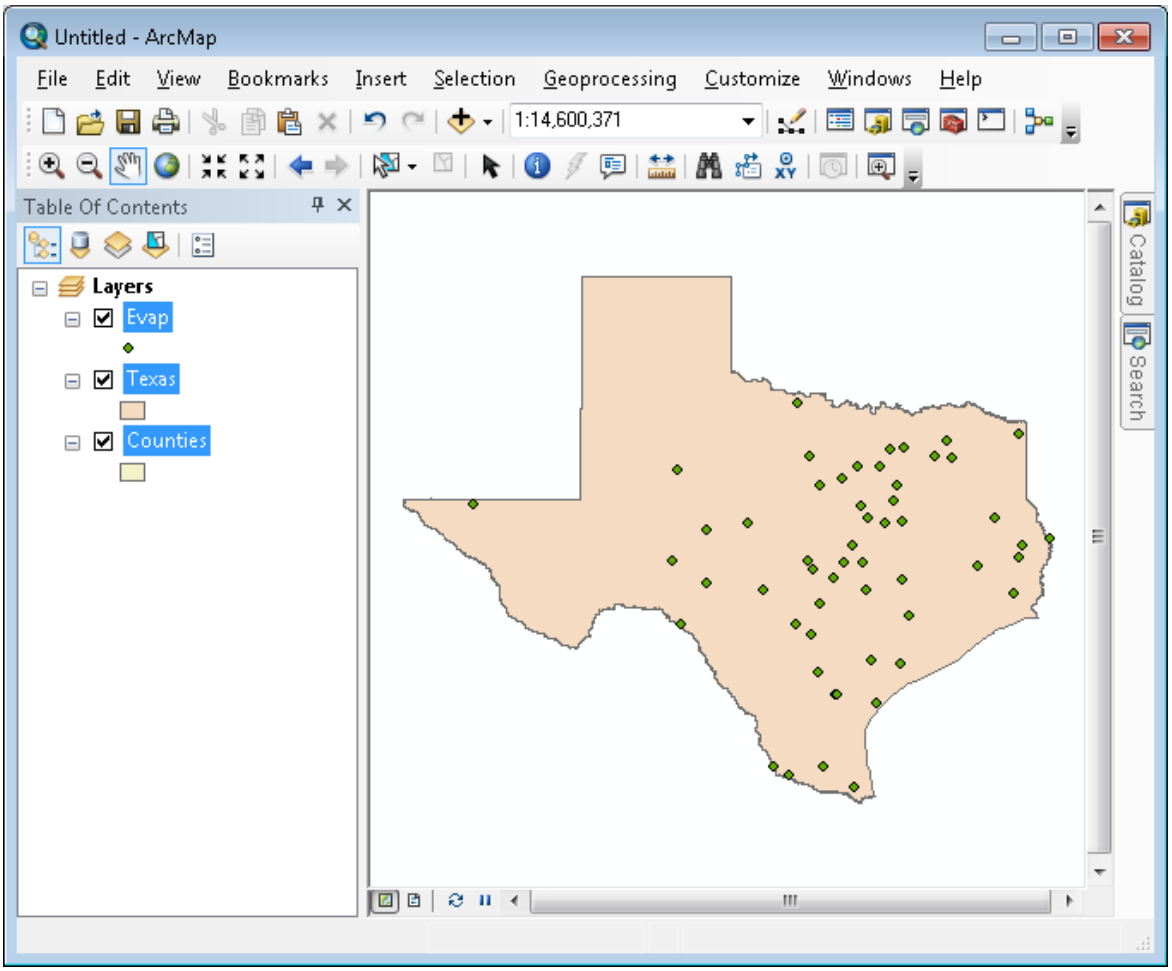


and navigate to the folder that contains your files. Here I selected my entire user folder so that ArcGIS has access to any files there.

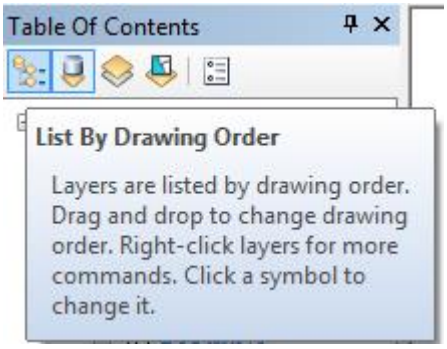


Then navigate to the folder containing the exercise data and select all three files at once by using the shift key. Click the Add button to add the data to your ArcMap display.

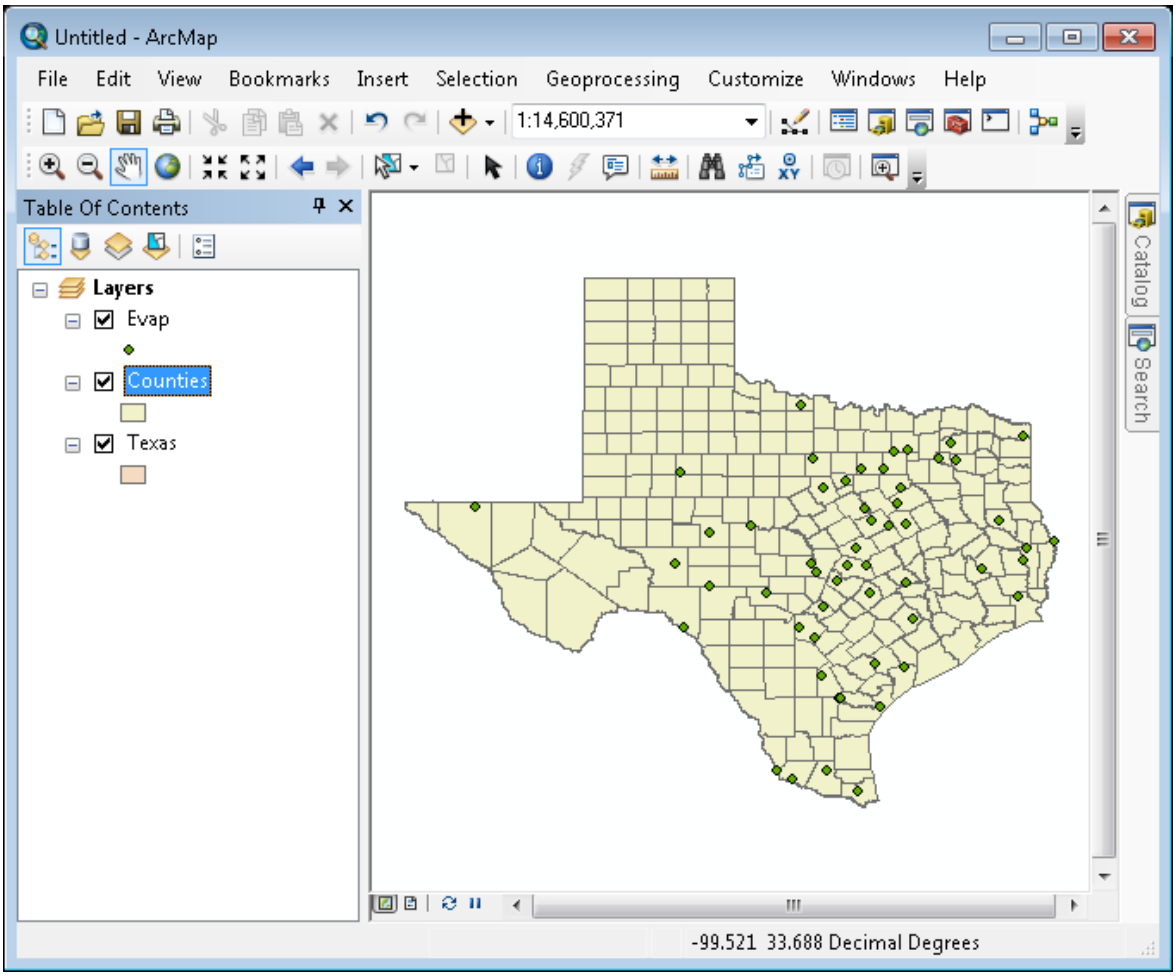

Add Data
Look in:
Ex1Data
Counties.shp
Evap.shp
Texas.shp
Name:
Counties.shp; Evap.shp; Texas.shp
Add
Show of type:
Datasets, Layers and Results
Cancel


Untitled - ArcMap
File Edit View Bookmarks Insert Selection Geoprocessing Customize Windows Help
1:14,600,371
Table Of Contents
Layers
Evap
Texas
Counties
Catalog
Search

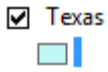
The display should look something like the above. Depending on the order in which themes were added the **Texas** theme may lie above the **counties** theme so you cannot see the **counties** theme. Click on the **List by Drawing Order** button in the Table of Contents page:



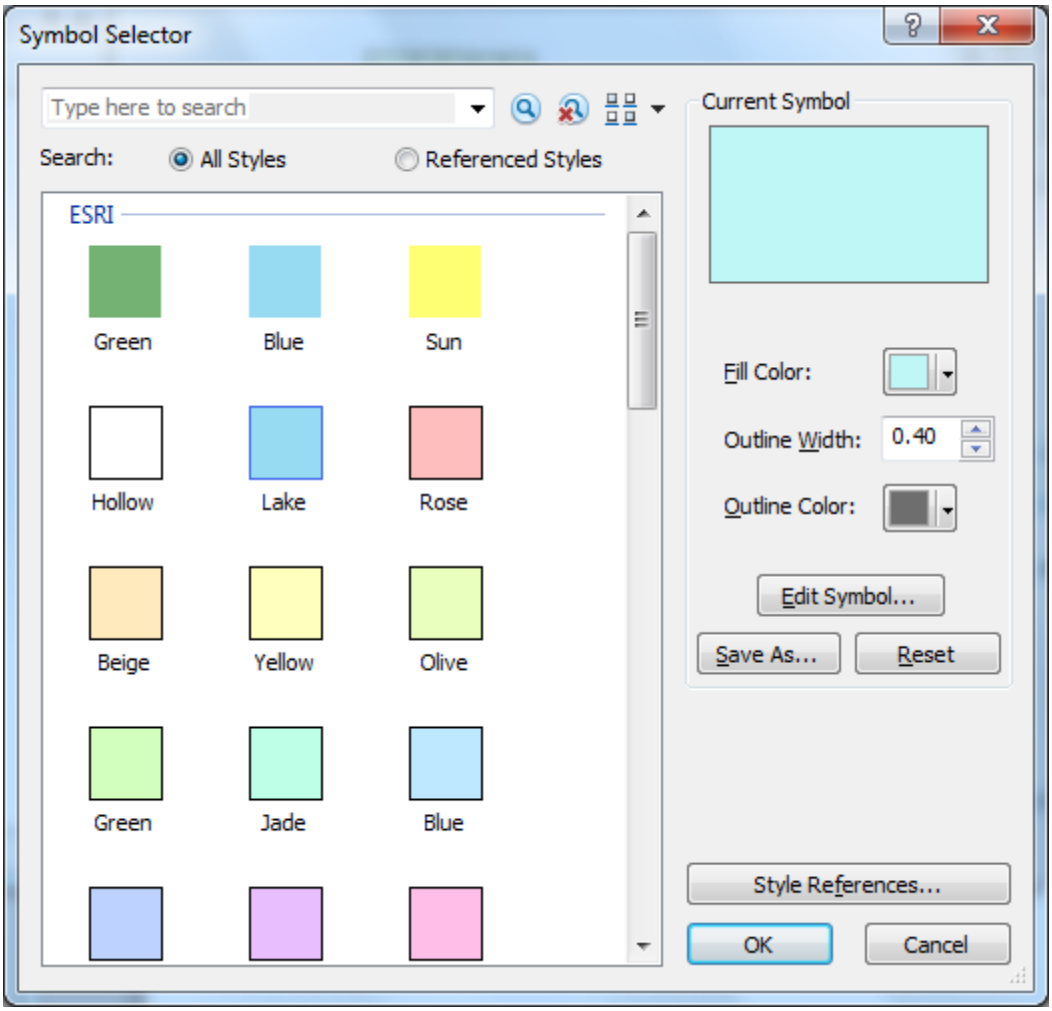
Click in the **Table of Contents** area below the feature class names so that three themes are no longer highlighted, then click on the **counties** theme and drag it up so that it is located above the **Texas** theme. You'll then get a display showing the counties.



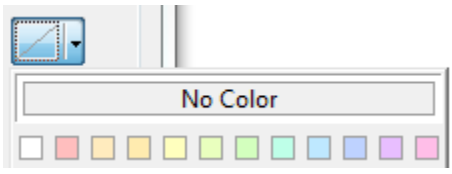
To change the appearance of a map display, you can access the **Symbology** menu just by clicking on the Symbol



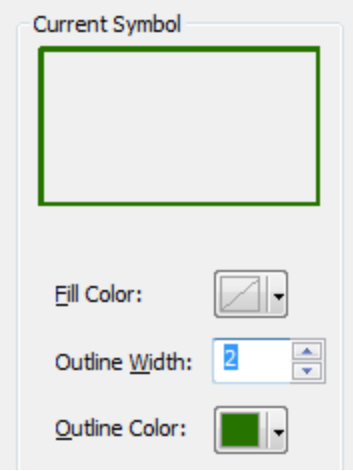
displayed in the ArcMap table of contents, and you'll get the **Symbol Selector** window



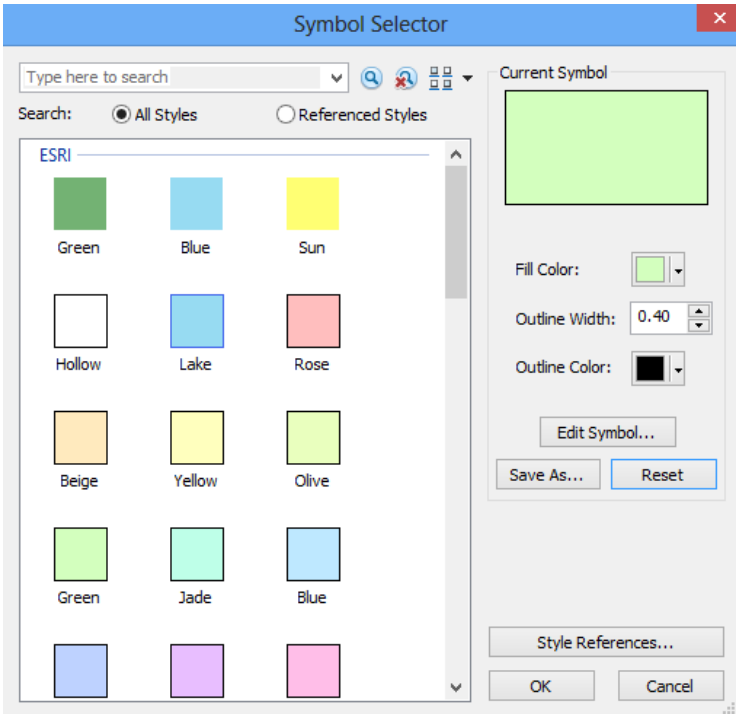
Click on the symbol color box, make your selections for the **Fill Color, Outline Width** and **Outline Color**, and click OK. You can show the outline of the State of Texas more distinctly by using the **No Color**

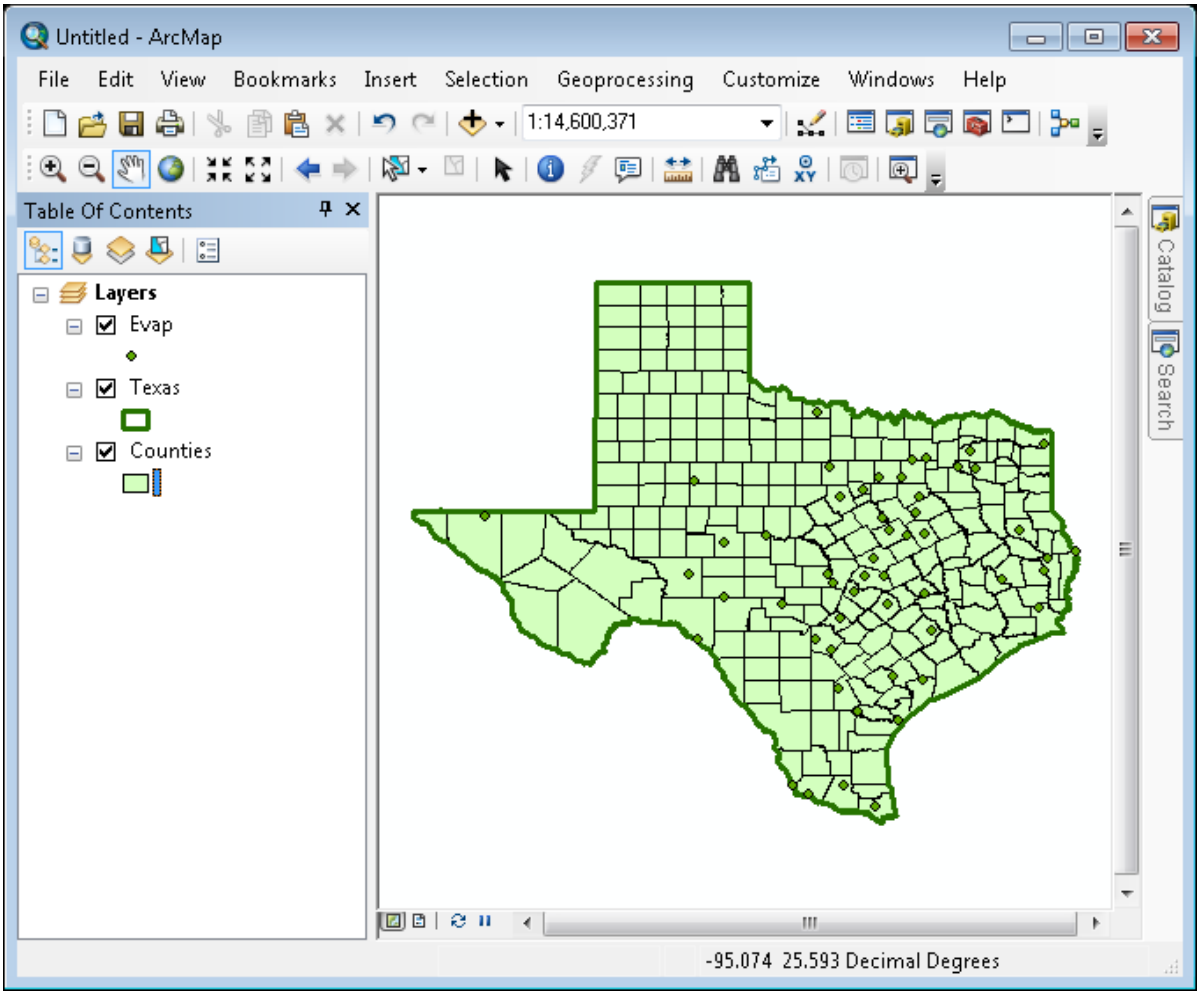


symbology for the Fill Color and then changing the Outline Color to Green and the **Outline Width** to 2.

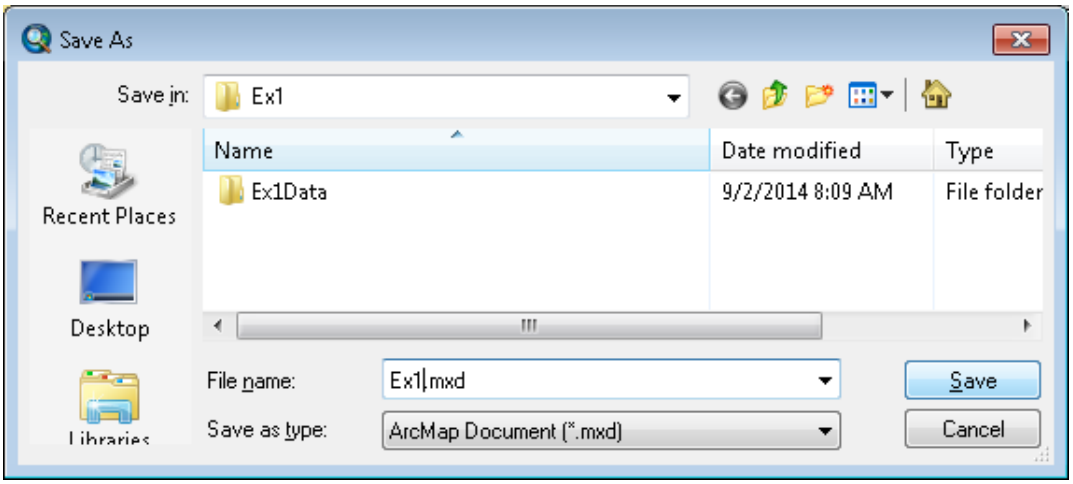


Drag the **Texas** layer above the **Counties** layer, and you'll see that the Counties are not obscured as they were before and the State of Texas is highlighted with a nice Green outline! We are green in Texas! If you have another color for your Counties, then click on the Counties symbol in the Legend and in the **Symbol Selector** window that appears select a nice green color and hit Ok to recolor your counties.





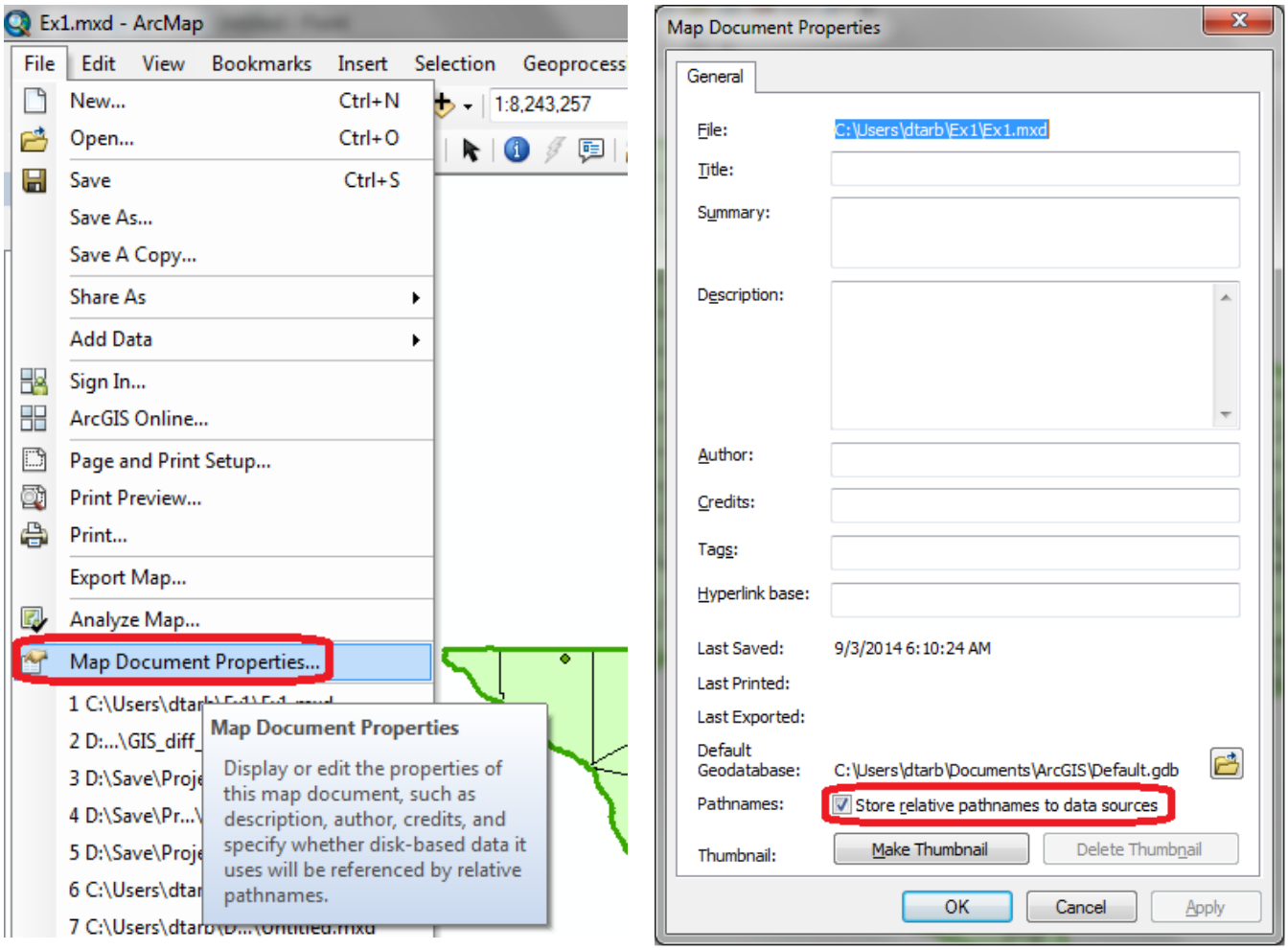
Save your work in ArcMap by choosing **File/Save** and, after navigating to your working directory, naming the file **Ex1** (the file will be assigned the extension mxd). When you do this, the **Ex1.mxd** file contains the table of contents and symbology information for your map. You can shut down Arc Map and then invoke Arc Map again and reload the same map display by clicking on **Ex1.mxd**.



Note that the mxd file that is saved does not contain the data. Rather it contains references to the data. This means that if you move the data files and then try and load the map document that ArcMap may not be able to find the data.

Helpful Tips:

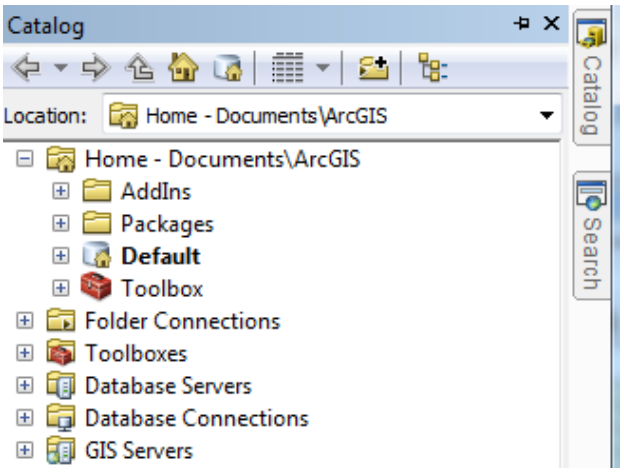
It is often helpful to set **Map Document Properties** to store relative pathnames to data sources. Then if you keep the map document and its data in the same folder and move the entire folder between computers the references to the data in the map persist.



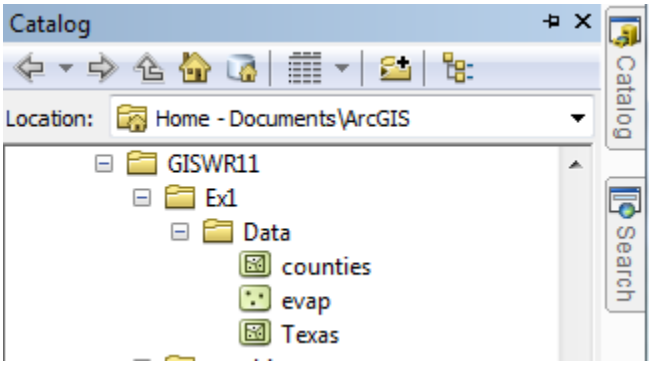
Also, if you open your ArcMap Ex1.mxd file later from another location in your file system, you may see a red exclamation points beside your feature classes. If this happens, in ArcMap, right click on the feature class use **Data/RepairData Sources** to relocate the file location where the corresponding data are now stored and your map will display correctly again.

2. Viewing Shapefiles in ArcCatalog

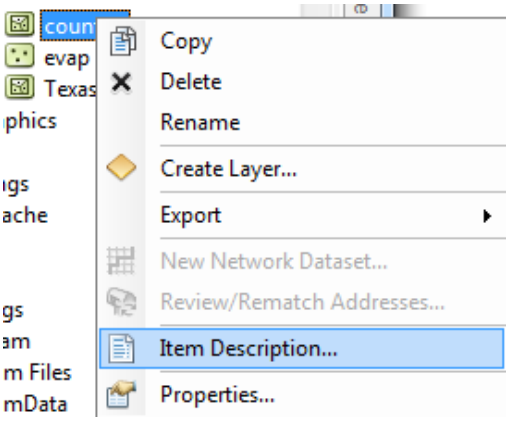
Open **ArcCatalog** by clicking on the Catalog tab on the right hand side of the map display



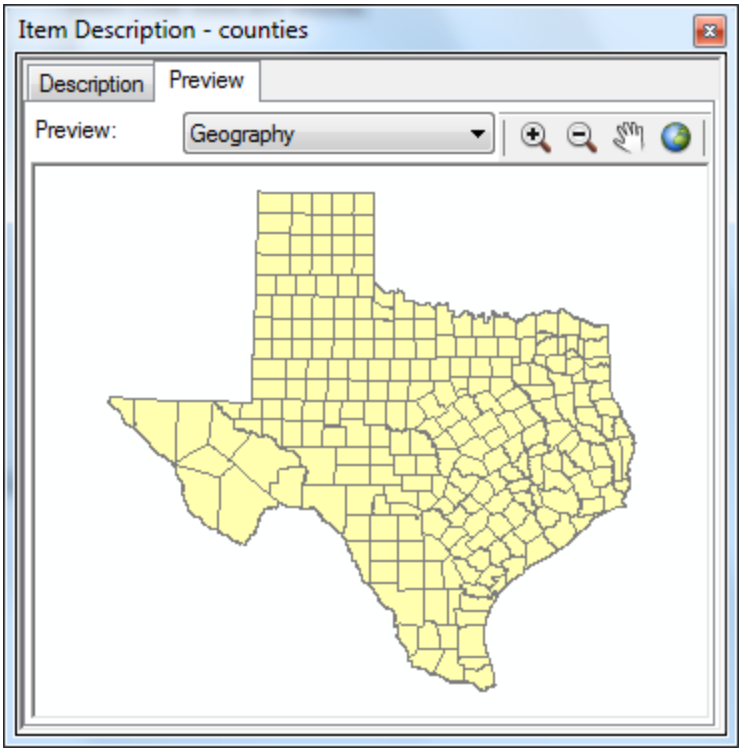
Click on the "Folder Connections" button and navigate to where your data are stored.



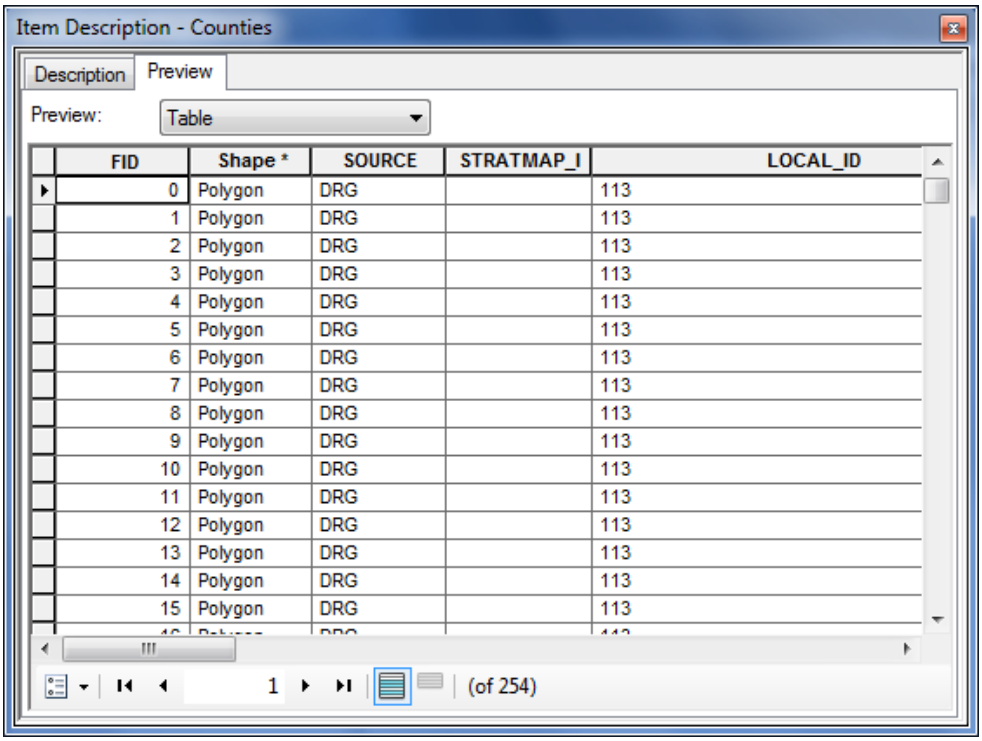
If you right click on a data layer, you can obtain an **Item Description**



Select the **Preview** tab and then **Geography** to see a map of the feature class

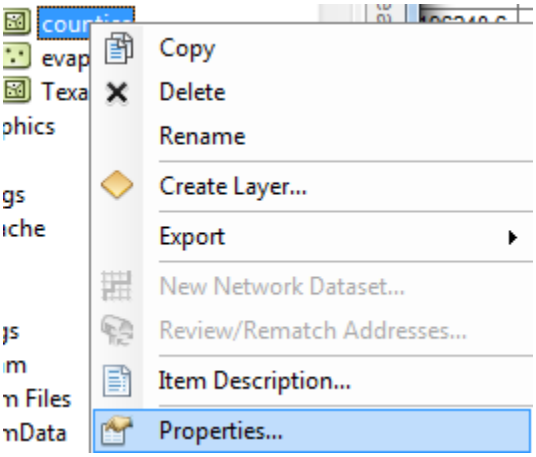


And then select the **Table** view

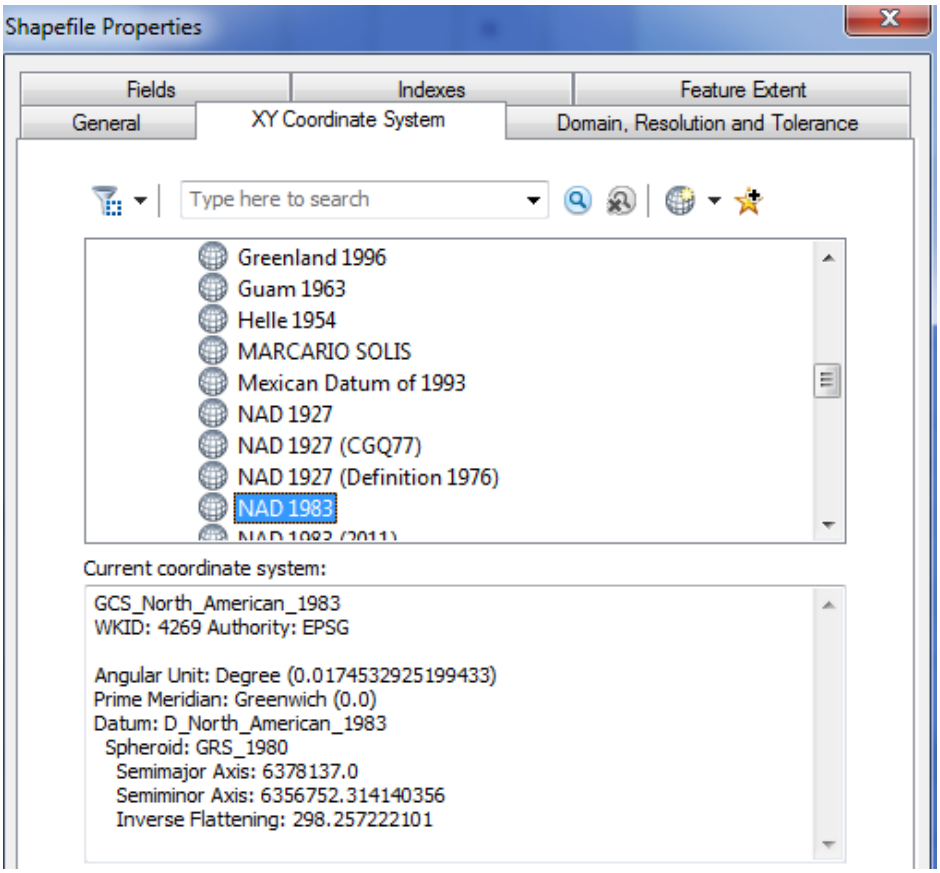


The attributes FID, Shape, Area and Perimeter are standard attributes for ArcGIS feature classes. The units of the area and perimeter are defined from the map units of the feature class.

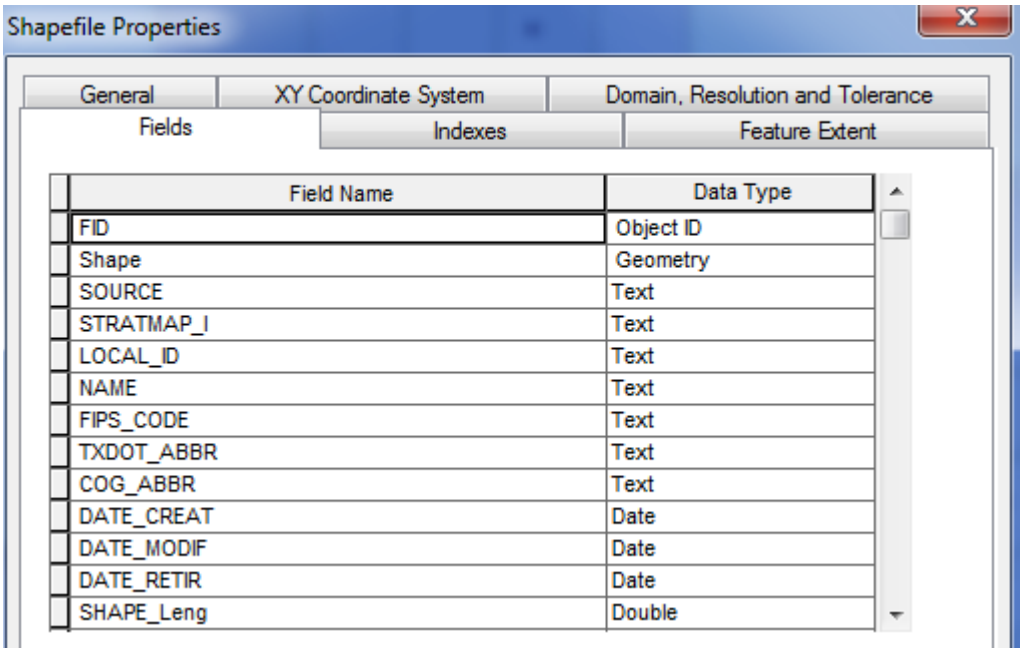
If you right click on a feature class and then select **Properties**



And select **XY Coordinate System** which shows you the parameters of the coordinate system of these data, **NAD83**, or the North American Datum of 1983. This provides a rather complicated set of parameters that we'll learn more about later.



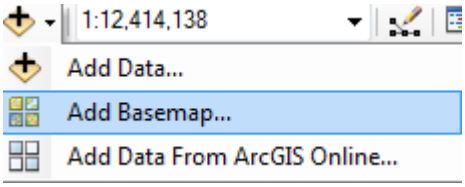
If you click on the **Fields** tab, you'll see a formal definition of each attribute field with its **Field Name** and **Data Type**. In this case, **ObjectID** means a special data type that indexes each feature as an object in the GIS, **Geometry** means that the Shape field has geographical coordinates stored in it, and **Float** and **Double** mean decimal numbers in single or double precision, respectively. There are some other data types such as Short and Long integers, Text and Date types that we'll encounter later in the course.

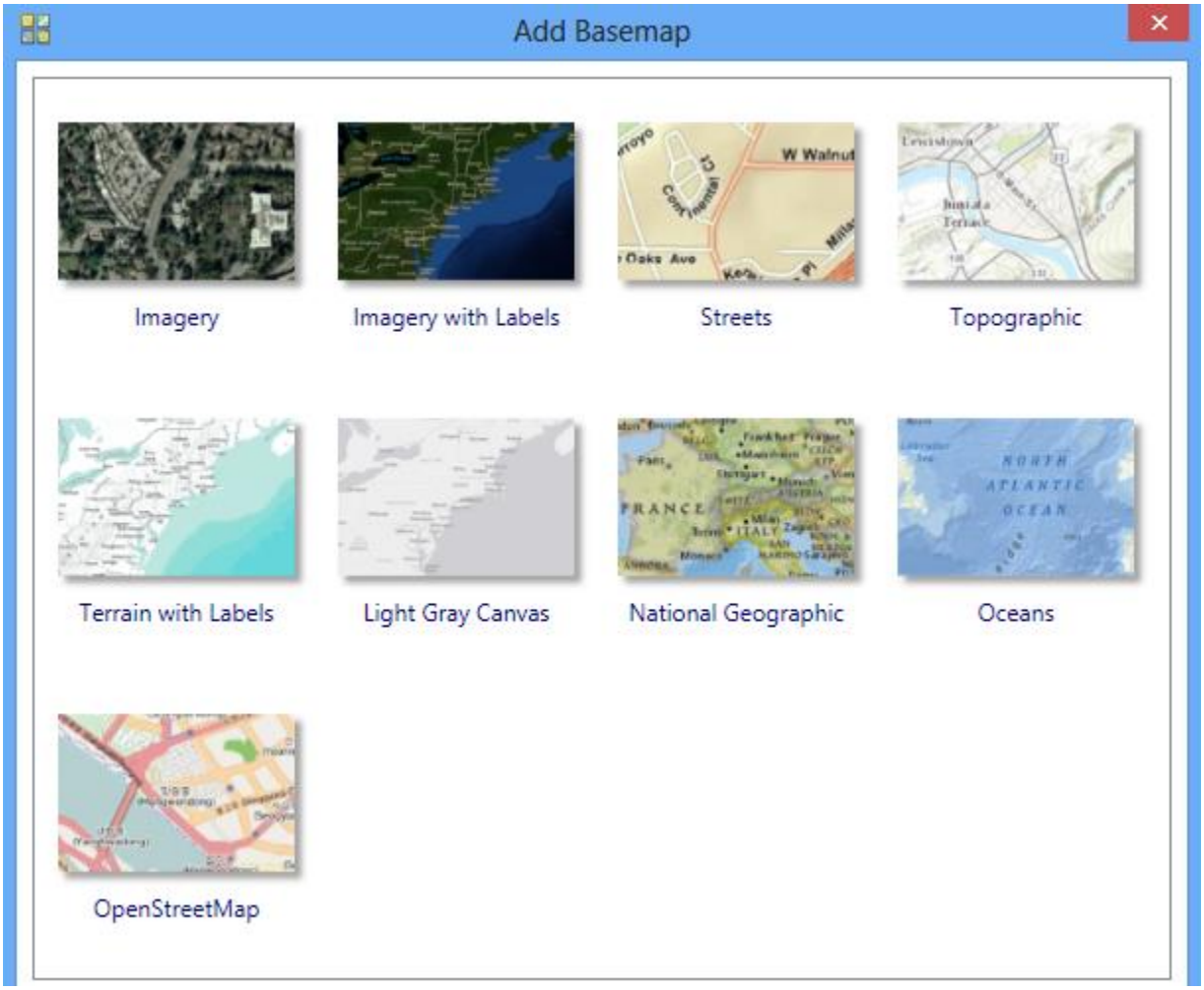


Click on the other two data layers**, Evap** and **Texas** to preview them also.

3. Using Base Maps from ArcGIS Online

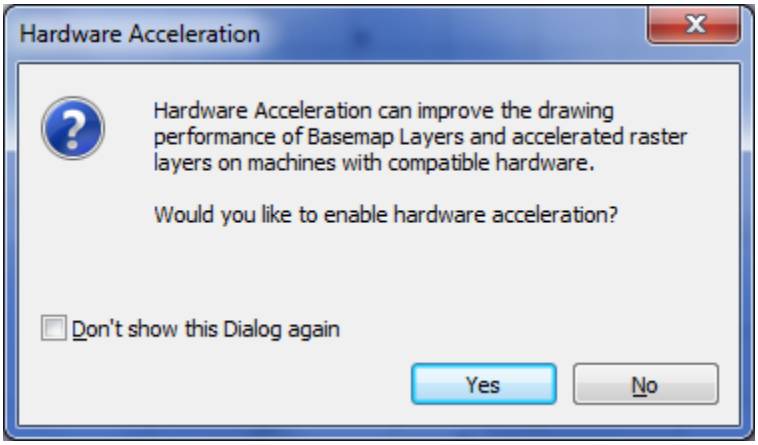
Up to this point we have just used local GIS data in our display. Let's instead using base maps from ArcGIS Online. Use **Add Basemap** (the little arrow to the right of the + for Add Data):



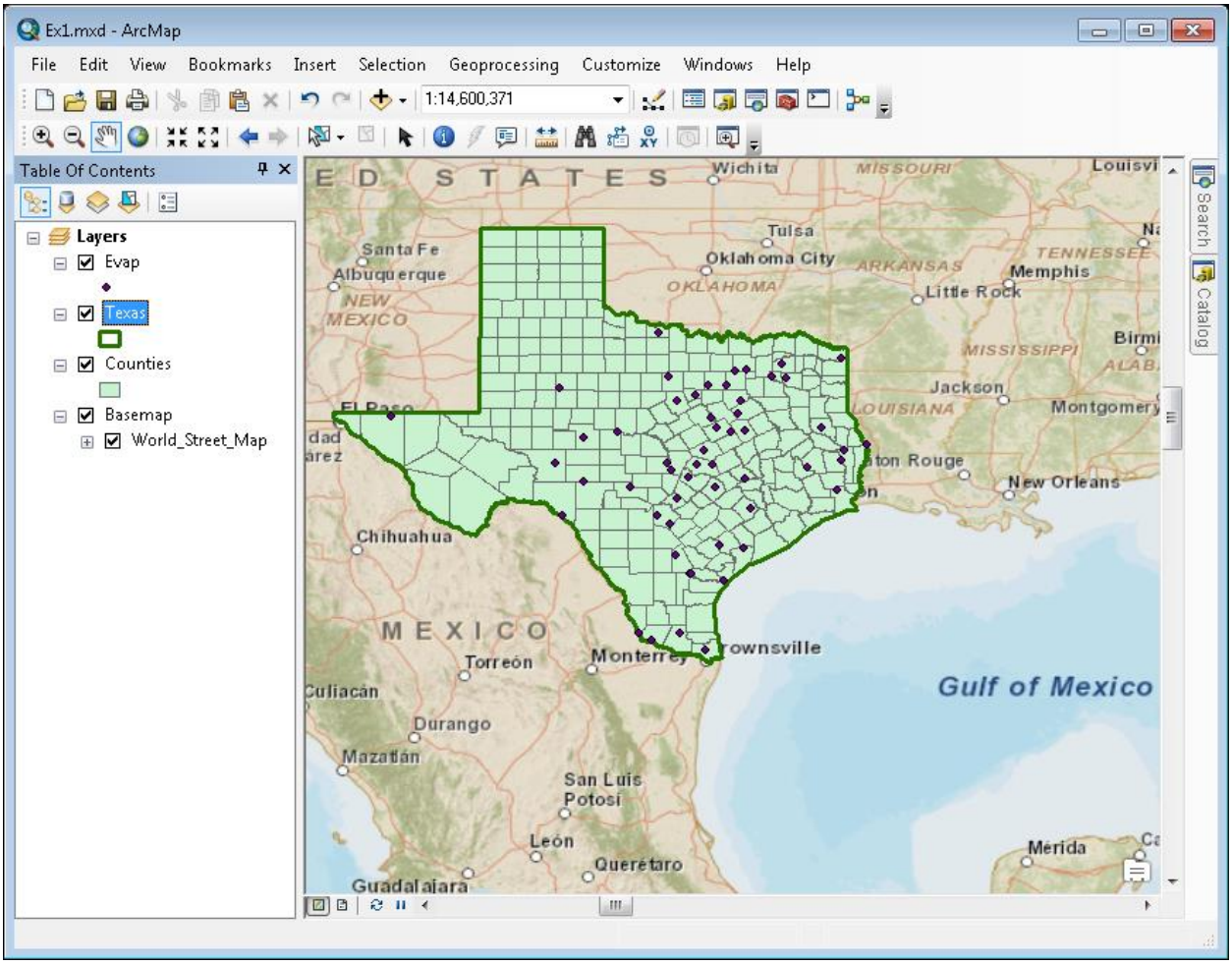


Click on "**Streets**" and Add.

If you get a message asking about Hardware Acceleration, say **Yes** to it.

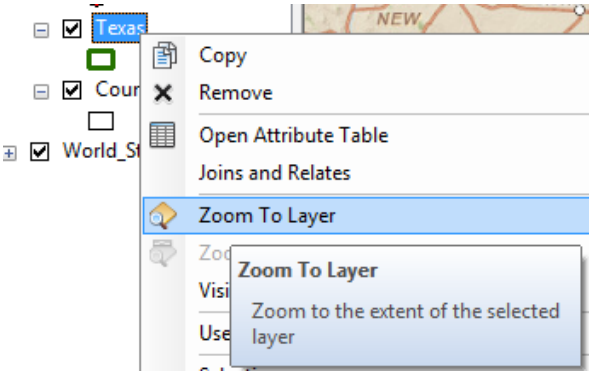


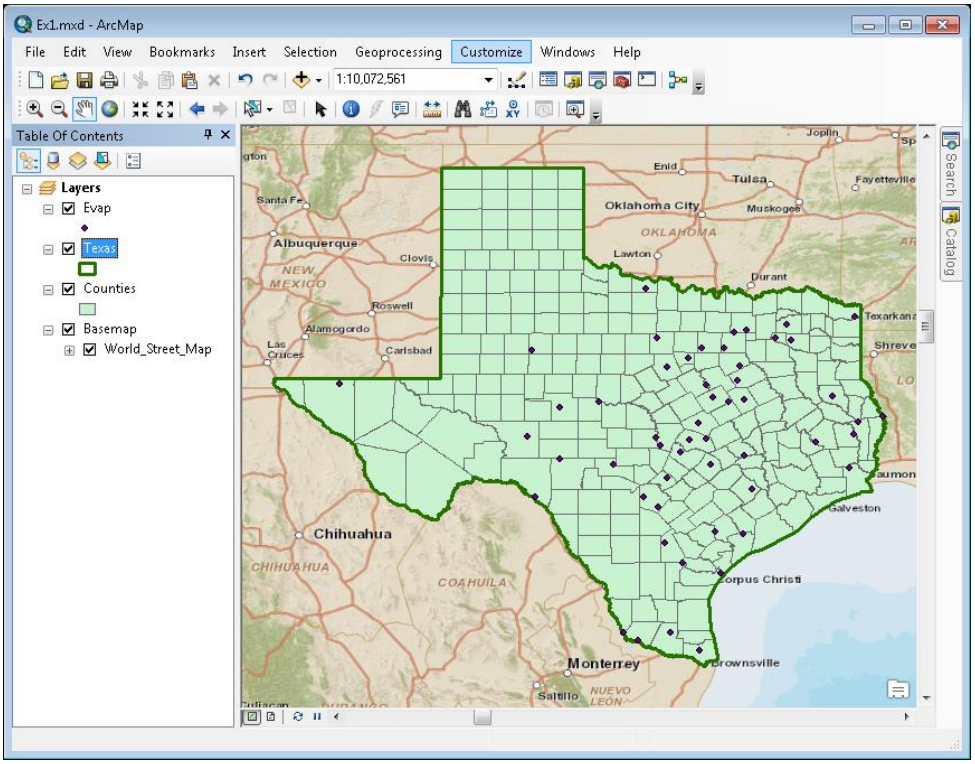
You should see a background map appear behind your Texas display like that shown below. Pretty cool!



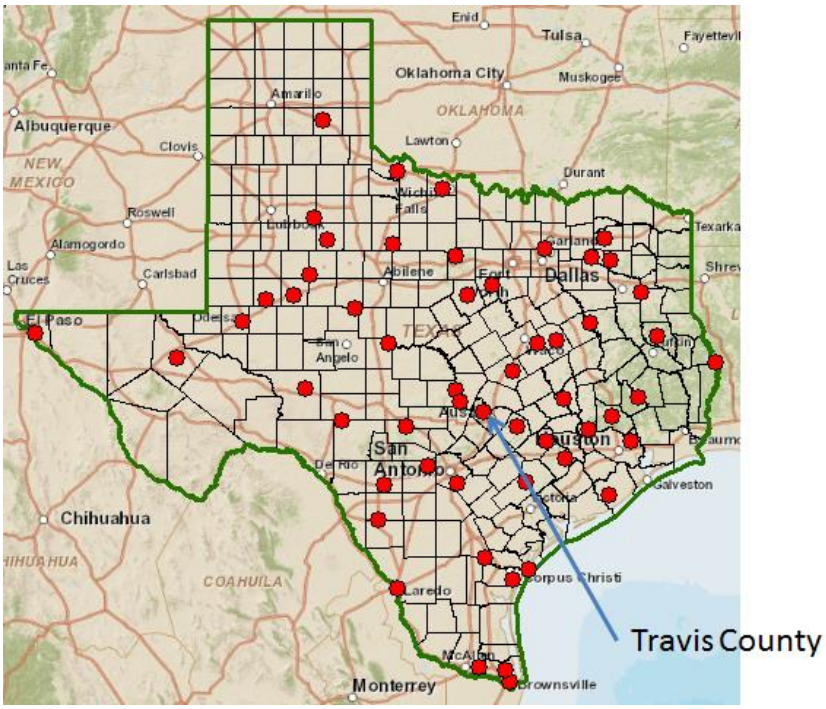
If your BaseMap does not show up, use the **Refresh** tool in the bottom left hand corner of the ArcMap display to redraw the map and the BaseMap should then show up.

To quickly get the map to center on Texas, right click on the Texas layer and select **Zoom to Layer**

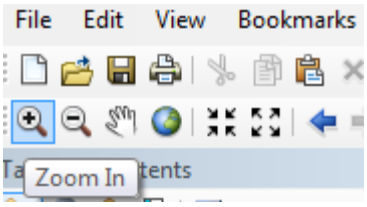




Click on the **Counties** theme and use the Symbol Selector to change the Fill Color to "No Color" so we can see through it to the background map, and the new display appears. Click on the symbol for the Evap points and use the Symbol Selector to change the size of the points to 10 and the color to Red. Let's examine Travis County.

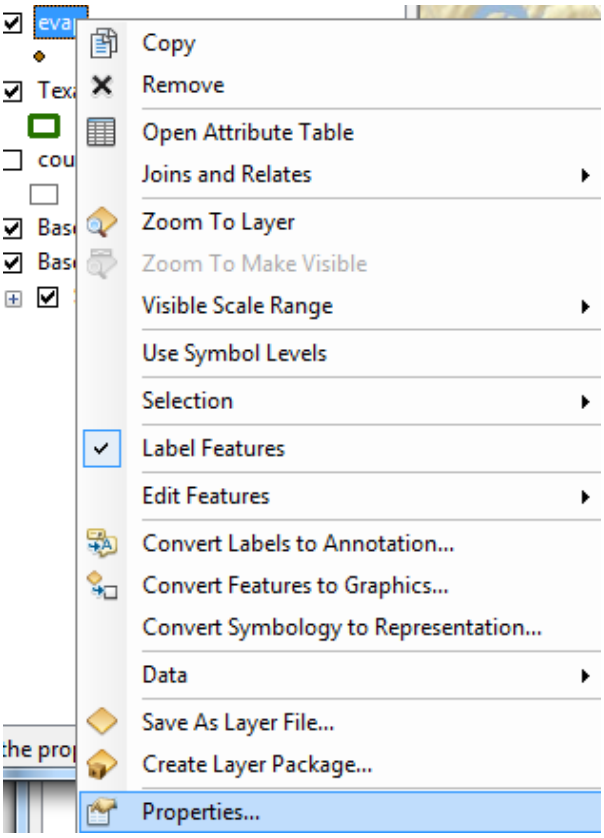


Use the Zoom in button to select a box around Travis County

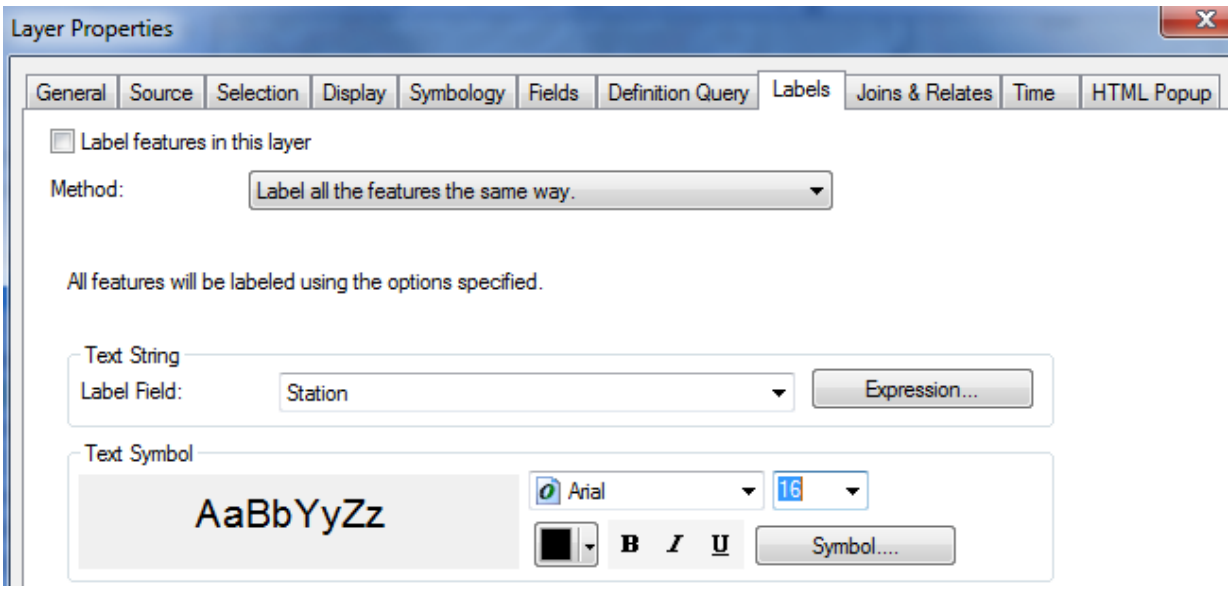


Zoom in to Travis County by Austin in the center of Texas, and let's examine the evaporation site by Lake Travis to the Northwest of the city. Notice how more detailed information appears as you zoom in closer.

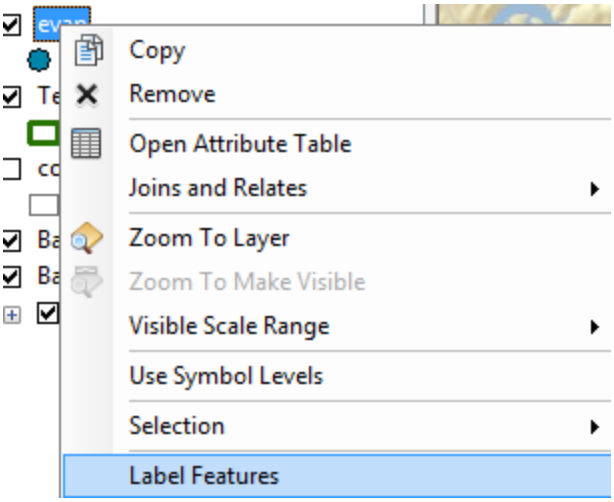
Let's label the sites with their names. Right click on the **Evap** theme and select **Properties** at the bottom of the display that appears.



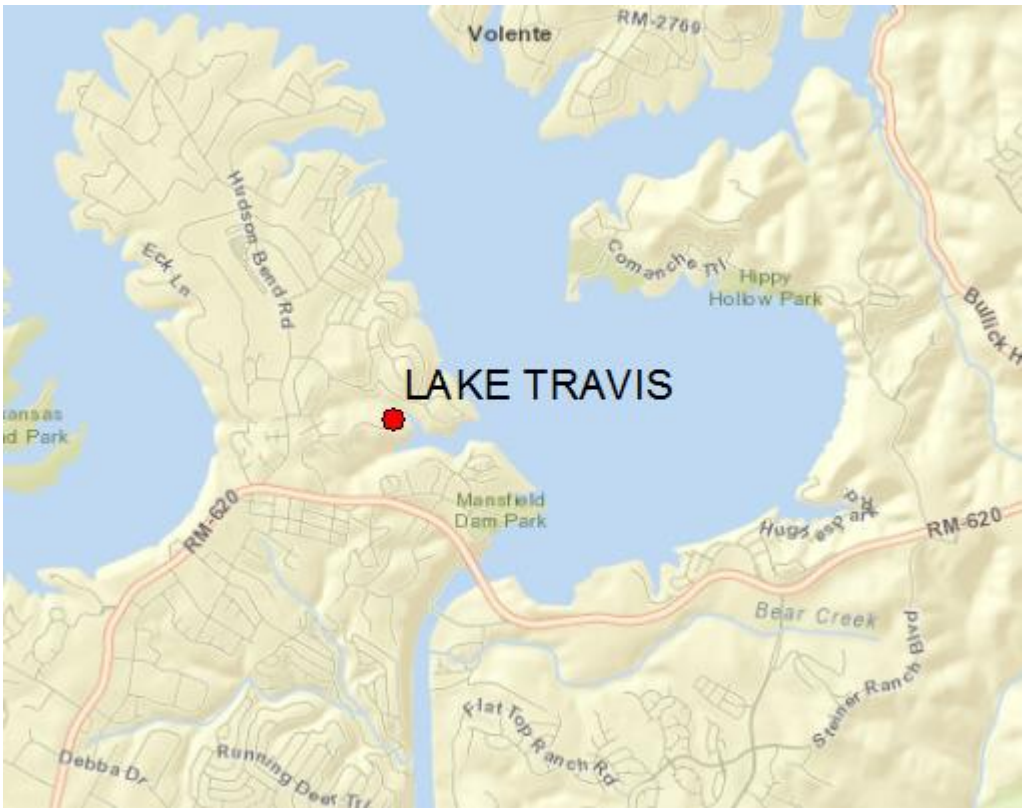
Select the **Labels** tab and for the **Label Field,** select **Station,** and **16** point as the type size. Hit **Apply** and then **Ok**, to close this window.



Now, right click on the Evap theme again and select **Label Features**, and you'll see a nice label **Lake Travis** appear by the site next to Lake Travis.



Now we've got a nice map that shows the location of our observation site labeled with its name.



If you zoom in a bit closer, you can see just where the site is located near Lake Travis. You can even see the access roads you'd use to go to this site.

Now, let's look at some imagery for this location. Proceeding as you did before to get the Street map, use **Add BaseMap**, to add data for **Imagery** Turn off the Street Map (uncheck it in the table of contents) so you can see the imagery.

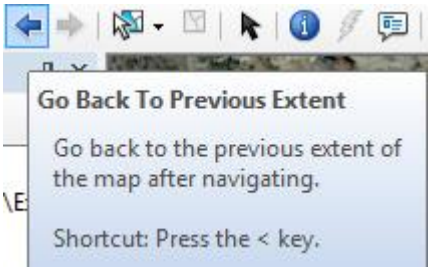
Imagery

And now you'll see the same information displayed against a background map of orthoimagery, and let's zoom in a bit to see more detail. For the **Evap** theme, I have used the **Properties/Label** to change the color of my site labels from black to blue to make them easier to see against the image background. This is really cool stuff! You can really get a sense of context about where this observation site is located.

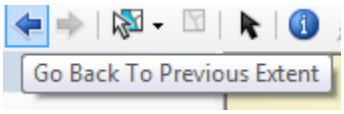
Use **File/Save** to save this map display as **Ex1.mxd** so that you can get it back later if you need it.

4. Accessing and Querying Attribute Data

Let's go back to the view we had earlier of Travis County. Use the Go Back to Previous Extent arrow

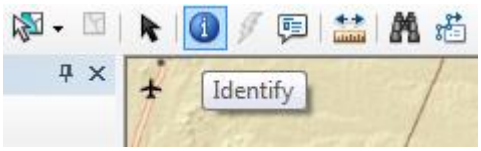


to step back through the views we have just been working on, and turn off the **Image** basemap so that you can see the **Streets** basemap again. Change the Label color for the evap sites back to Black.

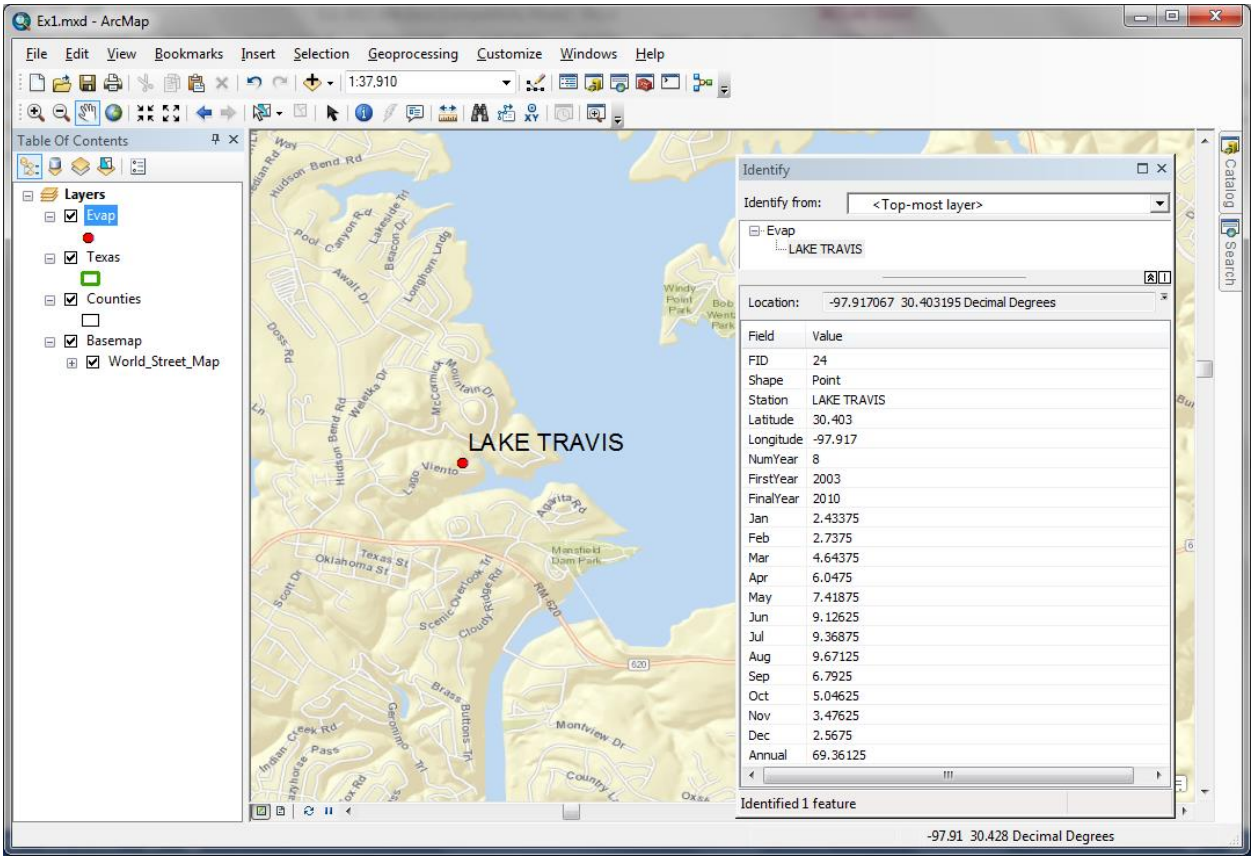


Numerical and text information stored in the fields of the shapefile tables are called **attributes**. To access attribute data of the feature at a specific location:

Click on the **Identify** tool



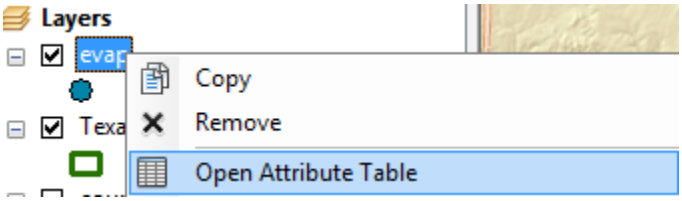
Click on the feature on the map you are interested in. In the **Identify** window that pops up you'll see the attributes of that particular feature. In this instance, what you see is that the data for Lake Travis, cover the range from 2003 to 2010, the latitude and longitude are 30.403 and -97.917, and the values from Jan through Dec are the mean monthly evaporation recorded at this location, in inches, whose annual total is an Annual of 69.36 inches.



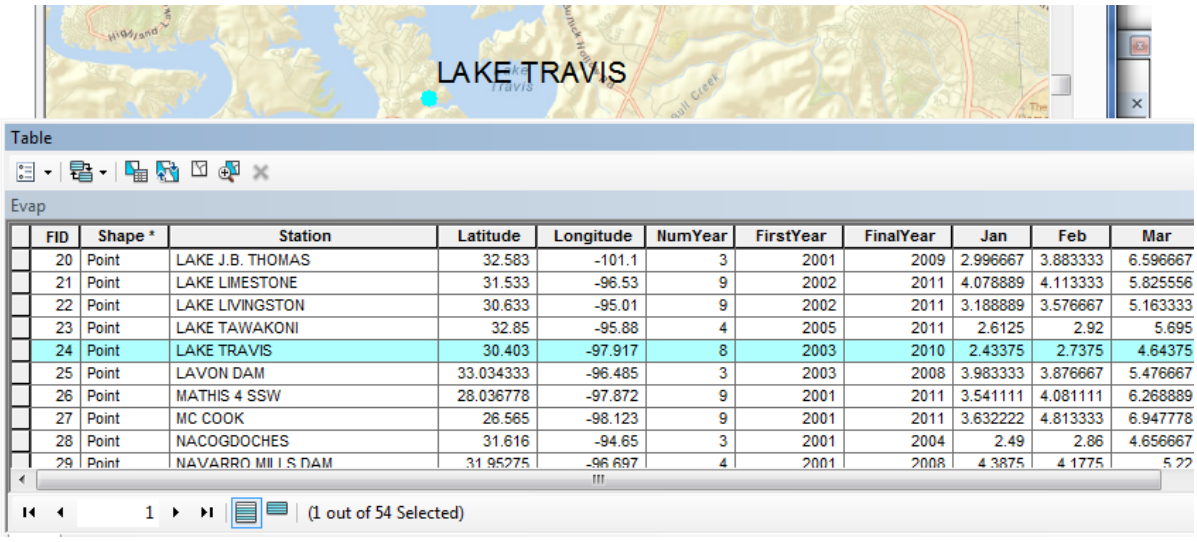
These are pan evaporation data recorded using an instrument like that shown below. The evaporation data were obtained from the Texas Water Development Board. Only data from 2001 onwards is used since the TWDB has quality control checked that information. Monthly evaporation is found by averaging the daily values of evaporation read from the pan, and multiplying by the number of days in the month. If a month has fewer than 20 daily values recorded, it is excluded from the dataset. Only years with valid monthly data for all 12 months are used in computing the mean monthly and mean annual pan evaporation data shown in the attribute table.

Viewing an Attribute Table

To access attribute data of an entire layer, in **ArcMap**: right click on the **Evap** layer name in the table of contents, and select **Open Attribute Table**:



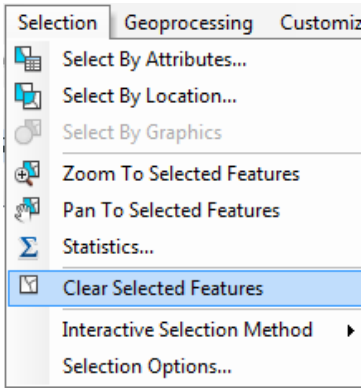
And if you scroll down the resulting **Table** and click on **FID 24** you'll see the record that contains the attributes of the Lake Travis station that you identified earlier. Click on this to select it, and you'll see the corresponding point selected in the map – this is a key idea of GIS – map features are described by records in attribute tables.



FID	Shape *	Station	Latitude	Longitude	NumYear	FirstYear	FinalYear	Jan	Feb	Mar
20	Point	LAKE J.B. THOMAS	32.583	-101.1	3	2001	2009	2.996667	3.883333	6.596667
21	Point	LAKE LIMESTONE	31.533	-96.53	9	2002	2011	4.078889	4.113333	5.825556
22	Point	LAKE LIVINGSTON	30.633	-95.01	9	2002	2011	3.188889	3.576667	5.163333
23	Point	LAKE TAWAKONI	32.85	-95.88	4	2005	2011	2.6125	2.92	5.695
24	Point	LAKE TRAVIS	30.403	-97.917	8	2003	2010	2.43375	2.7375	4.64375
25	Point	LAVON DAM	33.034333	-96.485	3	2003	2008	3.983333	3.876667	5.476667
26	Point	MATHIS 4 SSW	28.036778	-97.872	9	2001	2011	3.541111	4.081111	6.268889
27	Point	MC COOK	26.565	-98.123	9	2001	2011	3.632222	4.813333	6.947778
28	Point	NACOGDOCHES	31.616	-94.65	3	2001	2004	2.49	2.86	4.656667
29	Point	NAVARRO MILLS DAM	31.95275	-96.697	4	2001	2008	4.3875	4.1775	5.22

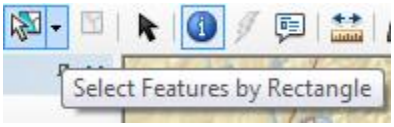
1 (1 out of 54 Selected)

To Clear a Selected feature and select a new one, use: **Selection/Clear Selected Features** in the ArcMap toolbar:

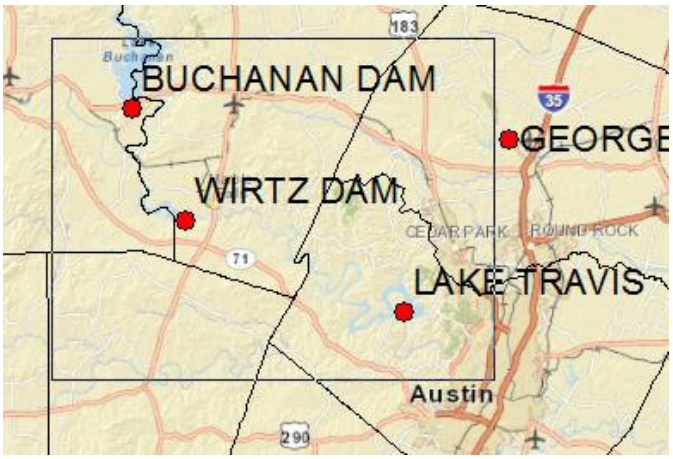


5. Selecting features from a feature class

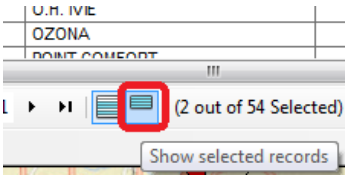
Selecting features from a feature class involves choosing a subset of all the features in the class for a specific purpose. Feature selection can be made from a map by identifying the geometric shape or from an attribute table by identifying the record. Regardless of how you select an object, both the shape in the map and the record in the attribute table will be selected. Click on the **Select Features by Rectangle** tool

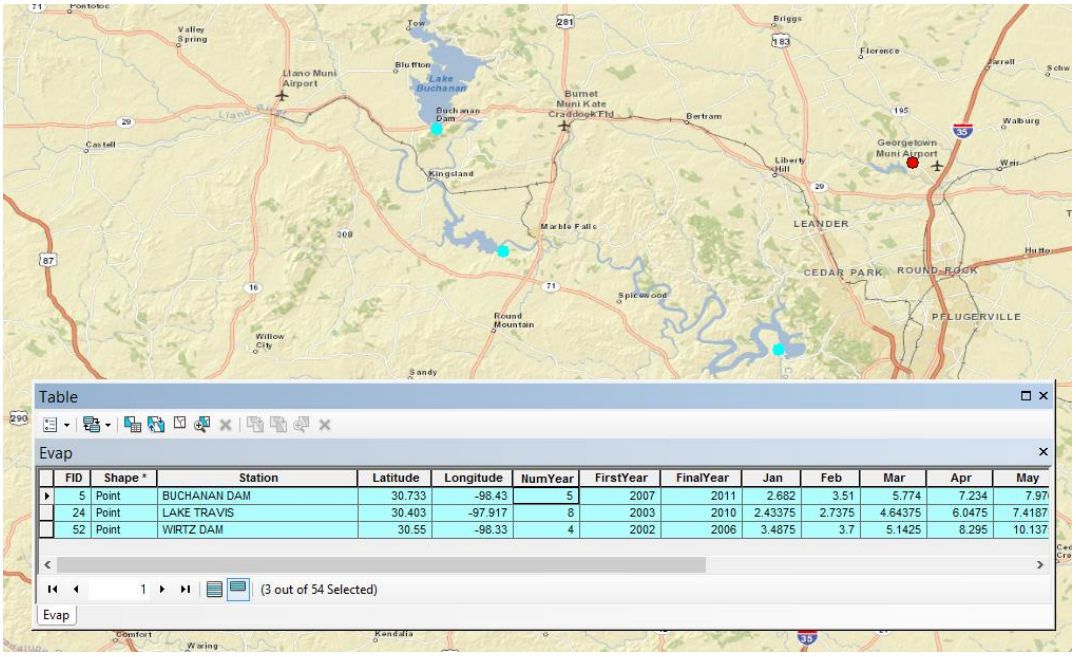


If zoom back a little bit and drag a box over the three evaporation sites in the Highland Lakes reservoir system,

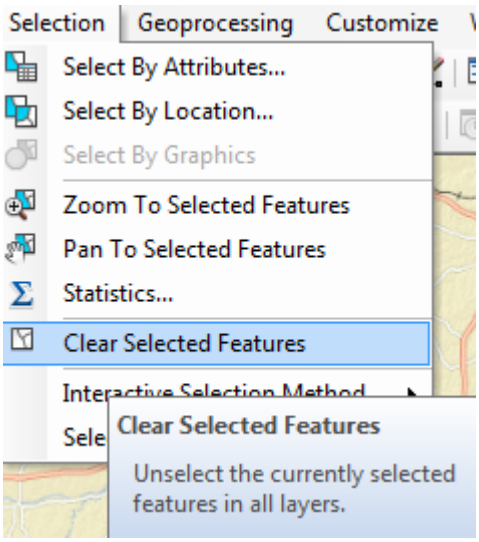


you'll see both records highlighted on the map and in the attribute table. I've turned off the Counties layer and used **Show selected records** at the bottom of the Attribute Table to just show the three highlighted stations.

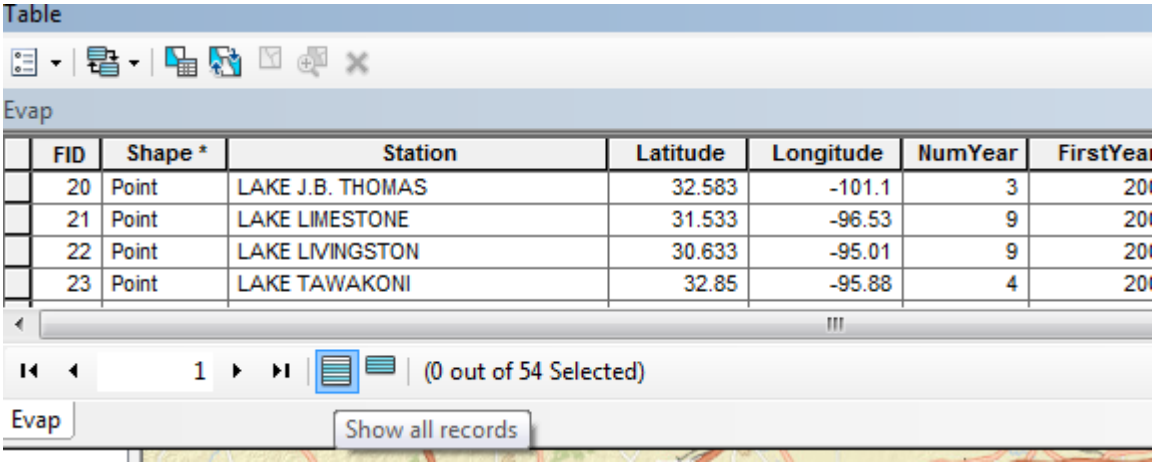




To clear your selection, choose **Selection/Clear Selected Features.**

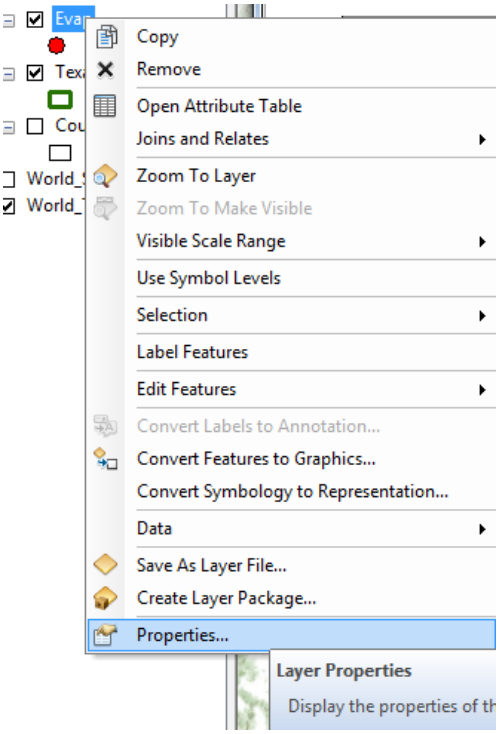


Clicking on Show all records, then displays all the records in the attribute table again.

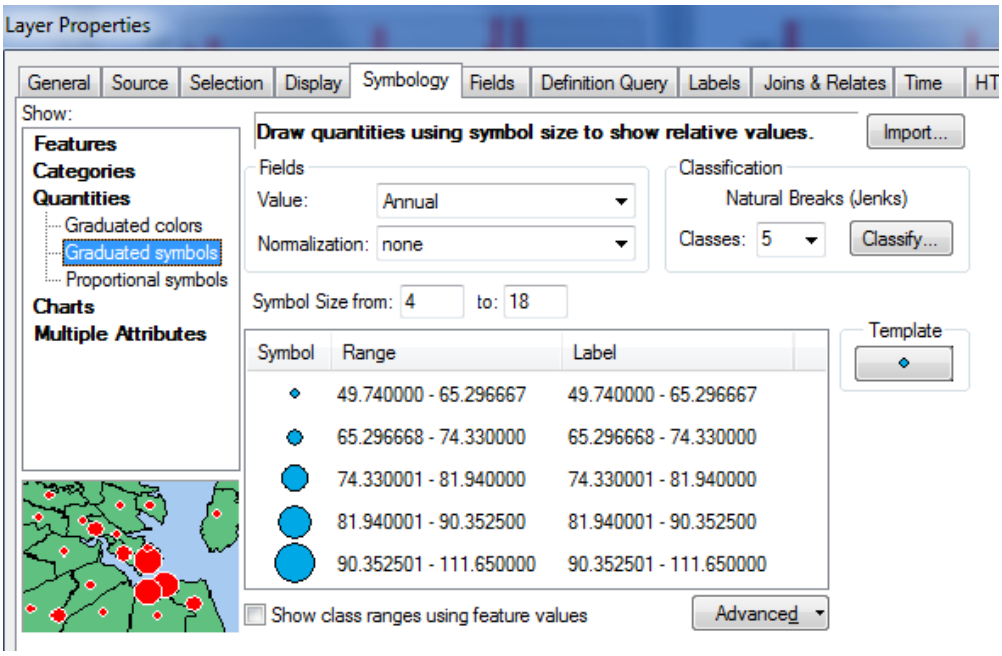


6. Mapping Annual Evaporation

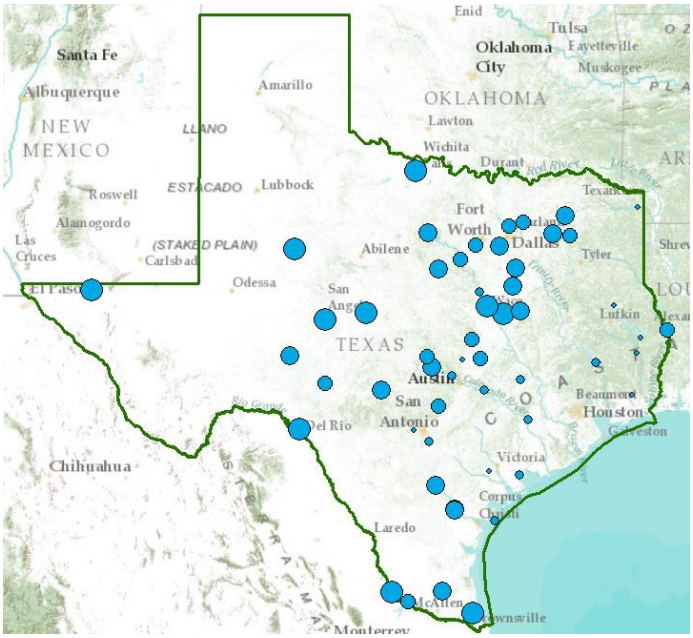
Let's suppose we want to map the values of annual evaporation recorded at the stations, rather than just symbolizing them by their location. Right click on the **Evap** layer and select **Properties/Symbology**



Show **Quantities/Graduated Symbols** with the **Value** field of **Annual**, and make the **Template** color blue.

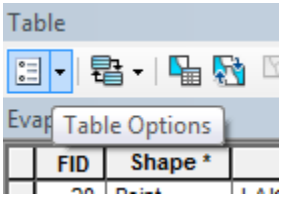


I have turned off all the other layers and added the **Topographic** base map to get the image below. Very cool!

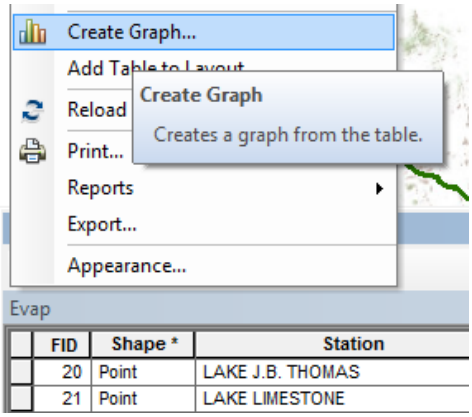


7. Making a Chart

You can see from the map that there is some tendency for lower evaporation values near the coast and to the East and higher values to the West. Charts are useful because they allow you to visualize trends in data. Open the Evap layer attribute table. Click on **Table Options**

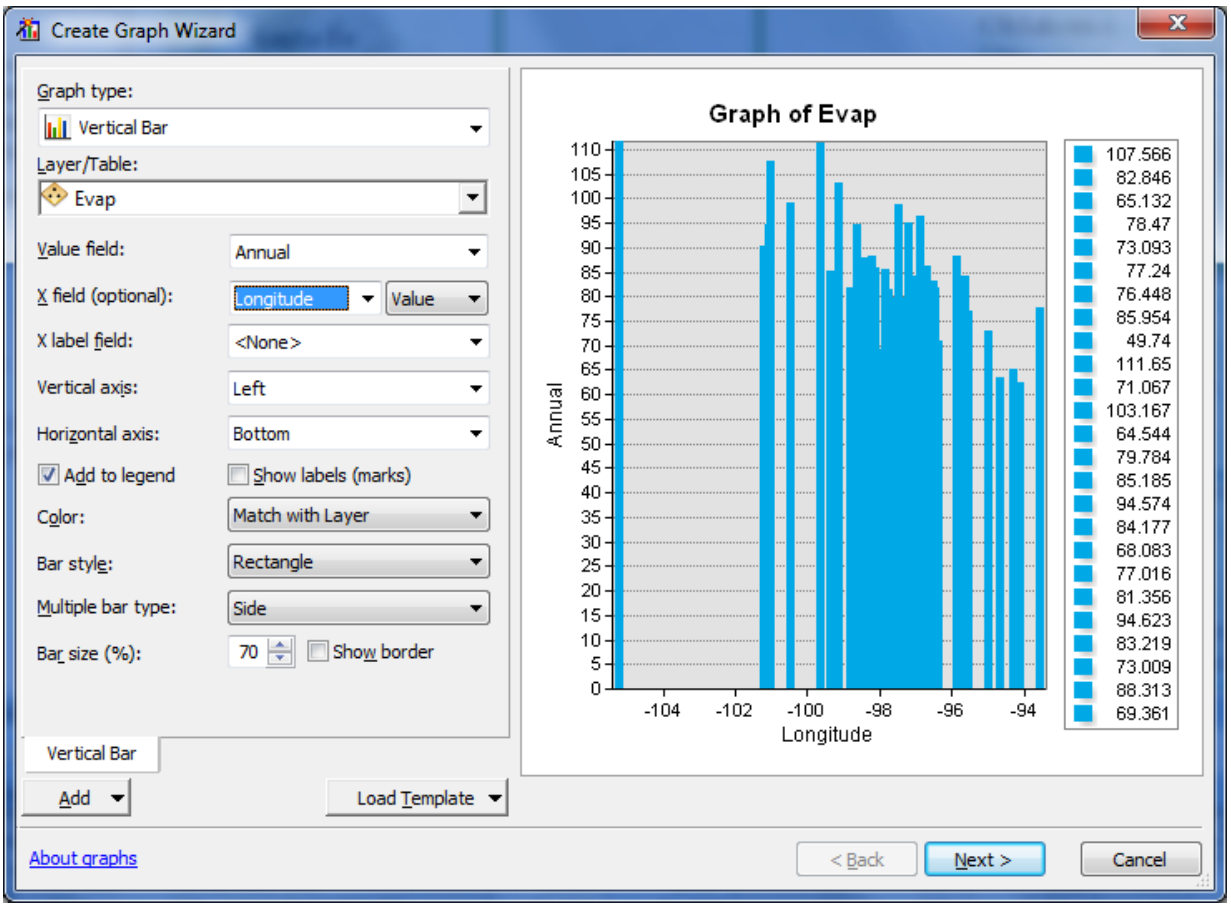


at the top left of the Table and select **Create Graph** to open the Create Graph Wizard.



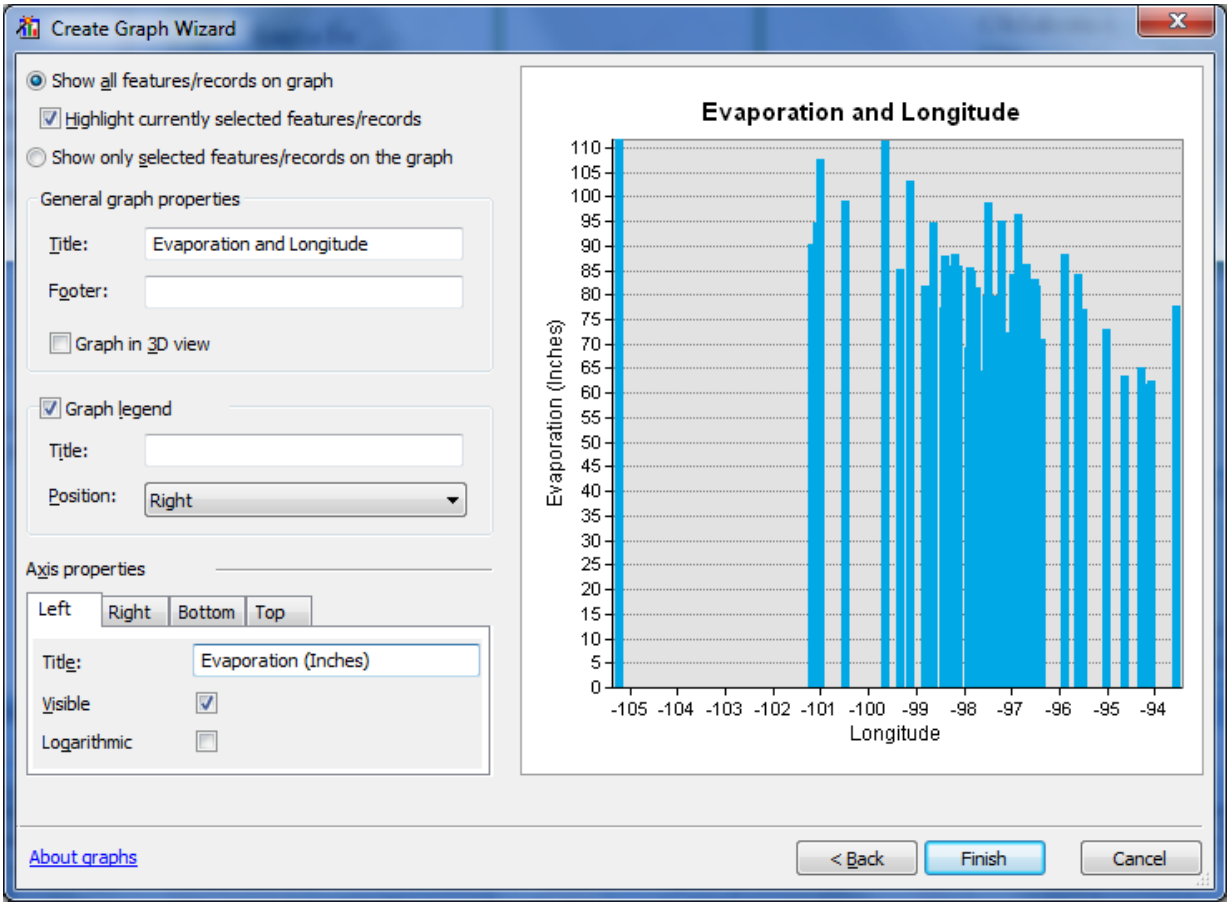
You will be making a Vertical bar chart (the default option). The next screen will allow you to indicate the data to be used in the graph. Here is a graph of the Annual Evaporation (**Annual**) of all the stations plotted against the Longitude of the station. You can see that there is a general trend of the evaporation increasing as you go from East to West in Texas. The color of the chart bars is blue, the same as the map

points.

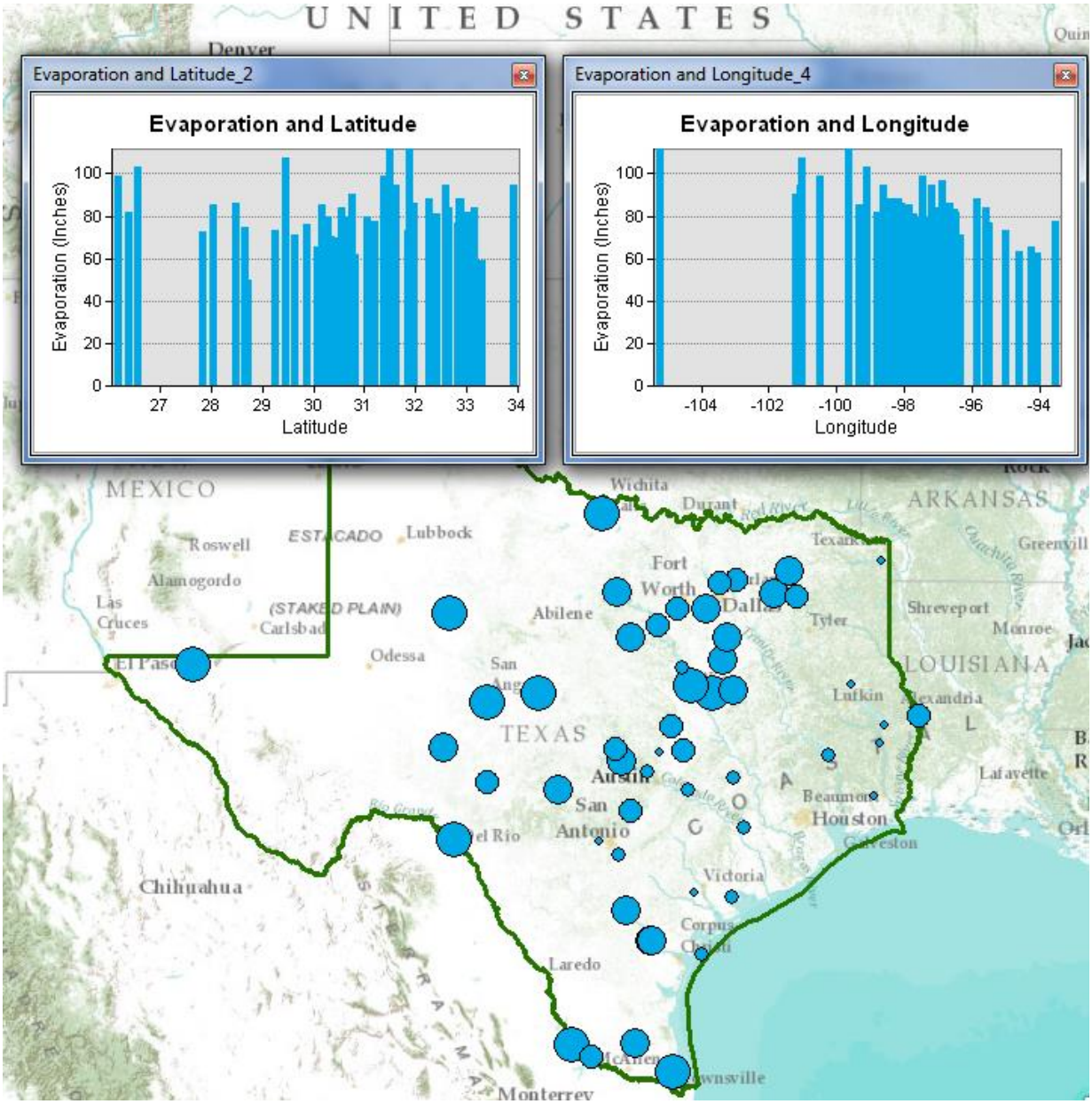


Click off "Add to Legend" to get rid of the legend on the right hand side.

Hit **Next** and edit the graph properties to make them nicer. Add a title **Evaporation and Longitude** and relabel the vertical axis **Evaporation (Inches)**



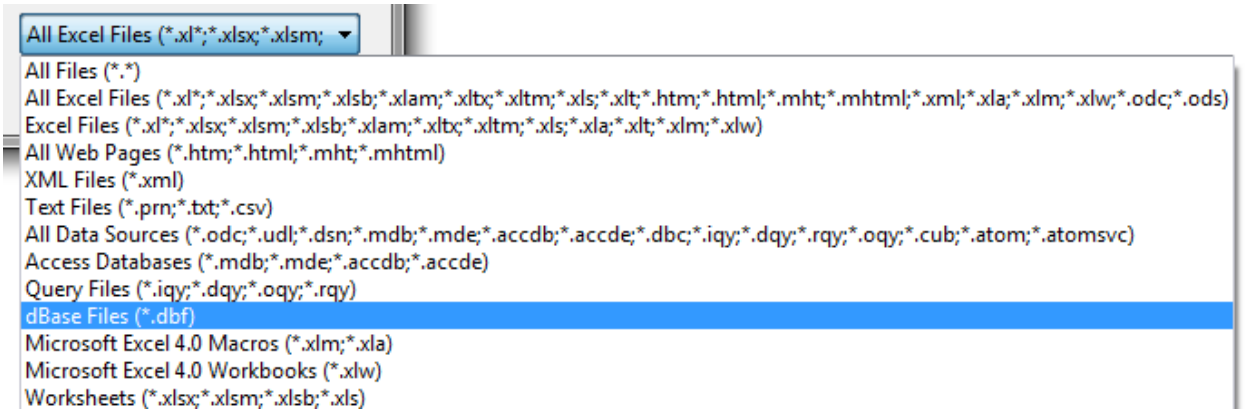
Click **Finish**, and you've created a graph linked to mapped features in ArcMap. If you create the same kind of graph for Evaporation and Latitude, you can see that there isn't a tendency for evaporation to vary with latitude in Texas, as there is for variation of evaporation with longitude.

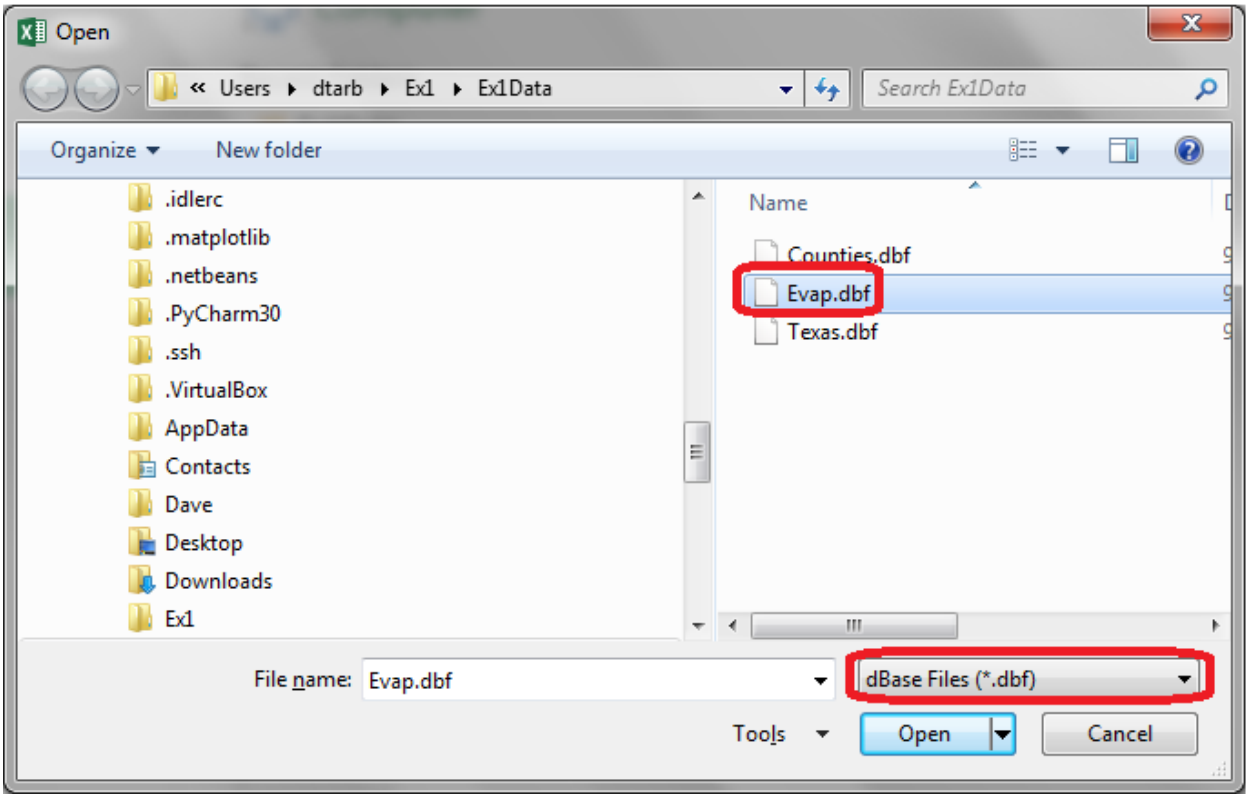


Save your ArcMap document **Ex1.mxd** so that you can retain this display.

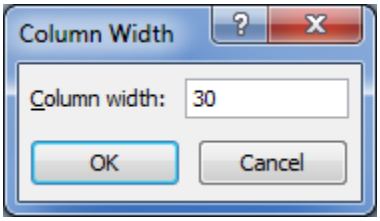
Graphing in Excel

Another graphing option is to make a chart in Excel using the dBase tables given by the evaporation shapefile. Open the evaporation attributes table **Evap.dbf** as a table in **Excel**. Use **Files of Type: dBase files** in Excel to focus only on .dbf tables when you open the table.

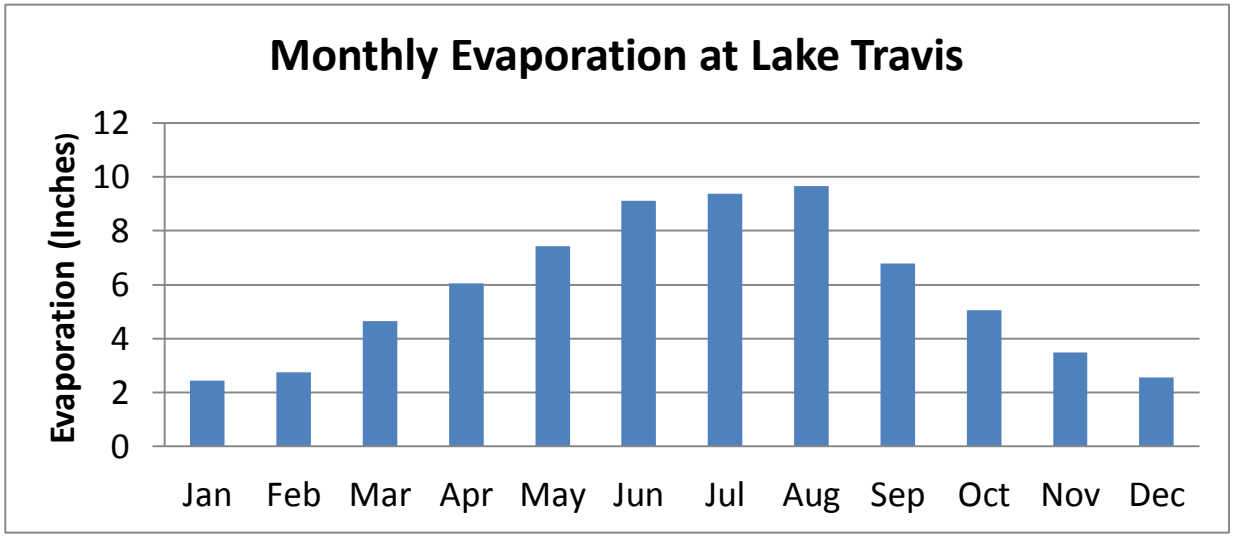




When you open the file, you'll see that the Station name is very wide (254 characters). Right click on this column in Excel and select Column width of 30 characters to correct this.



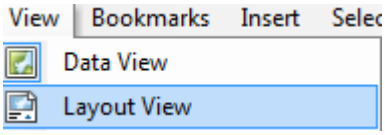
Select the stations you want to plot, copy their records to a new worksheet, delete the columns you don't need there, and then create a chart. Here is an example chart created this way.



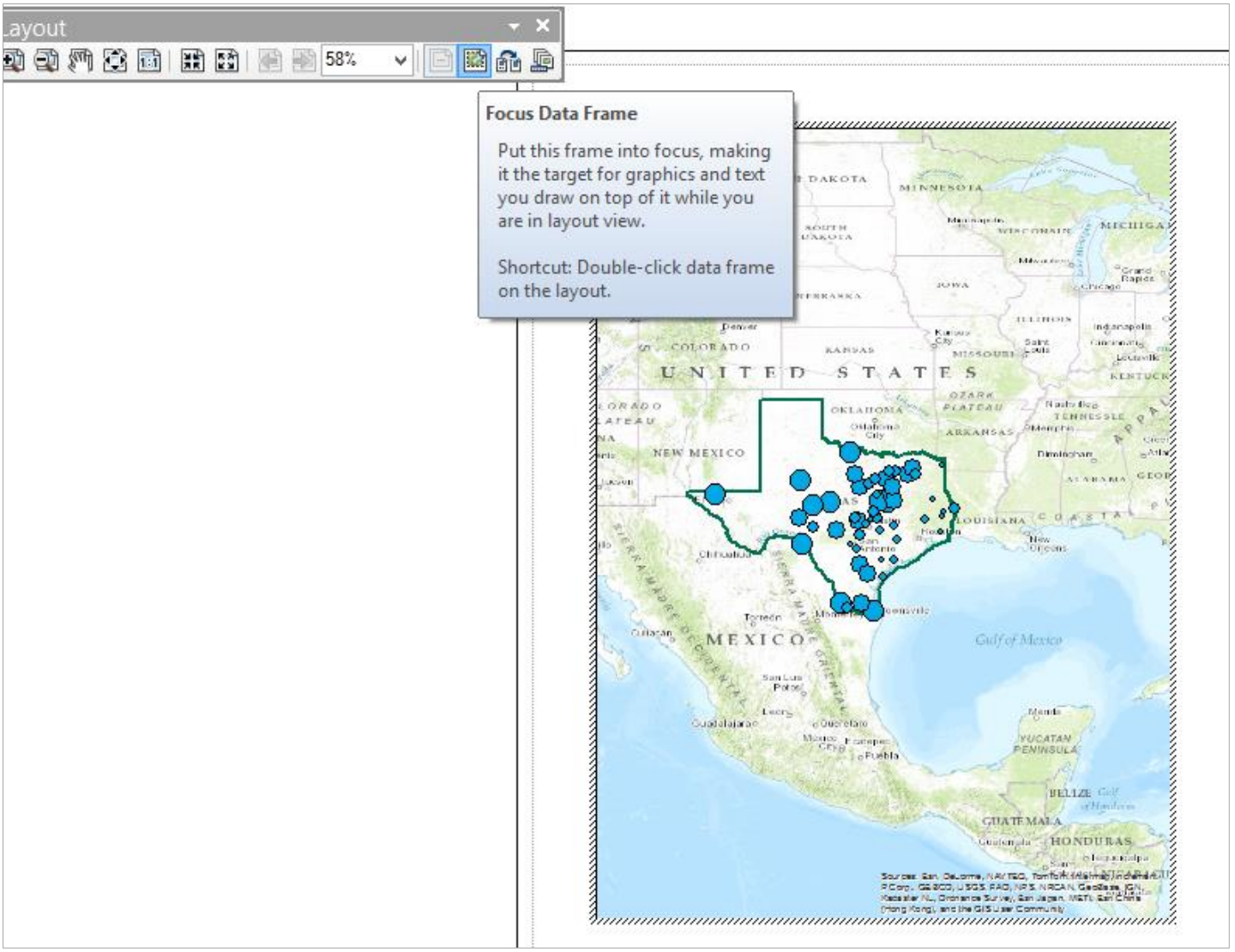
8. Creating a Map Layout

Now we are going to create a formal map of evaporation in Texas that includes the charts that we've created.

Change the format of the display window from **Data View** to **Layout View** by clicking on **View/Layout View**,



If nothing shows up in your layout, hit **Focus Data Frame** to put your map in the Layout Window.

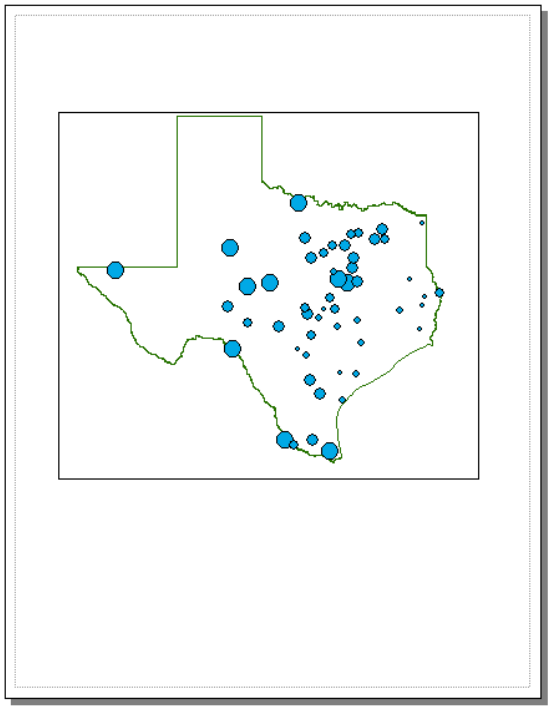


.

Reduce the size of the data frame in the layout (i.e., rectangle where the spatial data is contained) -- to make room for the graph -- by clicking on the map and moving its handlers. If you have a zoomed in view in Arc Map, you'll get the same image in the Layout. To move your map around use the **Pan** tool in the Tools toolbar

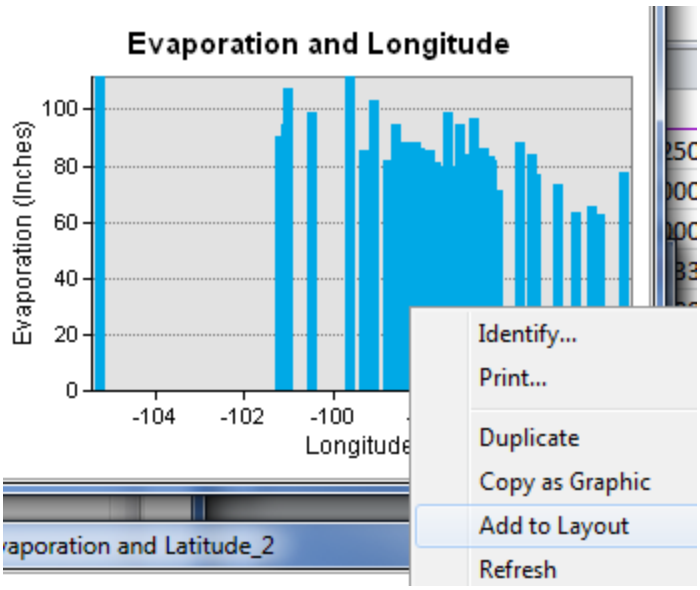
You can switch back and forth between data view and layout view. Changes made in one view will be reflected in the other view.

I have turned off the Basemap to make the map easier to interpret.

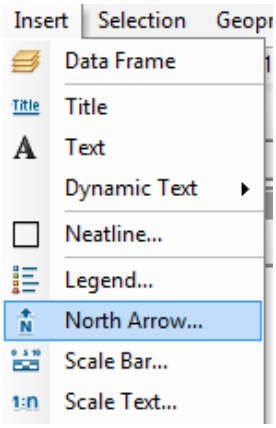


Keep saving your ArcMap document as you proceed through the map making steps so that if you mess up something you can get back the work you've already done.

To insert the ArcMap Chart into the Layout, right-click on the upper blue bar at the top of the Chart and select **Add to Layout**. Move and resize the graph as necessary. If you want to copy your graph from Excel, highlight the graph, and click on **Copy** in Excel, then **Paste** in ArcMap and your graph should appear in the map layout.

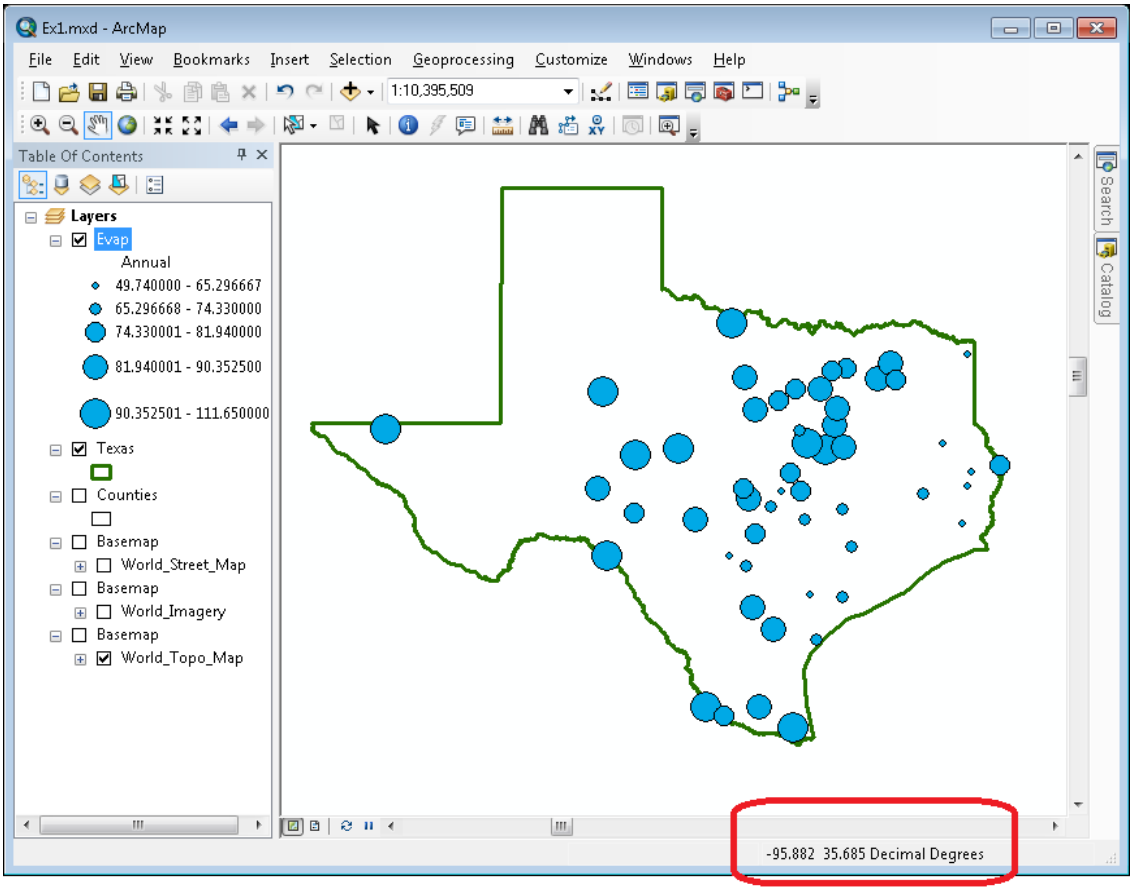


You can also insert a **North Arrow** and a **Scale Bar** by using the **Insert** menu in ArcMap.

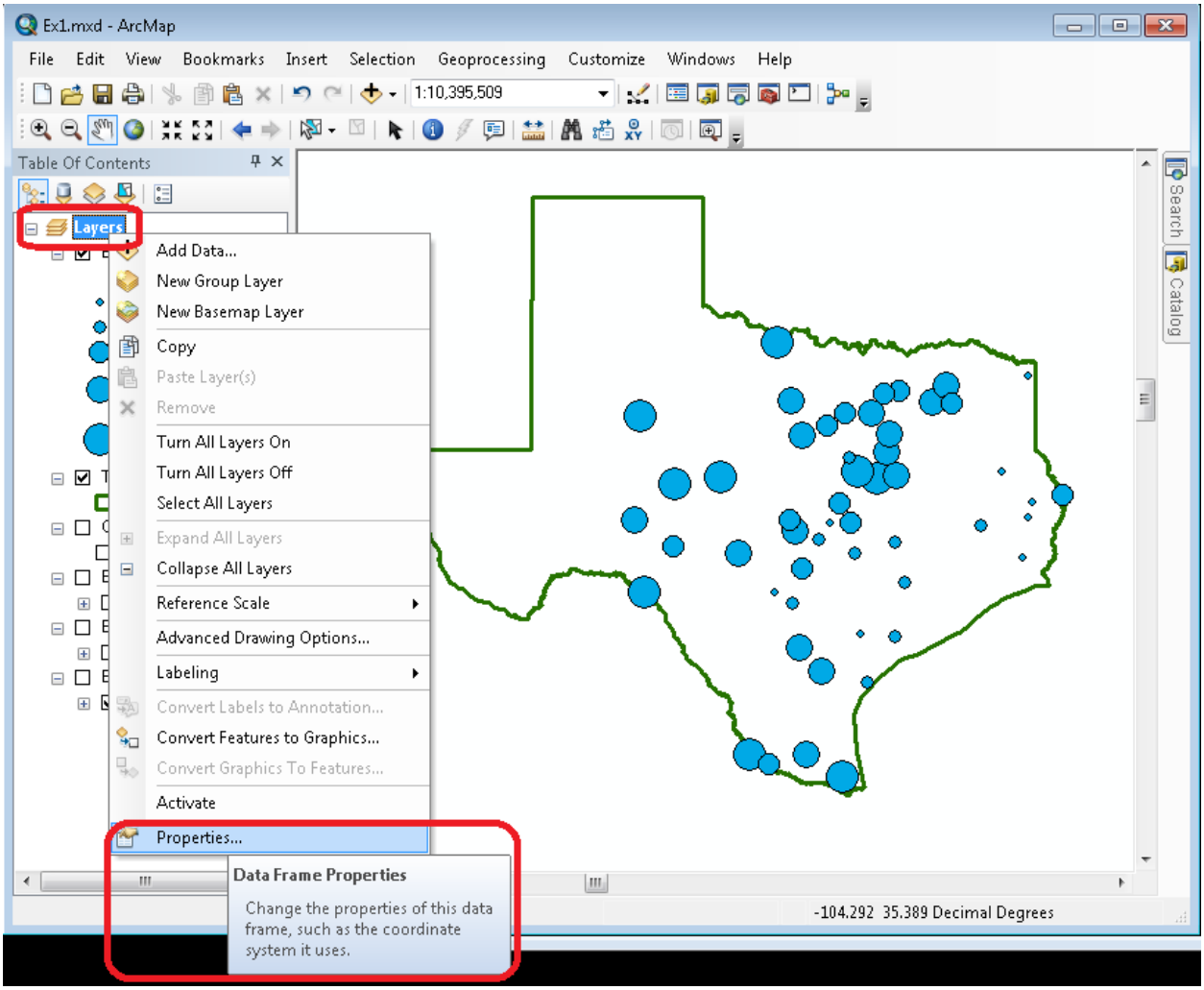


When you put up the scale bar you can select the distance units to be displayed. I have used miles.

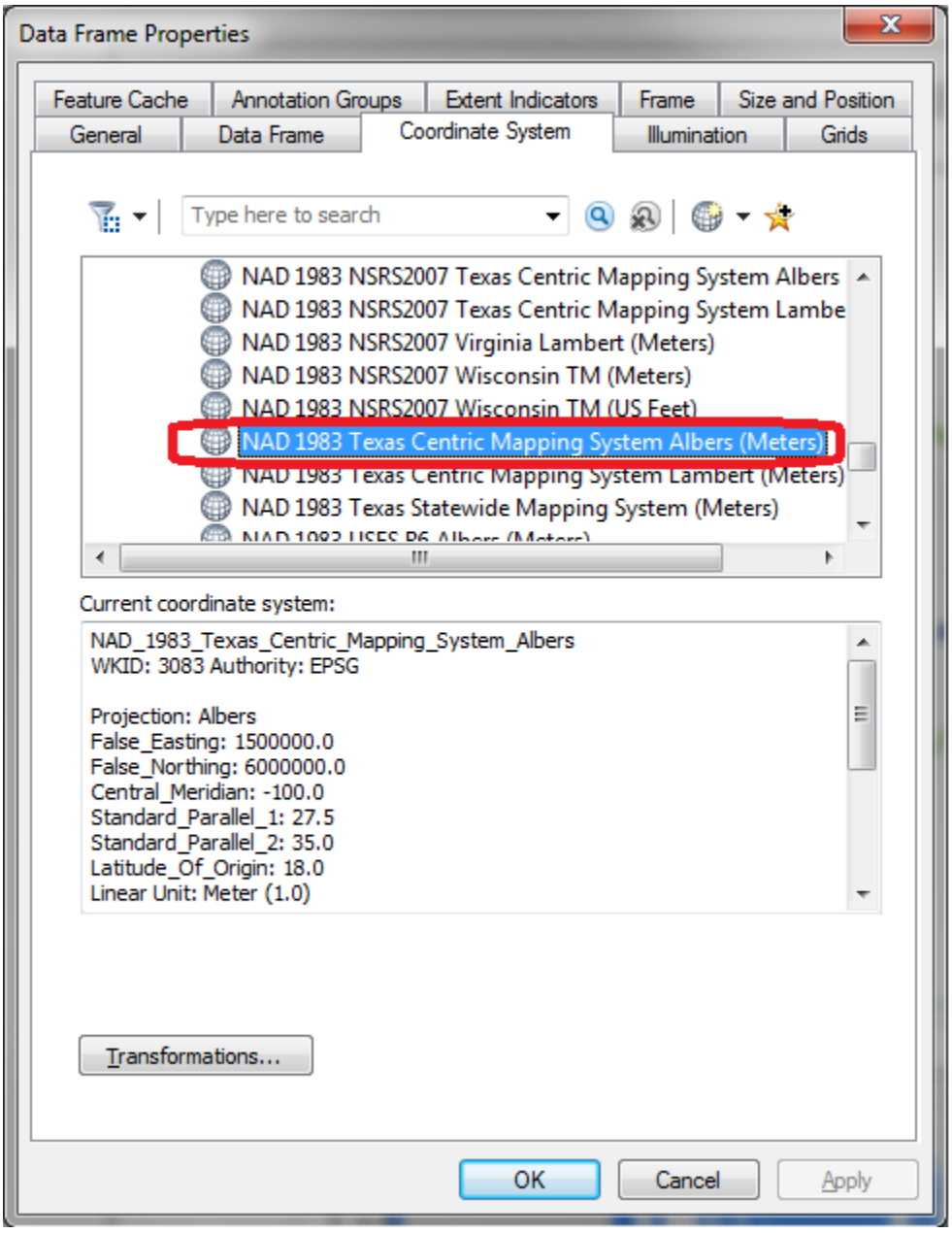
Note that if you look at the bottom right of ArcMap in Data View you see coordinates in Decimal Degrees. This is an indication that the map is being displayed using geographic coordinates. It is not strictly correct to use a length scale when data is displayed in geographic coordinates as lengths are different in the North-South and East-West directions. You will learn more about this in future classes. For now let's switch the coordinates used in the display.



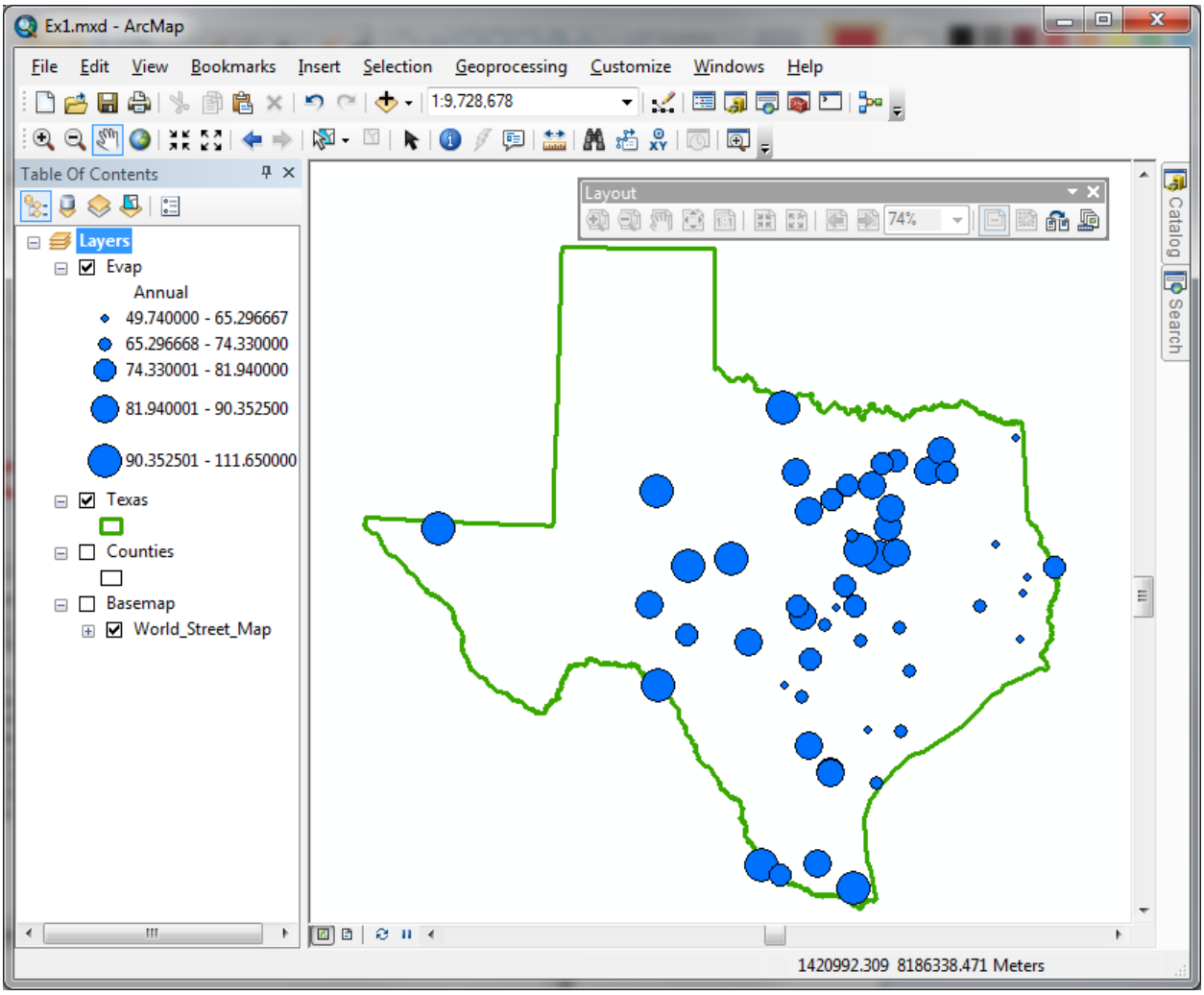
Right click on the **Layers** entry in the table of contents and select properties.



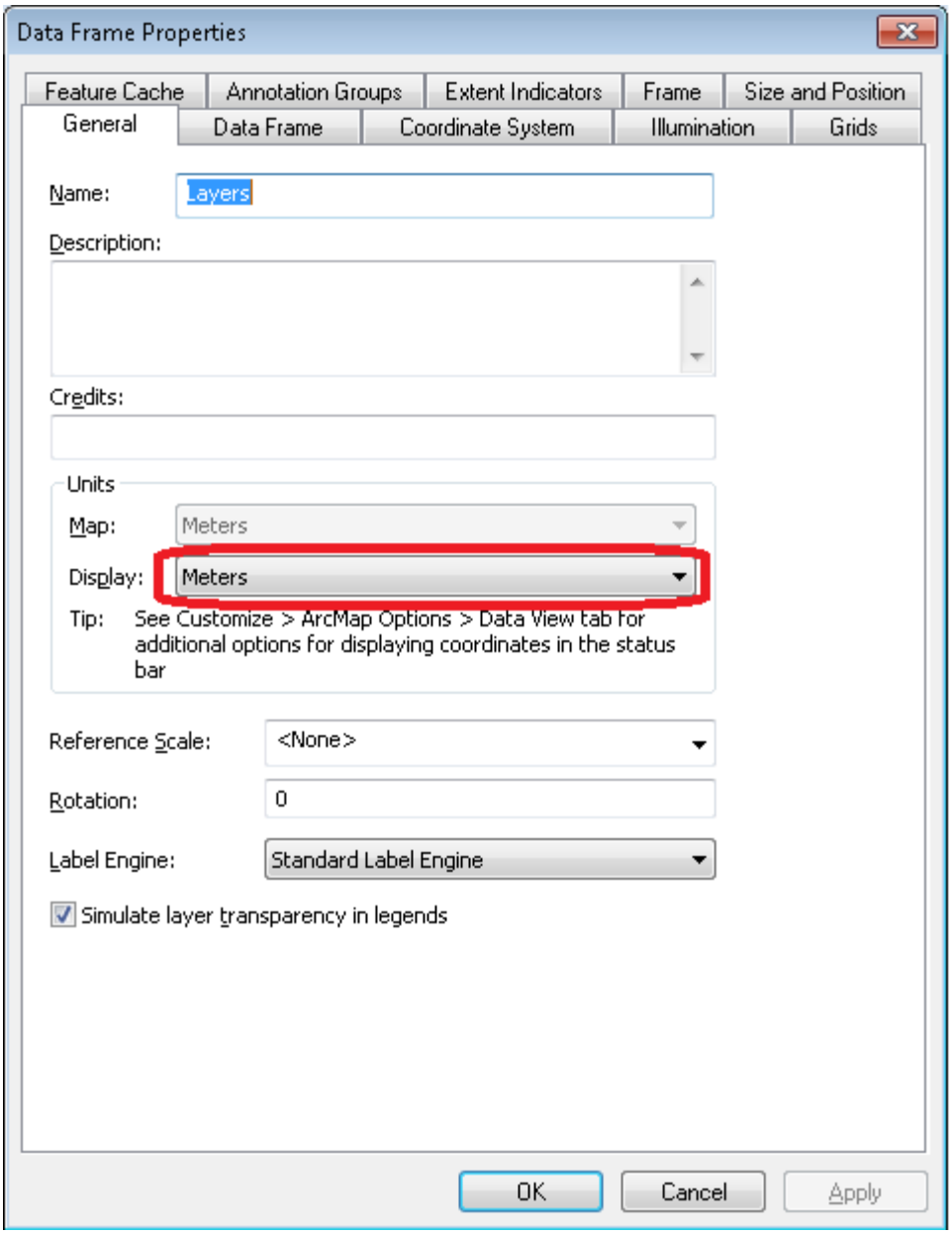
Layers is the name of the **Data Frame** used to display information in ArcMap. In **Data Frame Properties** click on **Coordinate System** and navigate to **Projected Coordinate Systems -> State Systems -> NAD 1983 Texas Centric Mapping System Albers (Meters)**. Click OK and Yes to the Warning about the coordinate system differing from one or more data sources in the map.



Note that for this exercise it does not really matter which coordinate system we select, but we need a projected coordinate system so that the scale bar is correct. Note that the display of Texas is adjusted according to the new projection.

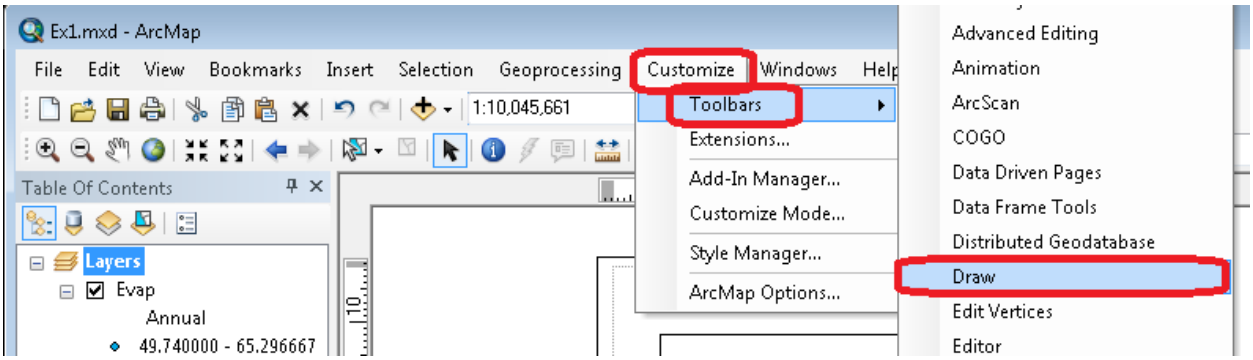


In the above I also set the Data Frame Display units to Meters for consistency with this coordinate system.

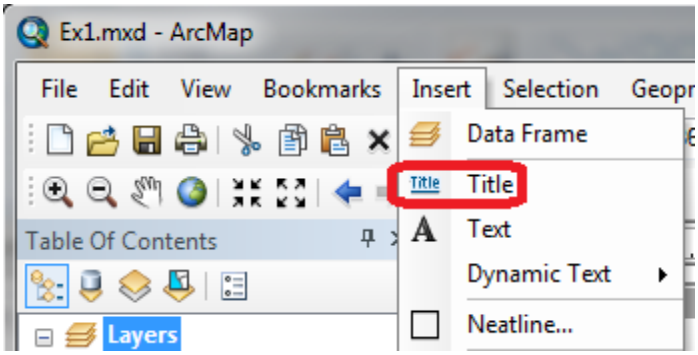


Switch back to Layout View.

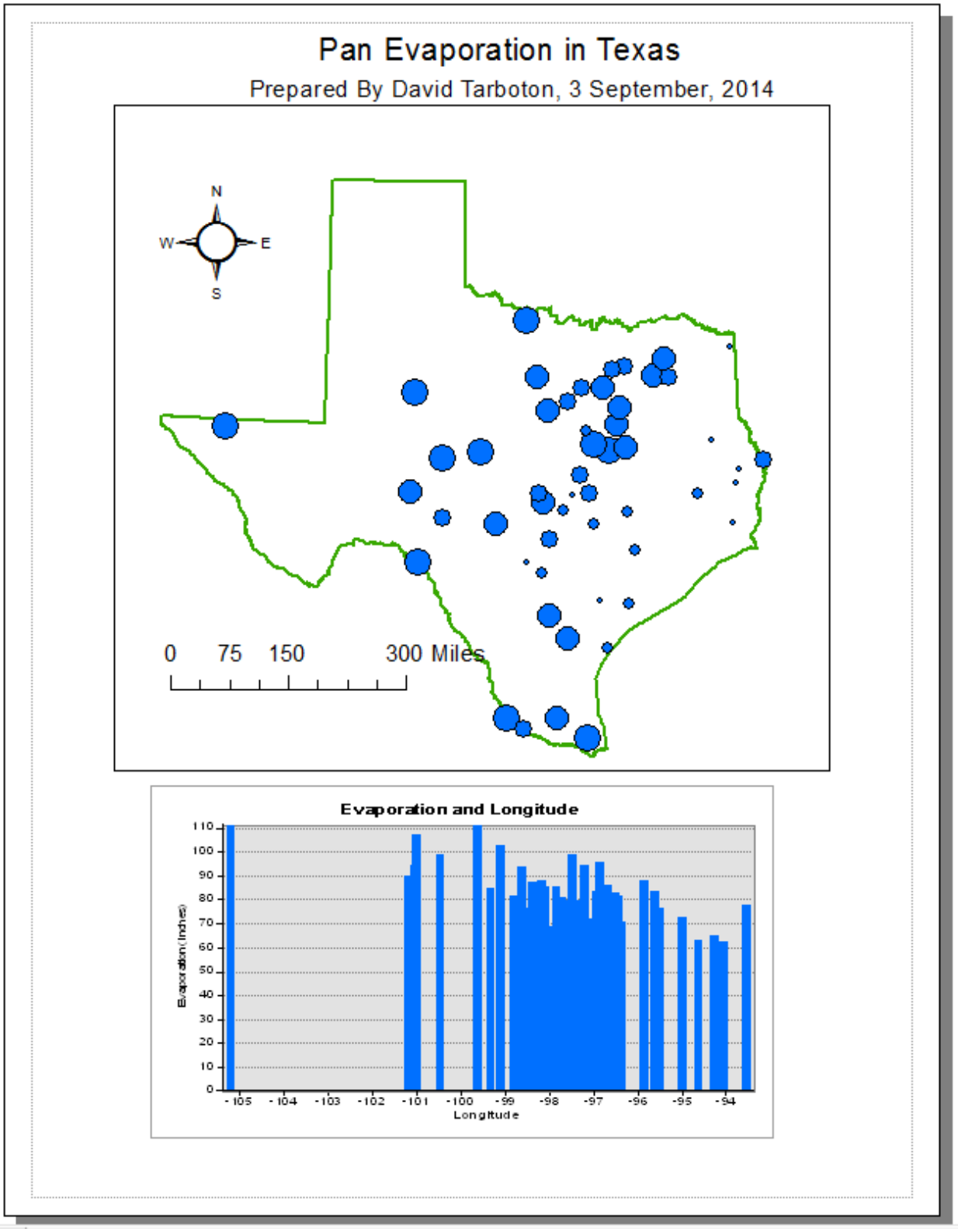
Select Customize -> Toolbars -> Draw to open the Draw Tool



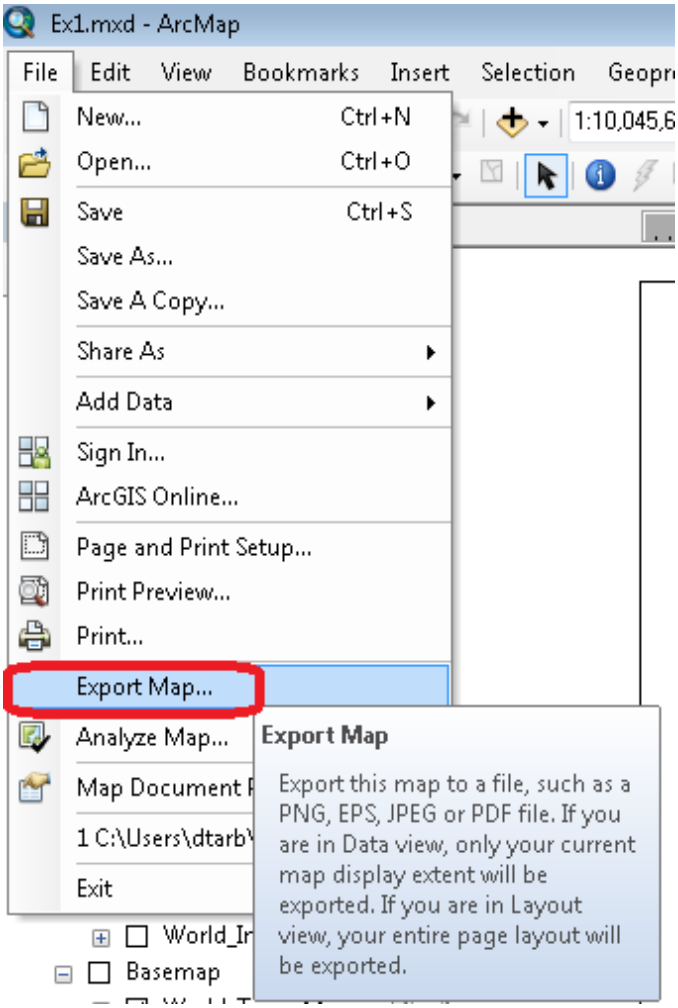
You can add a **Title** or **Text** with the text tool shown next to the line draw tool. The text displays in very small font sizes. Select and click on them, and use **Properties** to resize them. You can also add title and text from the Insert menu.



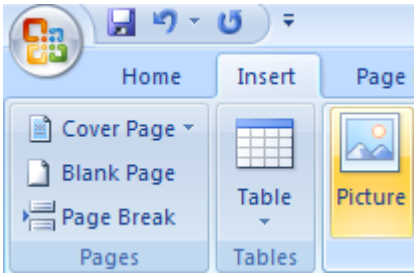
Your map might look like this:



You can export your map from ArcGIS using **File/Export Map** from the ArcMap menu, and you can store this as **Ex1.emf** in your data file.



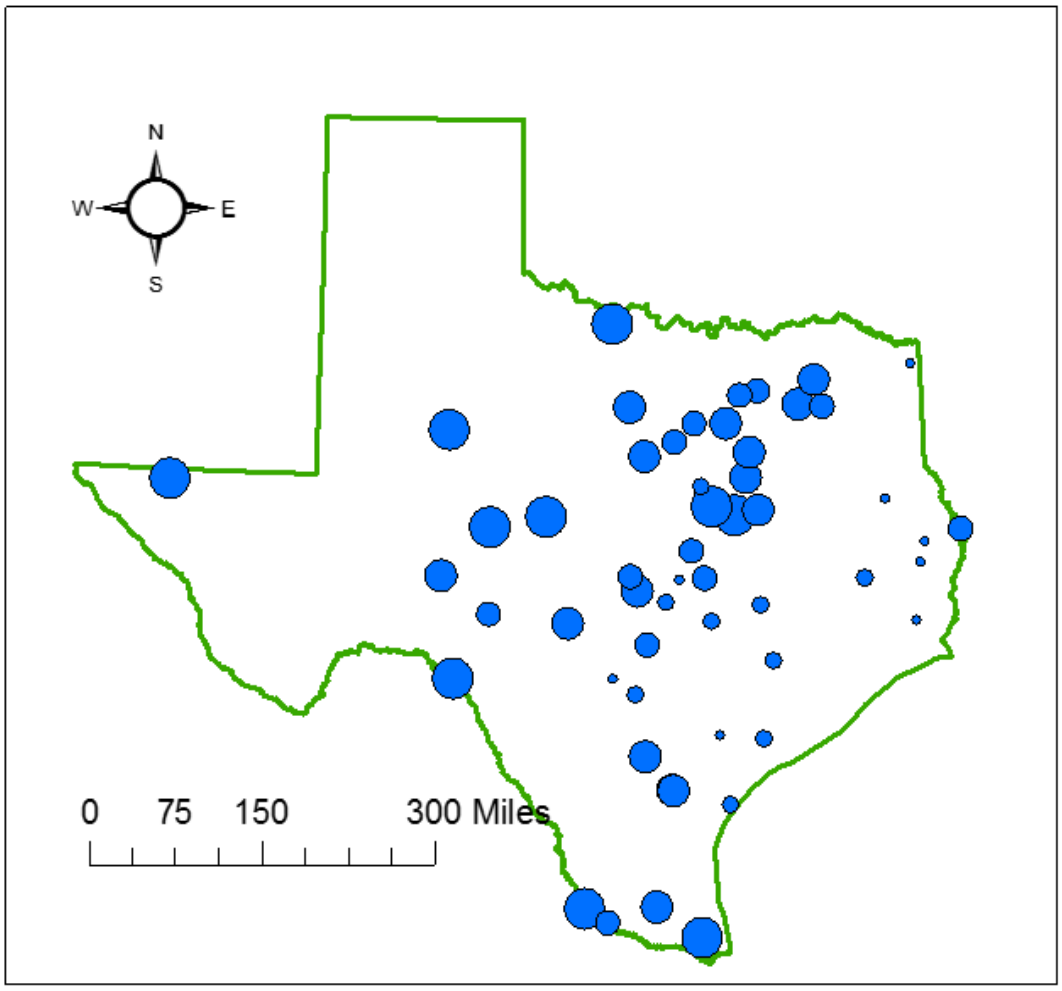
Then you can add it to a Word document using **Insert/Picture/From File** and load this emf file, as shown below. This preserves the crisp resolution of the ArcMap display in a word document.

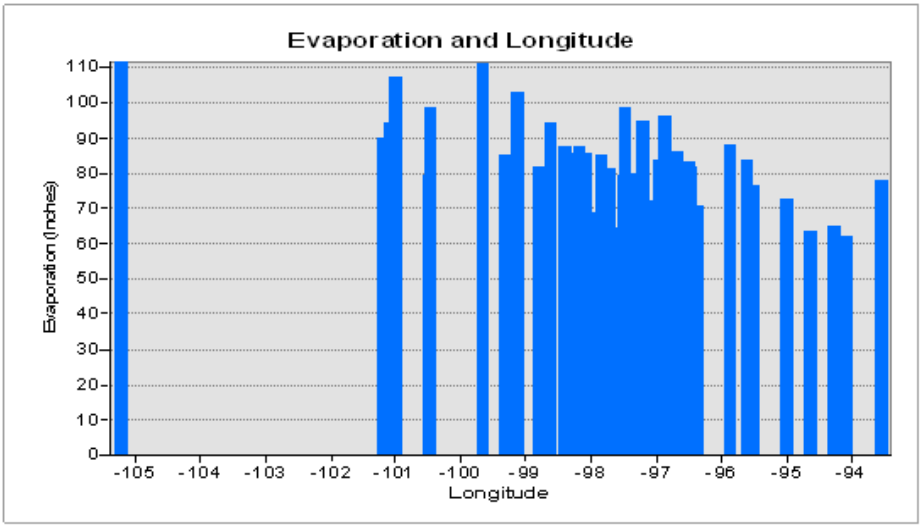


However there are some cautions embedding emf files in other documents. They do depend on ESRI fonts so if you try to print them on a computer that does not have these fonts installed you may get unexpected results. Also sometimes PDF is not properly created for documents that contain emf objects.

Pan Evaporation in Texas

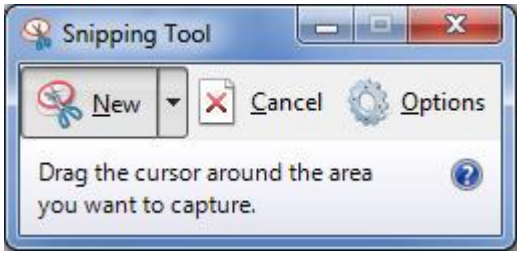
Prepared By David Tarboton, 3 September, 2014





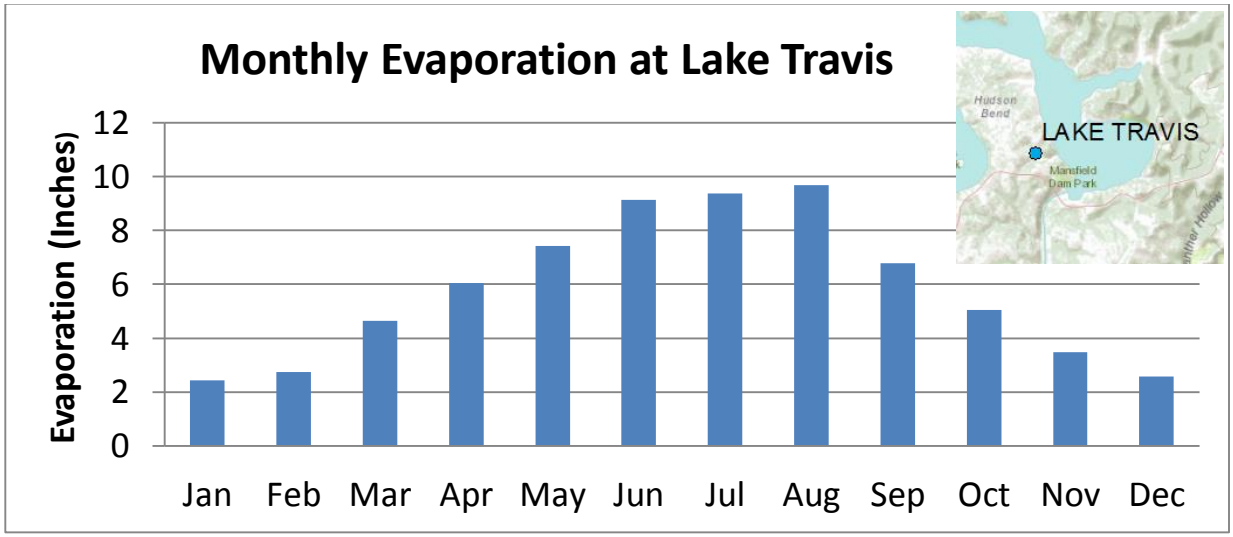
Helpful Tip:

A more general procedure is to simply copy the screen to the clipboard and crop out the part that you want, saving it to a file for later use. That is how all the images in this exercise were prepared. To copy any image, use the Snipping Tool in **All Programs/Accessories** on your Windows Desktop interface



Drag the cursor around the area that you want to capture and you'll see it copied into a new display, then use **Paste** to insert this snippet into a specific location in your document. If you only want to capture the active frame, press **Alt + Print Screen** and then Paste it to the new document.

This approach can also be used to add a map to a chart in Excel:



The manipulations just described transfer objects from one application to another.

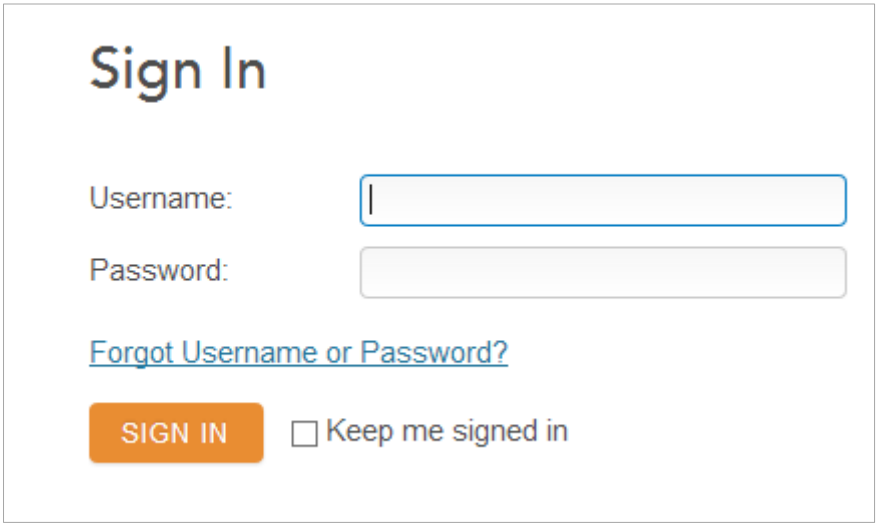
To be turned in: An ArcMap map layout in it showing a map of Texas with gages, coupled with a graph showing monthly evaporation data plotted from the gages. In the presentation of information on maps and charts it is important to include sufficient labeling detail so that the information can be clearly and unambiguously interpreted. You should include a scale bar to indicate distance, a north arrow to indicate direction and labels or legends with units wherever they are needed to interpret map or quantitative values.

9. Mapping in ArcGIS Online

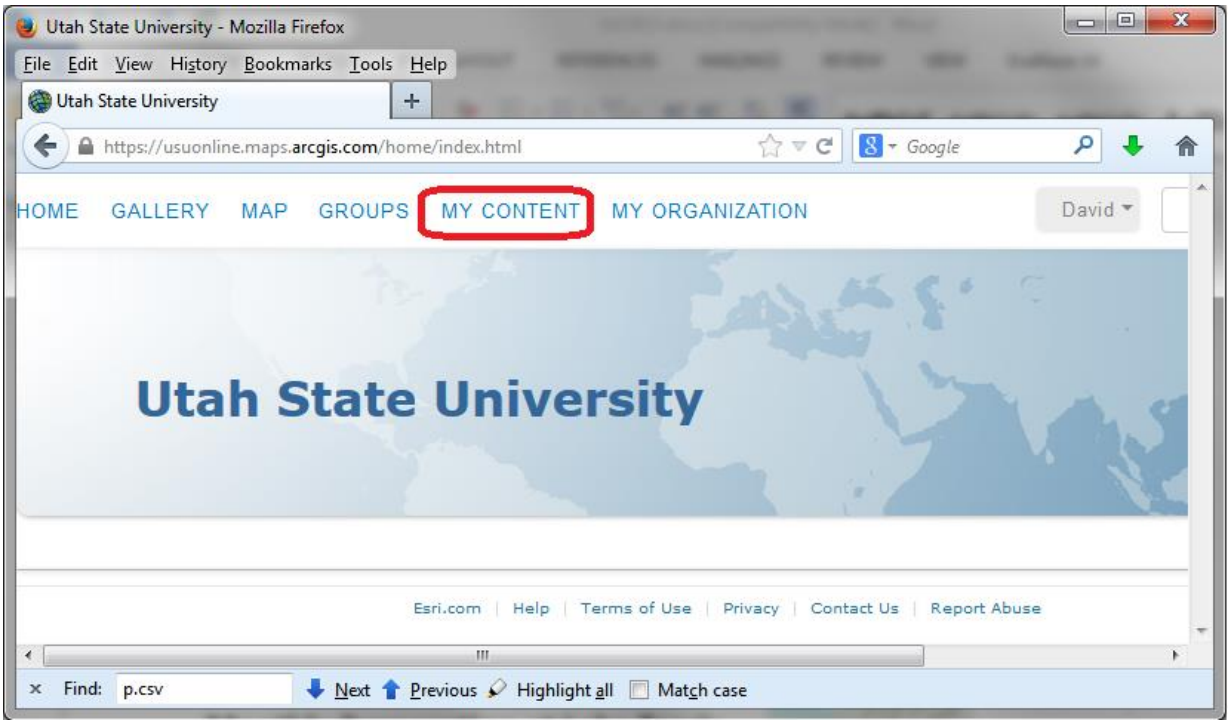
Now, let's suppose that you don't have ArcGIS Desktop and you want to make a map anyway. Let's do this in ArcGIS Online. You can make a map in ArcGIS Online without an ESRI Global Account, but if you want to save the map and share it with others on the web, you have to have an ESRI Global Account to do that. If you don't have and ESRI Global Account, go to https://webaccounts.esri.com/cas/index.cfm and create an account. For "Organization" use "University of Texas at Austin" or "Utah State University", whichever applies for you. To execute this part of the exercise you need to have two files:
(1) A Comma Separated Variable (CSV) file of Texas Pan Evaporation:
http://www.neng.usu.edu/cee/faculty/dtarb/giswr/2015/TexasPanEvap.csv
(2) A zipped shape file of Texas Counties:
http://www.neng.usu.edu/cee/faculty/dtarb/giswr/2015/Counties.zip

These files are also available in the zip file linked on the class website.
http://www.caee.utexas.edu/prof/maidment/giswr2015/Ex1/Ex1WebData.zip

Go to http://www.arcgis.com and sign in with your ArcGIS Online Username and Password

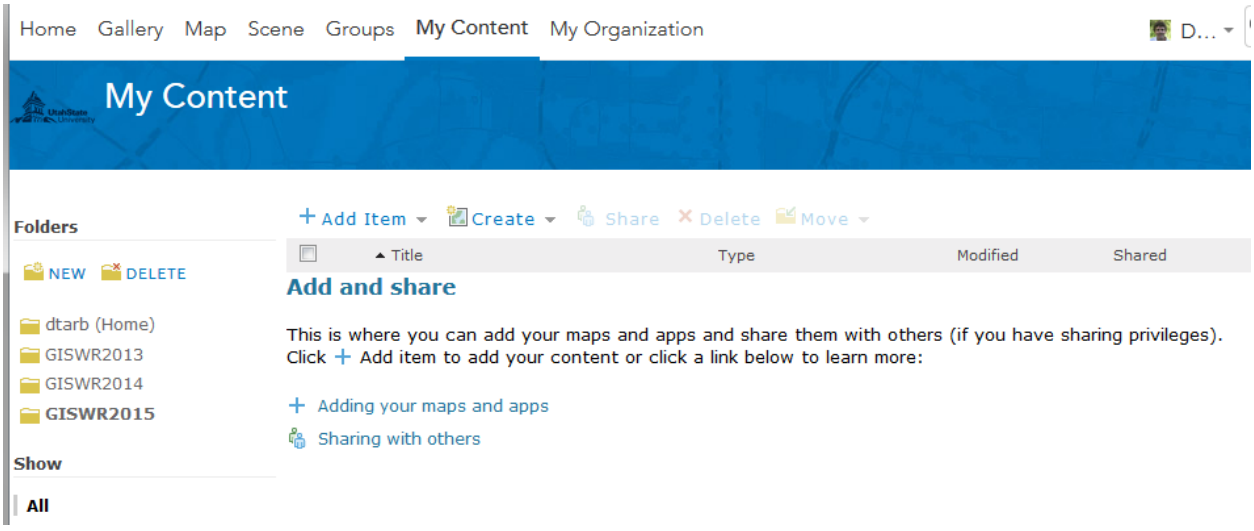


The landing page should look similar to the screen below. Click on "My Content"



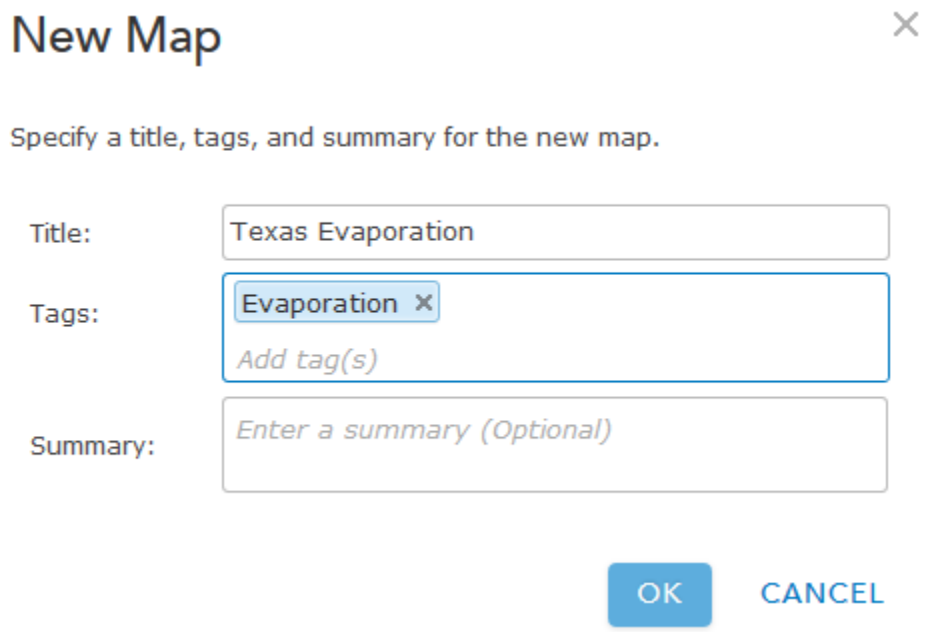
This opens a section where you can manage the content you have added to ArcGIS.com.

I have created a New Folder called GISWR2015 to store information in from this class and to keep this separate from what I have done in ArcGIS Online for other purposes.

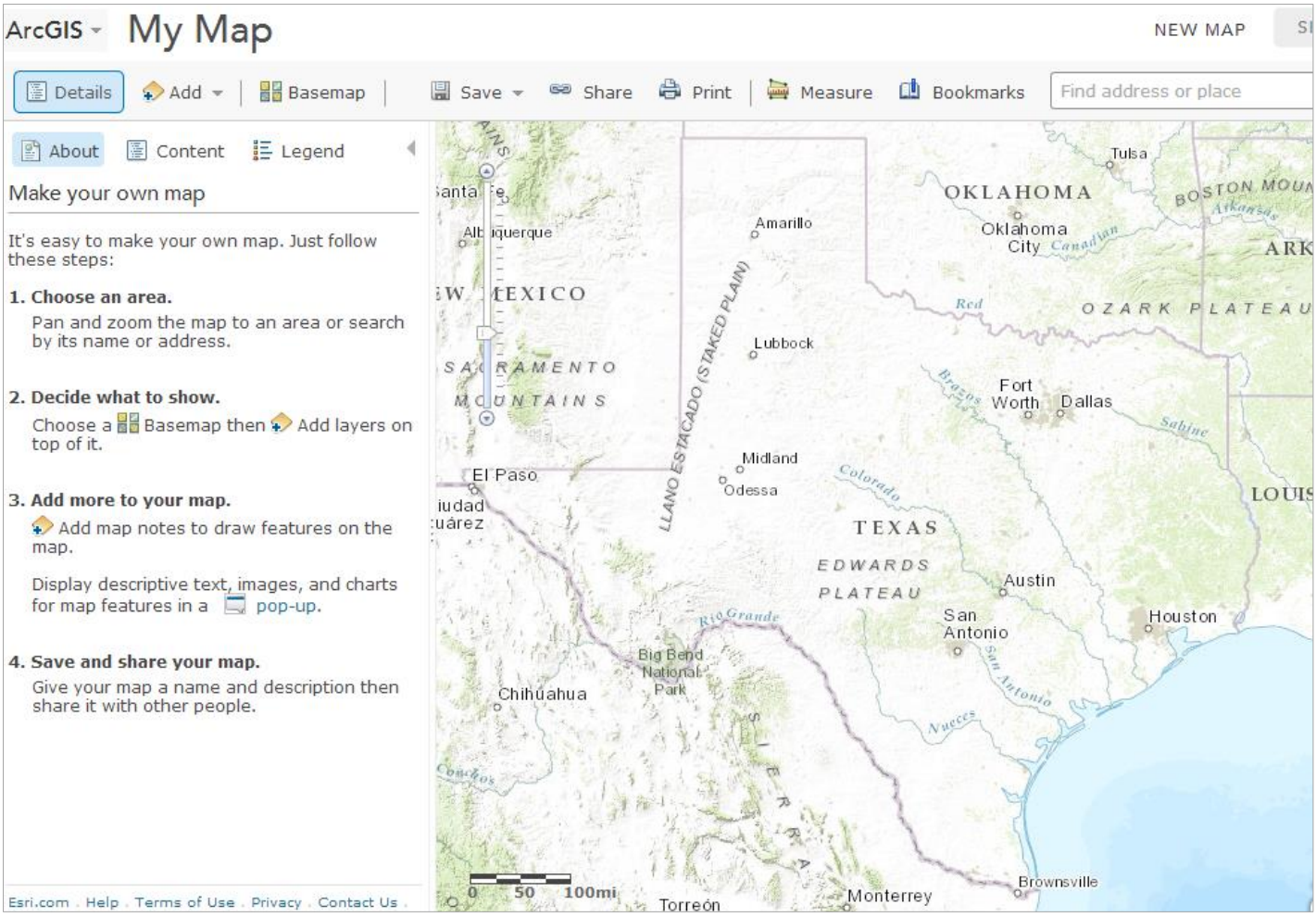


Click on

. Enter a Title and Tags, then click OK.

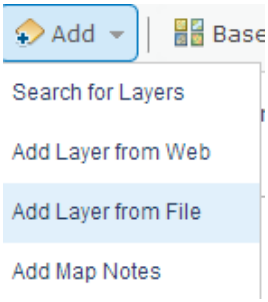


This brings up a Topographic Map of the United States to which we'll add the pan evaporation data. Zoom in to Texas. You can press "Shift" and then use your mouse to drag a box across Texas to facilitate zooming in.

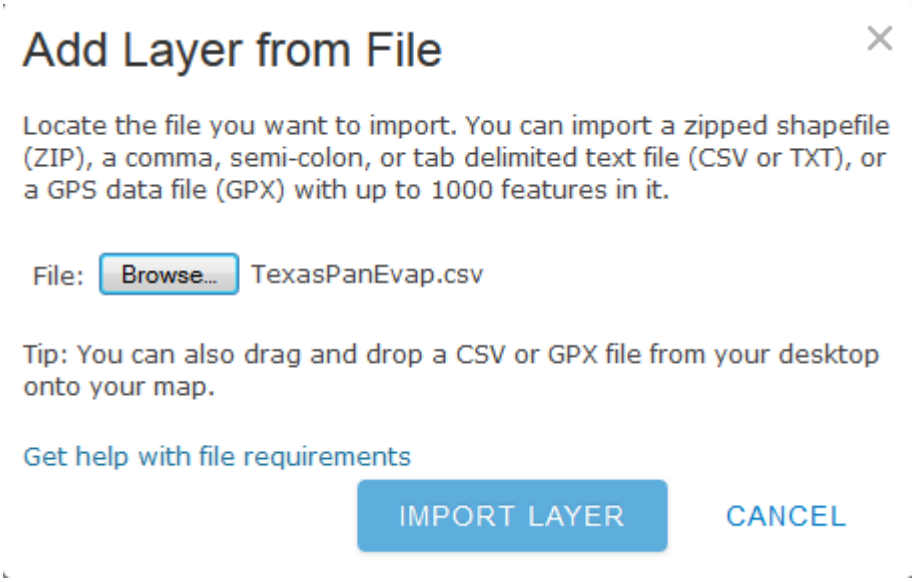


10. Adding Pan Evaporation Data

Add a Layer from File

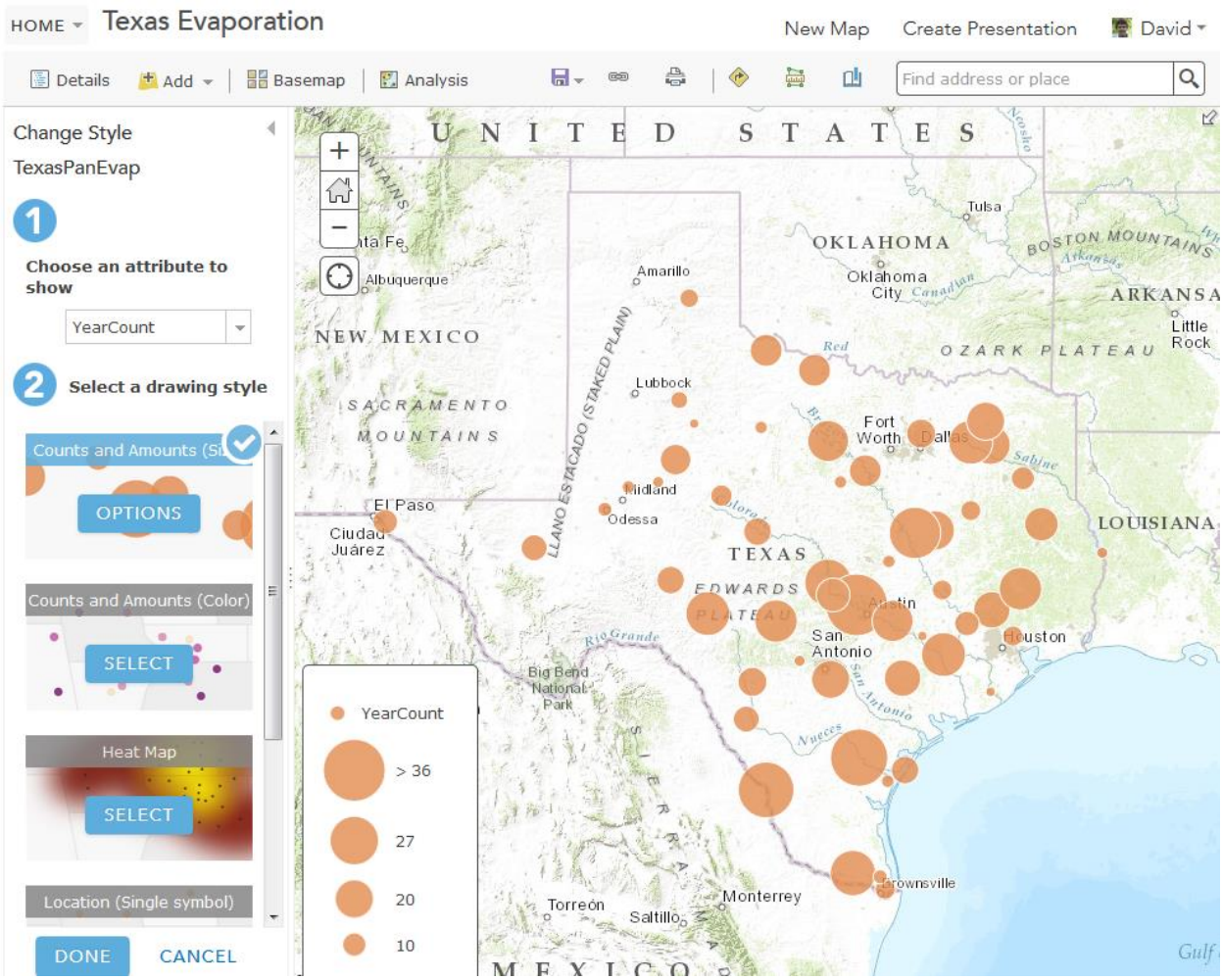


Browse to **TexasPanEvap.csv** and click **Import Layer**



You'll see the points added to the map. This works because the .csv file has the Latitude and Longitude of the points in decimal degrees:

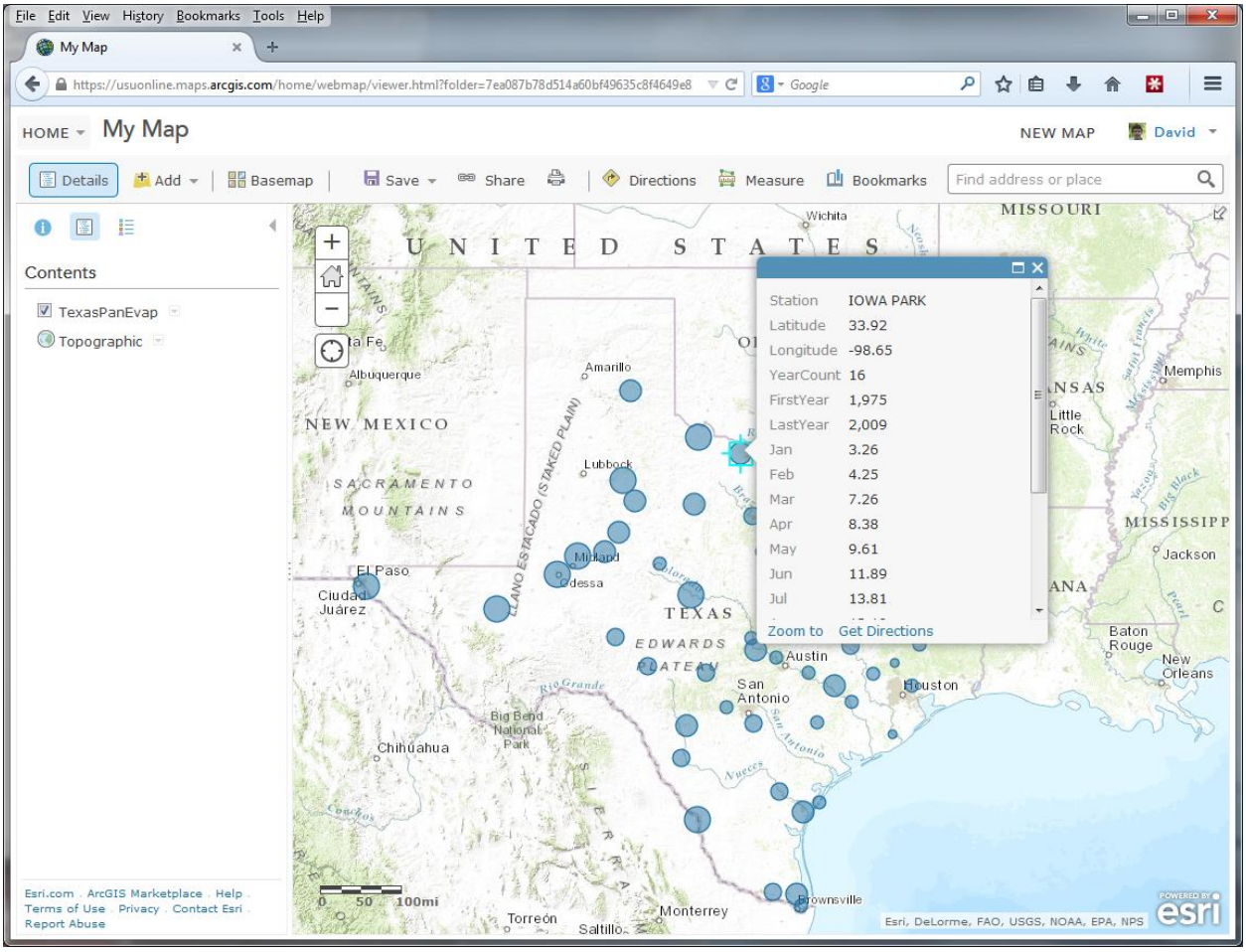
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
1	Station	Latitude	Longitude	YearCount	FirstYear	LastYear	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2	BIG SPRING	32.25	-101.425	2	2004	2005	3.74	4.24	8.28	9.31	12.11	14.72	14.41	9.66	10.77	5.67	4.91	3.9	101.69
3	BRAUNIG LAKE	29.25	-98.382	20	1977	2010	3.25	3.41	5.37	7.15	8.41	9.89	10.56	10.34	8.52	6.28	4.25	3.17	80.61
4	BRAZORIA RESERV	29.05	-95.55	1	1970	1970	2.21	3.23	3.41	5.07	4.55	6.47	6.9	8.5	5.1	4.23	3.94	2.24	55.85



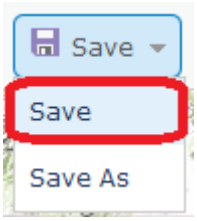
You will also see that the YearCount column was selected to scale attributes. Next to the blue 1, choose "**Annual**" Evaporation for attribute to show. Select **Options** below Counts and Amounts (size) for the drawing style

Here you can adjust the Symbols. For example, click on the Symbols circle and change the color to blue. Click **OK** and **Done** when you are satisfied.

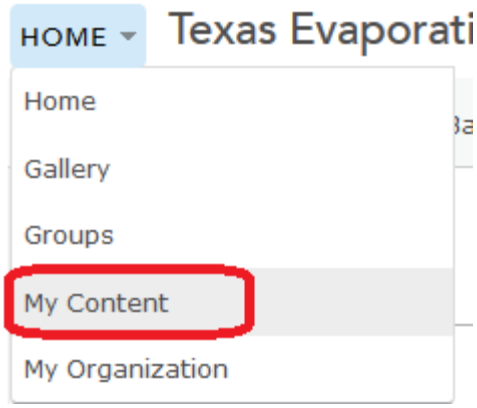
Hit **Apply** and **Done Changing Symbols** and you'll see a new map, and if you click on one of the observation sites, you can see a pop up with the data values at that point.



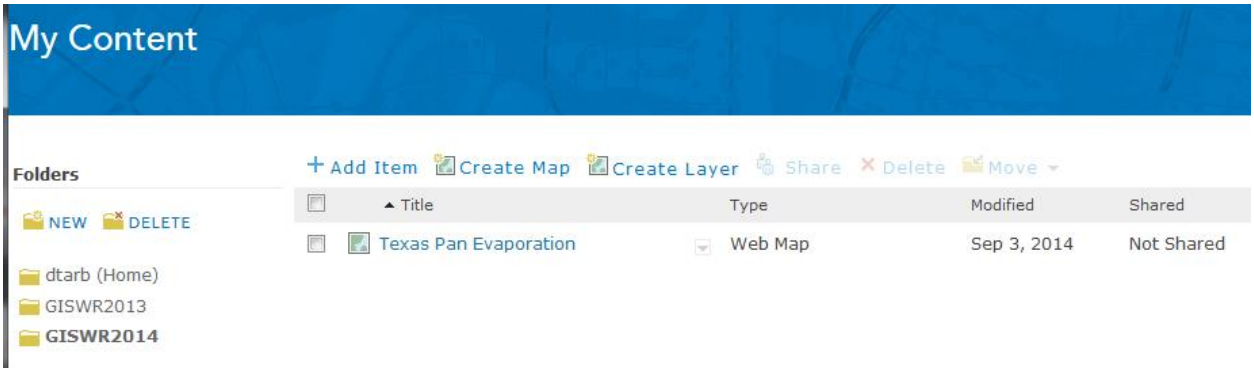
Ok, this is pretty cool. You've just created a web map with your own data in it. Now, let's save the map into your ArcGIS Online workspace:



Now if you look in **Home/My Content**,

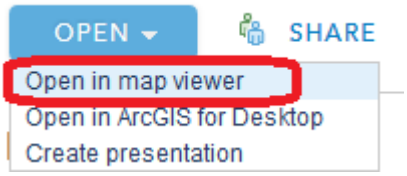


You'll see that you have the new map stored there.



If you click on the **Texas Evaporation** map title, you'll see a window open that tells you about this map.

If you **Open in map viewer**,

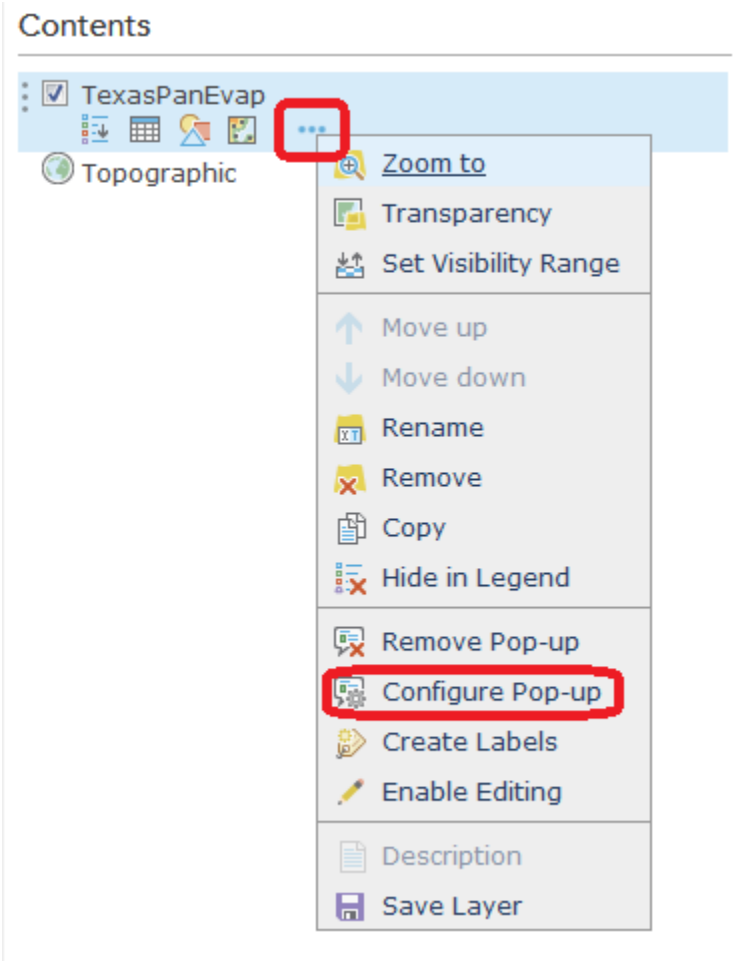


you'll see your map again as you had it before.

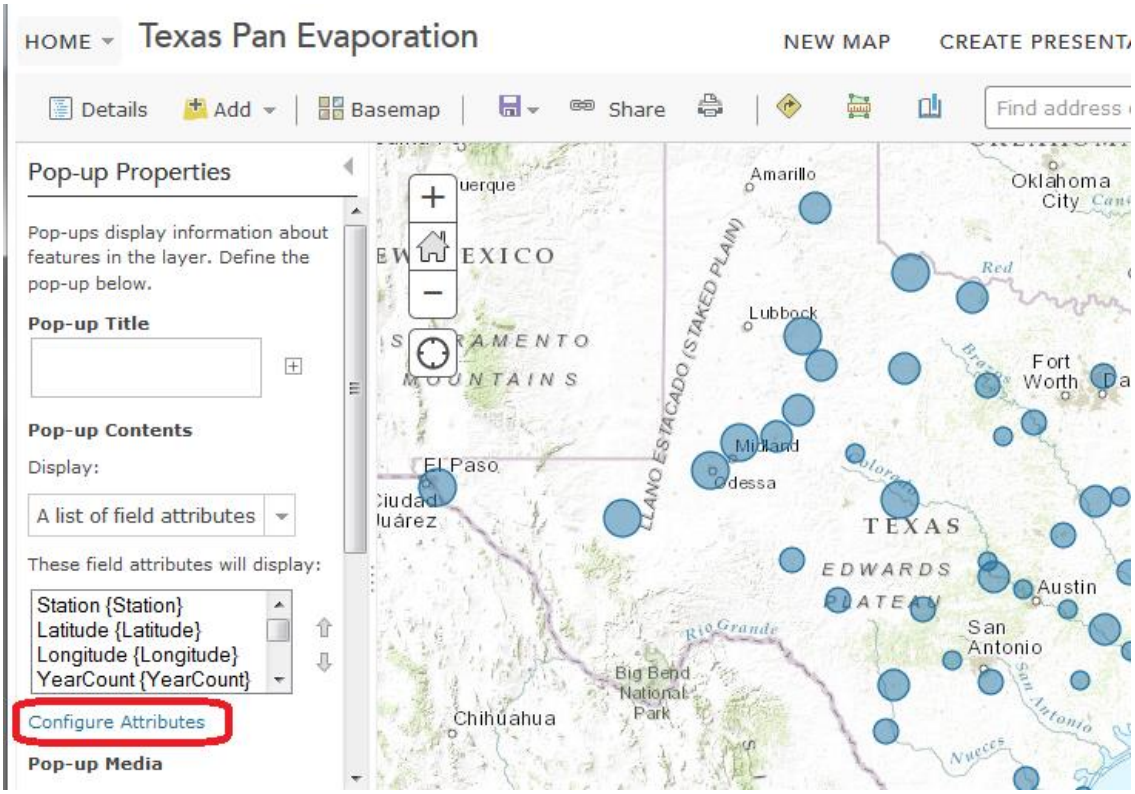
If you Open in ArcGIS for Desktop ArcMap will open and you will be prompted to enter your username and password. Then the map will open in ArcMap. There is thus interoperability between the desktop application and web mapping application.

11. Configuring Pop-Ups

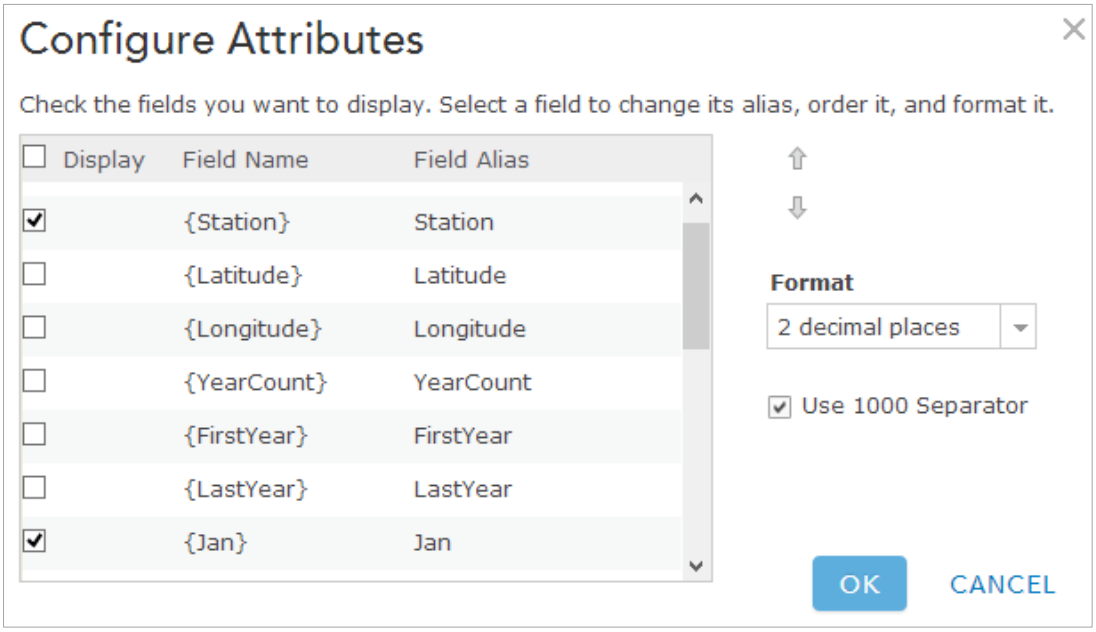
Let's configure the content of the information displayed when a point is clicked so that it shows just selected attributes, and also a chart of monthly pan evaporation. Select **Configure Pop-Up** for the TexasPanEvap layer.

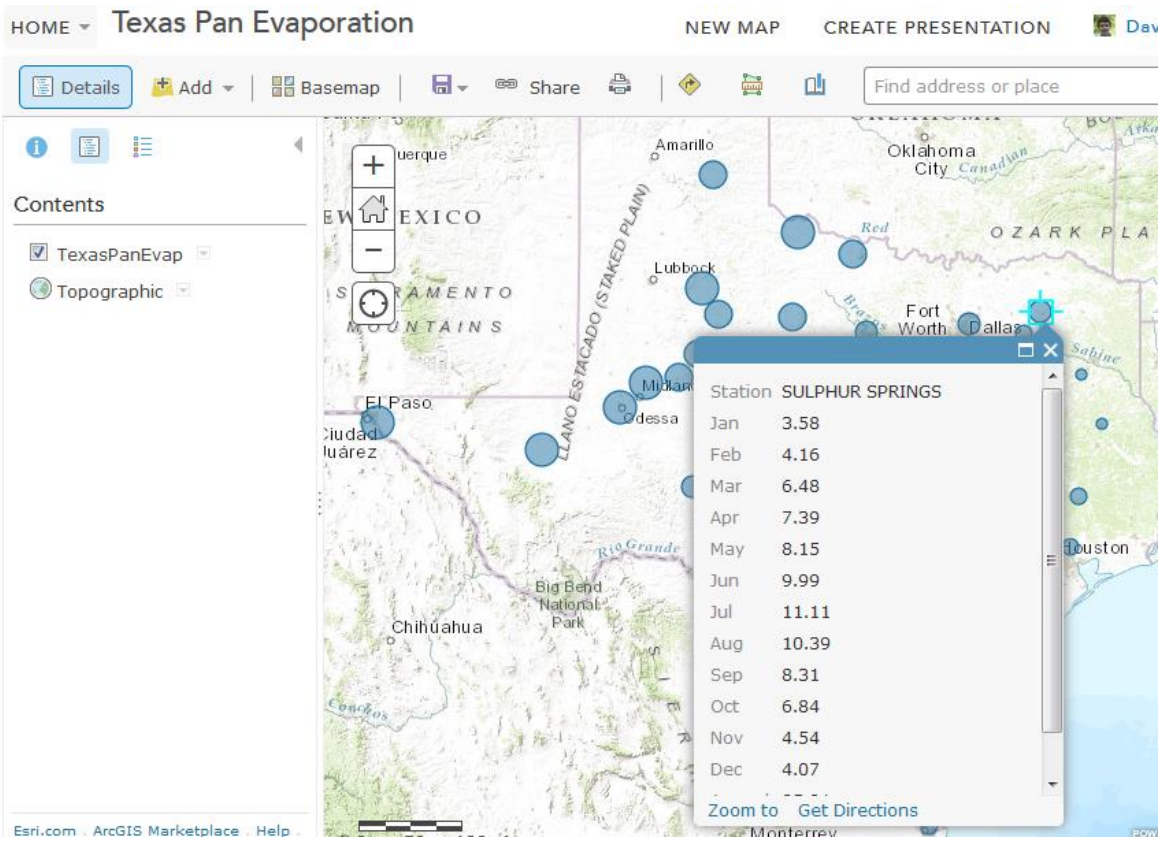


Hit **Configure Attributes**.

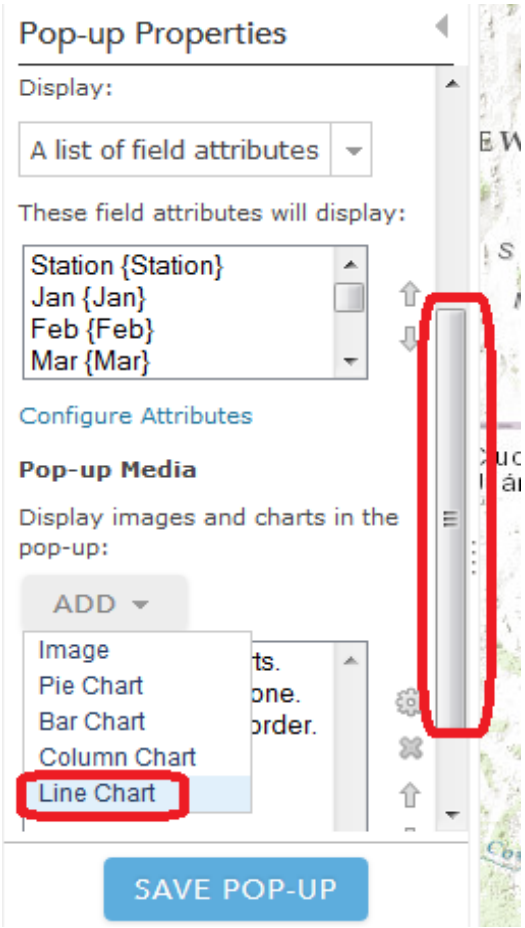


At the panel that opens select **Station** and all the monthly and annual evaporation values. Unselect other attributes. Hit **OK** and **Save Pop-up**. Now, your map will show a reduced set of attributes when you click on a point.

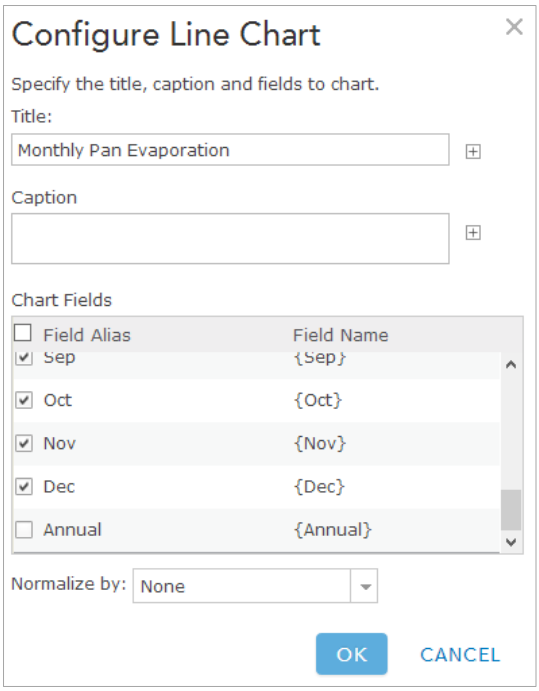




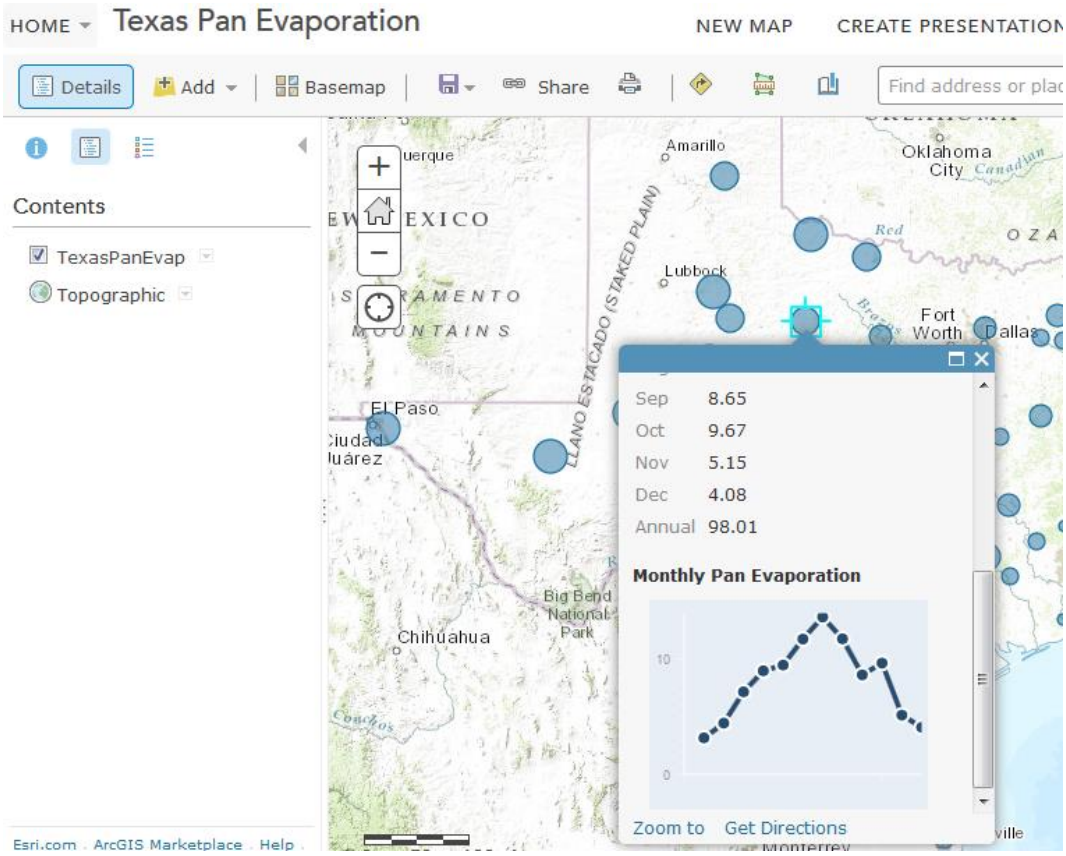
Now, Configure the Pop-up again, Scroll down the Pop-up properties and add a **Line Chart**



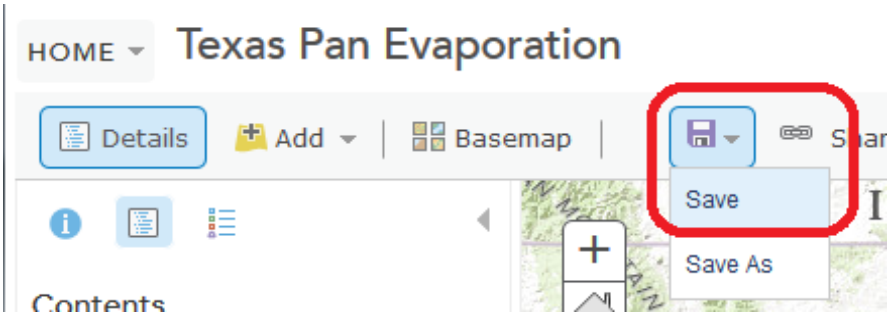
Make the title “Monthly Pan Evaporation” and select all the monthly pan evaporation values to display. Click **Ok** to apply these choices. Click **Save Pop-Up** to get the new chart in the Pop-Up display.



And now when you click on a point you get rather a nice chart, which along with the annual value of pan evaporation tells you the total evaporation and gives an image of how it is distributed over the year.

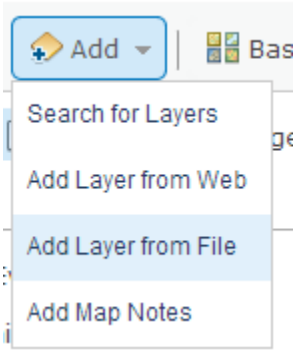


Click on Save to save these changes to your map for next time you open it. If you forget to Save the map configuration changes seem to be lost when you close the browser.

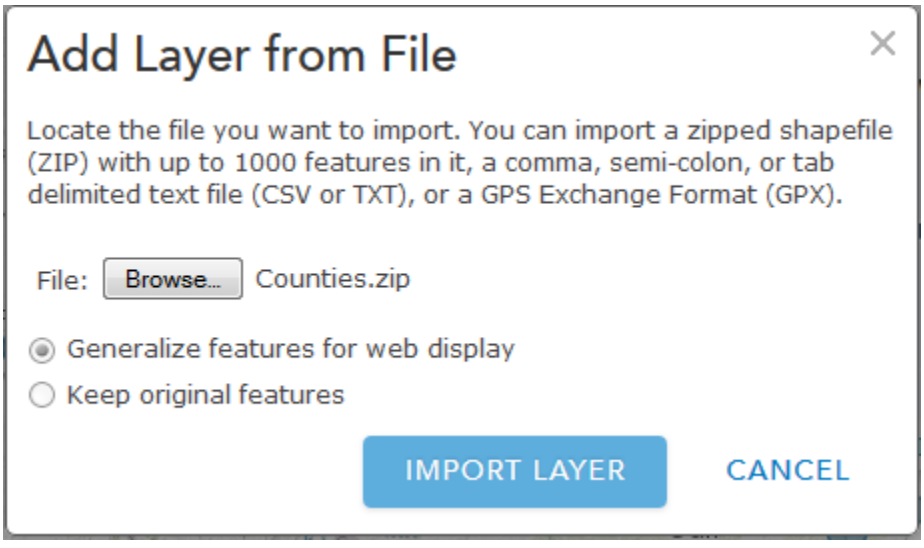


12. Adding Counties and Map Notes

Now, let's add the **Counties** layer to provide some more spatial context for the observation points

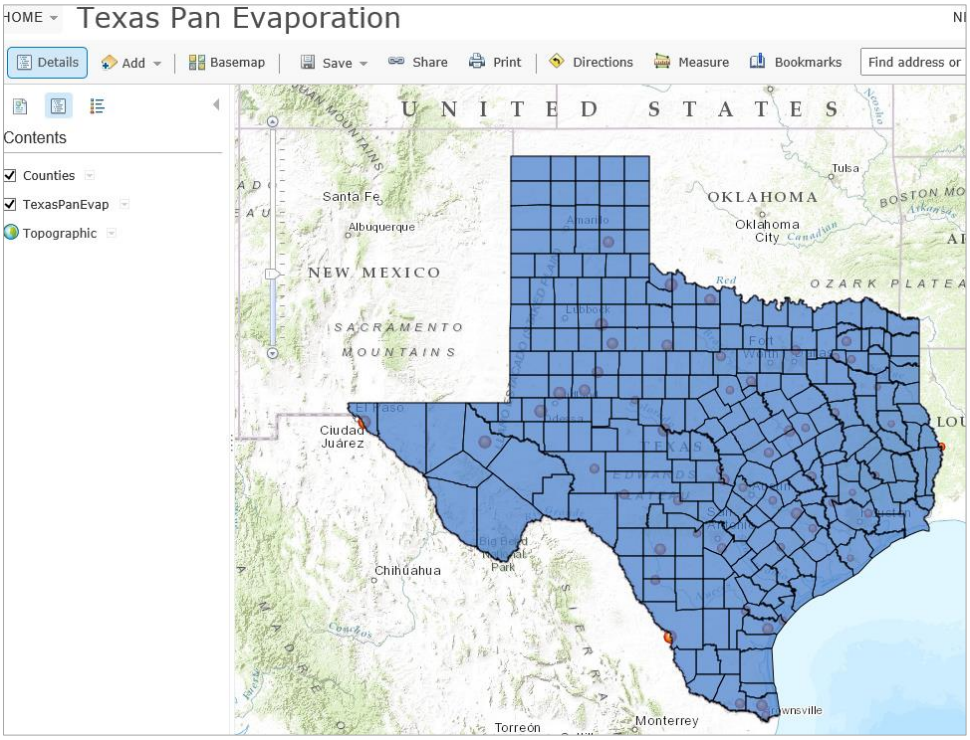


We'll add the Counties as a zipped file of the Counties shape file.

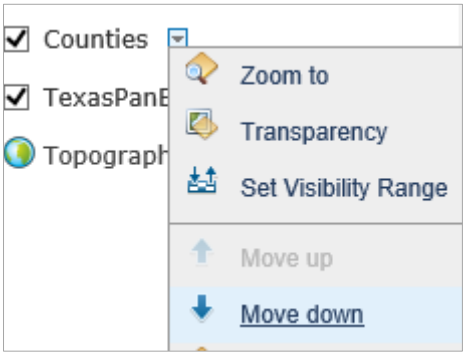


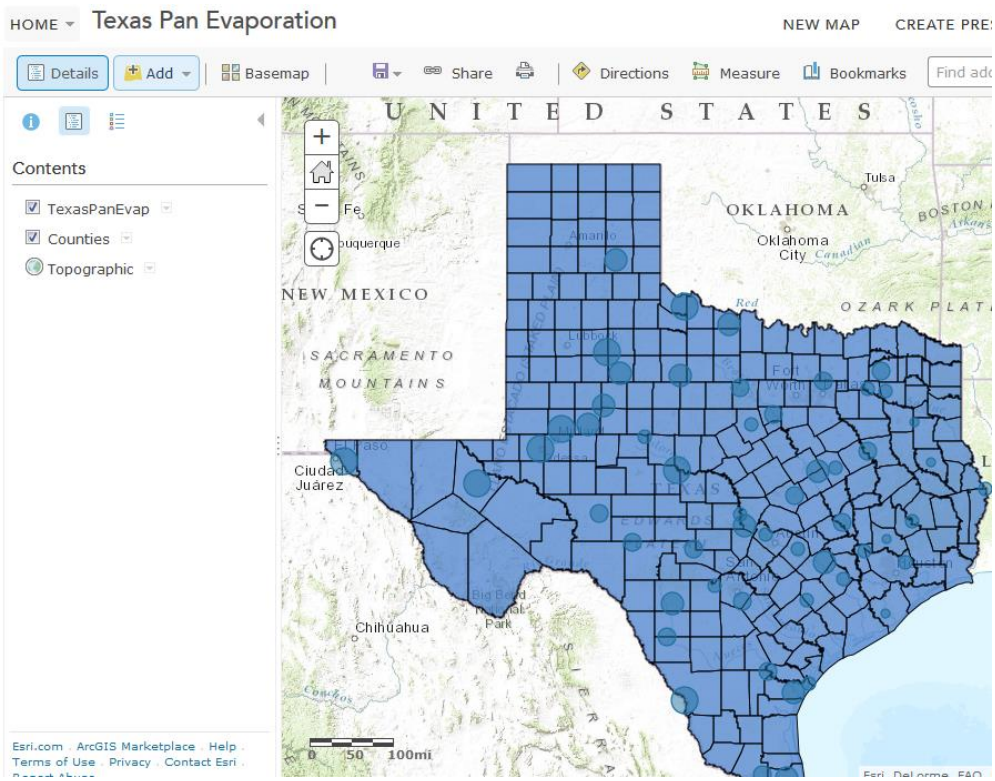
Under drawing style select Location (Single symbol). Change the color if you like.

When the Counties layer displays, it is the first layer on top of the map and it obscures the pan evaporation points.

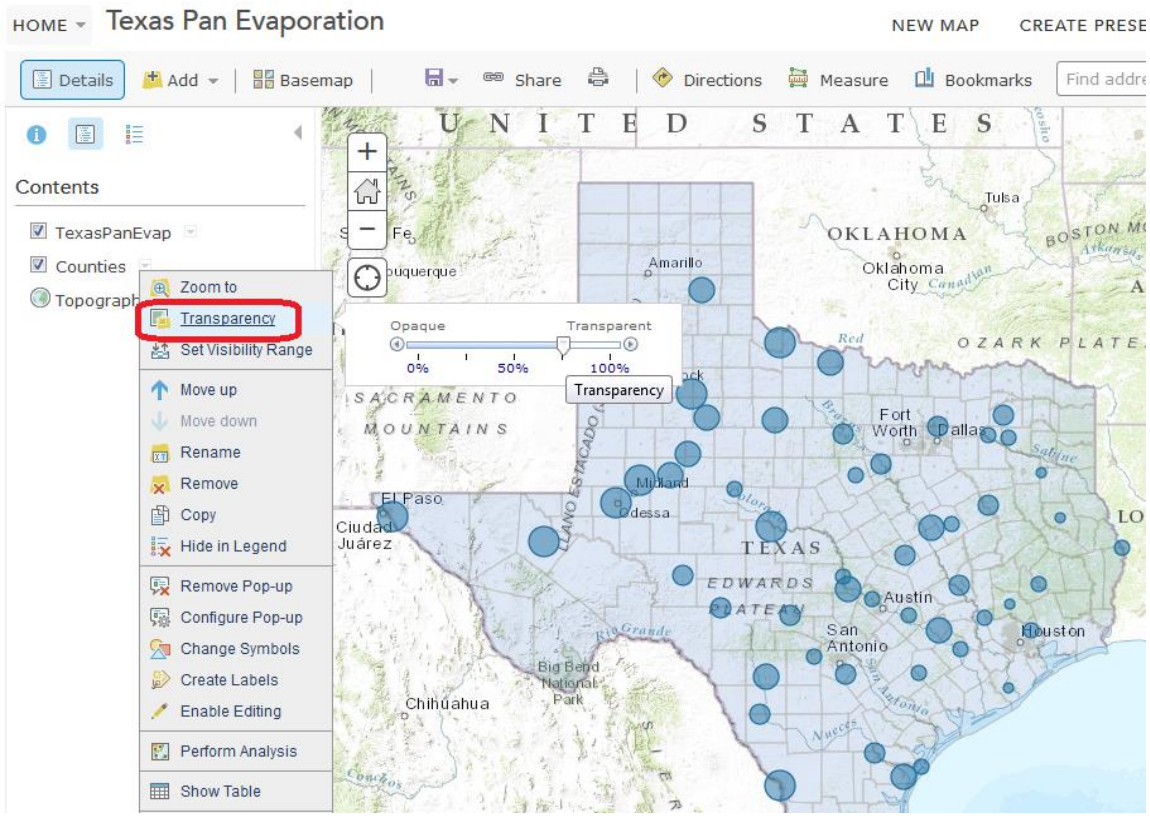


The **Counties layer** can be **moved down** so that the points are more clearly displayed

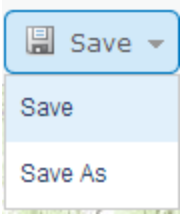




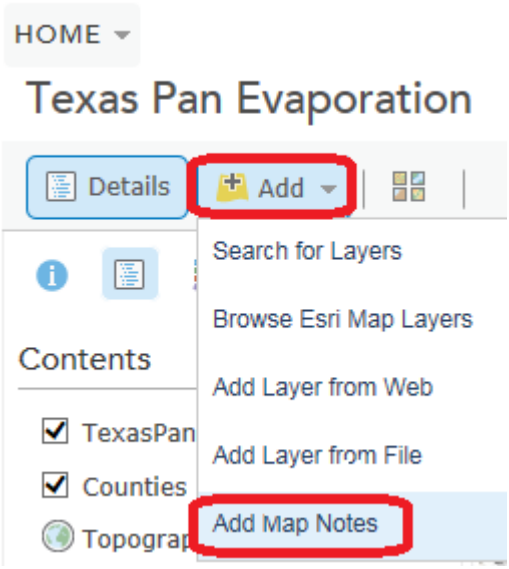
And if you set the Transparency of the Counties layer to 75%, a rather pleasant map appears:



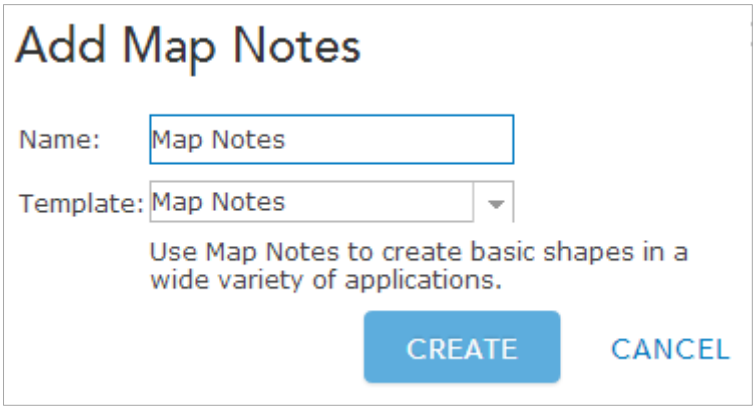
Let's **Save** the map so we can retrieve it in this condition again.



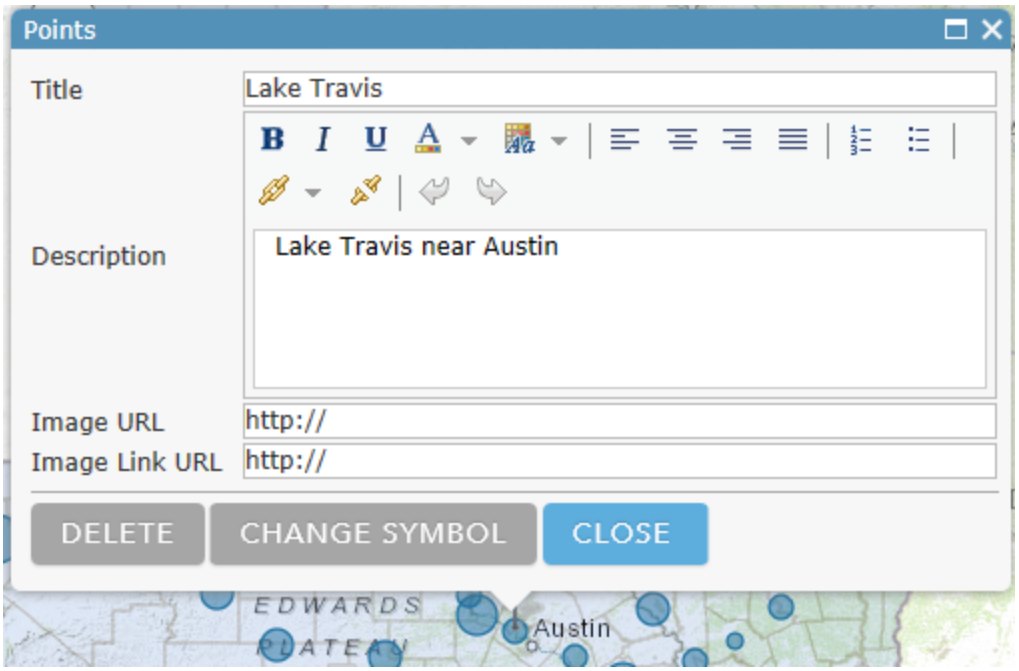
Now, let's suppose we want to Add some Notes on this map.



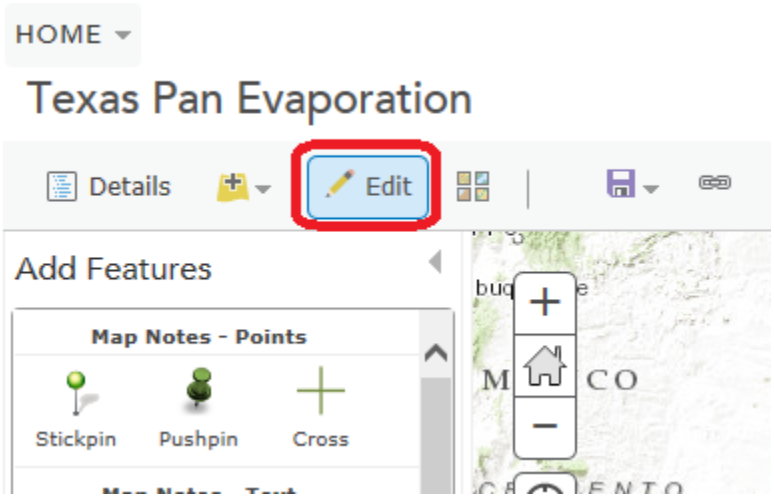
Just accept the template as it is presented to you using **Create**



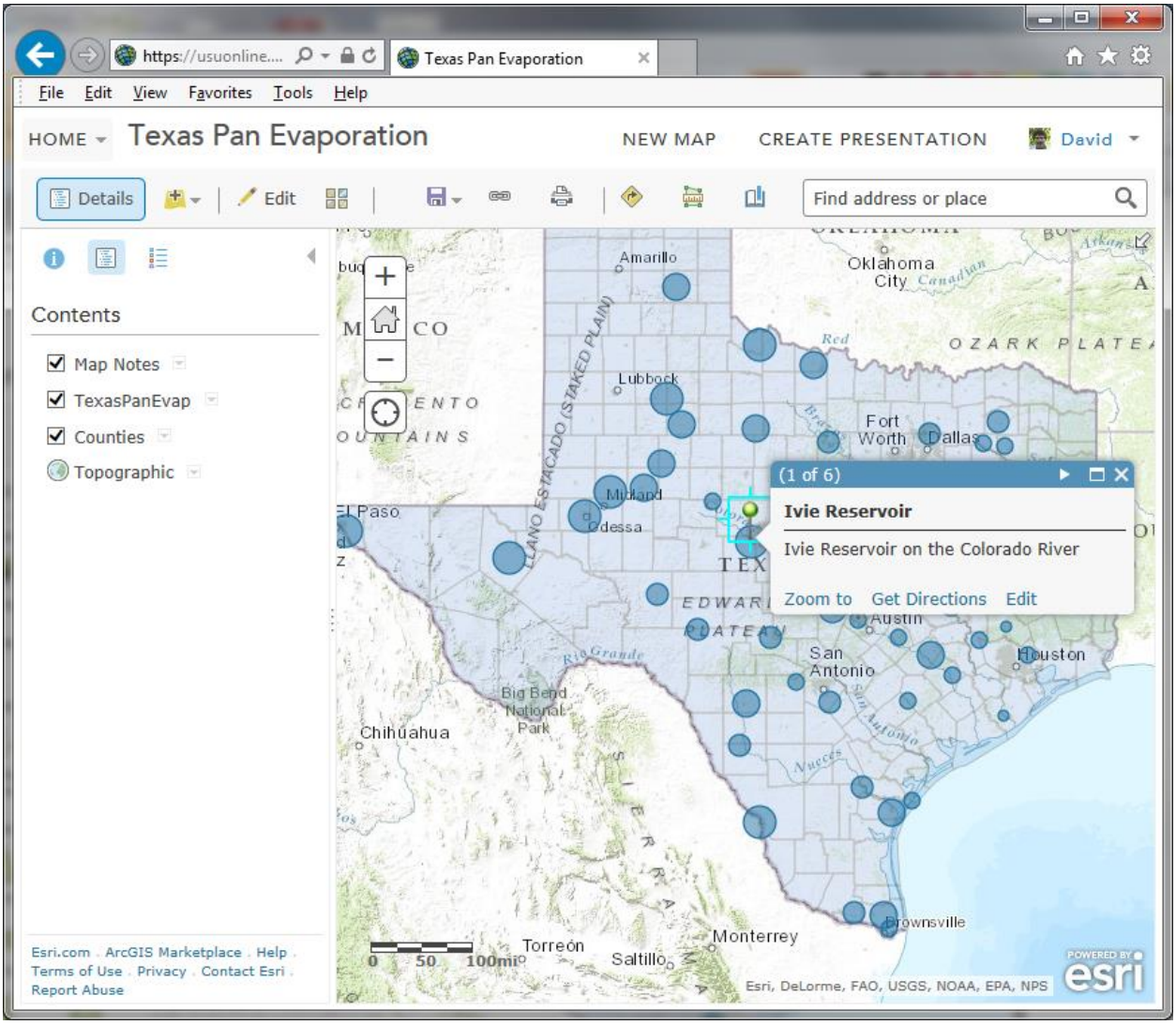
Add **Stickpins** to highlight the Pan Evaporation Sites at Lake Travis and Ivie Reservoir, both important water supply lakes on the Colorado River in Texas. Click on the Stickpin tool, then click on the map to place the stickpin. Add Title and Description Text. Click Close.



When you are done click on the Edit button to toggle editing off.



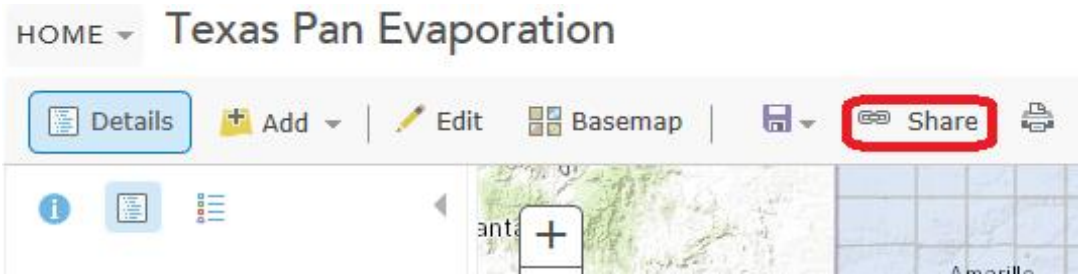
The result is a Map Notes layer where you can click on the Map Notes symbol to see the information you added.



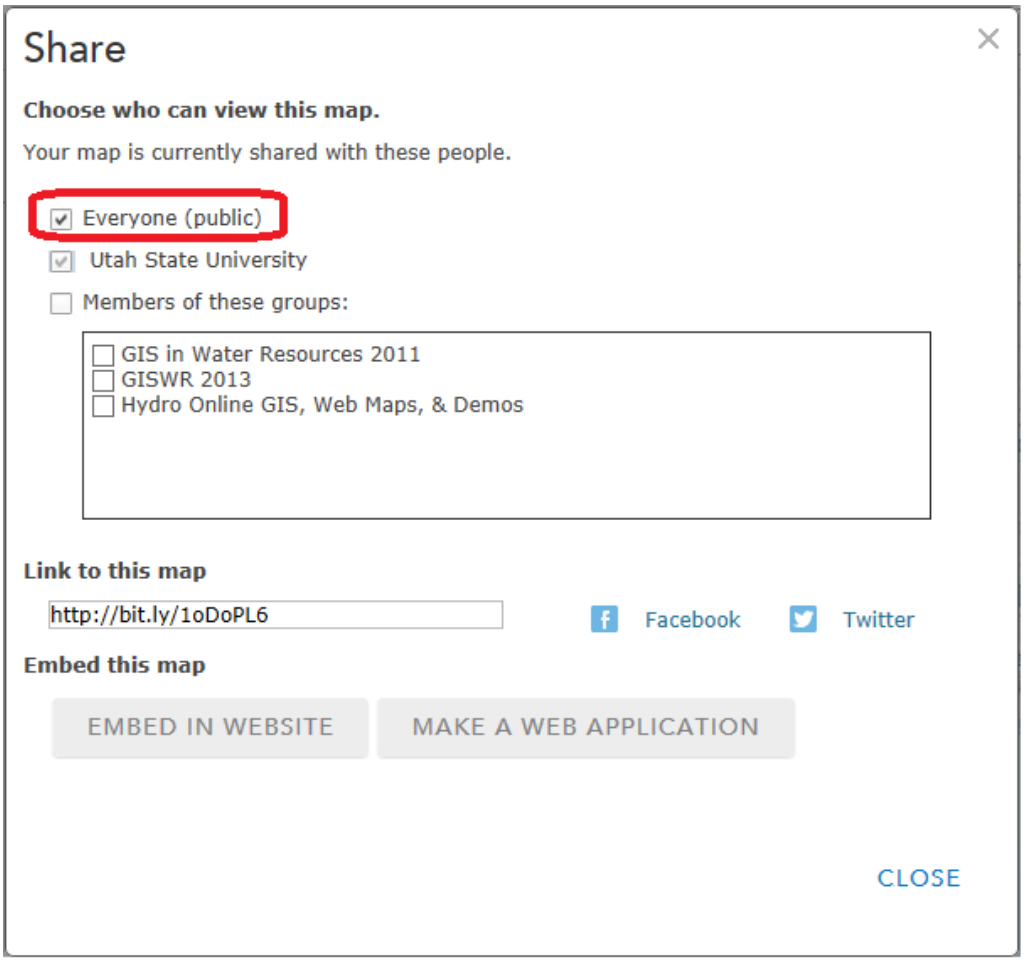
Save your map. The save step sometimes takes a while.

13. Sharing your Map on the Web

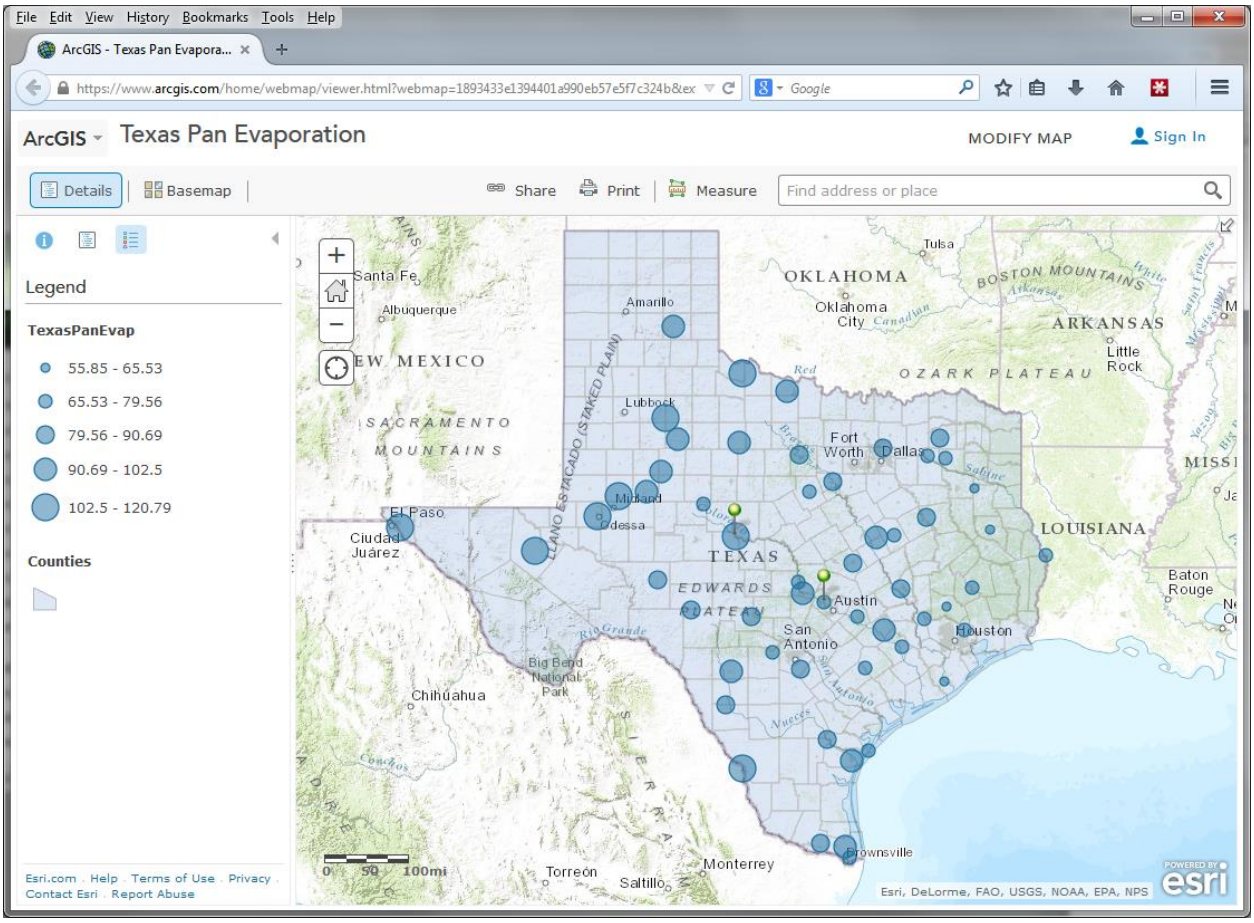
Now let's suppose you want to **Share** this map with colleagues online. Click on Share



I am a member of a number of **Groups** in ArcGIS Online, and I could choose just to share my map with one or more of those, but instead, let's share the map to **Everyone (public)**, and that way anyone can see it. I get back a web link for this http://arcg.is/1JtAJ5x



And if I put this address into a web browser, my map appears again! Ok, this is pretty cool. I've created a map on the web and shared it with others.



To be turned in: The web link (equivalent to my http://arcg.is/1JtAJ5x) for your map so that I can view it online.

Summary of Items to be Turned In:

(1) An ArcMap map layout in it showing a map of Texas with evaporation gages, coupled with a graph showing evaporation data plotted from the gages. In the presentation of information on maps and charts it is important to include sufficient labeling detail so that the information can be clearly and unambiguously interpreted. You should include a scale bar to indicate distance, a north arrow to indicate direction and labels or legends with units wherever they are needed to interpret map or quantitative values. Let's see some nice cartography!!

(2) The web link (equivalent to http://arcg.is/1JtAJ5x) for your map so that I can view it online. Please include this as part of the document that you prepare for (1) and submit the result as a single complete document.

The assignment is due in a week from the date it was assigned in class.

UT Austin: Please submit your solution through Canvas to assignment "Exercise 1".

USU: Please submit your assignment as a single Microsoft word or PDF document in Canvas.