

Introduction to ArcGIS

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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 10.2. 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.ce.utexas.edu/prof/maidment/giswr2013/Ex1/Ex1Data.zip>

You need to establish a working folder to do the exercise on. This can be in c:\temp, your student directory, or any convenient location on the computer you are working on. If you don't yet have a regular Login account at the Civil Engineering Learning Resource Center, get a temporary guest login to do the exercise.

After you have downloaded the zip file **Ex1Data.zip** double click on the file and you should see the Winzip, Alladin Stuffit utility, 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

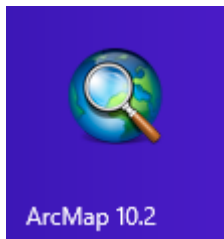
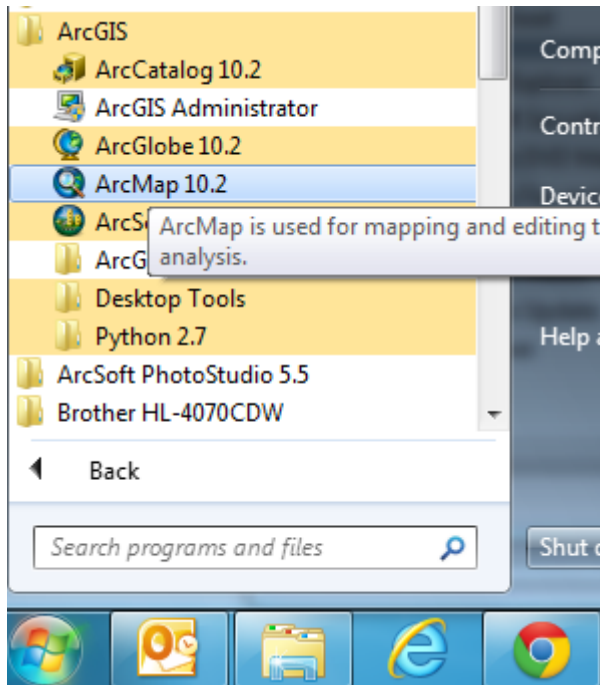
Procedure

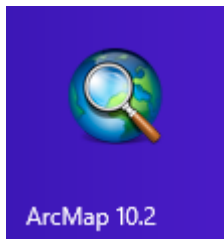
Please note that the following procedure is a general outline, which can be followed to complete this lesson. However, you are encouraged to experiment with the program and to be creative.

1. Viewing Shapefiles in ArcMap

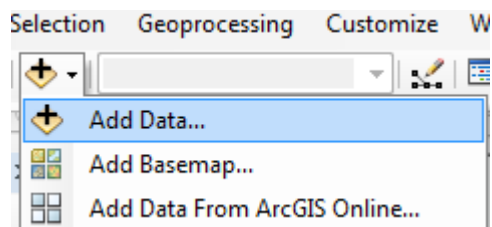
A *shapefile* is a homogenous collection of simple features that do not contain topological information. A shapefile includes geometric features and their attributes. The attributes are contained in a dBase table, which allows for the joining with a feature based on the attribute key.

Open **ArcMap** and select the **A new empty map** option. If you are using Windows 7 or Windows XP, 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.

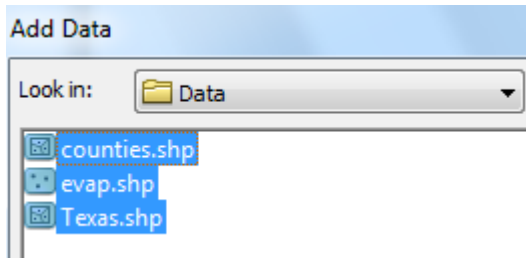
Use the **Add Data** button to add the data for this exercise to the ArcMap display.



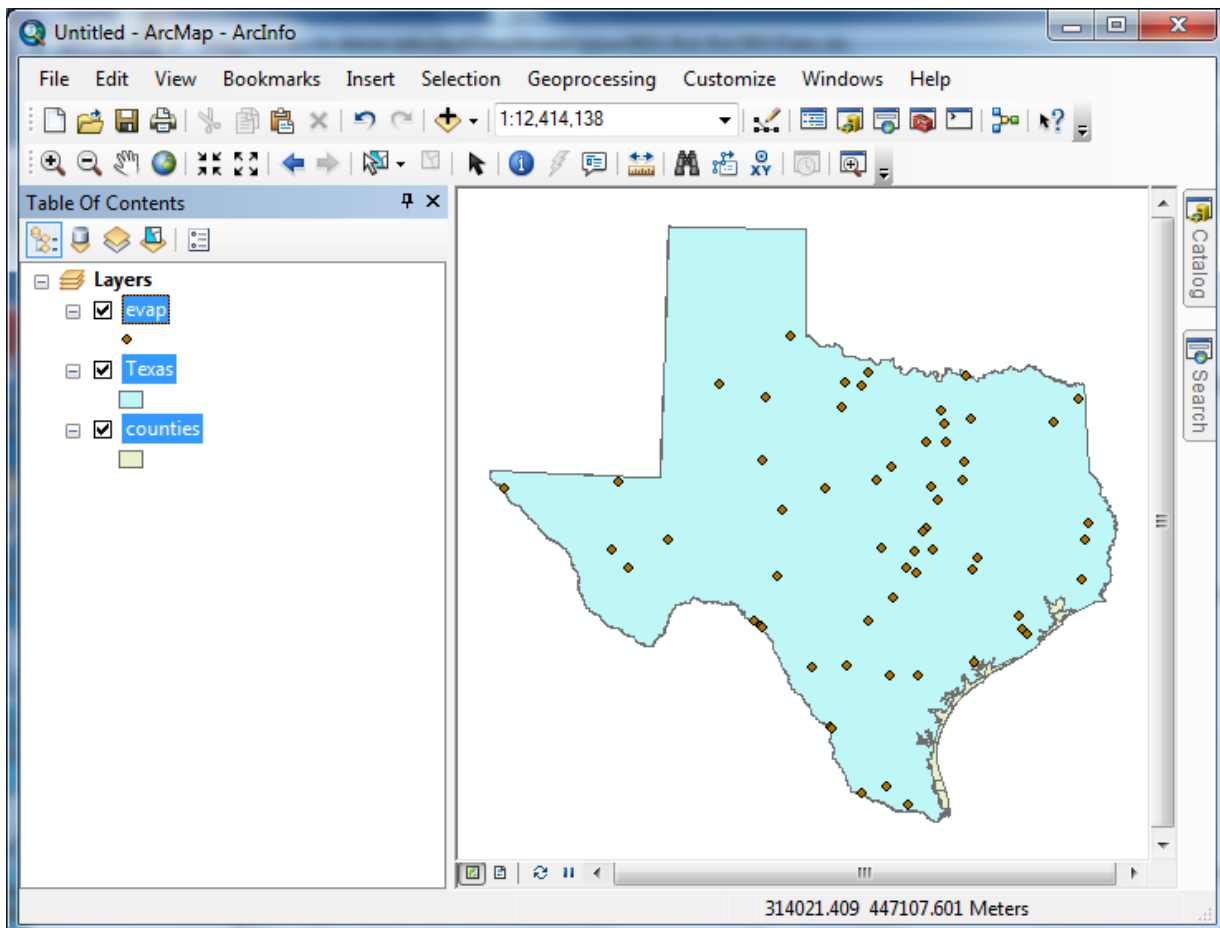
Navigate to the folder, which contains the data, and select all three files at once by using the shift key. Click the Add button to import the data. If you are using a network drive to obtain your files use the **Connect to folder** button to add the network drive to the ones that ArcMap is accessing so you can get to the files.



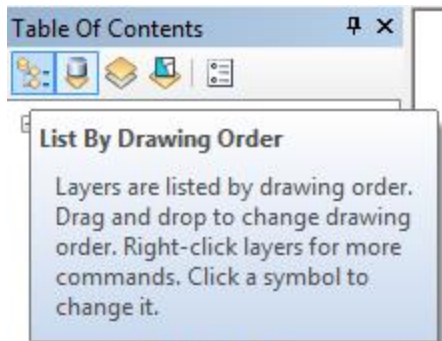
Click on each of the three shape files so that they are highlighted



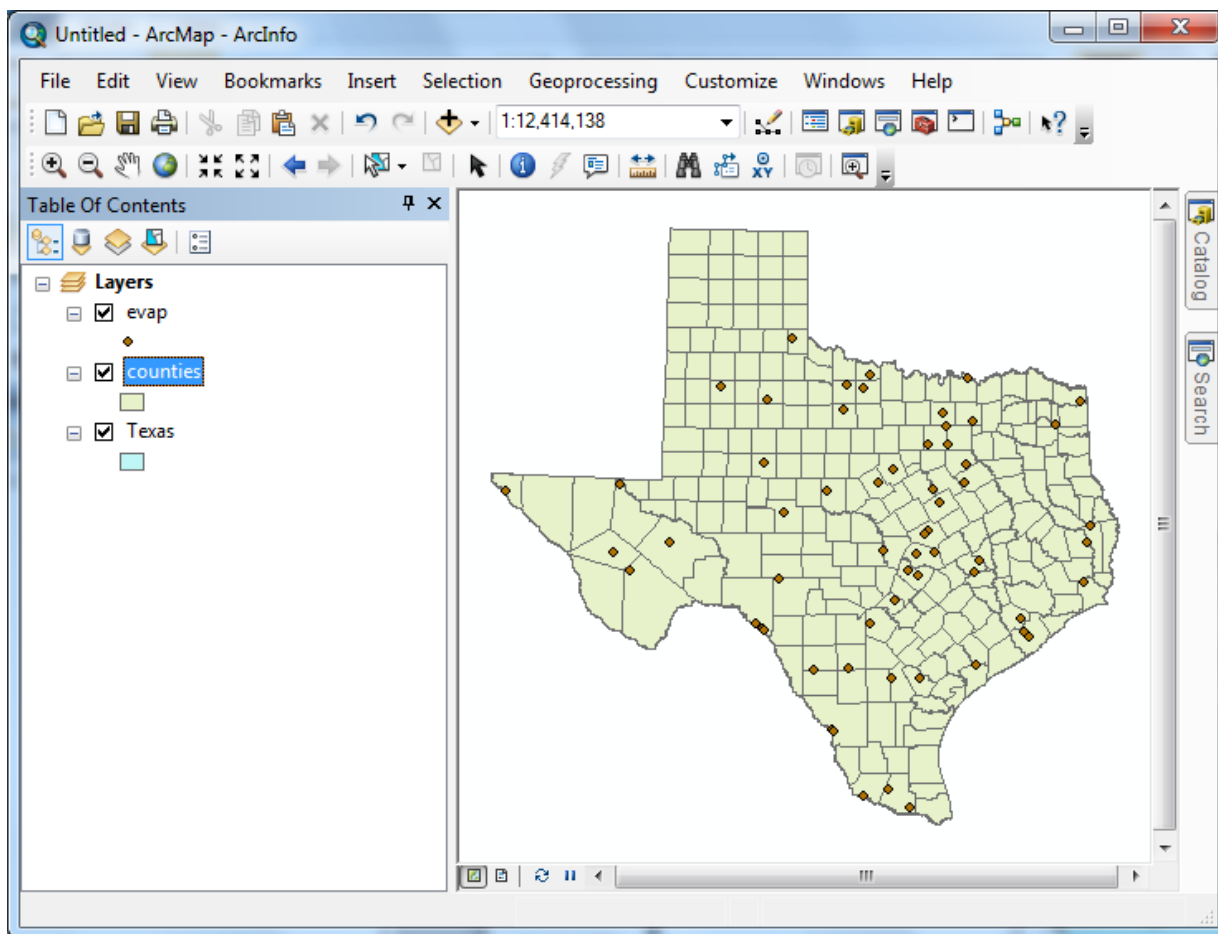
and add them to your ArcMap display.



All the themes are highlighted and Texas lies above counties so you cannot see the counties theme. Click on the **List by Drawing Order** button in the Table of Contents page:



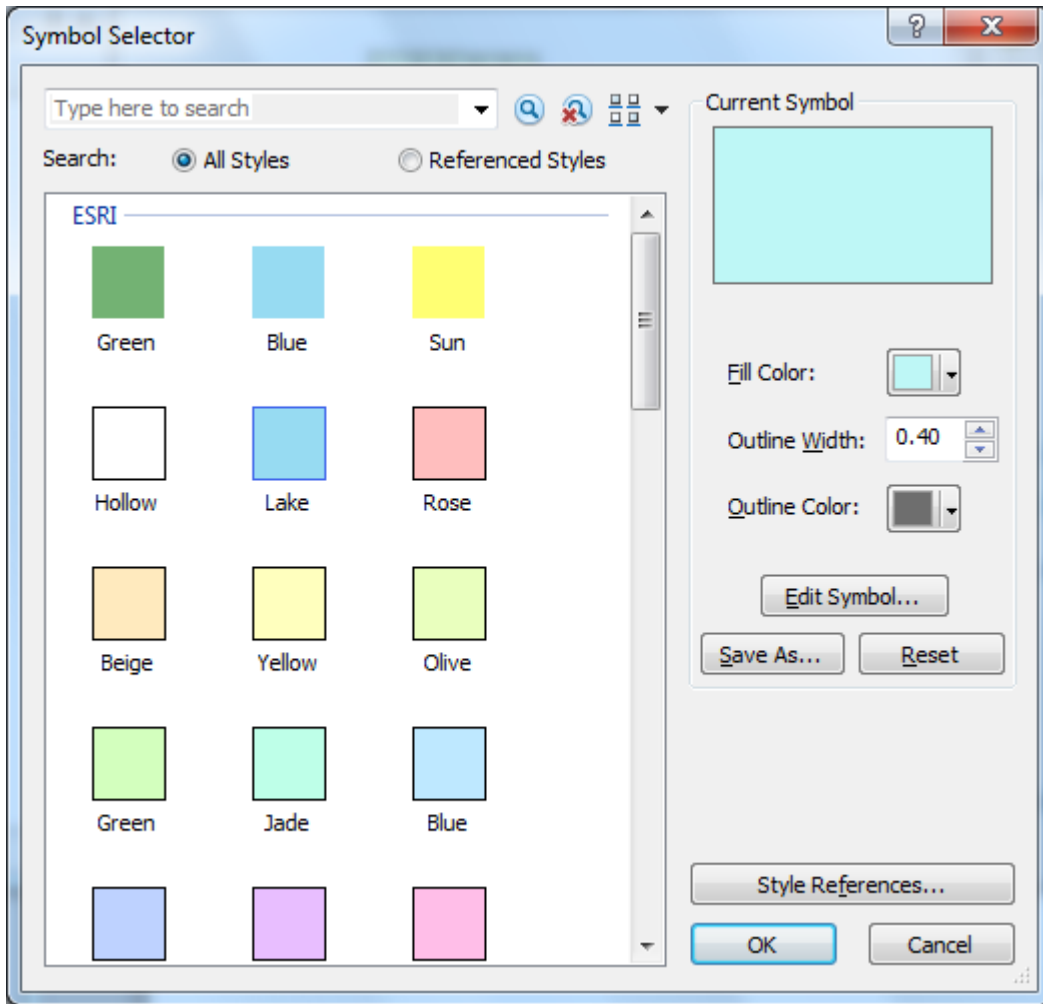
Click in the **Table of Contents** area below the feature class names so that three themes are no longer highlighted, then click on the **counties** theme and drag it up so that it is located above the **Texas** theme. You'll then get a display showing the counties.



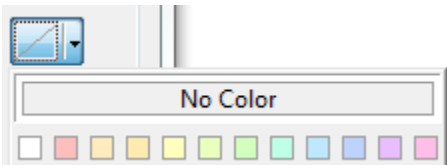
To change the appearance of a map display, you can access the **Symbology** menu just by double clicking on the Symbol

- Texas

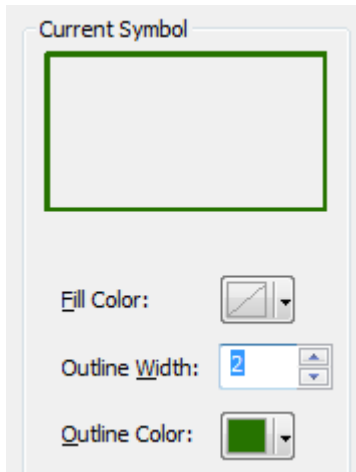
displayed in the ArcMap Layers, and you'll get the **Symbol Selector** window



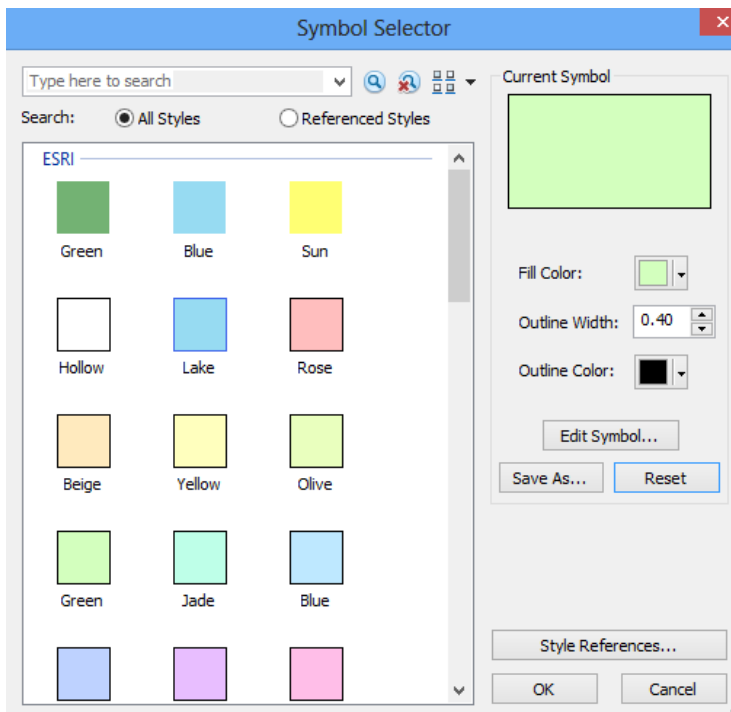
Click on the symbol color box, make your selections for the **Fill Color** and the **Outline Color**, and click OK, twice. You can show the outline of the State of Texas more distinctly by using the **No Color**

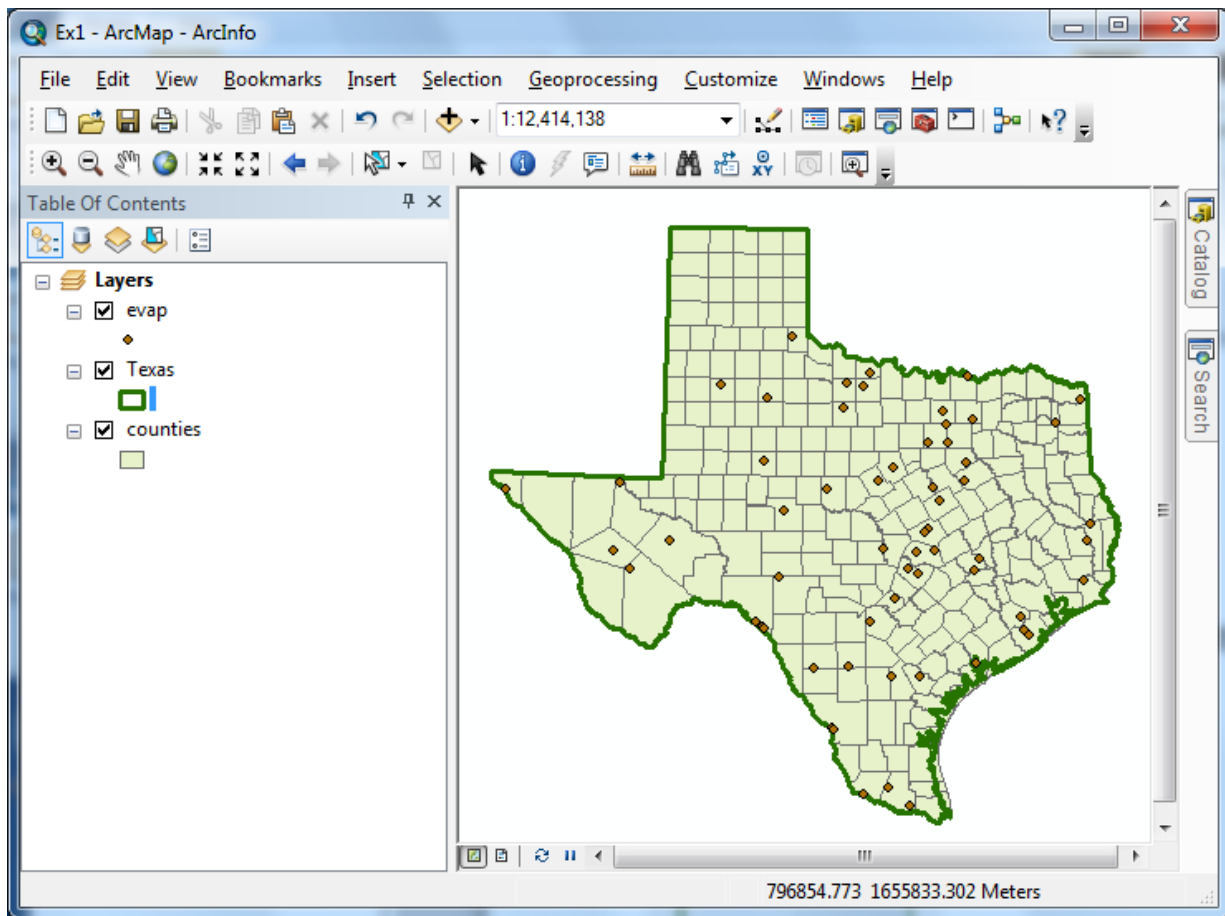


symbolology for the Fill Color and then changing the Outline Color to Green and the **Outline Width** to 2.



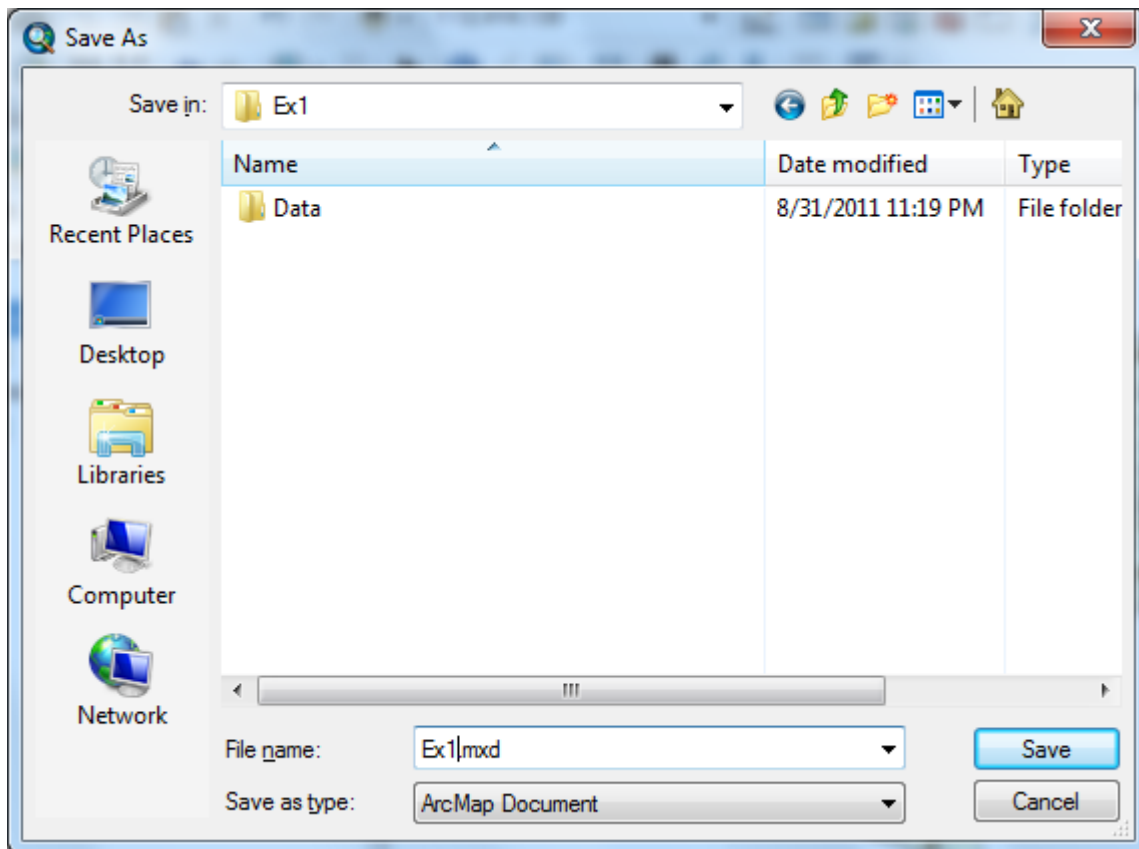
Drag the **Texas** layer above the **Counties** layer, and you'll see that the Counties are not obscured as they were before and the State of Texas is highlighted with a nice Green outline! We are green in Texas! If you have another color for your Counties, then click on the Counties symbol in the Legend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





To Save this map display, use **File/Save As** in ArcMap and save the resulting file as **Ex1.mxd**.

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 file location of the geodatabase and the symbology you've chosen for the map display. You can shut down Arc Map and then invoke Arc Map again and reload the same map display by clicking on **Ex1.mxd**. Note, however, that if in the mean time you've relocated your data, ArcMap will go back to where you had it at the time the map file was saved.

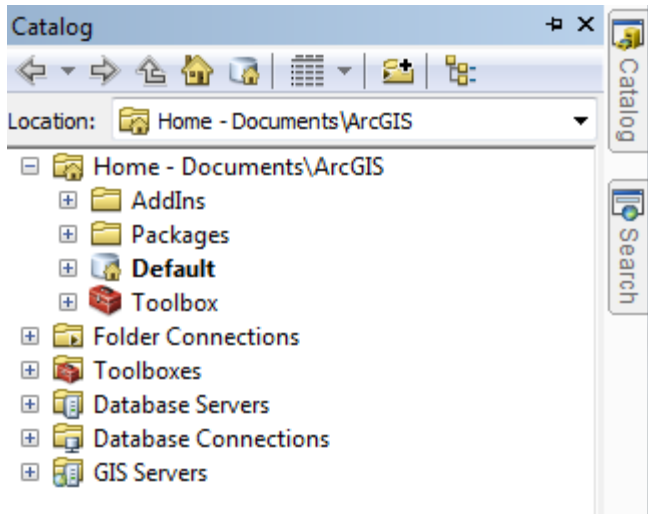


Helpful Tip:

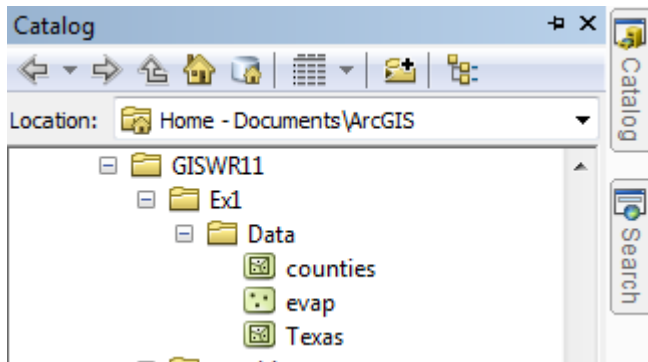
If you open your ArcMap Ex1.mxd file later from another location in your file system, you may see a red exclamation points beside your feature classes. If this happens, in ArcMap, right click on the feature class use **Data/RepairData Sources** to relocate the file location where the corresponding data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

2. Viewing Shapefiles in ArcCatalog

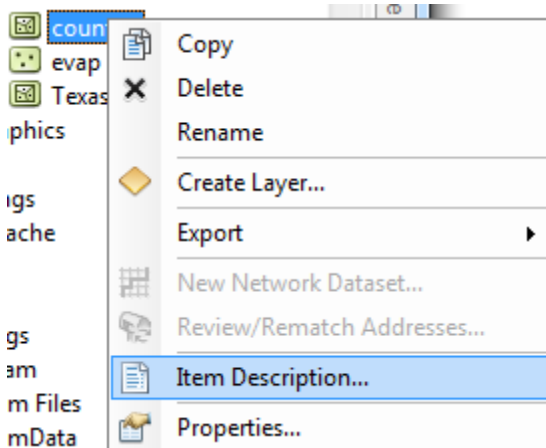
Open **ArcCatalog** by clicking on the Catalog tab on the right hand side of the map display



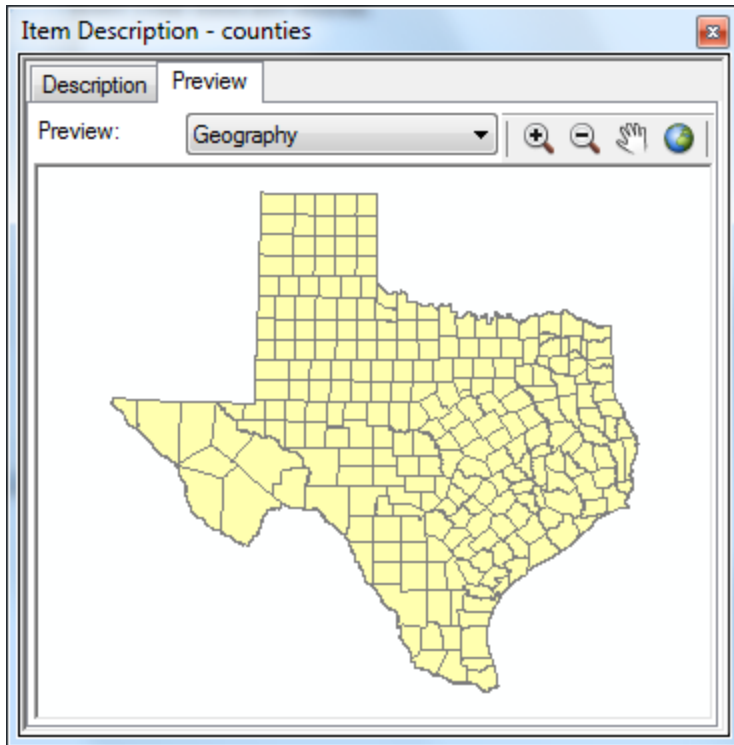
Click on the “Folder Connections” button and navigate to where your data are stored.



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

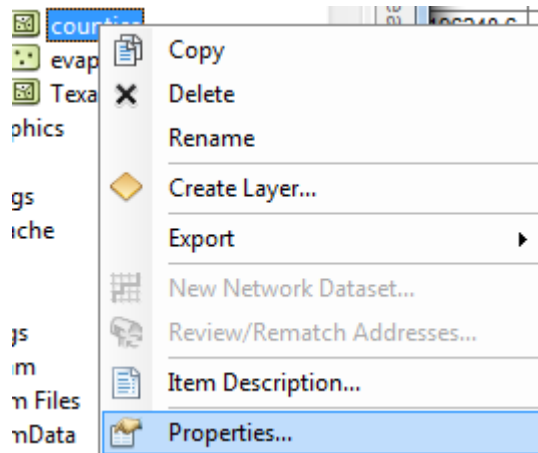
The screenshot shows the same software window, but now the "Preview" tab displays a table view. The dropdown menu shows "Table". The table has five columns: FID, Shape *, SOURCE, STRATMAP_I, and LOCAL_ID. The data rows show FID values from 0 to 15, all with "Polygon" shapes, "DRG" sources, and "113" in the STRATMAP_I and LOCAL_ID columns.

FID	Shape *	SOURCE	STRATMAP_I	LOCAL_ID
0	Polygon	DRG	113	113
1	Polygon	DRG	113	113
2	Polygon	DRG	113	113
3	Polygon	DRG	113	113
4	Polygon	DRG	113	113
5	Polygon	DRG	113	113
6	Polygon	DRG	113	113
7	Polygon	DRG	113	113
8	Polygon	DRG	113	113
9	Polygon	DRG	113	113
10	Polygon	DRG	113	113
11	Polygon	DRG	113	113
12	Polygon	DRG	113	113
13	Polygon	DRG	113	113
14	Polygon	DRG	113	113
15	Polygon	DRG	113	113

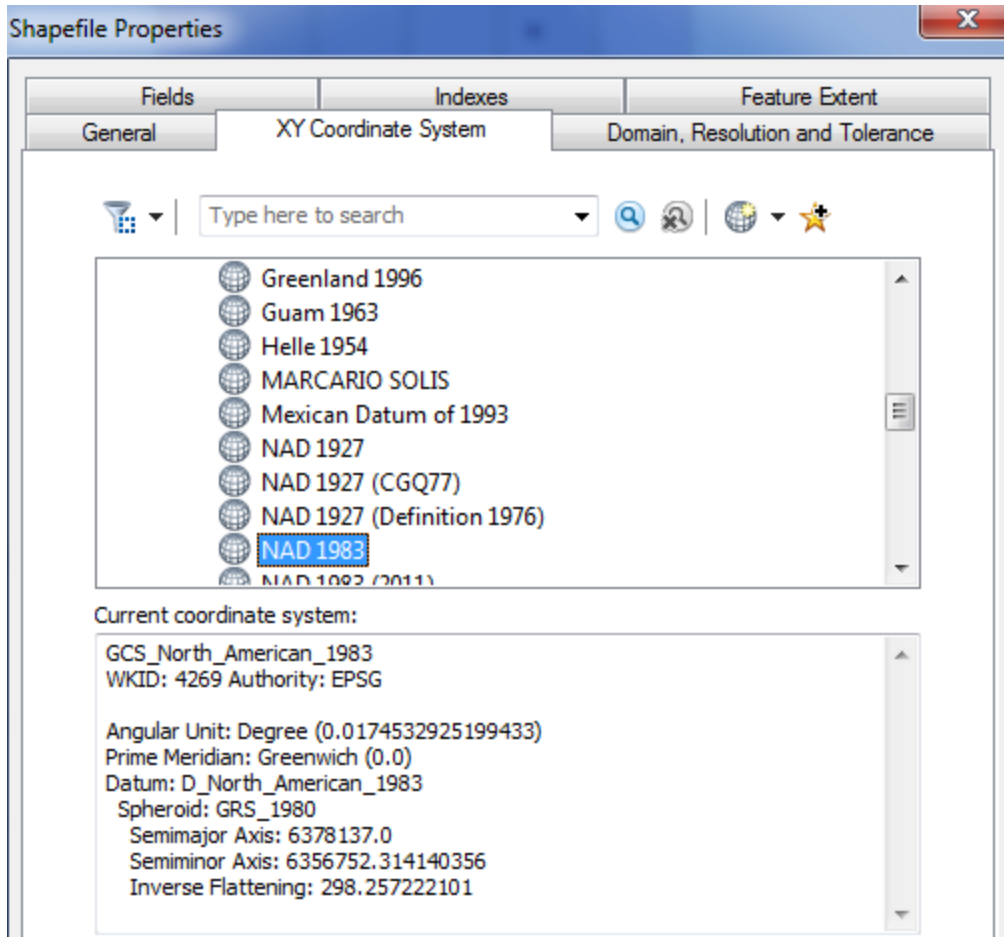
At the bottom of the window, there is a navigation bar with a list icon, navigation arrows, a page number "1", a table icon, and the text "(of 254)".

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.

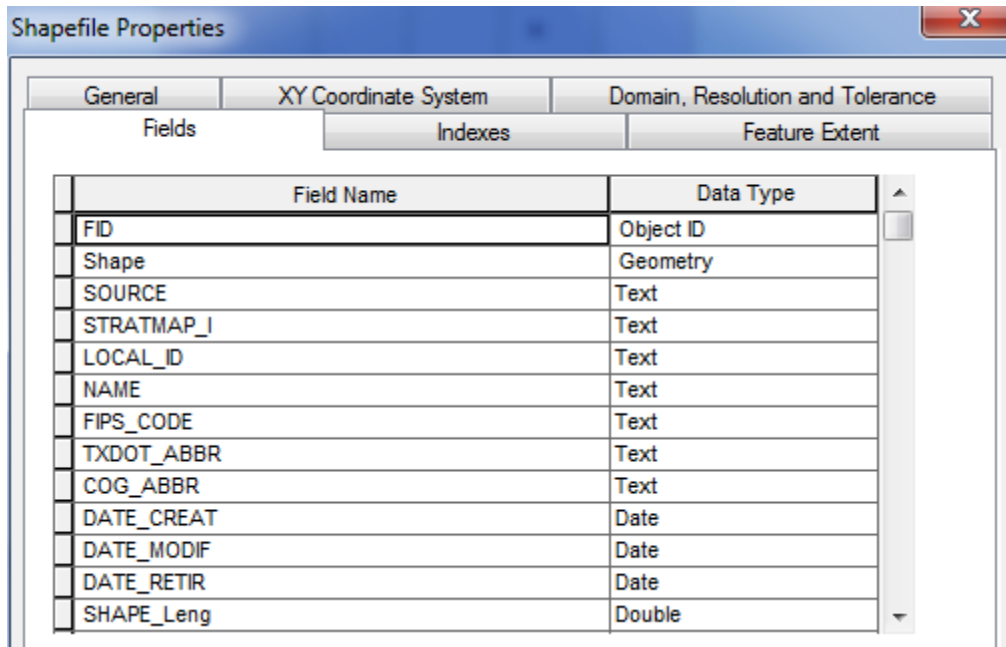
If you right click on a feature class and then select **Properties**



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.



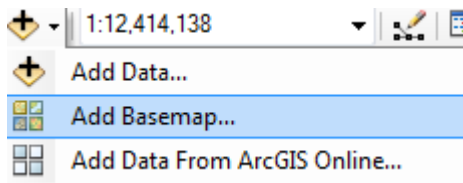
If you click on the **Fields** tab, you'll see a formal definition of each attribute field with its **Field Name** and **Data Type**. In this case, **ObjectID** means a special data type that indexes each feature as an object in the GIS, **Geometry** means that the Shape field has geographical coordinates 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.

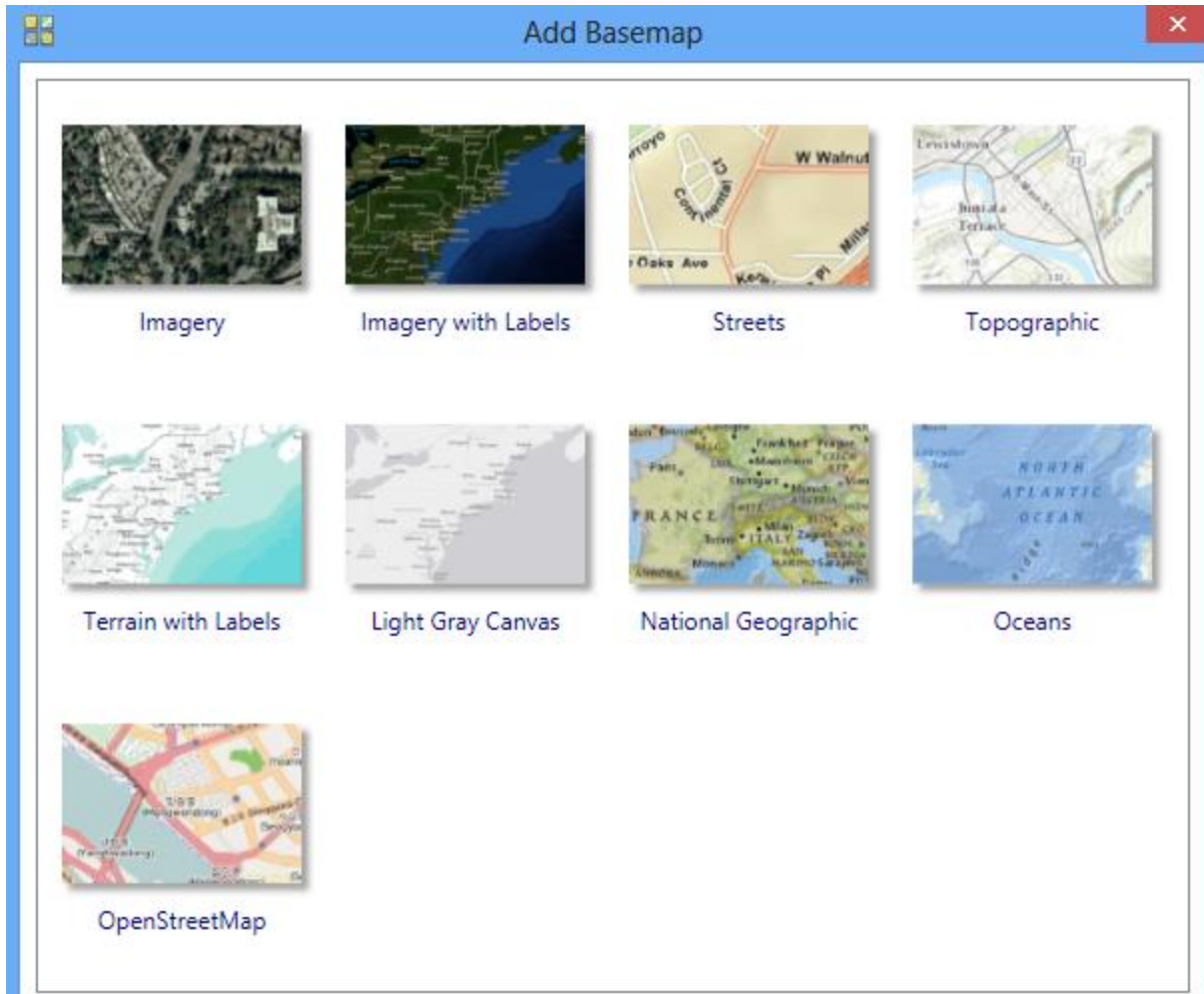


Click on the other two data layers, **Evap** and **Texas** to preview them also.

3. Using Base Maps from ArcGIS Online

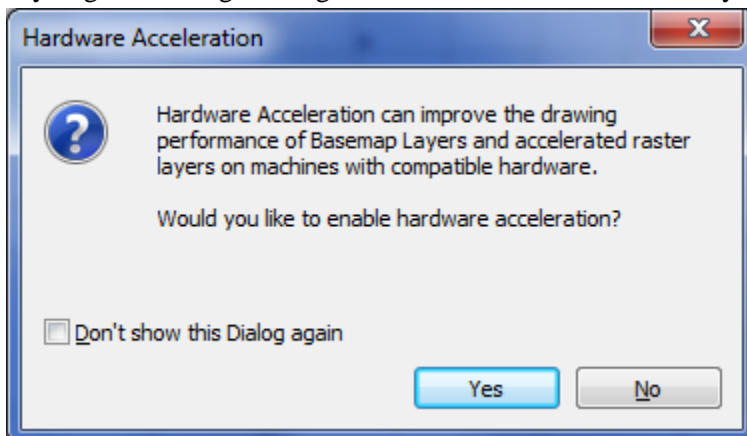
Up to this point we have just used local GIS data in our display. Let's instead use base maps from the ArcGIS Online. Use **Add Basemap** (the little arrow to the right of the + for Add Data):







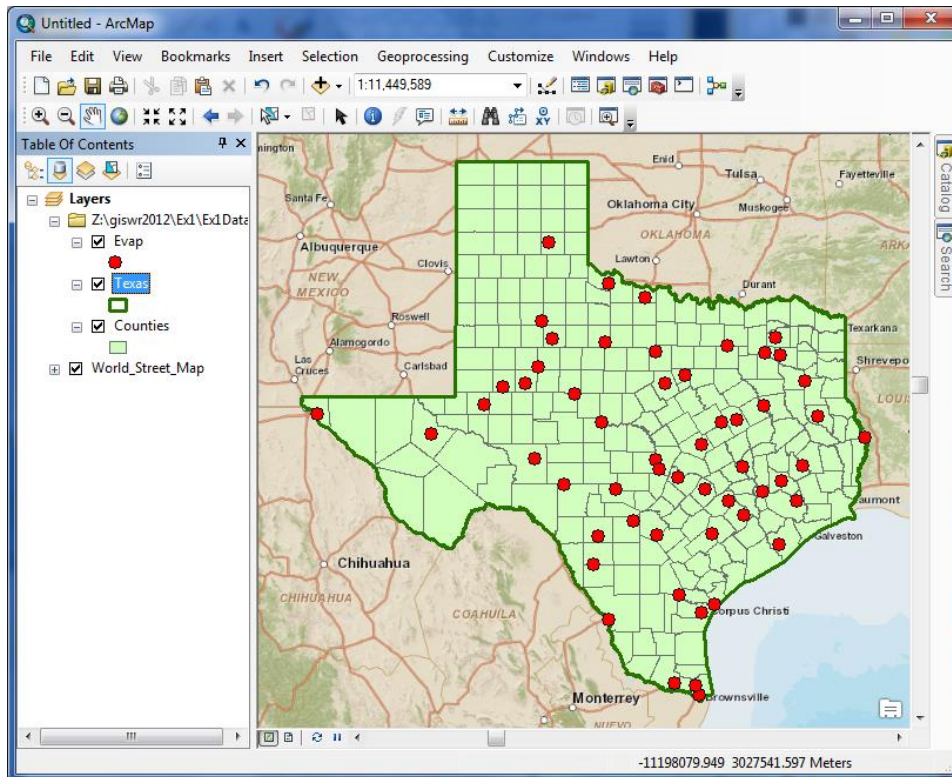
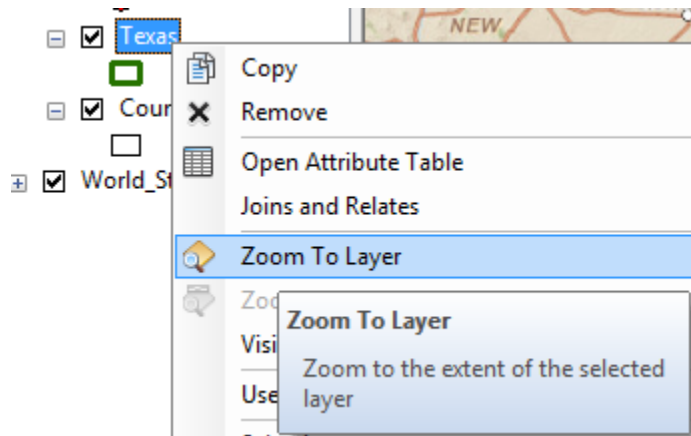
Click on “**Streets**” and Add. You’ll see a background map appear behind your Texas display. Pretty cool!

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

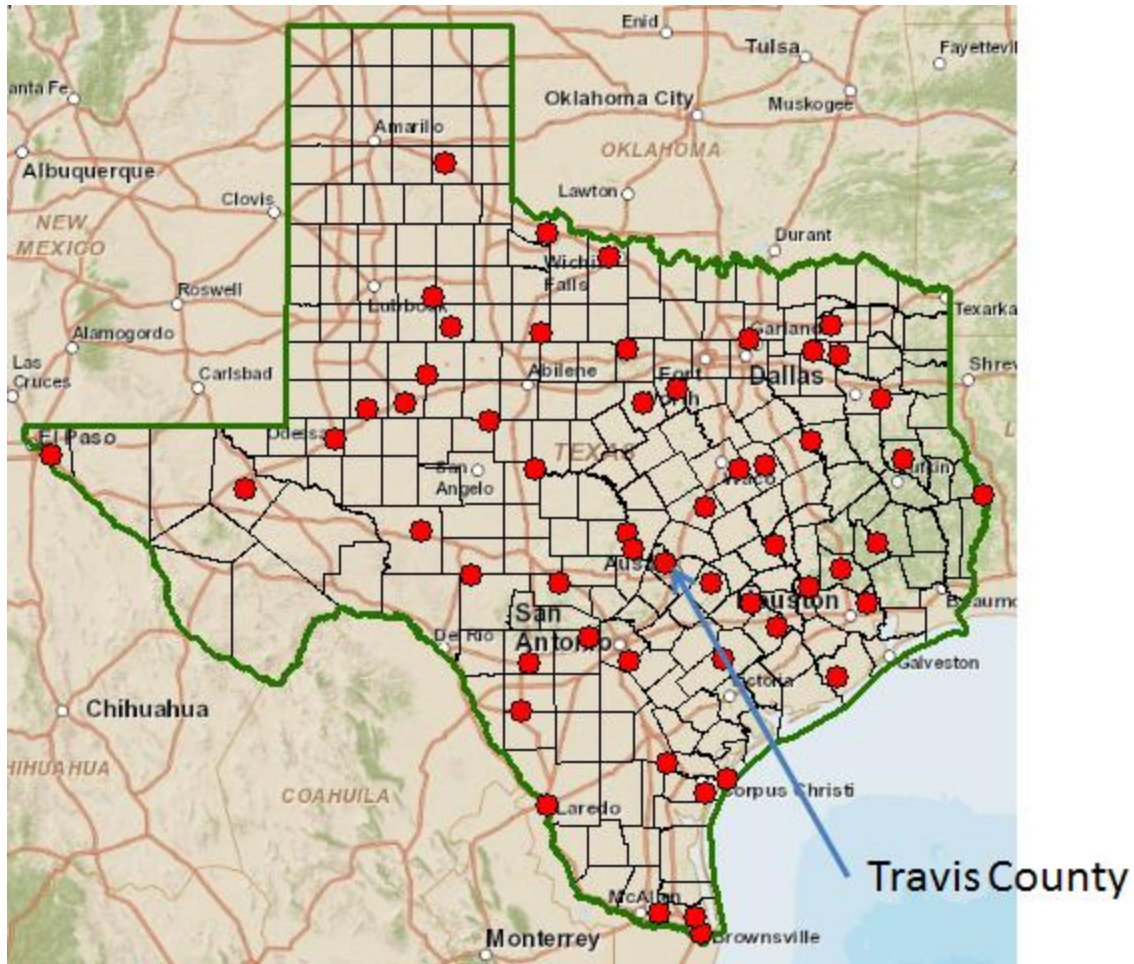


You should see a result like that shown below. If your BaseMap does not show up, use the **Refresh** tool  in the bottom left hand corner of the ArcMap display  to redraw the map and the BaseMap should then show up.

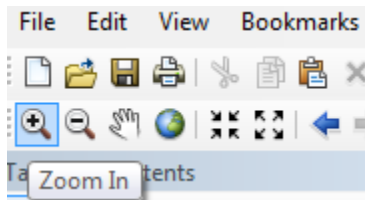
To quickly get the map to center on Texas, right click on the Texas layer and select **Zoom to Layer**



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. Let’s examine Travis County.



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

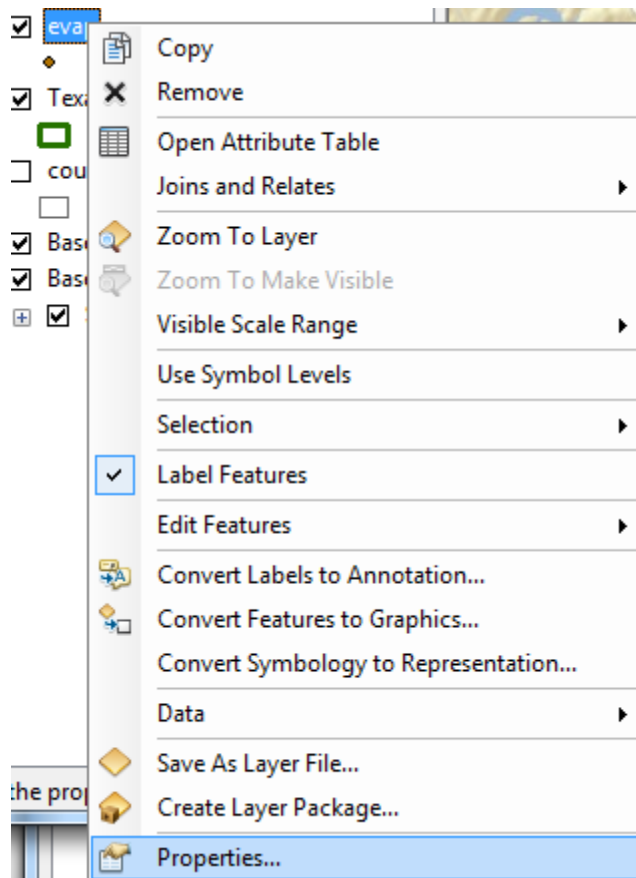




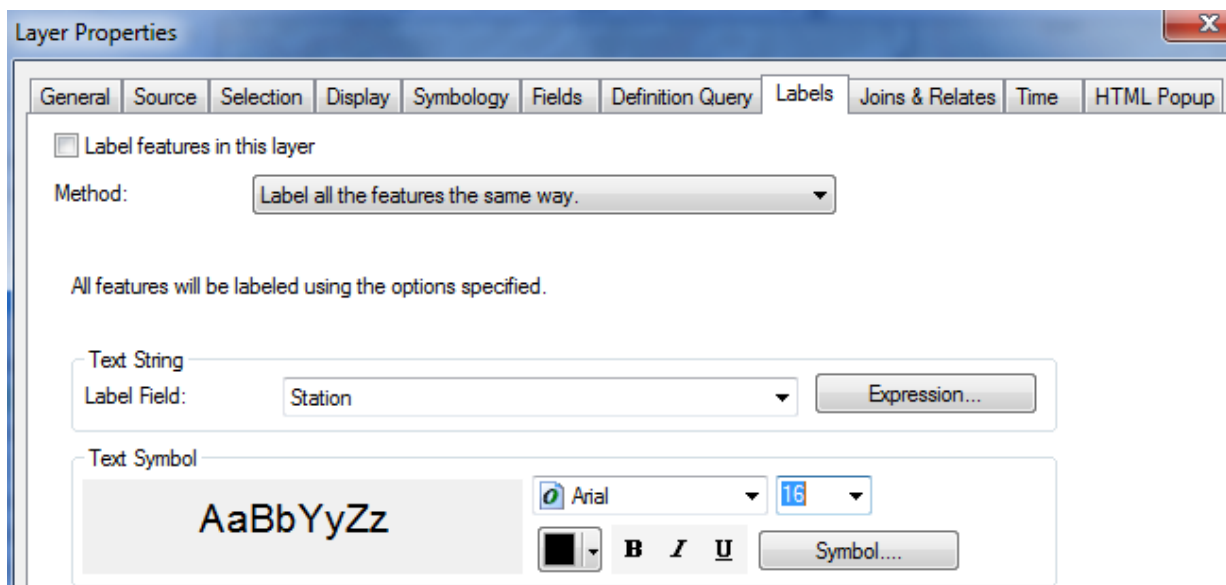
Zoom in to Travis County by Austin in the center of Texas, and let's examine the evaporation site by Lake Travis to the Northwest of the city. Notice how more interesting information appears as you zoom in closer.



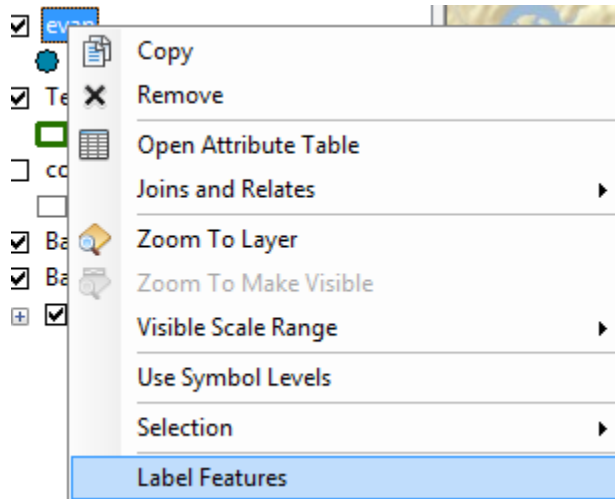
Let's label the sites with their names. Right click on the **Evap** theme and select **Properties** at the bottom of the display that appears.



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 **Mansfield Dam** appear by the site next to Lake Travis.



Click on the symbol for the Evap points and use the Symbol Selector to change the size of the points to 8 and the color to Red. 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. Mansfield Dam is the dam that is at the downstream end of Lake Travis. You can even see the access roads you'd use to go to this site.

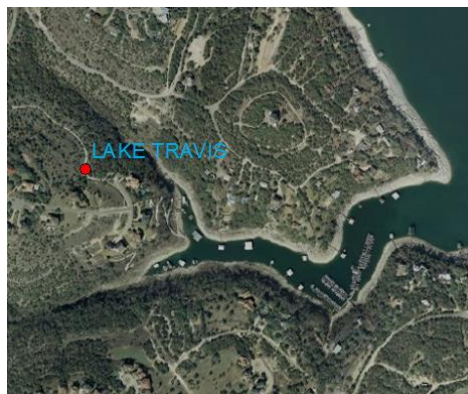


Now, let's look at some imagery for this location. Proceeding as you did before to get the Street map, use **Add BaseMap**, to add data for **Imagery** Turn off the Street Map (uncheck it in the table of contents) so you can see the imagery.



Imagery

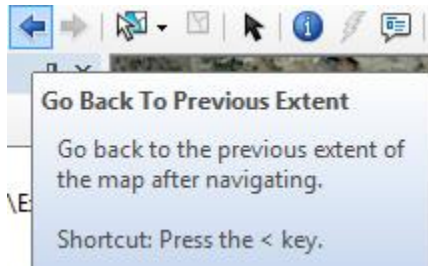
And now you'll see the same information displayed against a background map of orthoimagery, and let's zoom in a bit to see more detail. For the **Evap** theme, I have used the **Properties/Label** to change the color of my site labels from black to blue to make them easier to see against the image background.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



Use **File/Save As** to save this new 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

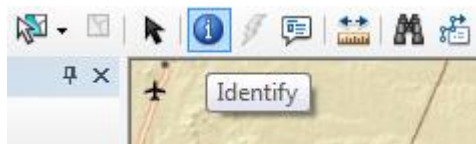


to step back through the views we have just been working on, and turn off the **Image** basemap so that you can see the **Streets** basemap again. Change the Label color for the evap sites back to Black.

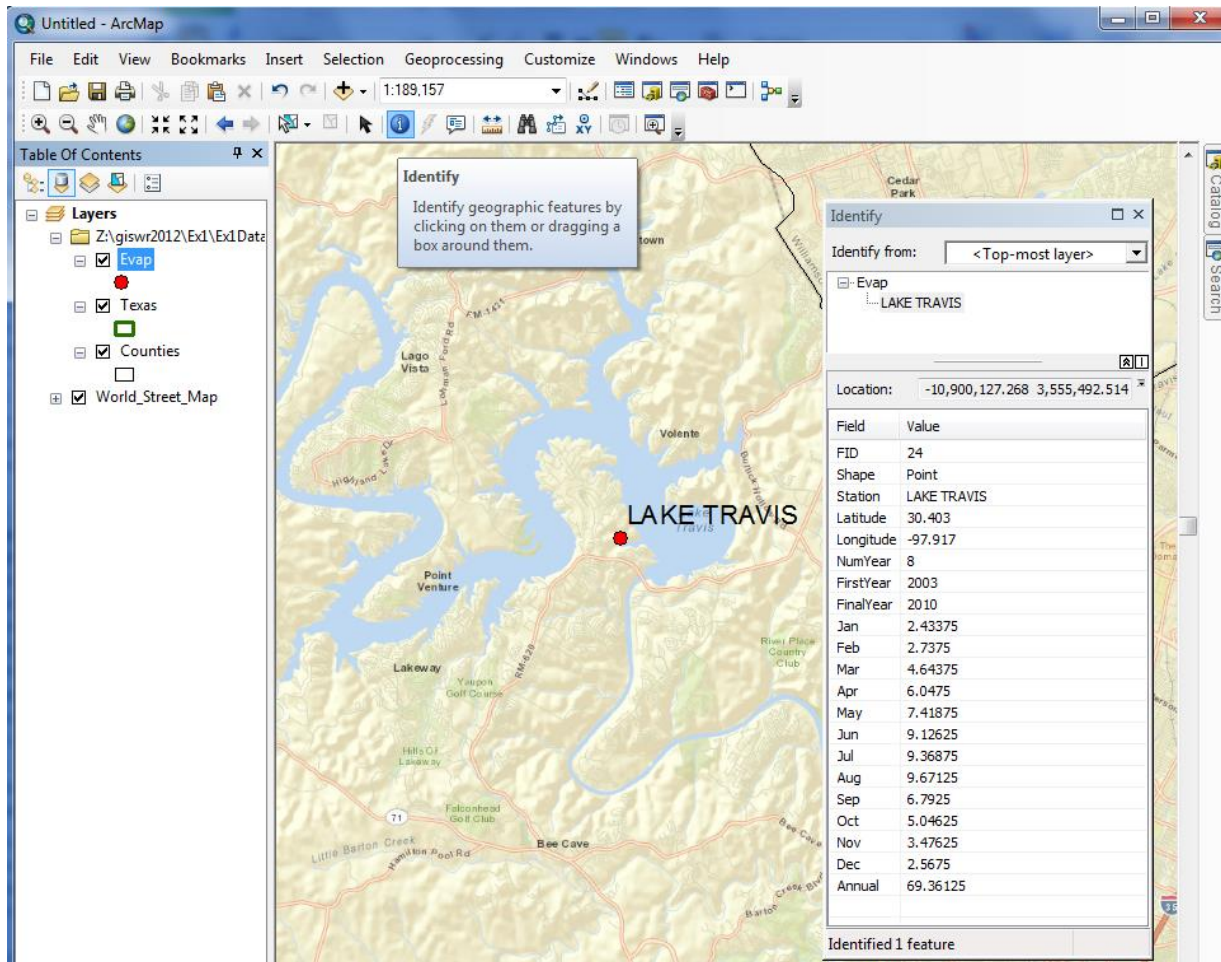


Numerical and text information stored in the fields of the geodatabase tables are called **attributes**. To access attribute data of the feature classes at a specific location:

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, 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.

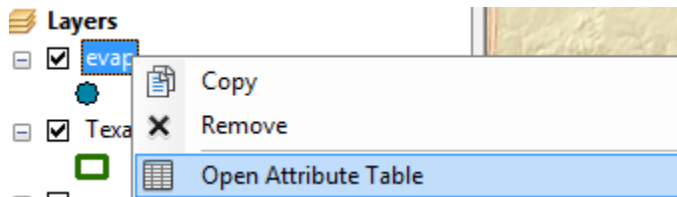


These are pan evaporation data recorded using an instrument like that shown below. The evaporation data were obtained from the Texas Water Development Board. Only data from 2001 onwards is used since the TWDB has quality control checked that information. Monthly evaporation is found by averaging the 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.

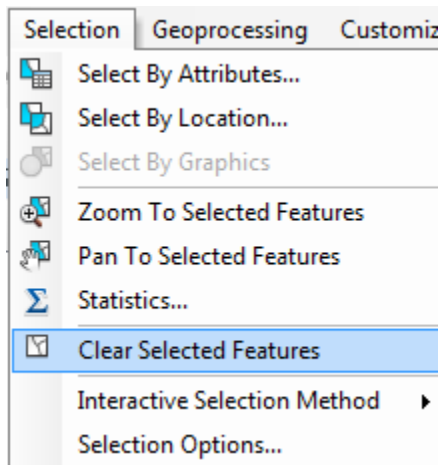
Table

Evap

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 MILL S DAM	31.95275	-96.697	4	2001	2008	4.3875	4.1775	5.22

(1 out of 54 Selected)

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

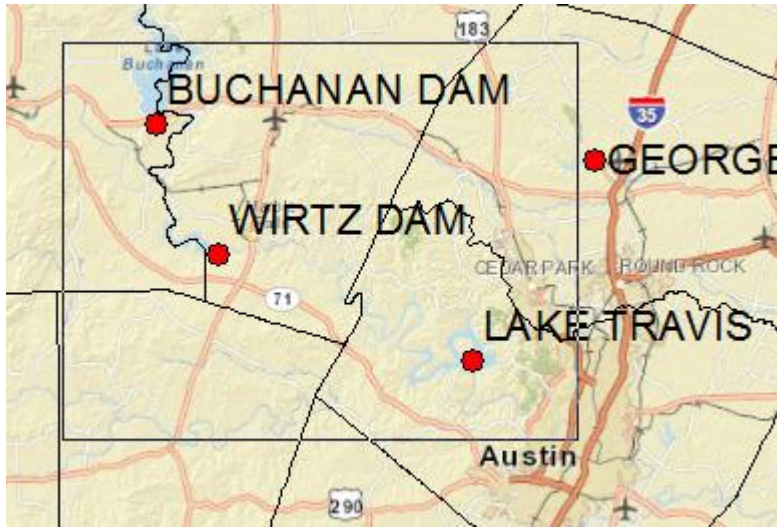


5. Selecting features from a feature class

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,



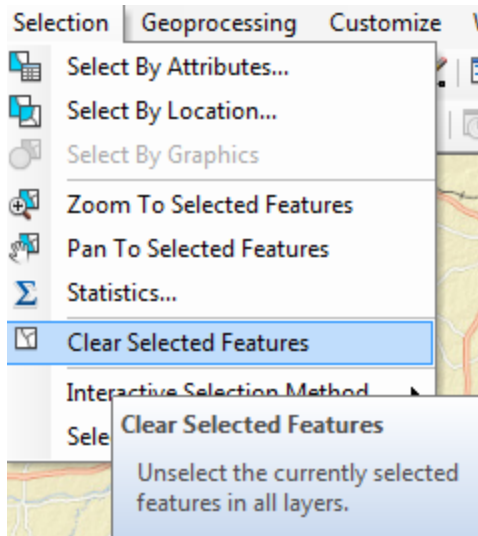
you'll see both records highlighted on the map and in the attribute table. I've turned off the Counties layer and used **Show selected records** at the bottom of the Attribute Table to just show the three highlighted stations.

The map shows a zoomed-in view of the three evaporation sites. An attribute table window is open, displaying the following data:

FID	Shape *	Station	Latitude	Longitude	NumYear	FirstYear	FinalYear	Jan	Feb	Mar	Apr	May
5	Point	BUCHANAN DAM	30.733	-98.43	5	2007	2011	2.682	3.51	5.774	7.234	7.97
24	Point	LAKE TRAVIS	30.403	-97.917	8	2003	2010	2.43375	2.7375	4.64375	6.0475	7.4187
52	Point	WIRTZ DAM	30.55	-98.33	4	2002	2006	3.4875	3.7	5.1425	8.295	10.137

The table also includes a toolbar with various icons and a status bar at the bottom indicating "(3 out of 54 Selected)".

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



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

Table

Evap

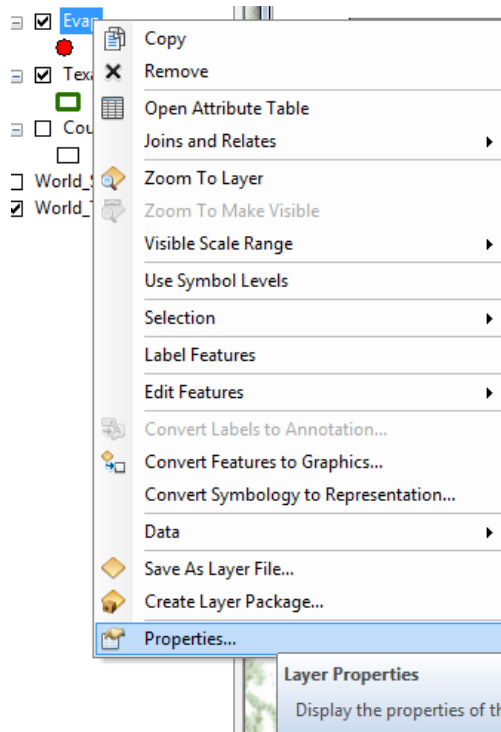
FID	Shape *	Station	Latitude	Longitude	NumYear	FirstYear
20	Point	LAKE J.B. THOMAS	32.583	-101.1	3	201
21	Point	LAKE LIMESTONE	31.533	-96.53	9	201
22	Point	LAKE LIVINGSTON	30.633	-95.01	9	201
23	Point	LAKE TAWAKONI	32.85	-95.88	4	201

1 | (0 out of 54 Selected)

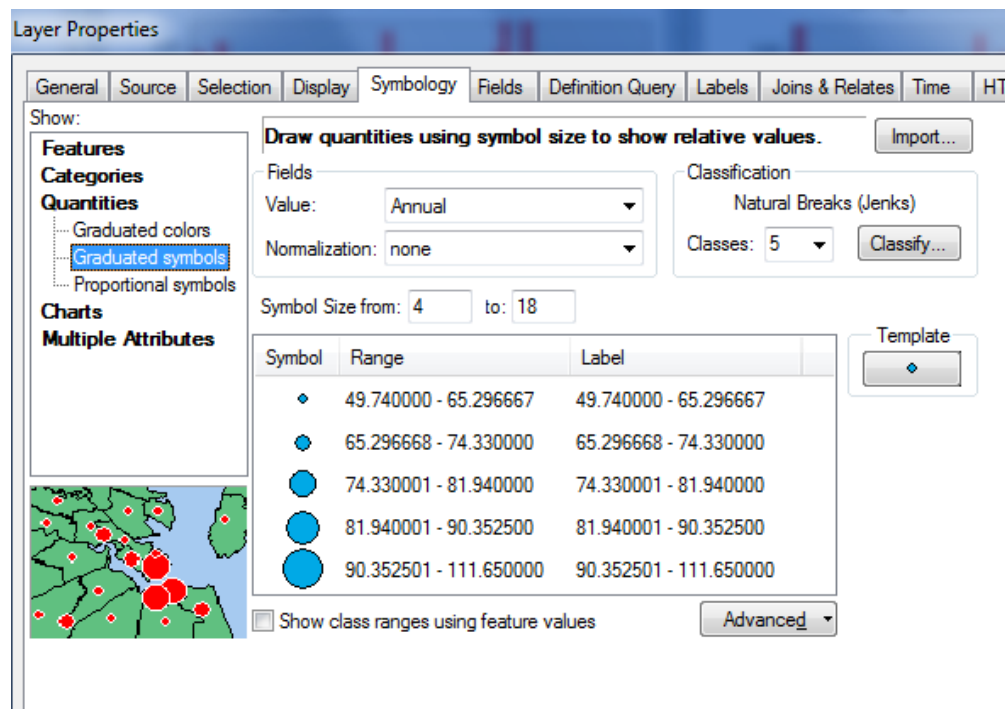
Evap Show all records

6. Mapping Annual Evaporation

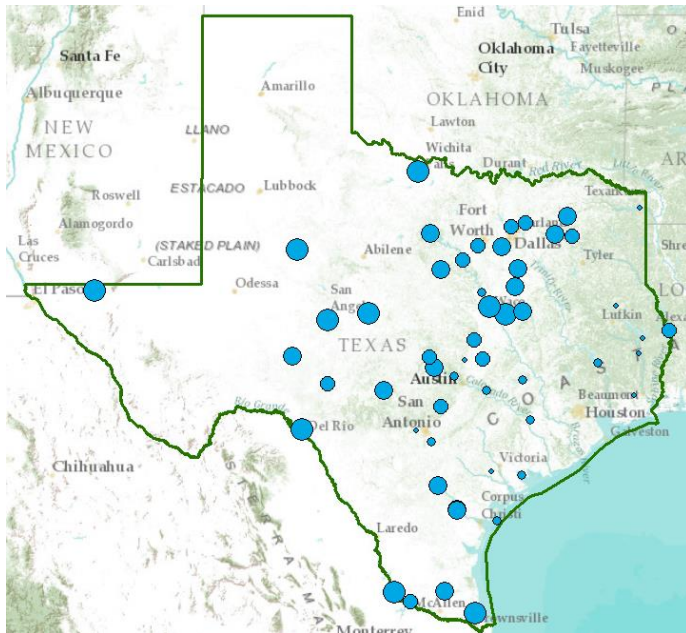
Let's suppose we want to map the values of annual evaporation recorded at the stations, rather than just symbolizing them by their location. Right click on the **Evap** layer and select **Properties/Symbology**



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

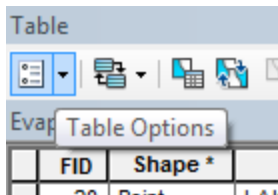


I have turned off all the other layers and added the **Topographic** base map to get the image below. Very cool!

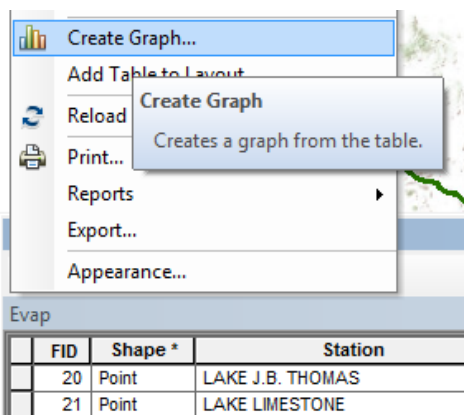


7. Making a Chart

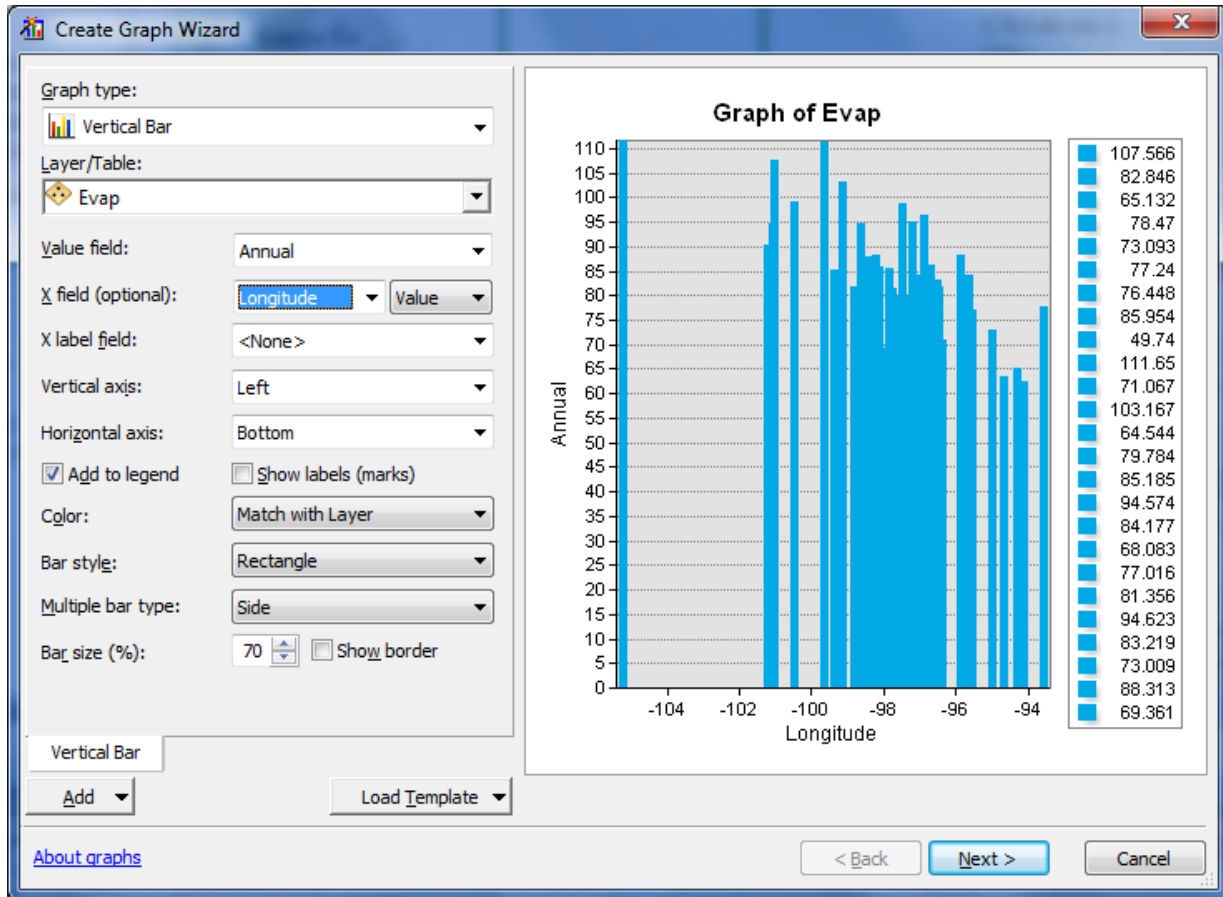
You can see from the map that there is some tendency for lower evaporation values near the coast and to the East and higher values to the West. Charts are useful because they allow you to visualize trends in data. Click on **Table Options**



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

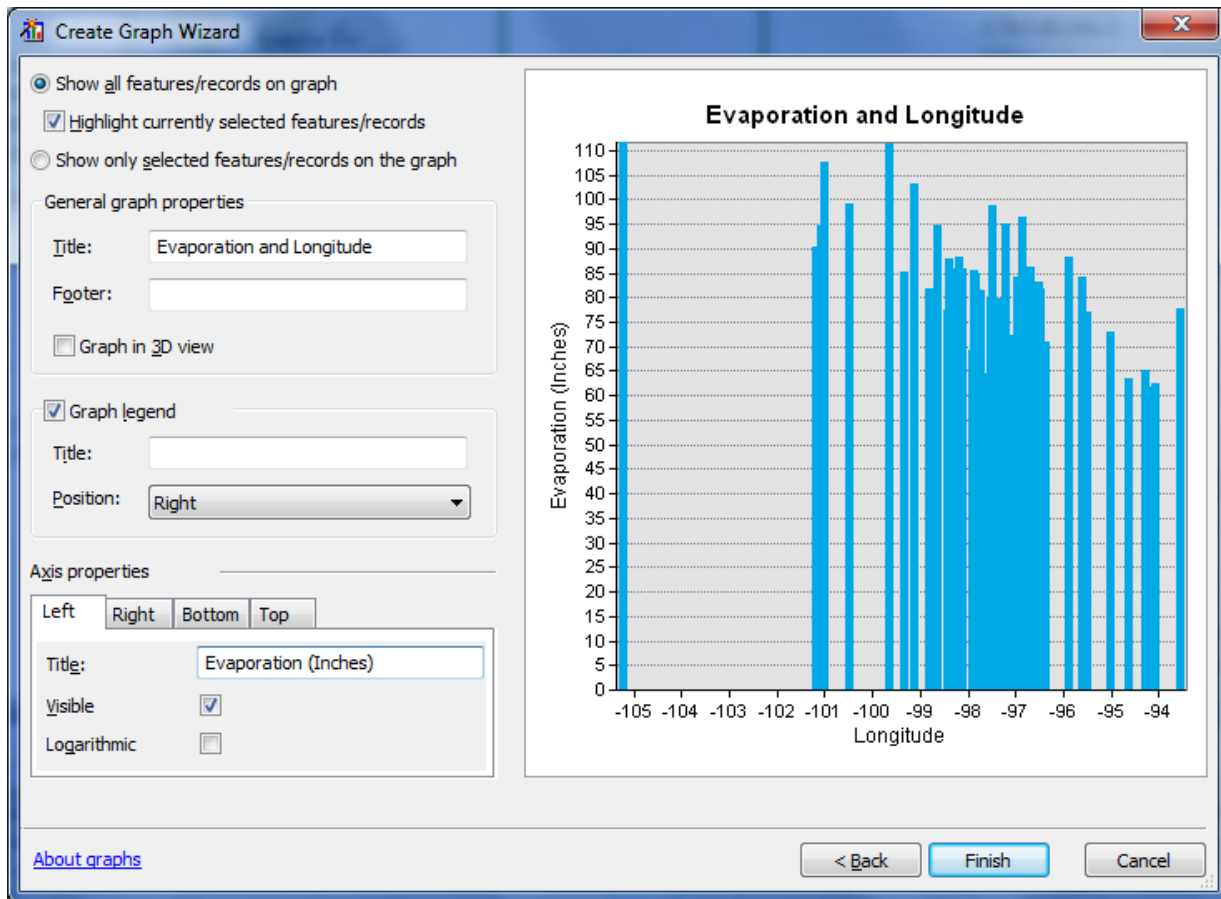


You will be making a Vertical bar chart (the default option). The next screen will allow you to indicate the data to be used in the graph. Here is a graph of the Annual Evaporation (**Annual**) of all the stations plotted against the Longitude of the station. You can see that there is a general trend 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.

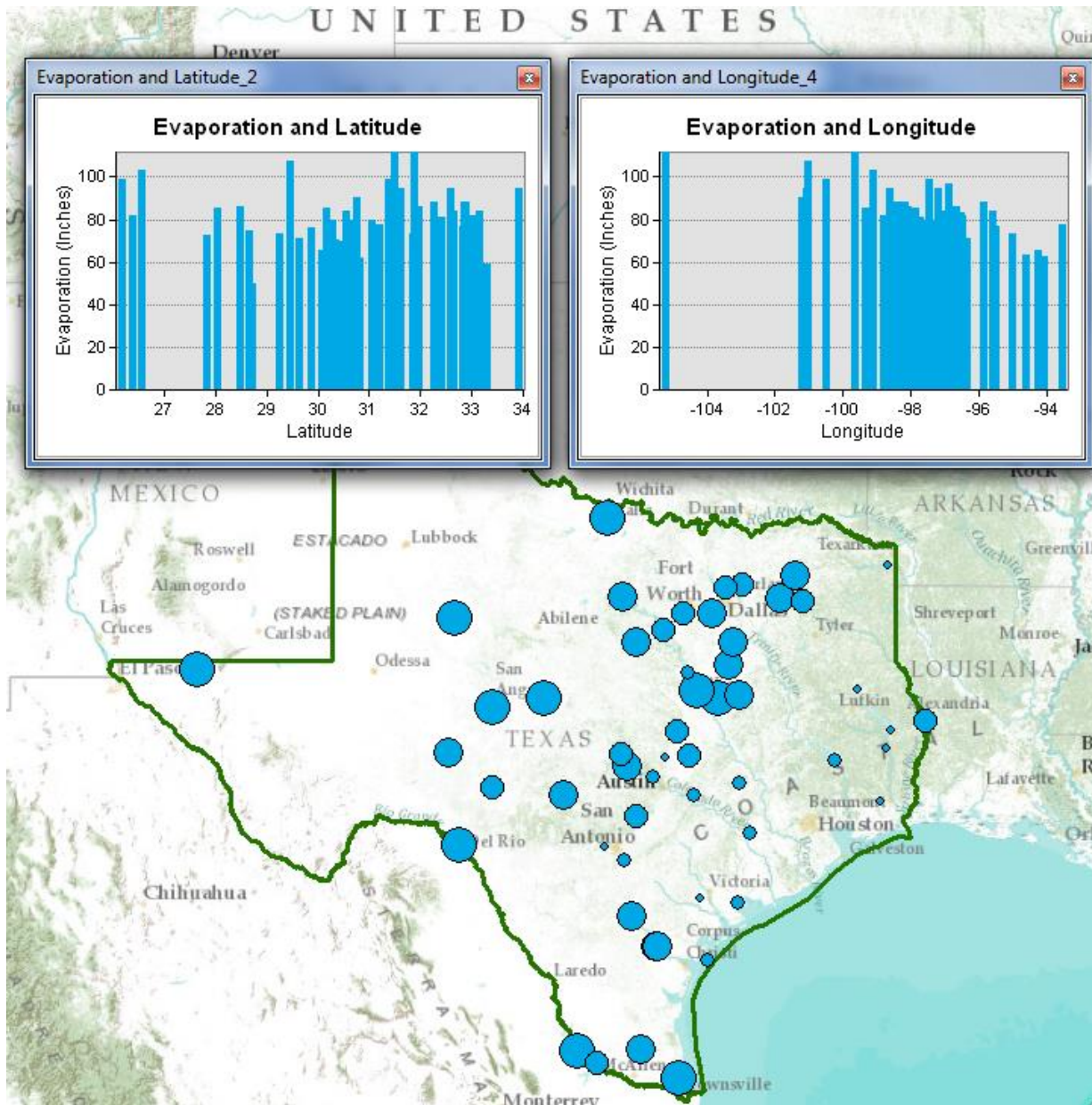


Click off “Add to Legend” to get rid of the legend on the right hand side.

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



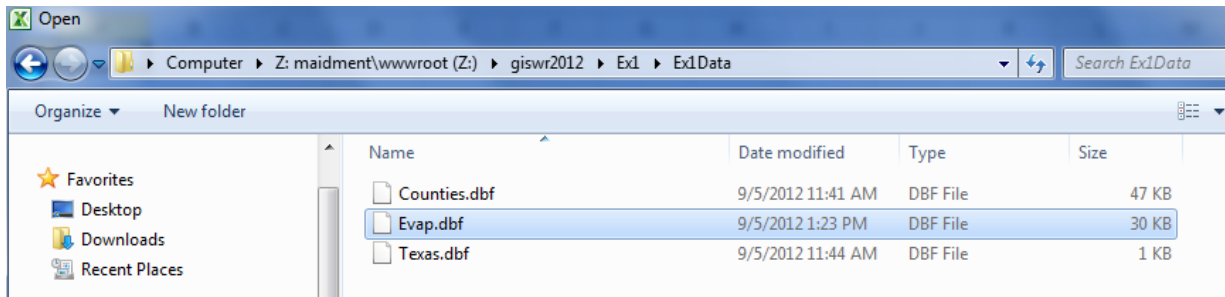
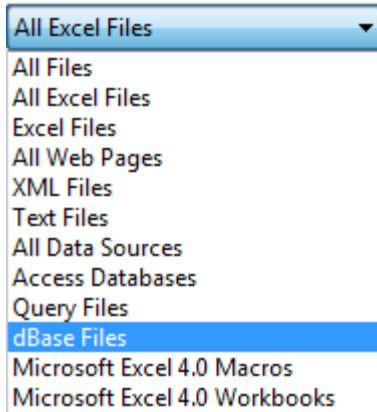
Click **Finish**, and you've created a graph linked to mapped features in ArcMap. If you create the same kind of graph for Evaporation and Latitude, you can see that there isn't a tendency for evaporation to vary with latitude in Texas, as there is for variation of evaporation with longitude.



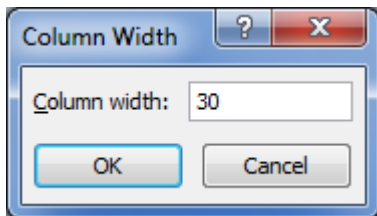
Save your ArcMap document **Ex1.mxd** so that you can retain this display.

Graphing in Excel

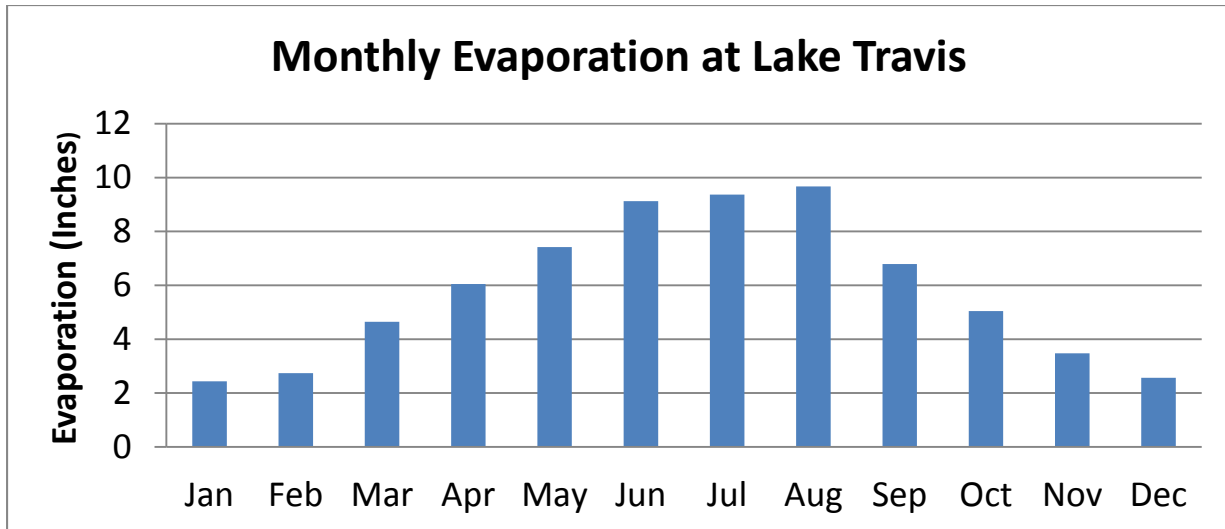
Another graphing option is to make a chart in Excel using the dBase tables given by the evaporation shapefile. Open the evaporation attributes table **Evap.dbf** as a table in **Excel**. Use **Files of Type: dBase files** in Excel to focus only on .dbf tables when you open the table.



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.



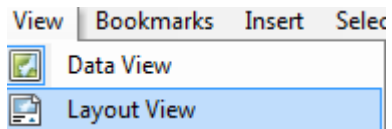
Select the stations you want to plot, copy their records to a new worksheet, delete the columns you don't need there, and then create a chart. Here is an example chart created this way.



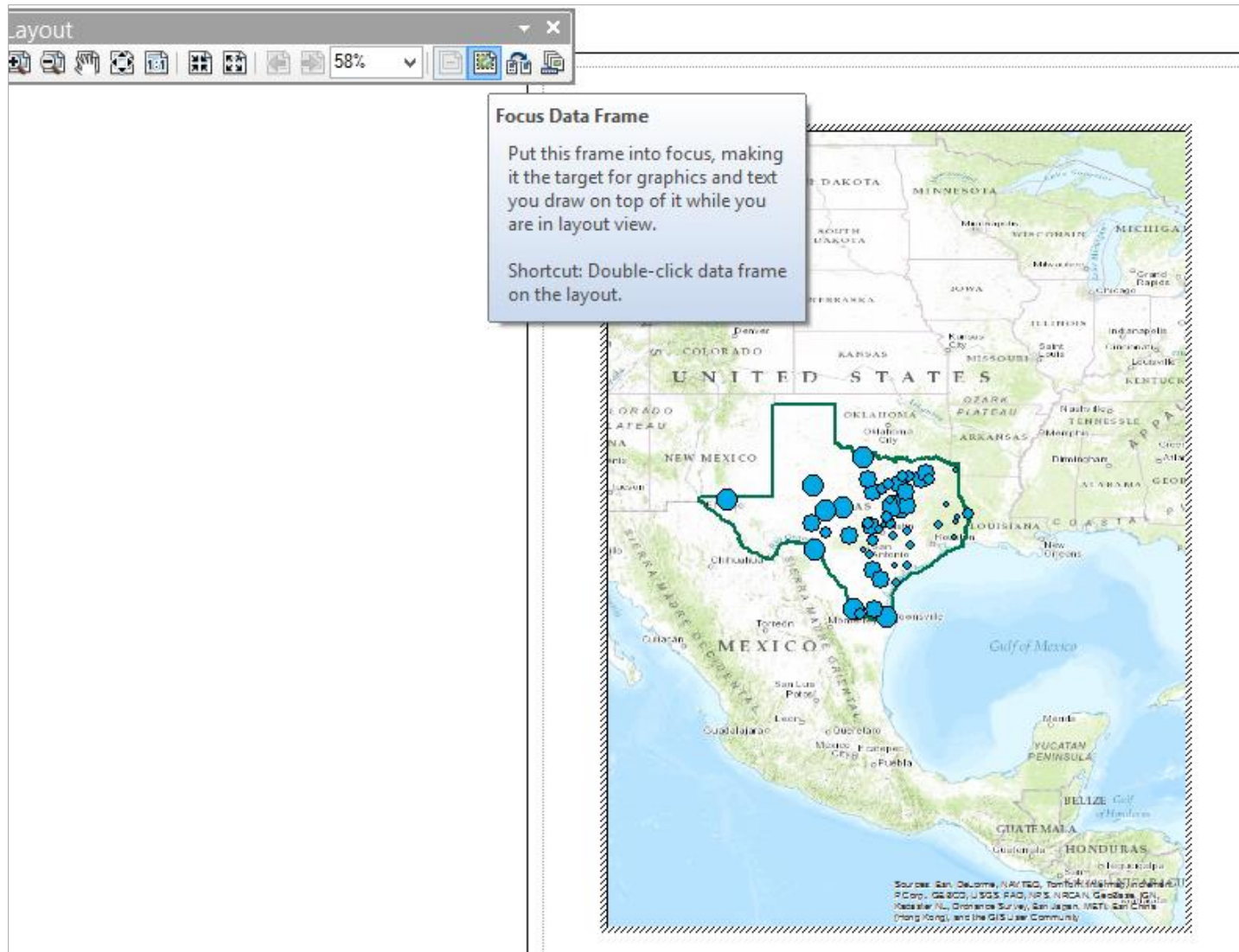
8. Creating a Map Layout

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.

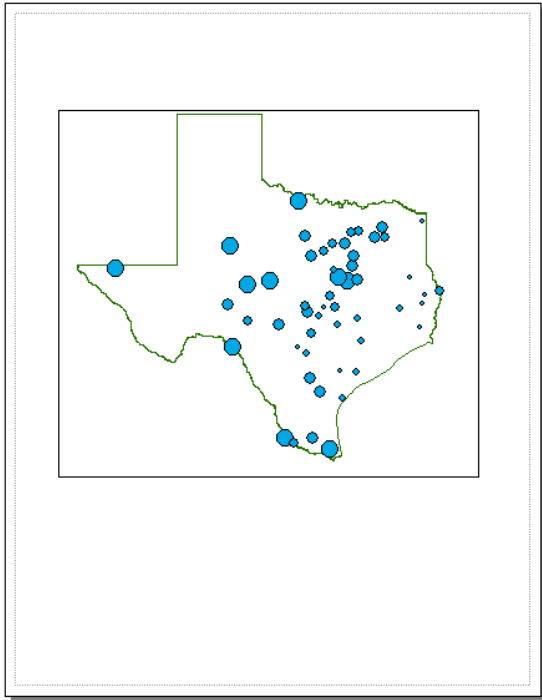


Reduce the size of the data frame in the layout (i.e., rectangle where the spatial data is contained) -- to make room for the graph -- by clicking on the map and moving its handlers. If you have a zoomed in view in Arc Map, you'll get the same image in the Layout. To move your map around use the **Pan**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



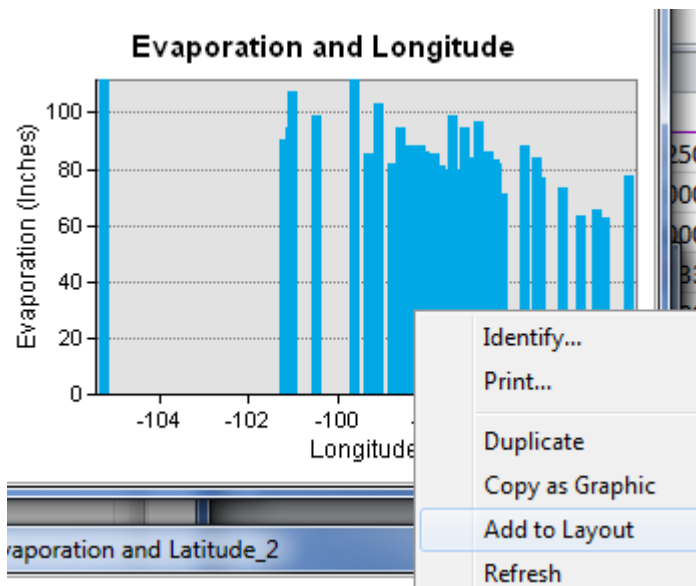
You can switch back and forth between data view and layout view. Changes made in one view will be reflected in the other view.

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

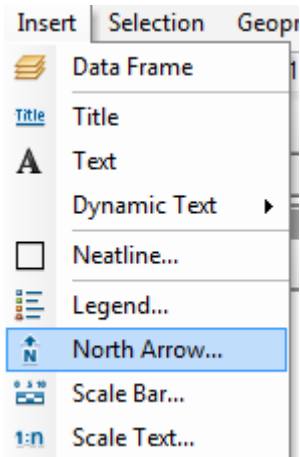


Keep saving your ArcMap document as you proceed through the map making steps so that if you mess up something you can get back the work you've already done.


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.



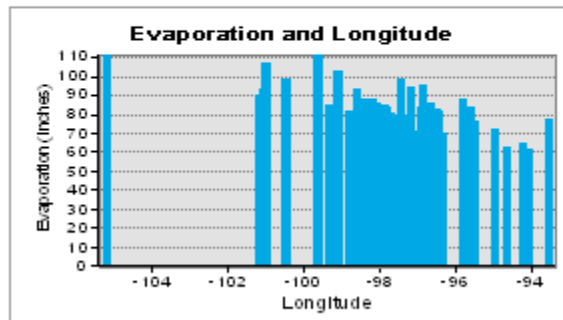
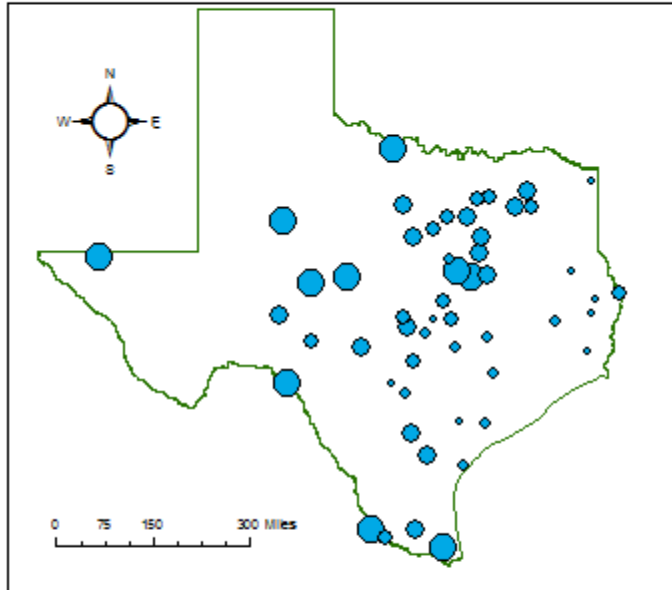
When you put up the scale bar you can select the distance units to be displayed. I have used miles.

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.

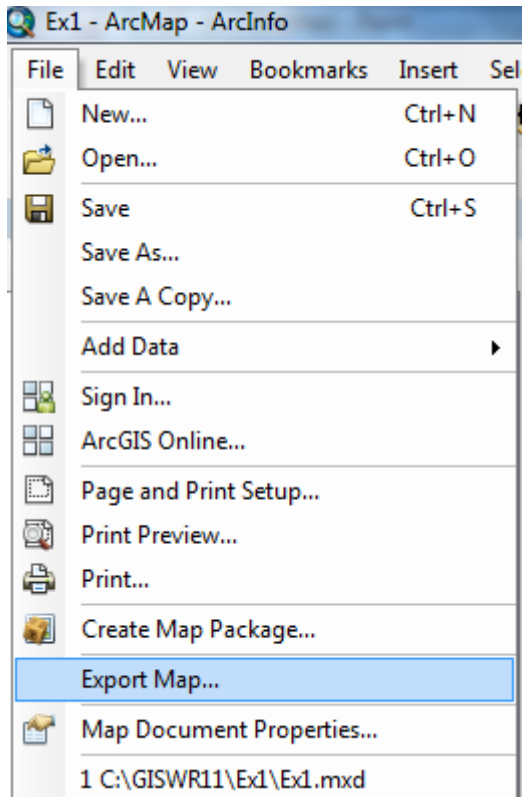
Your map might look like this:

Pan Evaporation in Texas

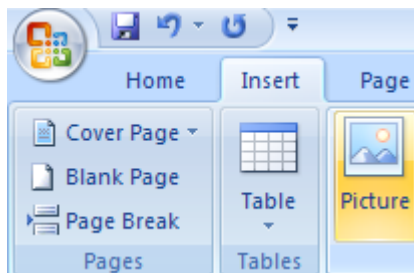
Prepared by David R. Maidment, 5 September 2012



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.

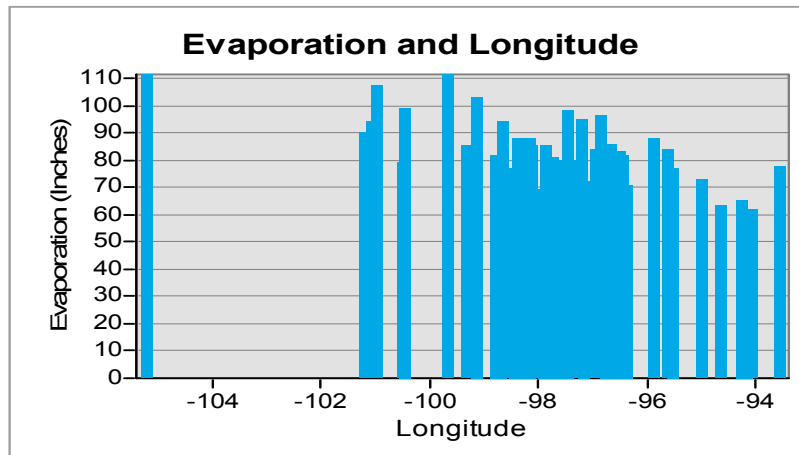
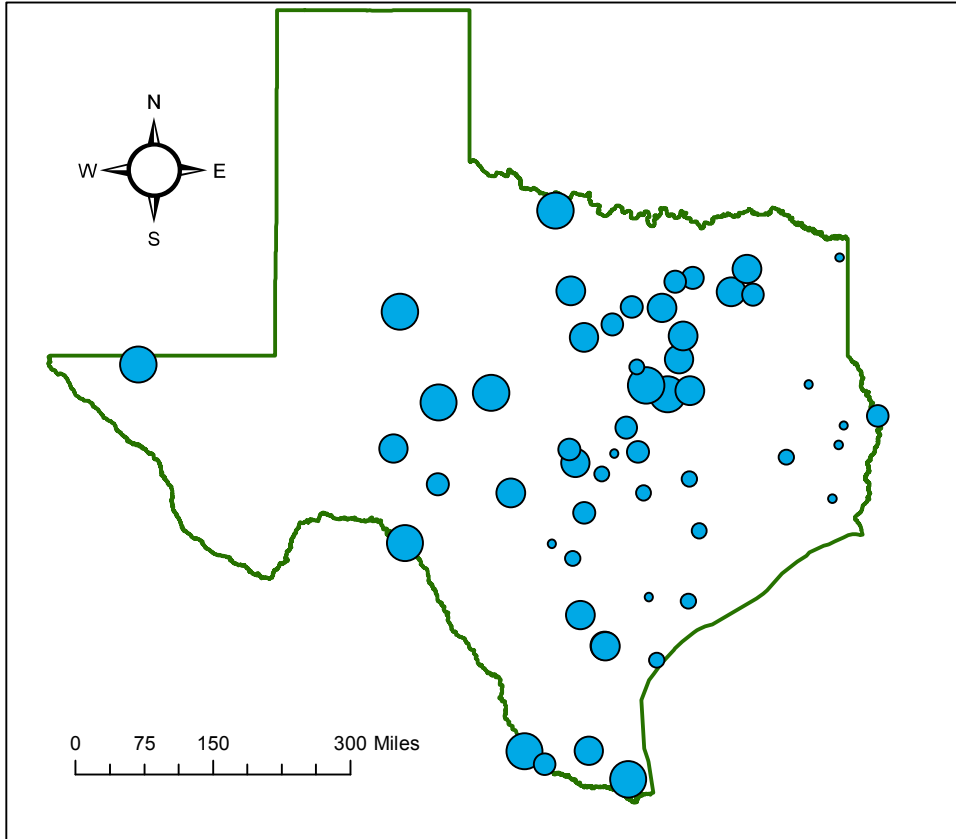


Then you can add it to a Word document using **Insert/Picture/From File** and load this emf file, as shown below. Pretty cool!



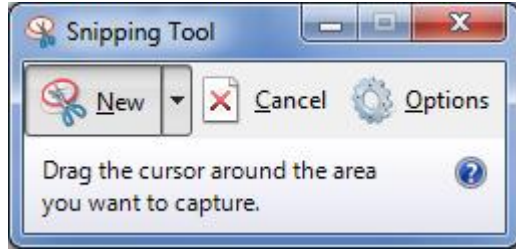
Pan Evaporation in Texas

Prepared by David R. Maidment, 5 September 2012



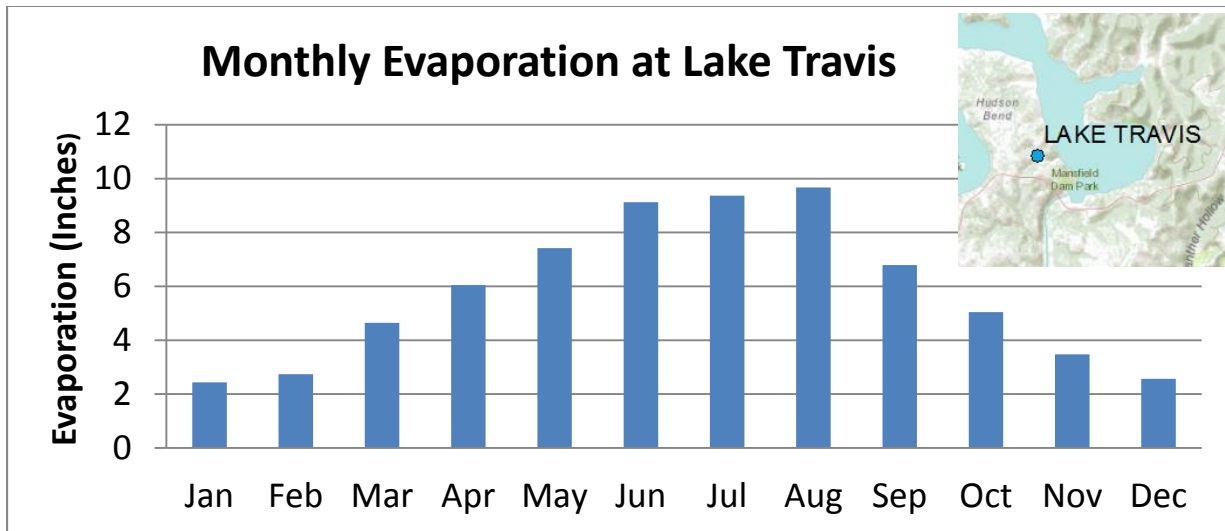
Helpful Tip:

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 an 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 is more appropriate for you. To execute this part of the exercise you need to have two files:

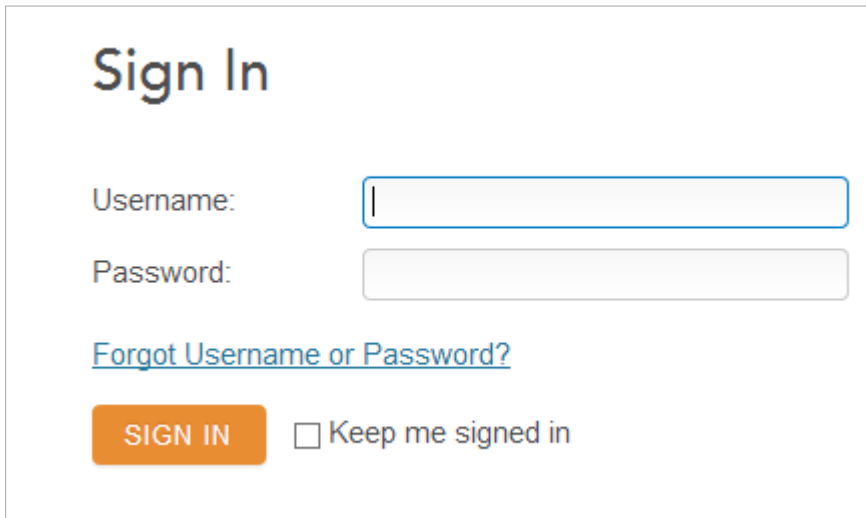
(1) A Comma Separated Variable (CSV) file of Texas Pan Evaporation:

<http://www.caee.utexas.edu/prof/maidment/giswr2013/Ex1/AGOL/TexasPanEvap.csv>

(2) A zipped shape file of Texas Counties:

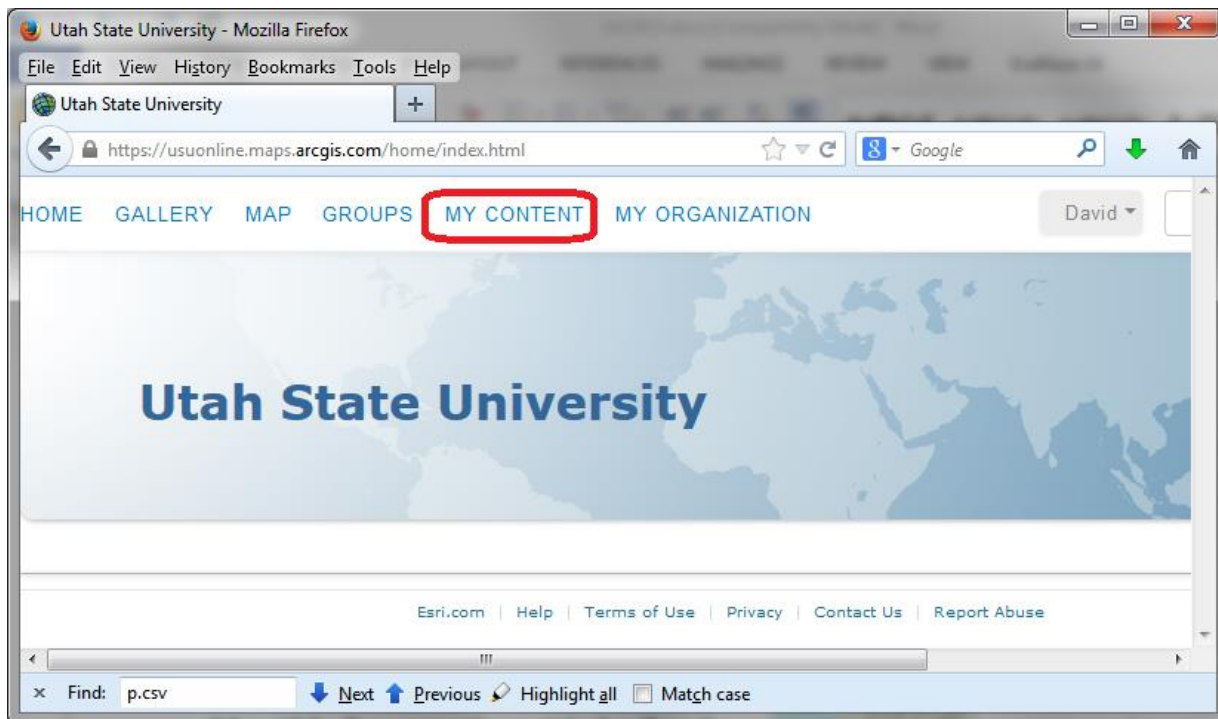
<http://www.caee.utexas.edu/prof/maidment/giswr2013/Ex1/AGOL/Counties.zip>

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



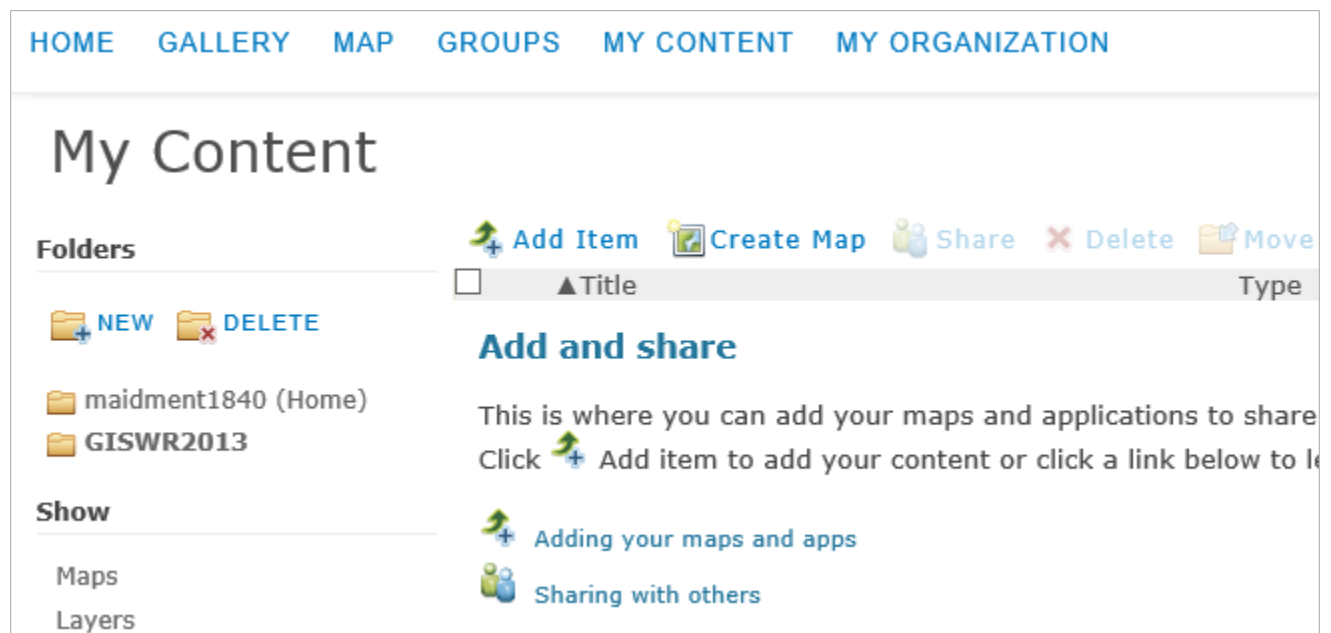
The screenshot shows the ArcGIS Online sign-in interface. At the top left, the text "Sign In" is displayed in a large, bold, dark font. Below this, there are two input fields: "Username:" followed by a text box containing a vertical cursor, and "Password:" followed by a text box. Underneath the password field is a blue hyperlink that reads "Forgot Username or Password?". At the bottom left, there is an orange button with the text "SIGN IN" in white capital letters. To the right of this button is a checkbox with the text "Keep me signed in" next to it.

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

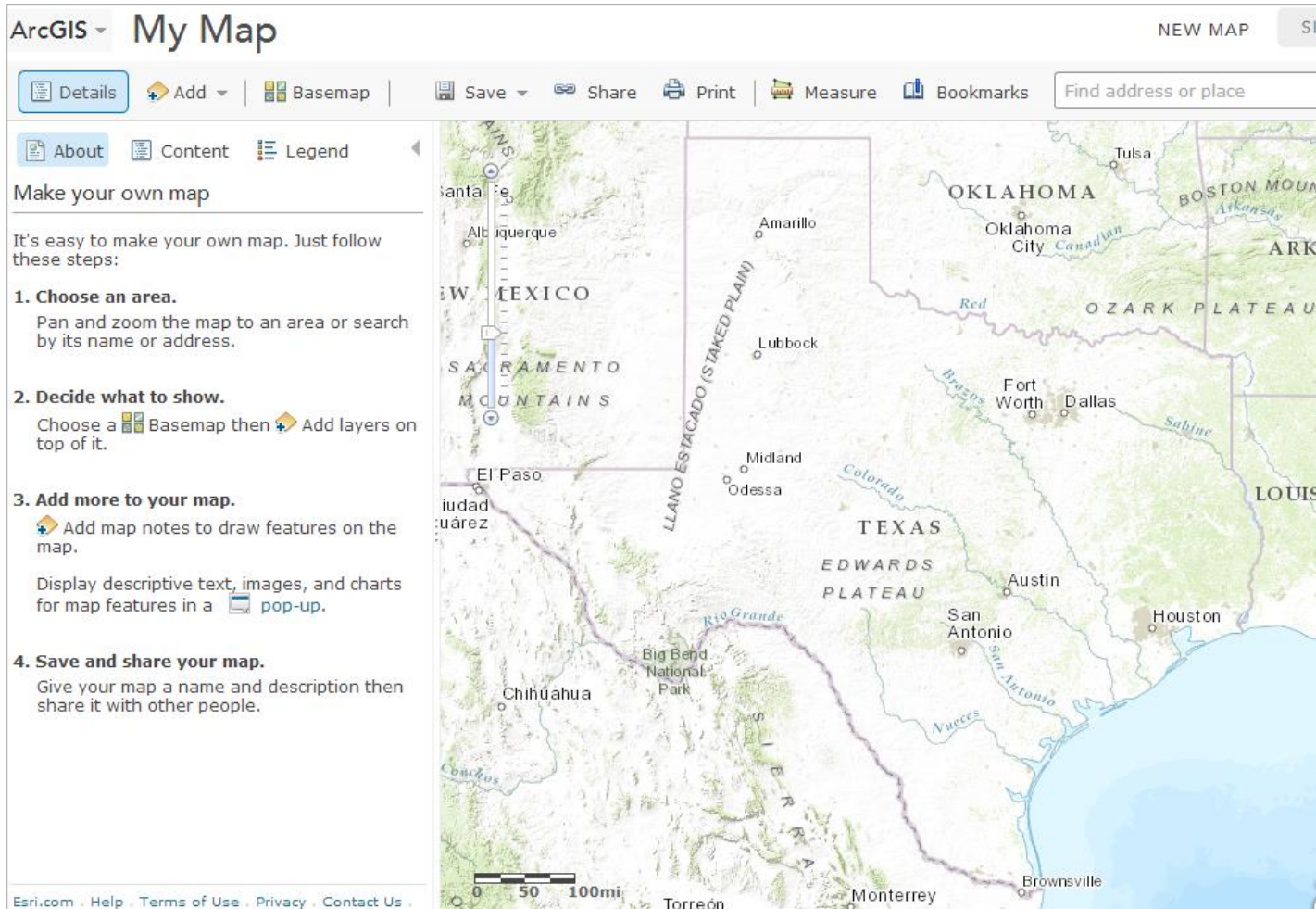


This opens a section where you can manage the content you have added to ArcGIS.com.

I have created a New Folder called GISWR2013 to store information in from this class and to keep this separate from what I have done in ArcGIS Online for other purposes.

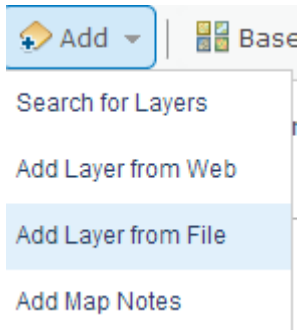


Click on [Create Map](#) to bring up a Topographic Map of the United States to which we'll add the pan evaporation data. A topographic map of North America opens up. Zoom in to Texas. You can press "Shift" and then use your mouse to drag a box across Texas to facilitate zooming in.

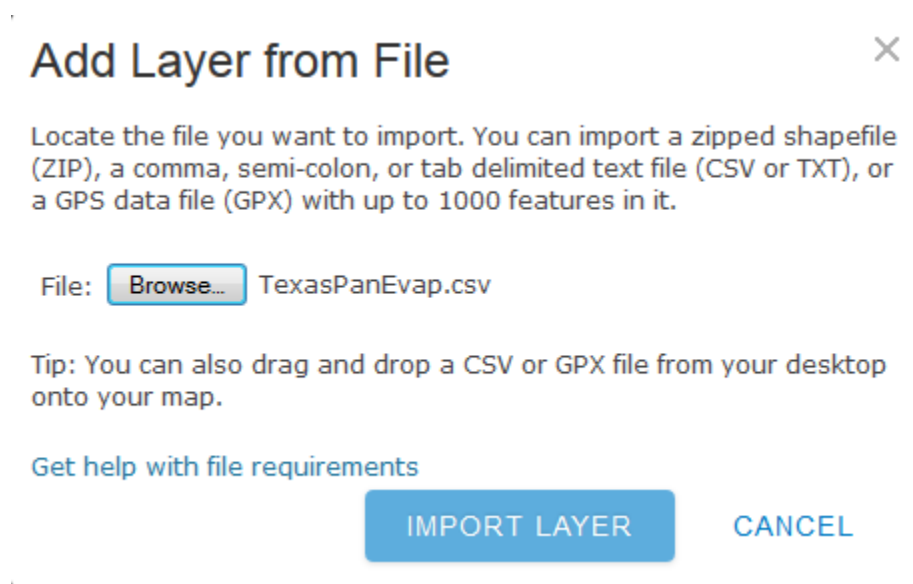


10. Adding Pan Evaporation Data

Add a Layer from File

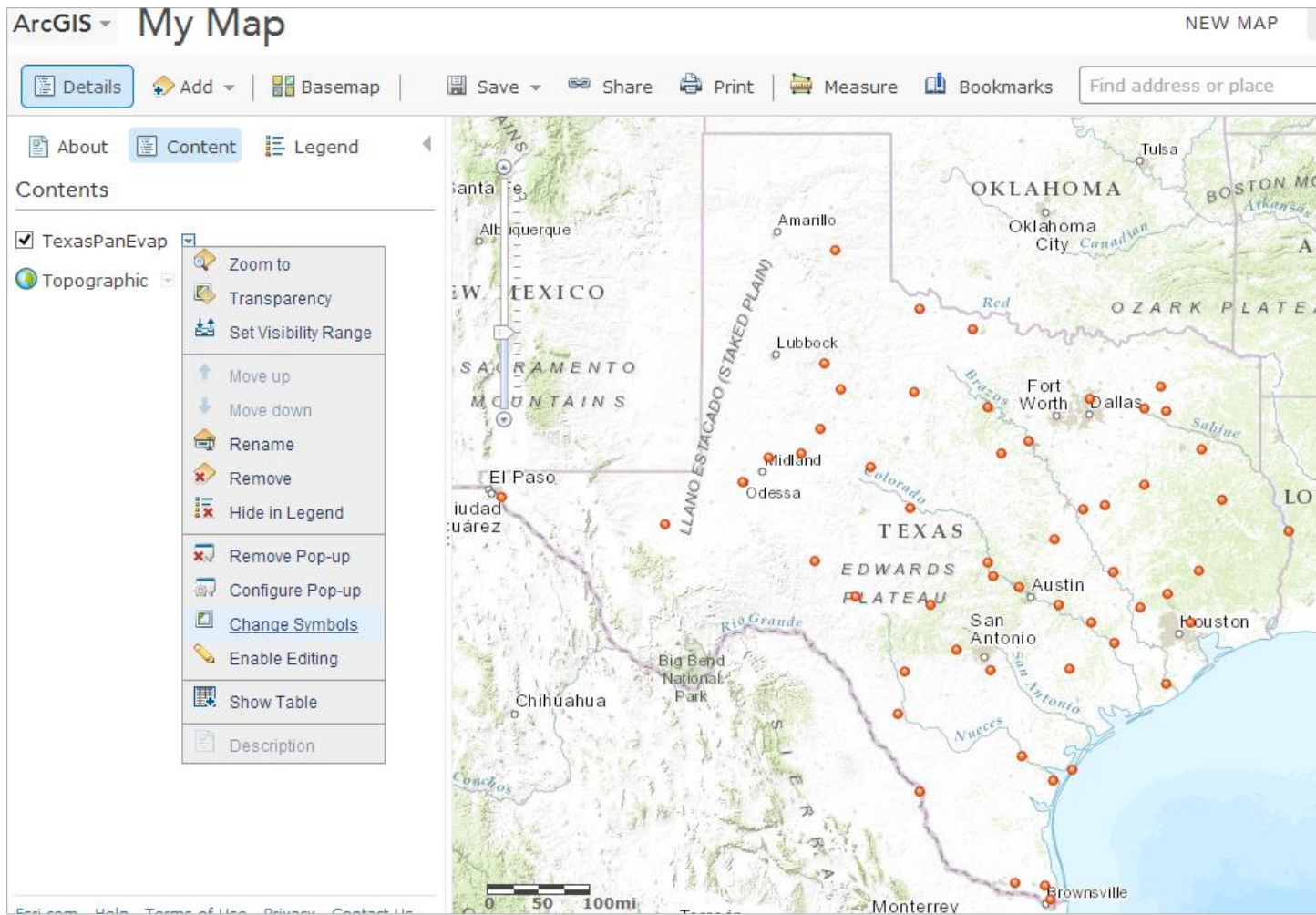


Browse to **TexasPanEvap.csv** and click **Import Layer**



You'll see the points added to the map. This happens 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



Now, let's **Change Symbols** on the map.

Use **Size** as the discriminator and **Annual** as the Attribute to show. This value is the annual pan evaporation in Inches.

Change Symbols ✕

Specify what symbols to use to draw the layer. [Help](#)






Use:

To show:

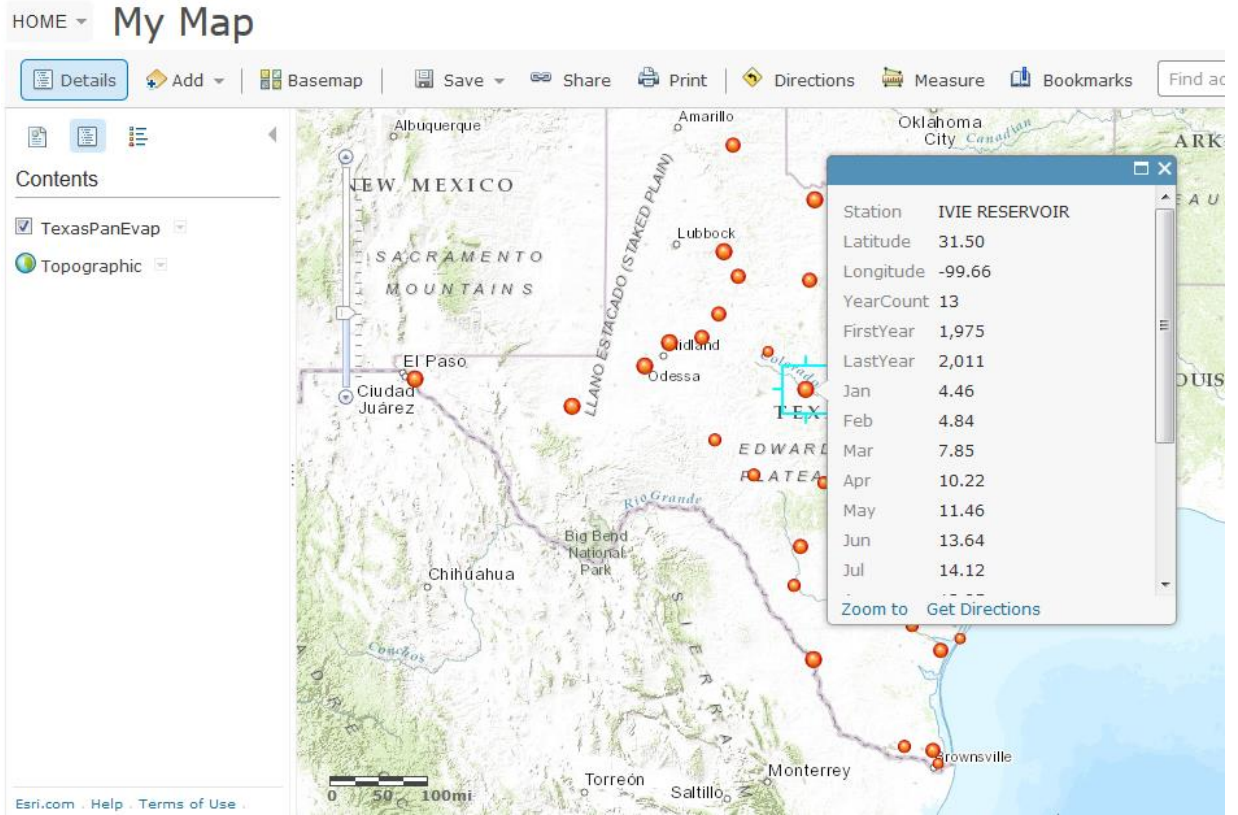
By:

With: Classes

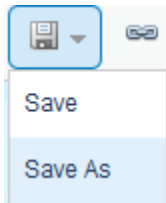
SYMBOLS

	55.85 - 65.53
	65.53 - 79.56
	79.56 - 90.69
	90.69 - 102.5
	102.5 - 120.79

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:



I have given my map a title, some tags by which it can be discovered and a description.

Save Map

Title:

Tags:
Add tag(s)

Summary:

Save in folder:

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

HOME ▾ **Texas**

- Home
- Gallery
- Groups
- My Content**
- My Organization
- Help

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

My Content

<input type="checkbox"/>	▲ Title	Type	Modified	Shared
<input type="checkbox"/>	Texas Pan Evaporation	Web Map	Sep 4, 2013	Not Shared

Folders

- NEW DELETE
- maidment1840 (Home)
- GISWR2013

If you click on the **Texas Pan Evaporation** map title, you'll see a window open that tells you about this map, and if you open this in the **ArcGIS.com map viewer**, you'll see your map again as you had it before. Hence, if you inadvertently close your web browser wherein you are creating this map, nothing is lost.

Texas Pan Evaporation



A map of pan evaporation sites with monthly mean pan evaporation data. Created by Maidment.

Web Map by [maidment1840](#)
Last Modified: September 4, 2013

☆☆☆☆☆ (0 ratings, 3 views)

[Facebook](#) [Twitter](#)

OPEN ▾ **SHARE** **EDIT** **DELETE** **MOVE** ▾

- Open in ArcGIS.com map viewer
- Open in ArcGIS Explorer Online
- Open in ArcGIS 10 For Desktop

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.

HOME ▾ Texas Pan Evaporation

HOME ▾ Texas Pan Evaporation

Details Add ▾ Basemap Save ▾ Share Print Directions Measure Bookmarks

Contents

- TexasPanEvap
- Topographic

Zoom to

Transparency

Set Visibility Range

Move up

Move down

Rename

Remove

Hide in Legend

Remove Pop-up

Configure Pop-up

Change Symbols

Enable Editing

Perform Analysis

Show Table

Description

Hit Configure Attributes.

Texas Pan Evaporation

Details Add ▾ | Basemap | Save ▾ | Share | Print | Directions | Measure | B

Pop-up Properties

Pop-ups display information about features in the layer. Define the pop-up below.

Pop-up Title

Pop-up Contents

Display:

A list of field attributes ▾

These field attributes will display:

- Station {Station}
- Latitude {Latitude}
- Longitude {Longitude}
- YearCount {YearCount}

Configure Attributes

Pop-up Media

Display images and charts in the pop-up:

SAVE POP-UP

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.

Configure Attributes

Check the fields you want to display. Select a field to change its alias, order it, and format it.

<input type="checkbox"/>	Display	Field Name	Field Alias
<input checked="" type="checkbox"/>		{Station}	Station
<input type="checkbox"/>		{Latitude}	Latitude
<input type="checkbox"/>		{Longitude}	Longitude
<input type="checkbox"/>		{YearCount}	YearCount
<input type="checkbox"/>		{FirstYear}	FirstYear
<input type="checkbox"/>		{LastYear}	LastYear
<input checked="" type="checkbox"/>		{Jan}	Jan

Format

2 decimal places ▼

Use 1000 Separator

OK
CANCEL

ArcGIS

My Map

NEW MAP

Details
Add
Basemap
Save
Share
Print
Measure
Bookmarks

About

Content

Legend

Contents

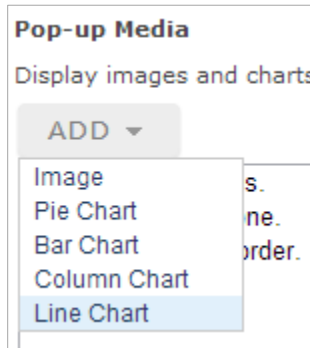
TexasPanEvap

Topographic

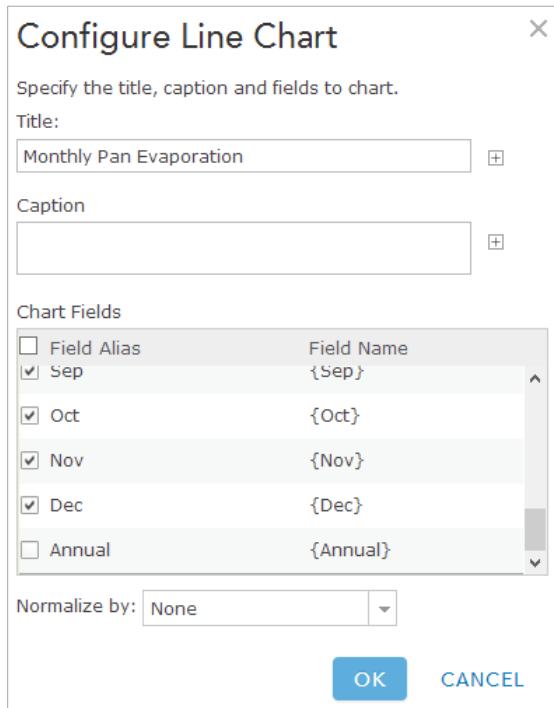
Station IVIE RESERVOIR	
Jan	4.46
Feb	4.84
Mar	7.85
Apr	10.22
May	11.46
Jun	13.64
Jul	14.12
Aug	12.85
Sep	10.03
Oct	7.41
Nov	5.47
Dec	4.50
Annual	106.84

Zoom to

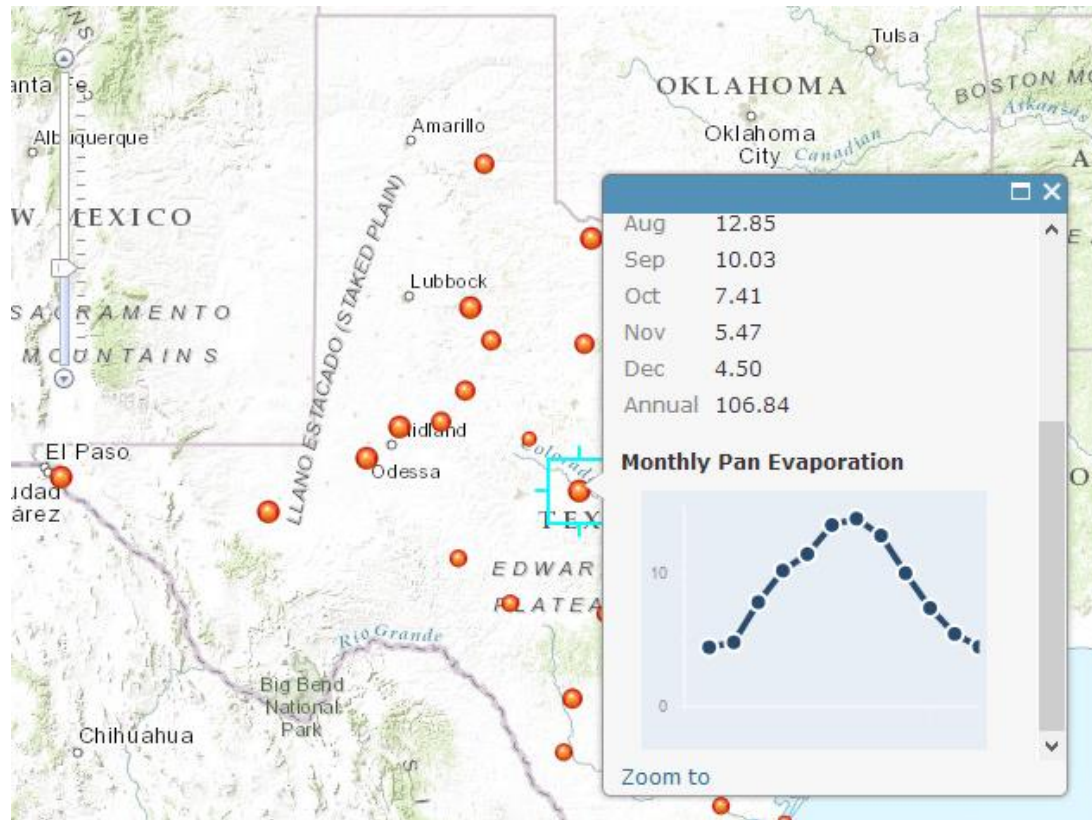
Now, Configure the Pop-Up again, and let's add a **Line Chart**



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

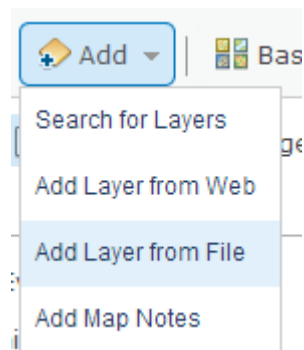


And now when you click on a point you get rather a nice chart, which along with the annual value of pan evaporation tells you the total evaporation and gives an image of how it is distributed over the year.

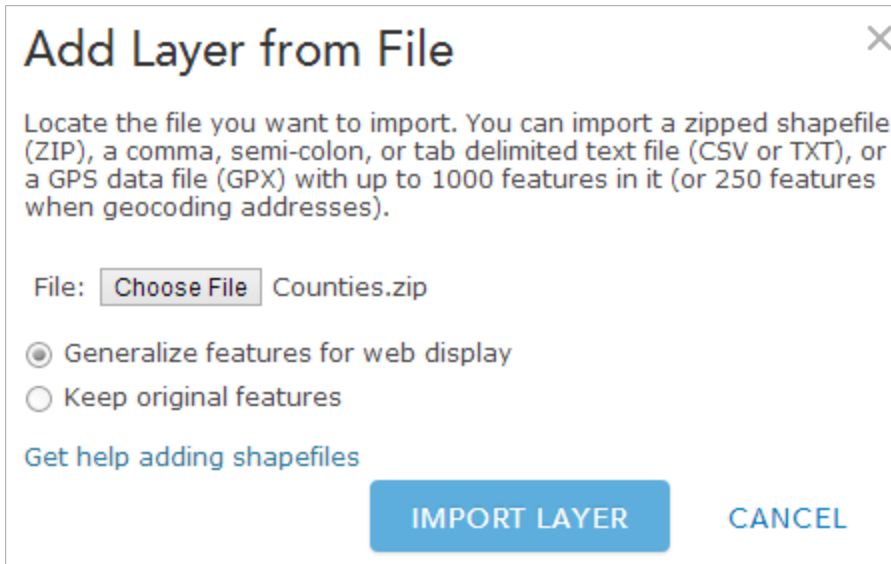


12. Adding Counties and Map Notes

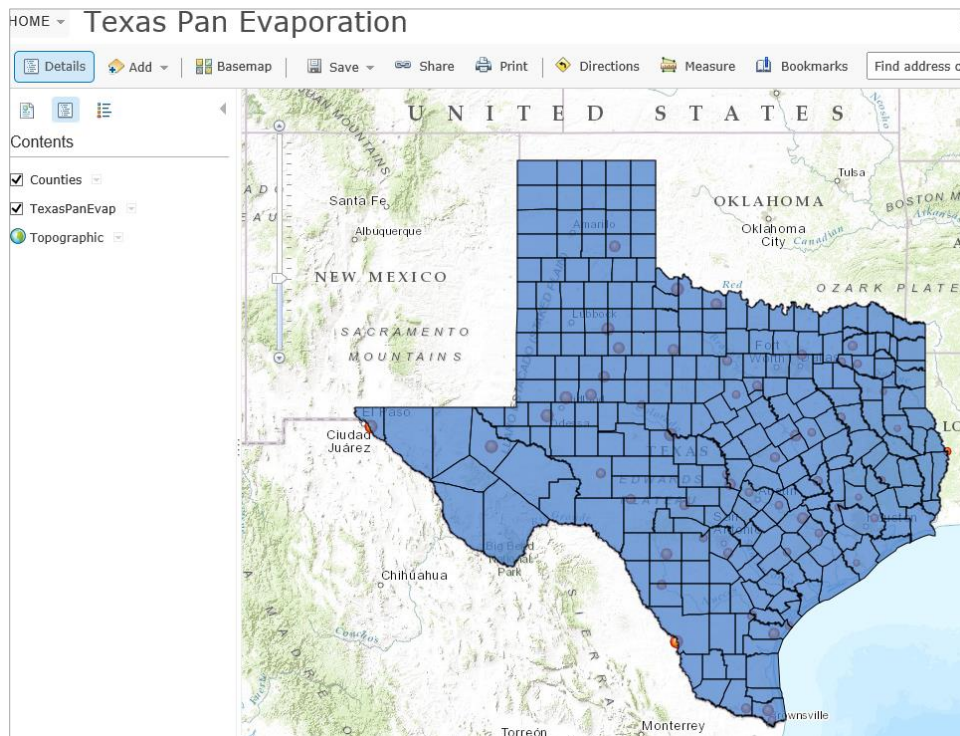
Now, let's add the **Counties** layer to provide some more spatial context for the observation points



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



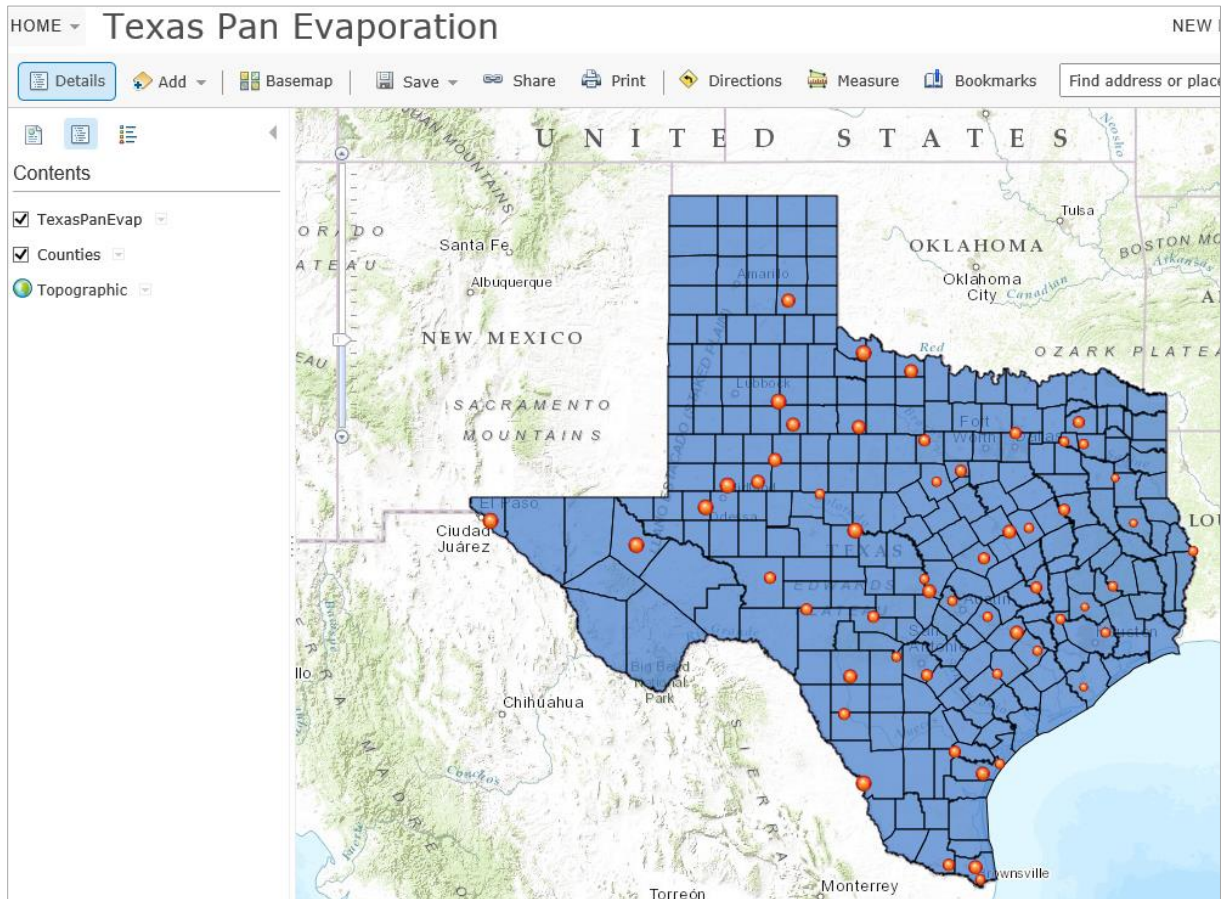
When the Counties layer displays, it is the first layer on top of the map and it obscures the pan evaporation points.



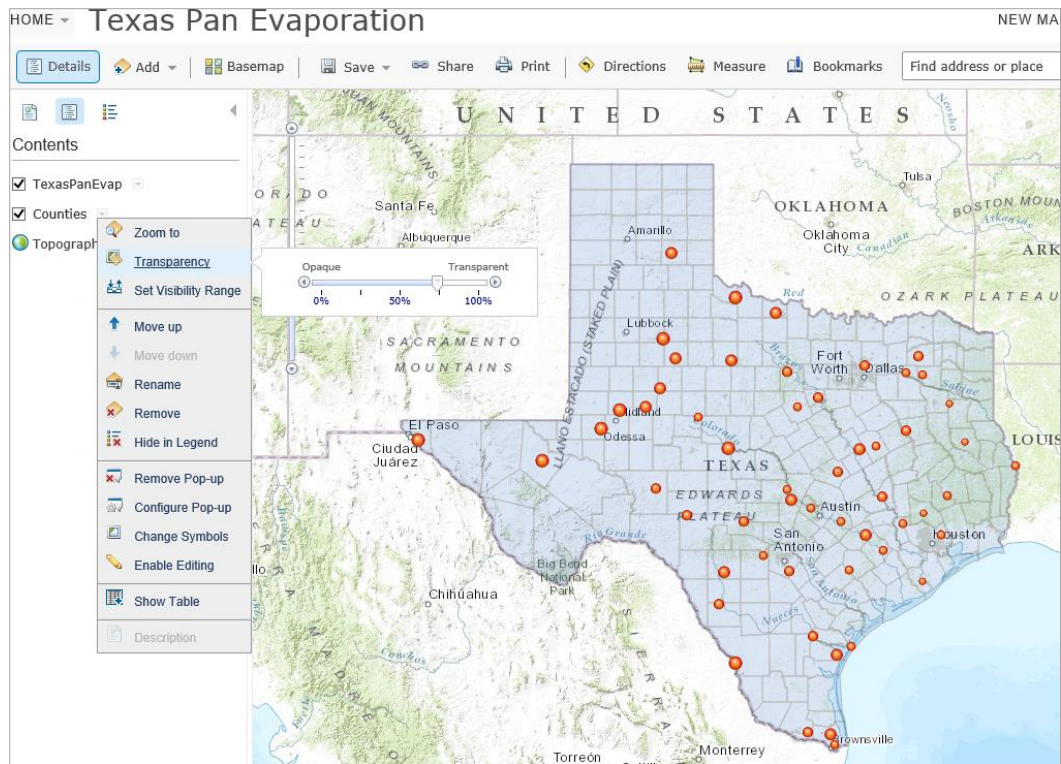
The **Counties** layer can be **moved down** so that the points are more clearly displayed

- Counties ▼
- TexasPanE
- Topograph

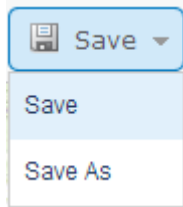
- Zoom to
- Transparency
- Set Visibility Range
- Move up
- Move down



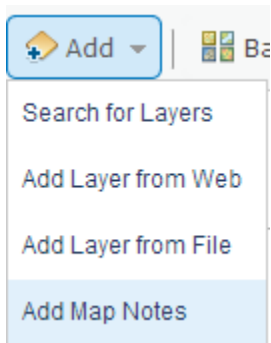
And if you set the Transparency of the Counties layer to 75%, a rather pleasant map appears:



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 Map Notes

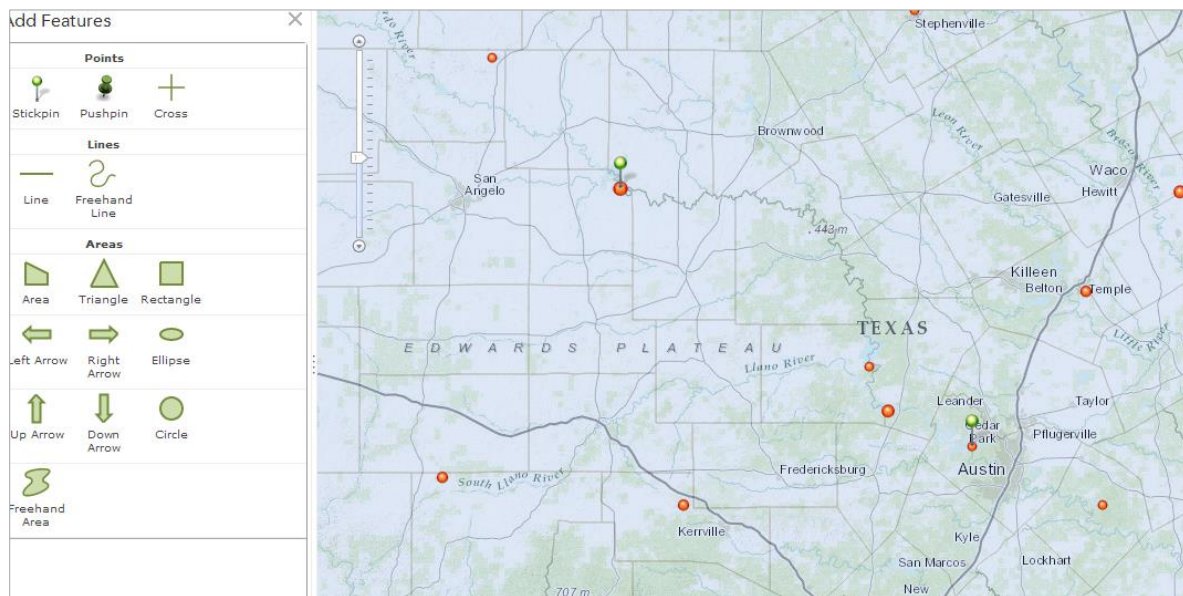
Name:

Template:

Use Map Notes to create basic shapes in a wide variety of applications.

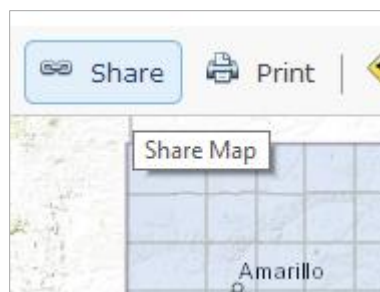
[CREATE](#) [CANCEL](#)

Add **Stickpins** to highlight the Pan Evaporation Sites at Lake Travis and Lake Ivie, both important water supply lakes on the Colorado River in Texas.



13. Sharing your Map on the Web

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



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://bit.ly/17zT5BM>



Share

Choose who can view this map.

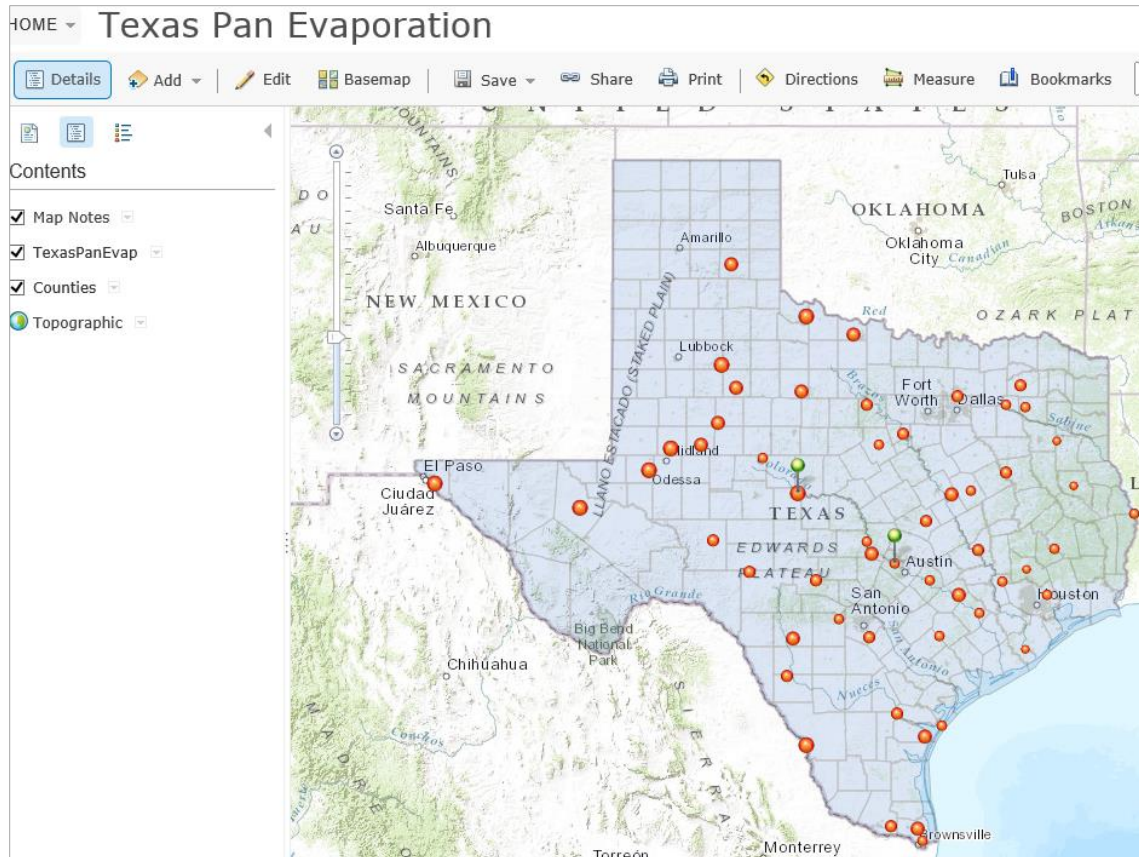
Your map is currently shared with these people.

- Everyone (public)
- University of Texas at Austin
- Members of these groups:
 - 98th Meridian
 - Arc Hydro River
 - BMPProto Web Maps & Demos
 - Center for Research in Water Resources
 - CUAHSI
 - GIS in Water Resources 2011
 - GIS in Water Resources 2012

Link to this map

 Facebook  Twitter

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://bit.ly/17zT5BM>) 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 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://bit.ly/17zT5BM>) for your map so that I can view it online.

The assignment is due in a week from the date it was assigned in class. Please print out your items to be turned in and bring them to class to turn in to the instructor.

For Utah State University Students, please turn this assignment in electronically. Please email dtarb@usu.edu a Microsoft word or PDF document with your map and web link to your online map.