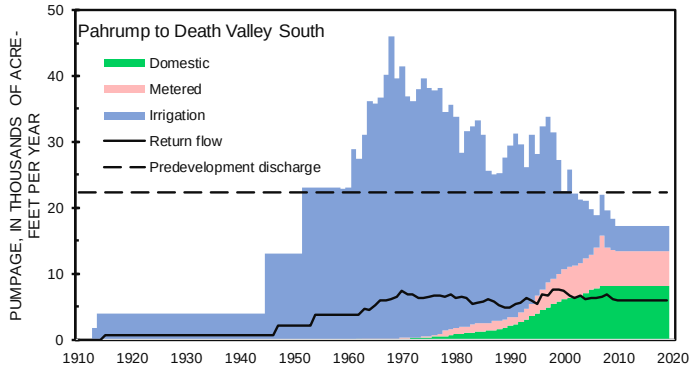
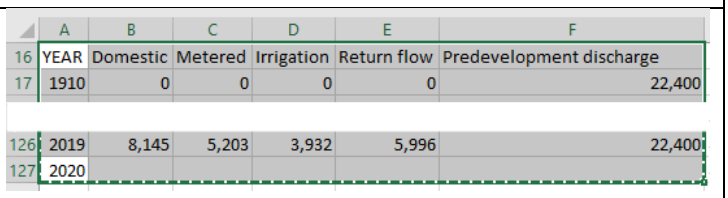
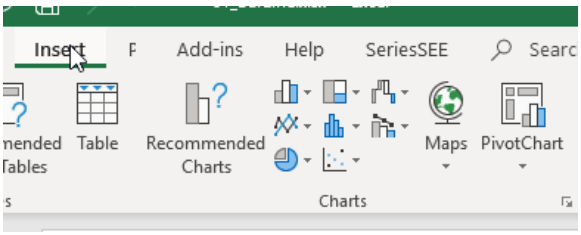
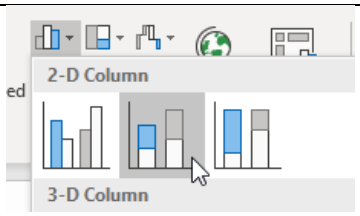
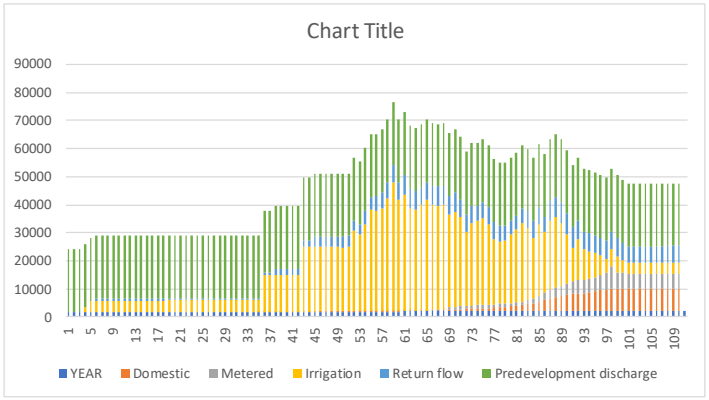
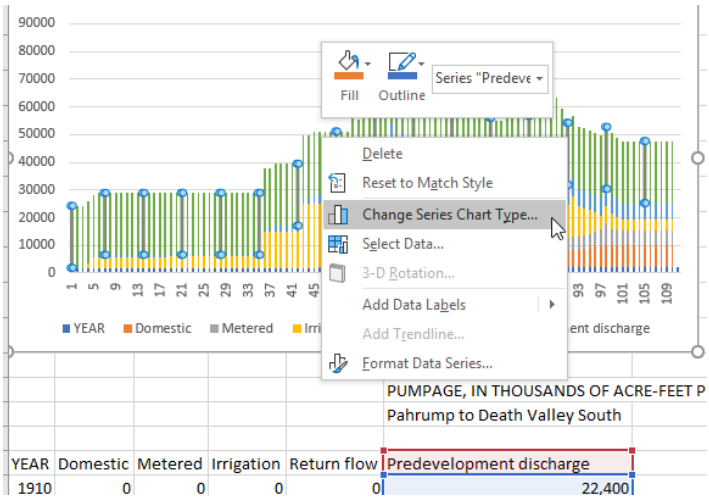
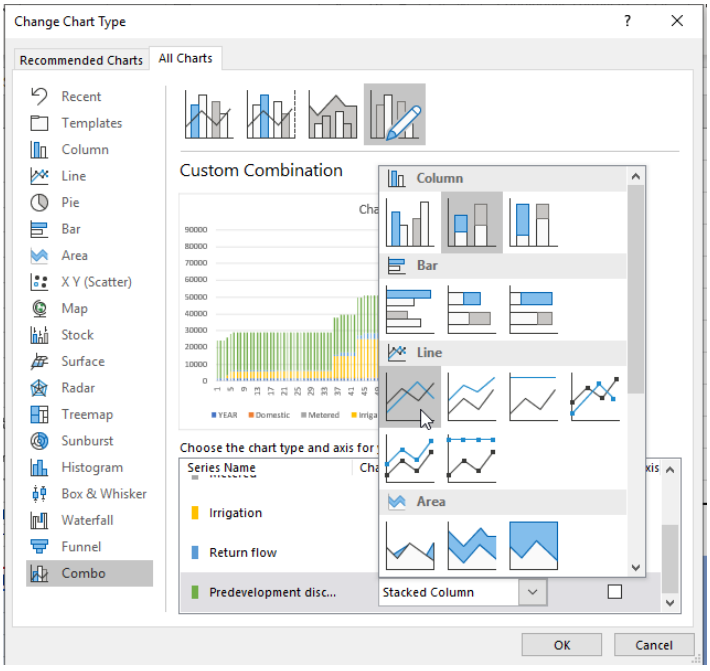
02_Plotting

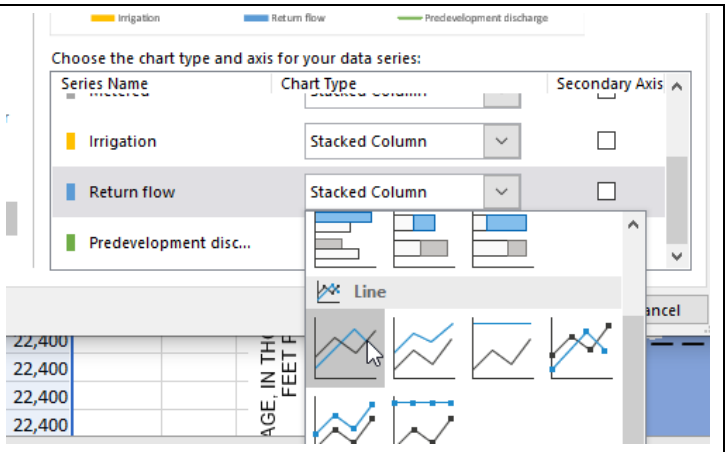
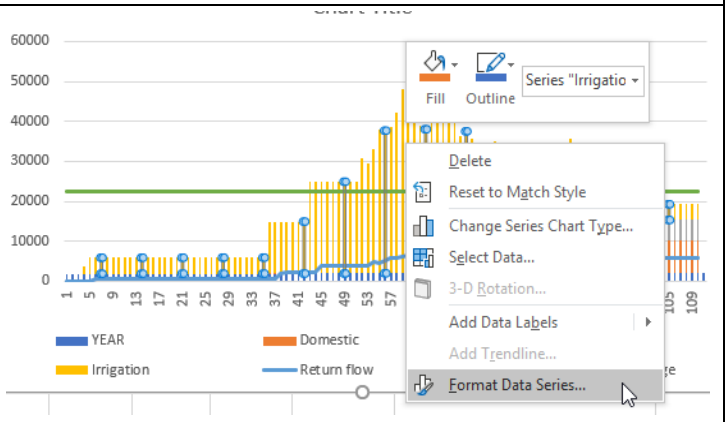
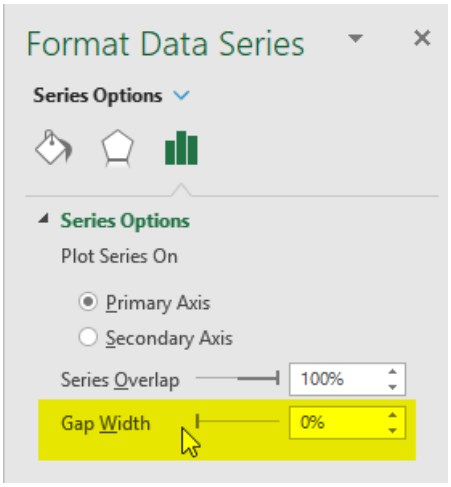
Useful Chart types

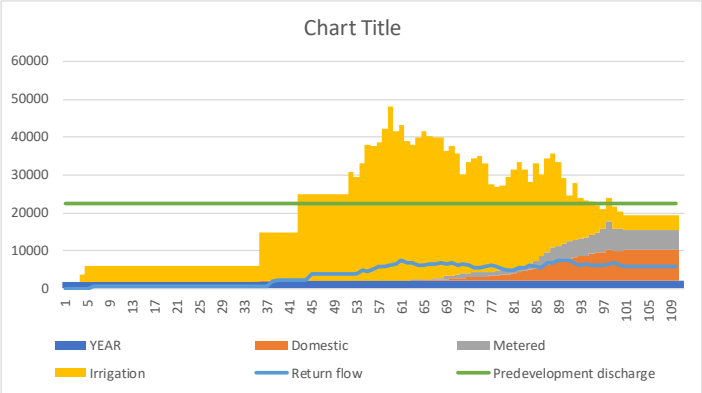
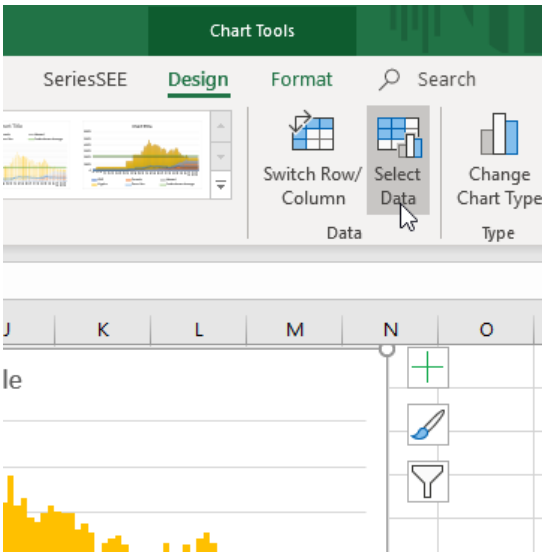
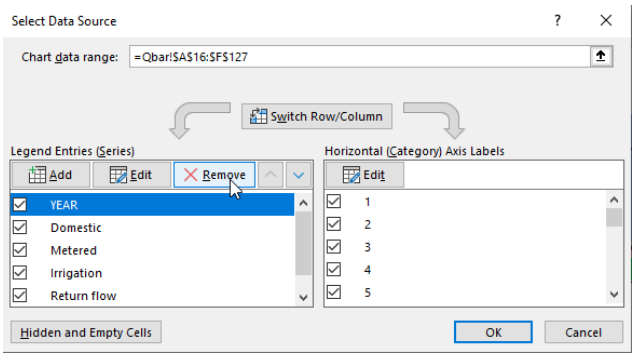
Column, line, and XY charts the most useful with XY charts being most versatile. Column or bar charts are good for displaying regularly spaced data where showing the area under the curve facilitates interpretation.

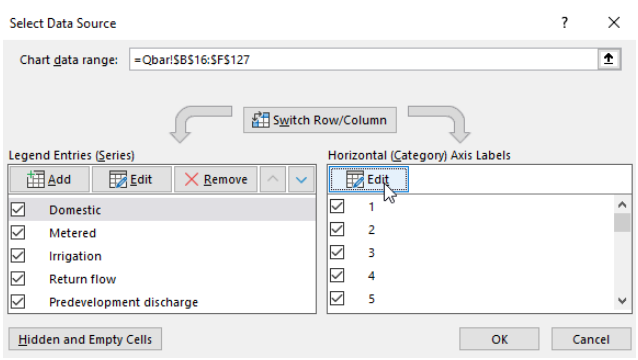
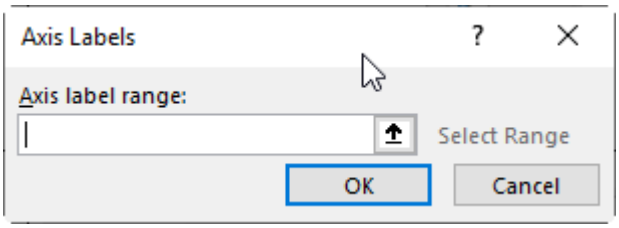
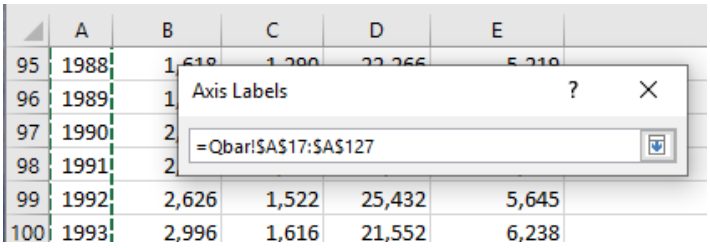
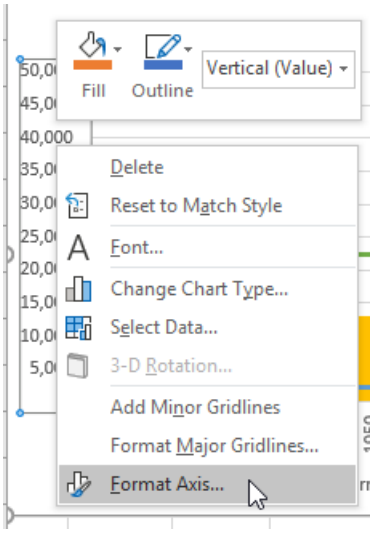
Stacked columns and lines – 01_BarLine.xlsx

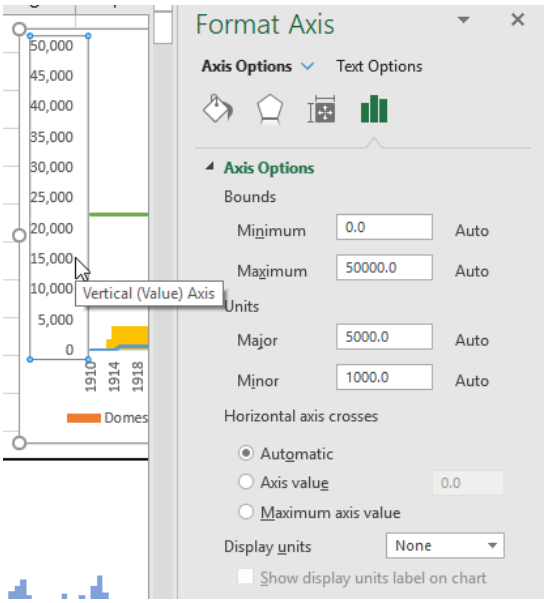
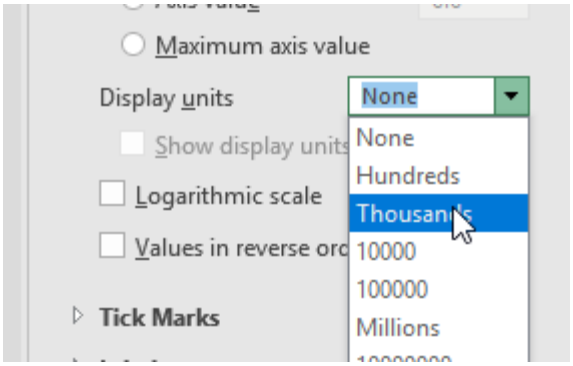
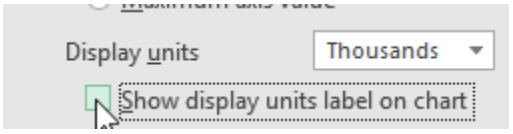
Creating basic elements of the adjacent plot from data in the file 01_BarLine.xlsx follow.	
Highlight range A16:F127.	
Select Insert tab on ribbon for chart options.	
Select stacked column format. Cut new chart and paste in cell A1.	

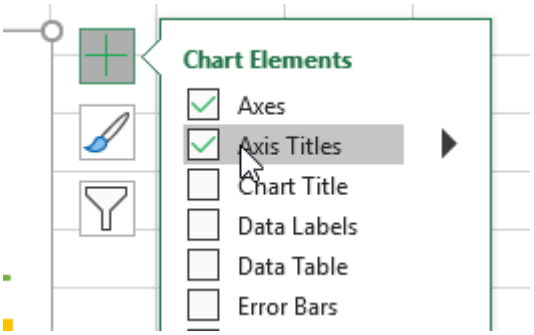
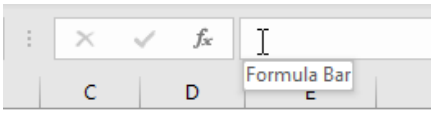
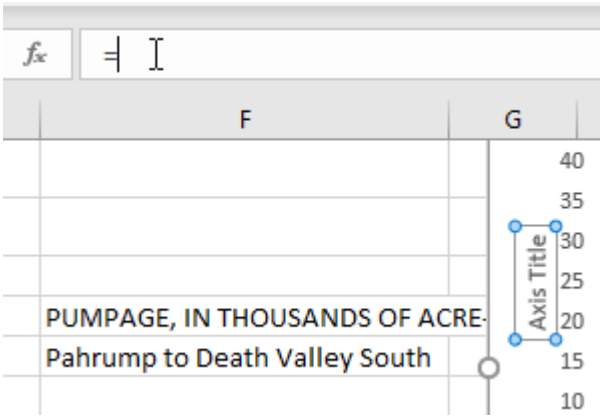
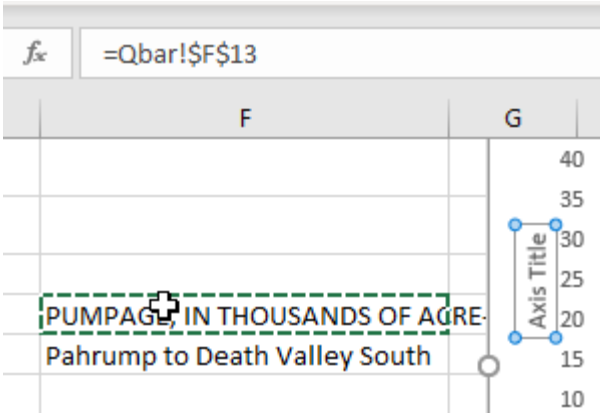
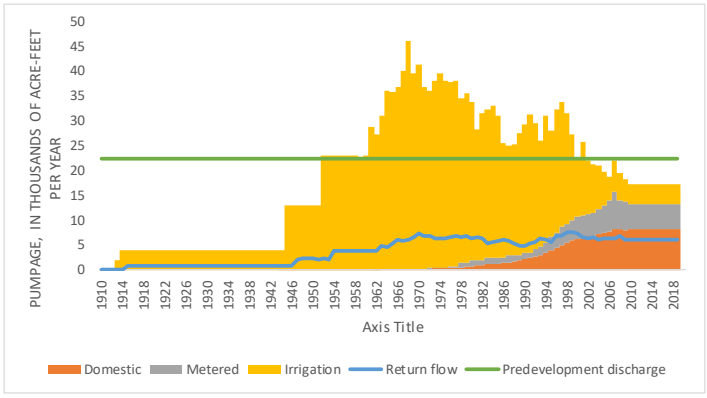
New chart appears as,	
Select “Predevelopment discharge” series. Right-click to activate dialog. Select “Change Series Chart Type…” from dialog.	
Change “Predevelopment discharge” series from “Stacked column” to “line”.	

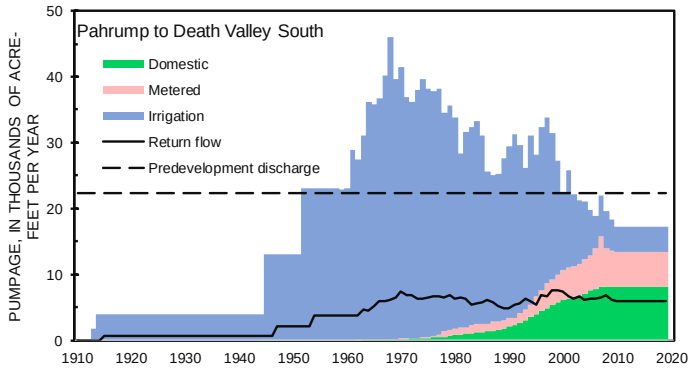
Also change “Return flow” series from “Stacked column” to “line”.	
Select “Irrigation” series. Right-click to activate dialog. Select “Format Data Series…” from dialog.	
Select “Series Options,” Rightmost symbol,  Set “Gap Width” to 0%.	

Basic elements exist, but X-axis is wrong. “YEAR” was interpreted as a time series rather than labels.	
Select chart so that “Chart Tools” appear in ribbon. Select “Select Data” from “Design” tab under “Chart Tools” “Select Data Source” form will appear.	
Select “YEAR” series on the “Select Data Source” form. Click “Remove” button to eliminate the “YEAR” series.	

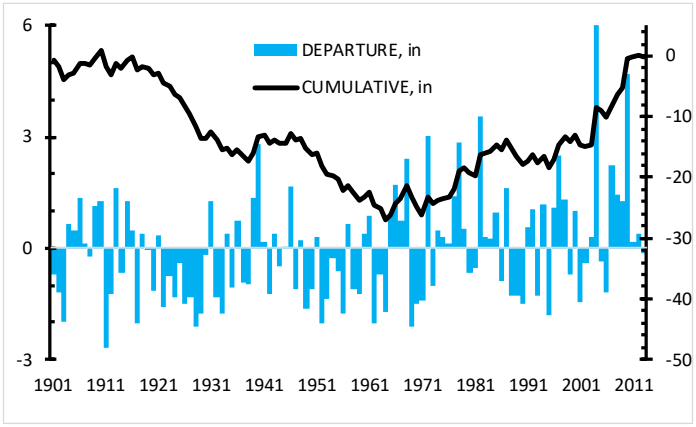
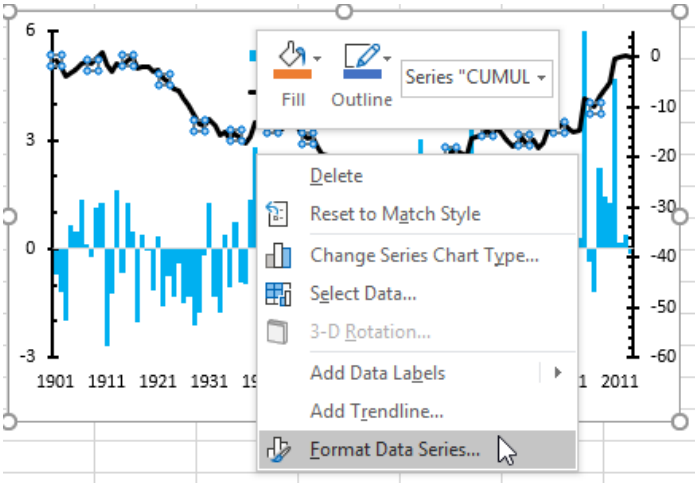
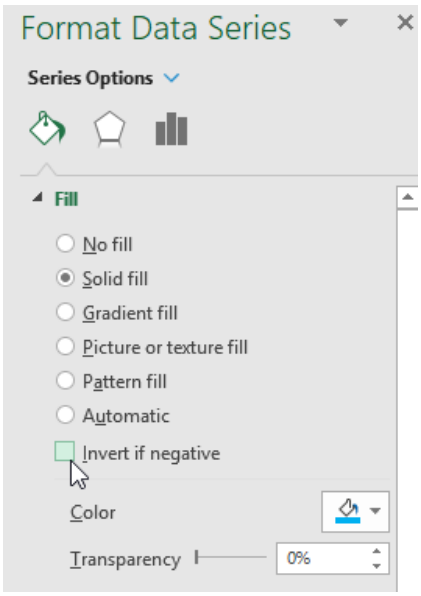
Select another series (Domestic in this example). Click “Edit” under “Horizontal Category Axis Labels.	
The “Axis Labels” form will appear.	
Graphically select or type the range “Qbar!$A$17:$A$127”. Click “OK” on the “Axis Labels” and “Select Data Source” forms until all forms are closed.	
Select Y-axis. Activate “Format Axis” dialog by either, Right-clicking to activate dialog and selecting “Format Axis…” from dialog, or Type ctrl+1.	

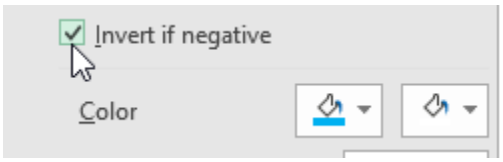
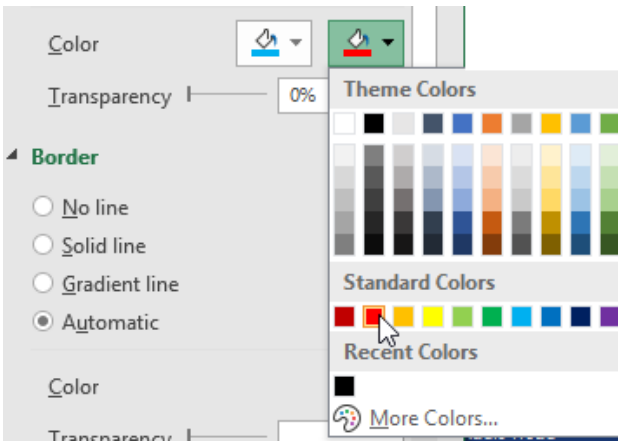
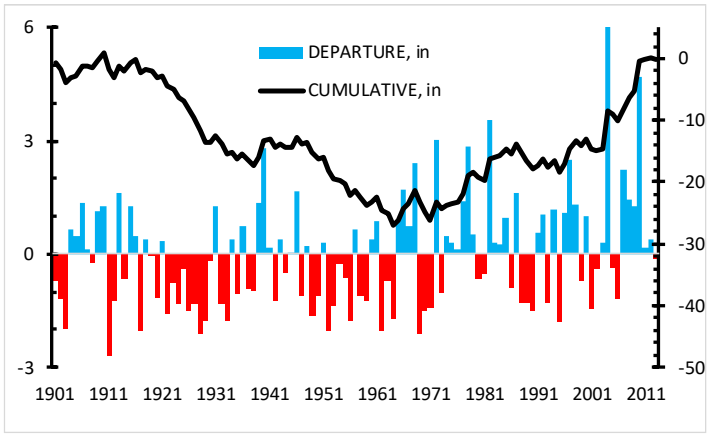
Select “Axis Options,” and rightmost symbol,  . Change “Display units.”	
Select “Thousands” from menu.	
Uncheck the “Show display units label on chart” option.	
Select chart and click the  that appear outside the upper, right corner of the chart.	

Add “Axis Titles.”	
Select the new Y-axis title box that was added to the chart. Click in the Formula bar,  Type “=”	
Select cell F13 with your mouse and type Enter/Return. This defines the title through data in cell F13, which is easier to edit and revise.	
The chart should appear as, This covers most structural elements needed to recreate the mixed stacked column and line chart.	

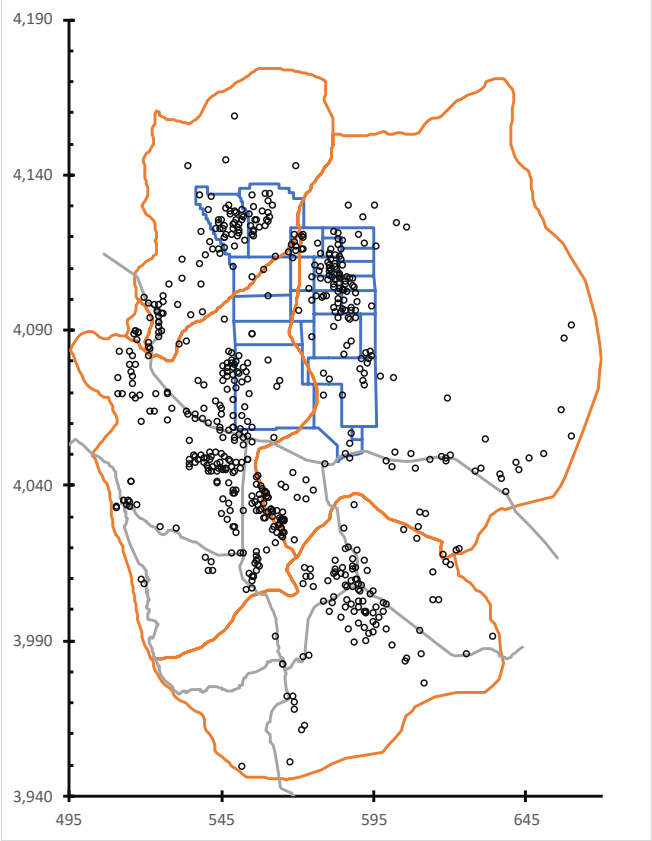
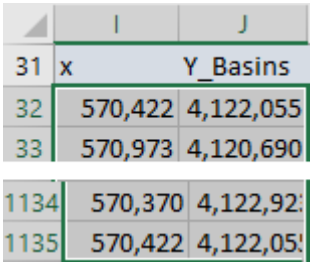
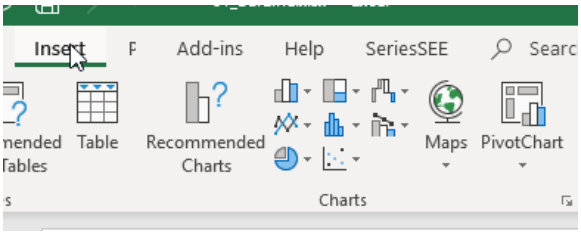
Additional formatting is discussed in class.	

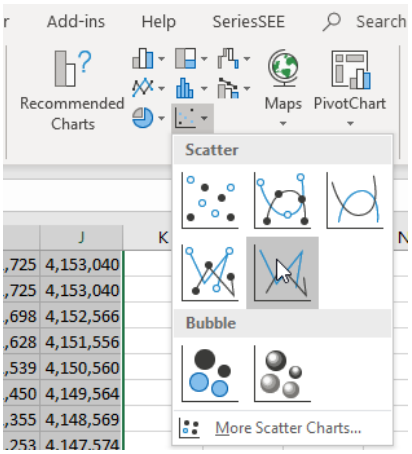
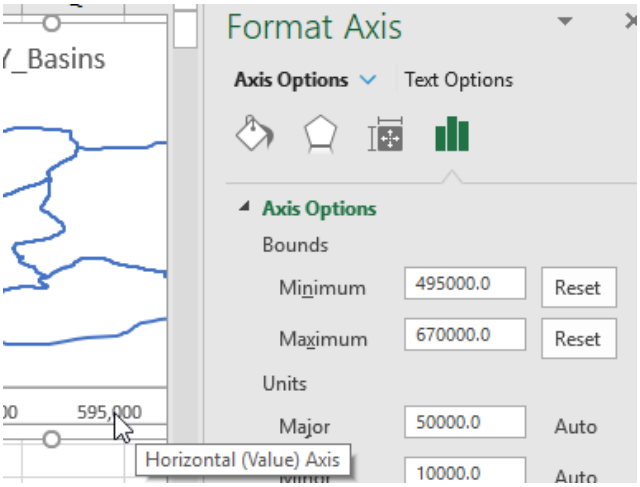
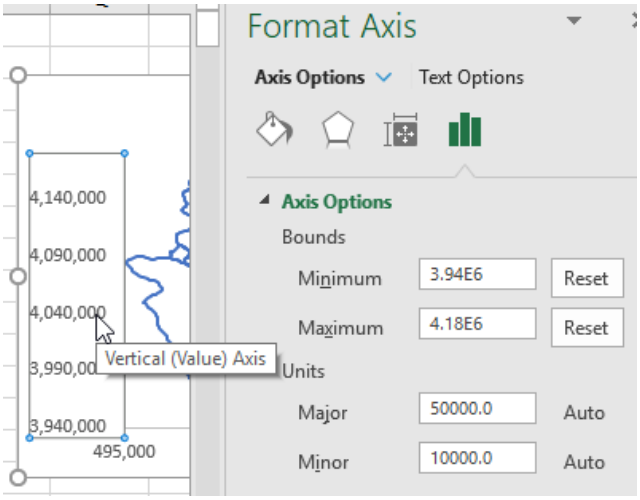
Differentiate positive & negative columns – 02_Departure.xlsx

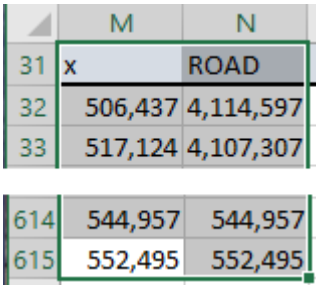
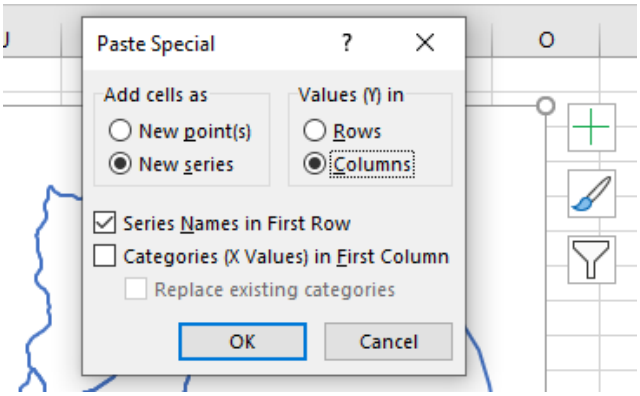
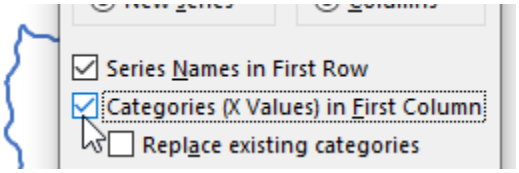
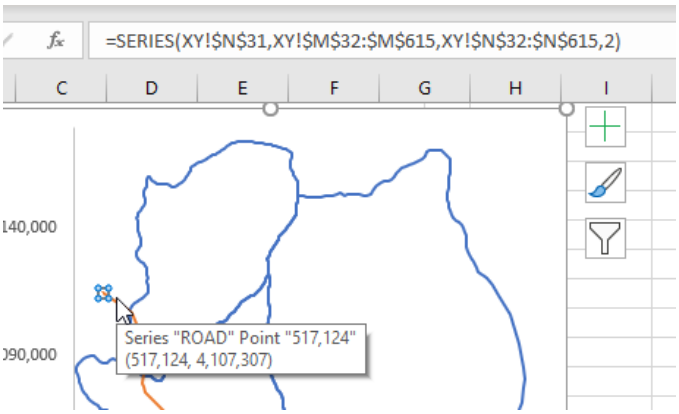
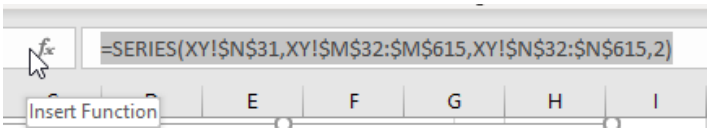
Departure and cumulative precipitation series are created in class. Chart is similar to previous example and creation is not repeated. Shading of the DEPARTURE series differs.	
Select “DEPARTURE” series. Right-click to activate dialog. Select “Format Data Series…” from dialog.	
Select “Series Options,” Leftmost symbol,  , Fill&Line Check “Invert if negative”.	

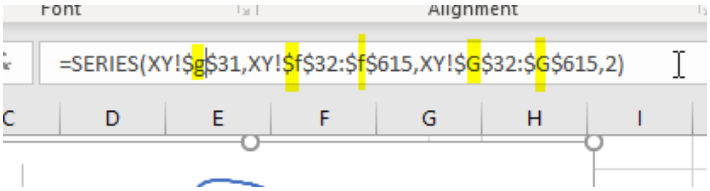
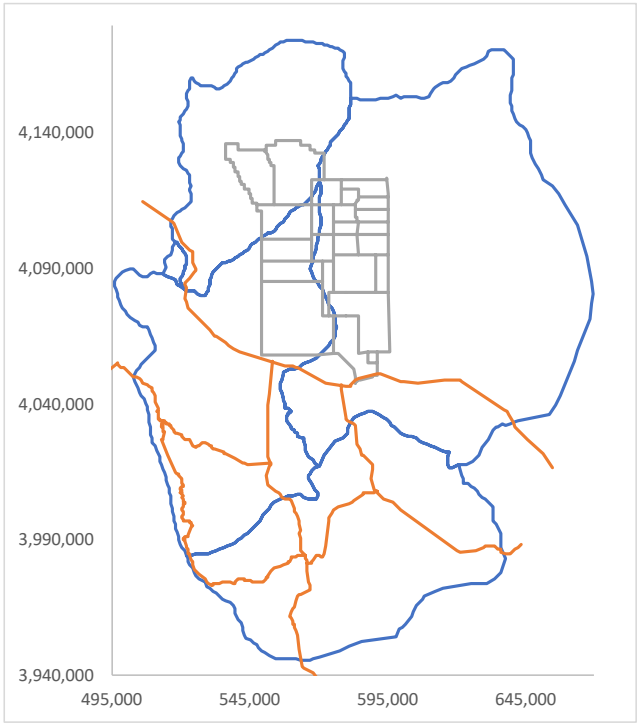
A second color fill dialog appears.	
Set the second color dialog to red.	
“DEPARTURE” series is now blue when positive and red when negative.	

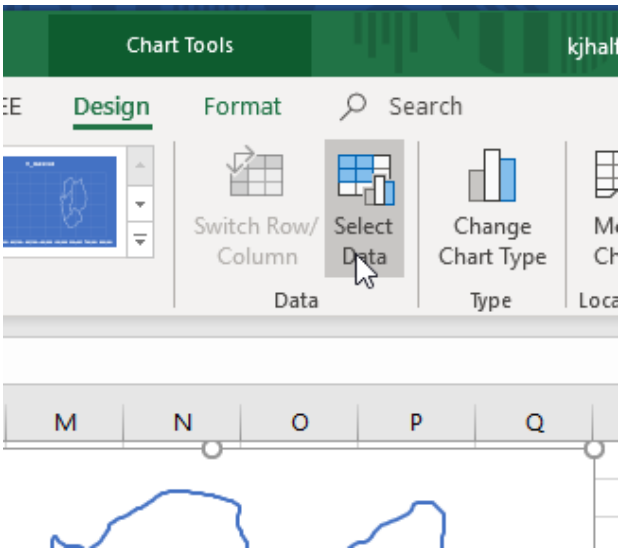
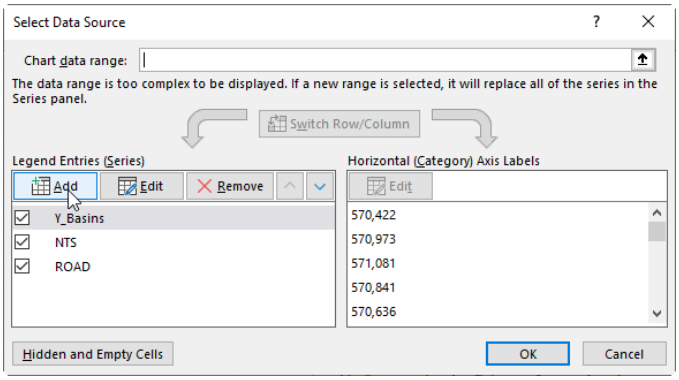
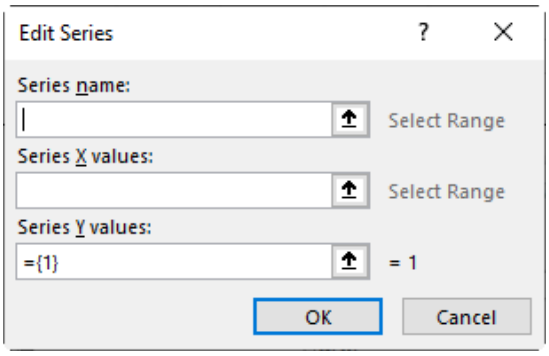
XY charts and adding series, Copy-paste & Direct entry– 03_XYmap.xlsx

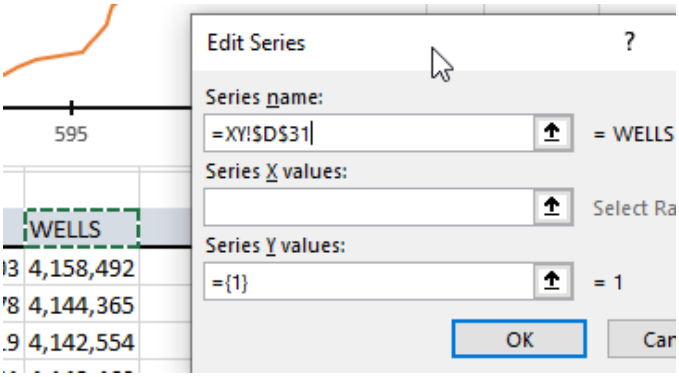
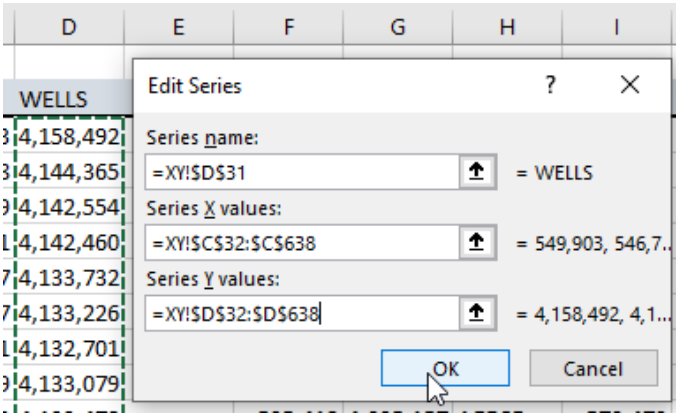
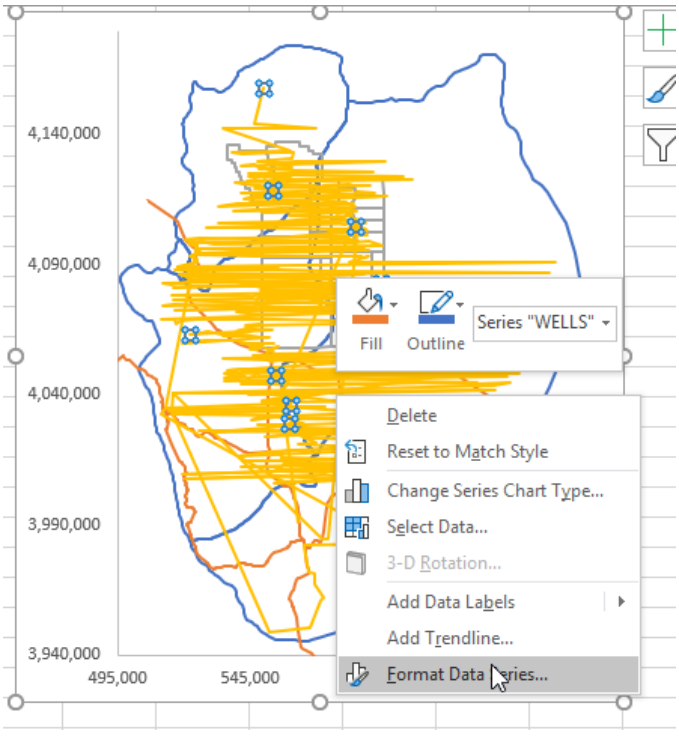
Build a map in an XY plot to illustrate adding series from disparate ranges to a complex XY chart.	
Highlight range I31:J1135. Include headers.	
Select Insert tab on ribbon for chart options.	

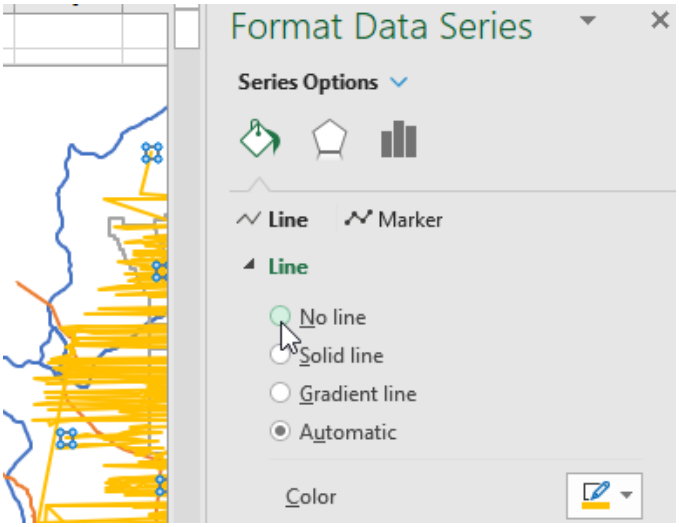
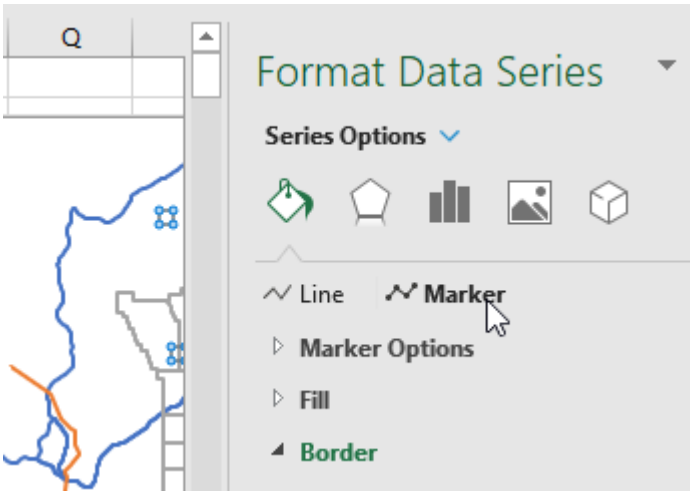
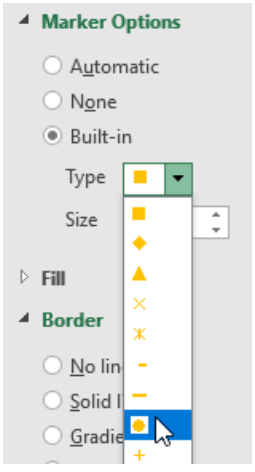
Select XY scatter with straight lines. Cut new chart and paste in cell A1.	
Set X-axis range. Minimum = 495,000. Maximum = 670,000.	
Set Y-axis range. Minimum = 3.94E6 Maximum = 4.18E6	

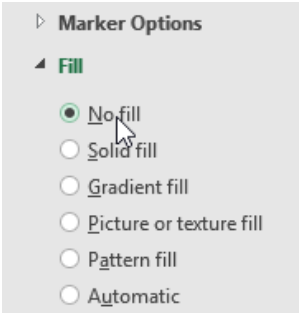
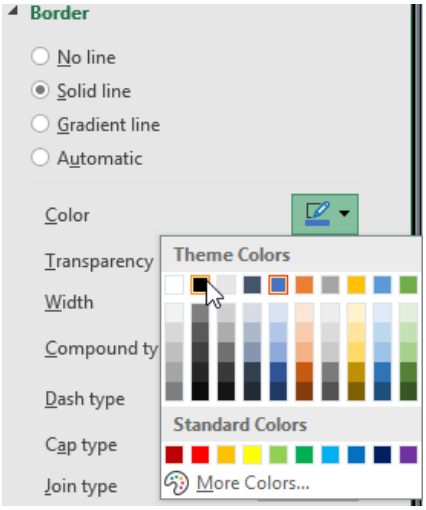
Highlight range M31:N615. Include headers. Copy range into memory, ctrl+C.	
Select chart and paste special.	
Check, “Categories (X Values) in First Column.” Click OK.	
Select the “ROAD” series.	
Select the formula for the “ROAD” series in the function bar. Copy text of formula into memory, ctrl+C.	

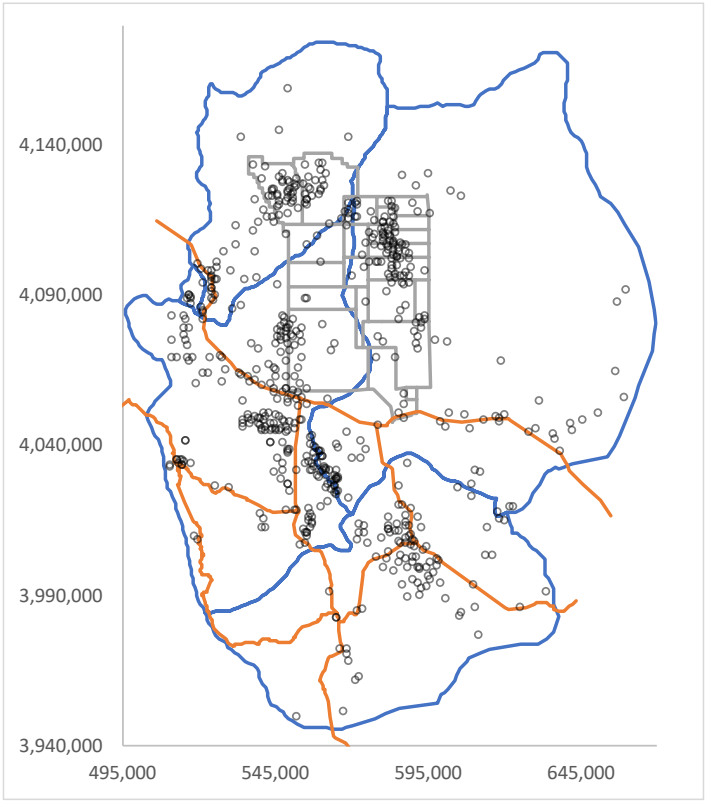
Exit function bar and select the chart.	
Select the function bar. Paste the formula for the “ROAD” series in the function bar, Ctrl+V. Type F2 function key for ease of editing. Change **N** to **G** and **M** to **F**. Type Enter/Return.	
The NTS series from columns **F** & **G** have been added.	

Select chart so that “Chart Tools” appear in ribbon. Select “Select Data” from “Design” tab under “Chart Tools” “Select Data Source” form will appear.	
Click “Add” button to create another series.	
The “Edit Series” form will appear.	

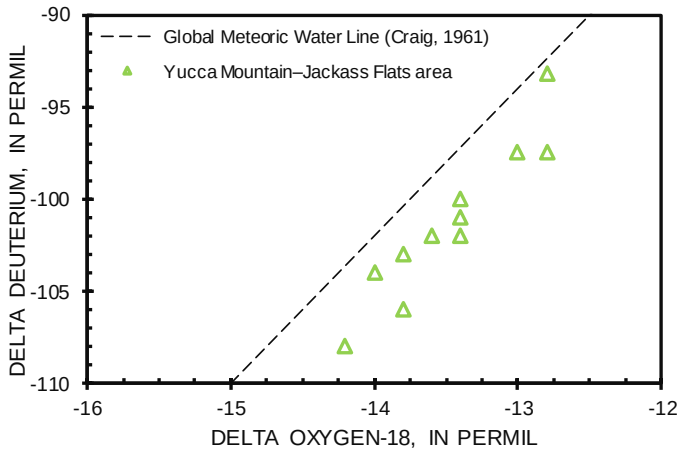
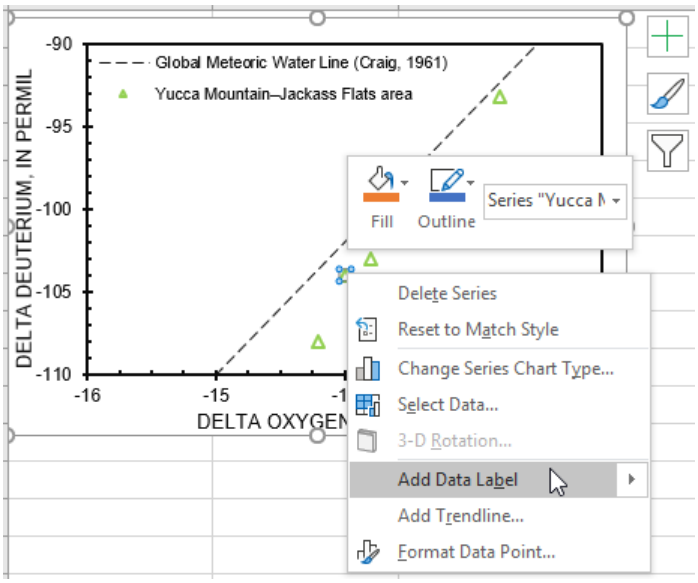
Select cell D31 for the series name.	
Select range C32:C638 for X values. Select range D32:D638 for Y values. Click “OK” to accept data for new series and “OK” on “Select Data Source” form until all forms are closed.	
The “WELLS” series has been added, but display remains incorrect. Select the “WELLS” series. Right-click to activate dialog. Select “Format Data Series…” from dialog.	

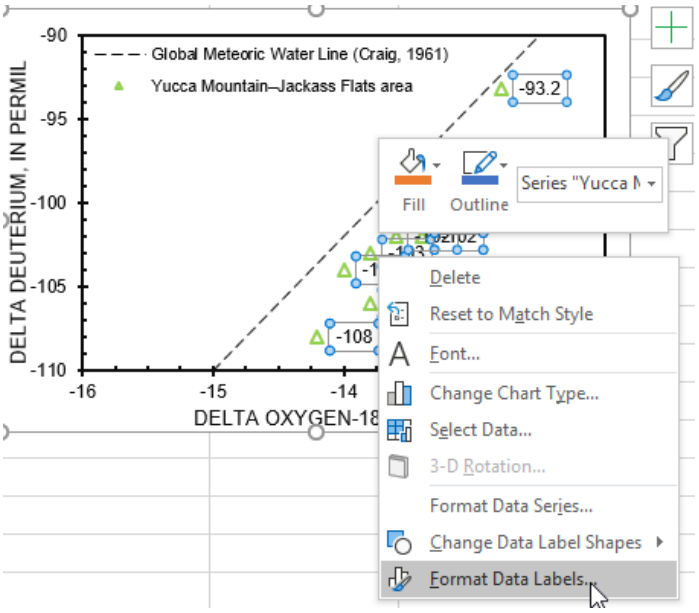
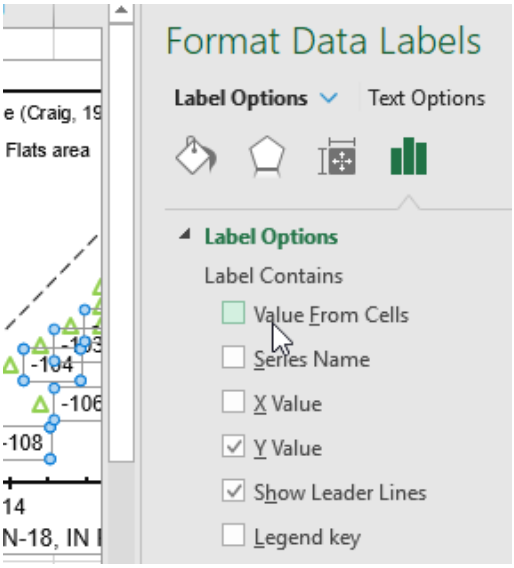
Select “Series Options,” Leftmost symbol,  , Fill&Line Select “No Line” option for formatting Line option,  , of series.	
Select Marker option,  .	
Expand Marker Options. Select a circle from the Built-in marker Type. Reduce the marker size to 4.	

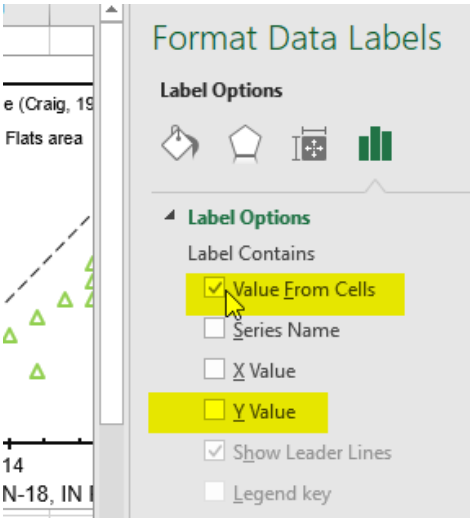
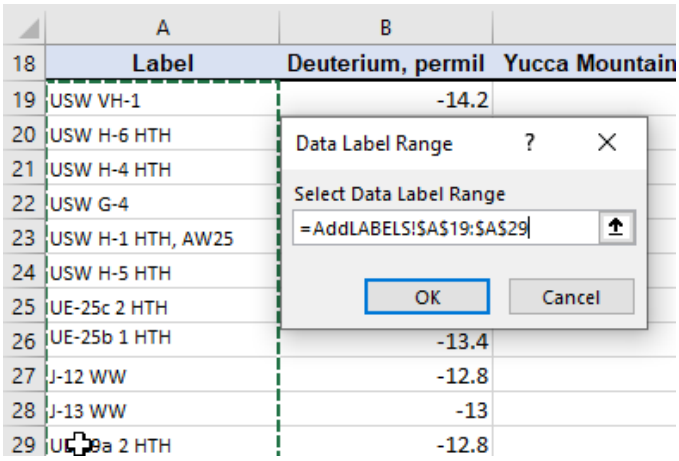
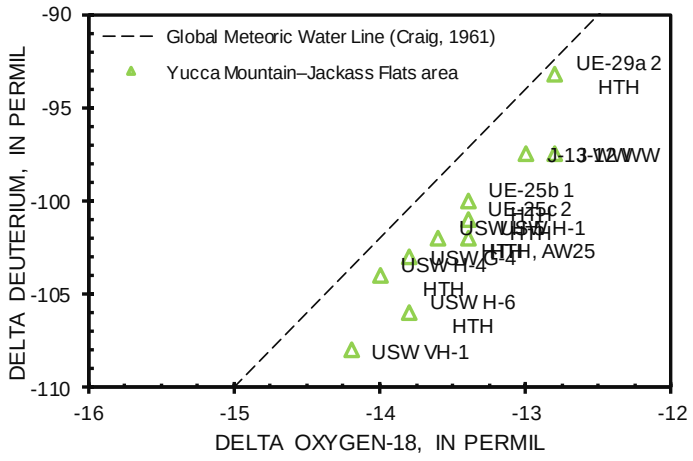
Expand Fill. Select “No Fill” option.	
Expand Border. Select “Solid line.” Pick a black color.	
Set transparency of line to 50%.	

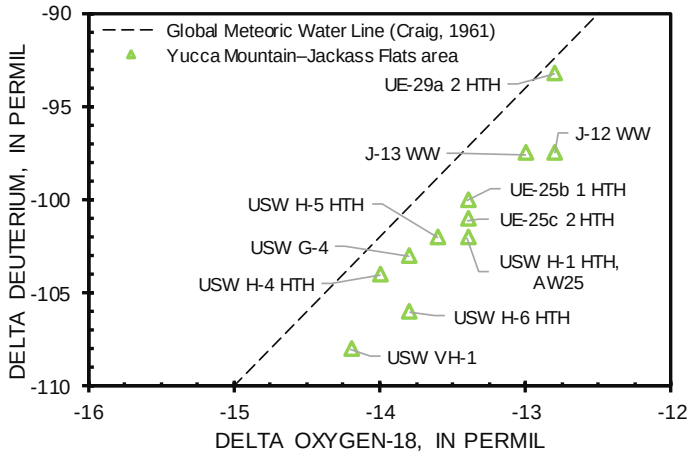
The map has been recreated in an XY chart and 4 methods of adding series were demonstrated.	

Specify labels from ranges – 04_FC_isotope_PAIRS.xlsx

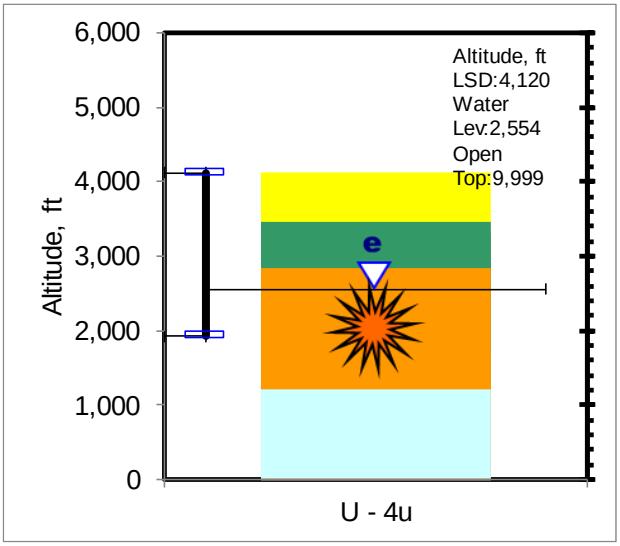
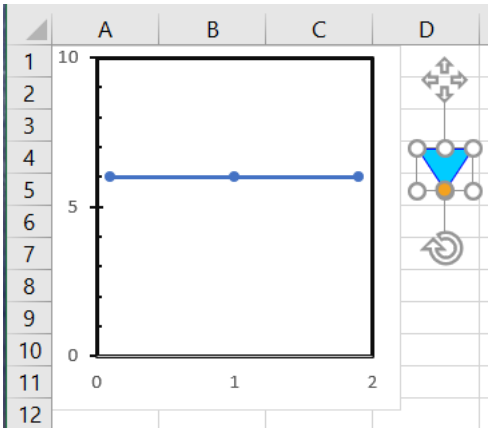
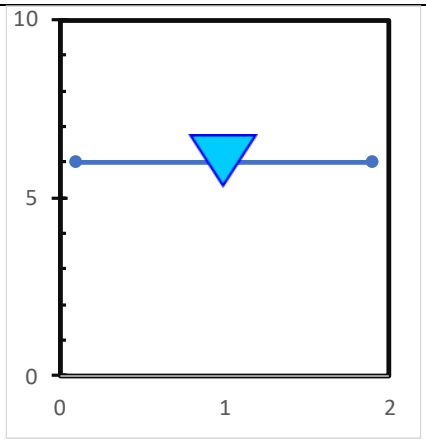
Stable isotopes are plotted, but sites are not identified.	
Select the “WELLS” series. Right-click to activate dialog. Select “Add Data Label” from dialog.	

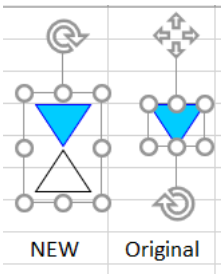
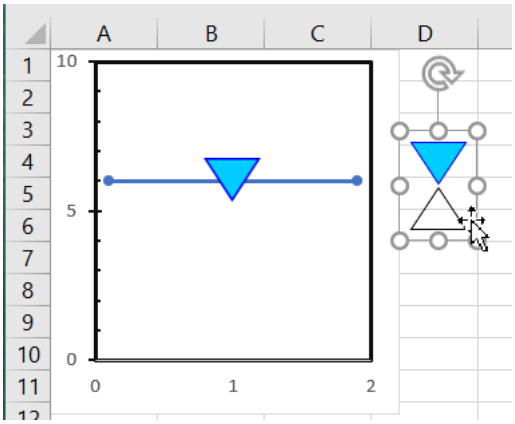
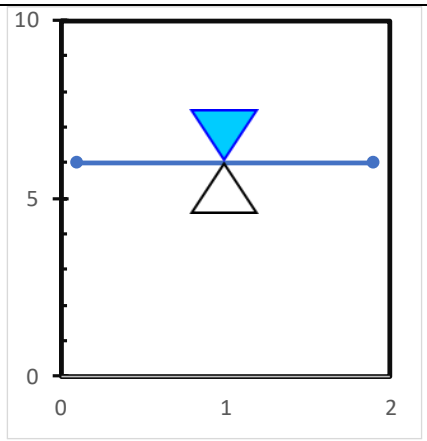
Select the new data labels. Right-click to activate dialog. Select “Format Data Labels…” from dialog.	
Select “Label Options,” Rightmost symbol,  Expand Label Options	

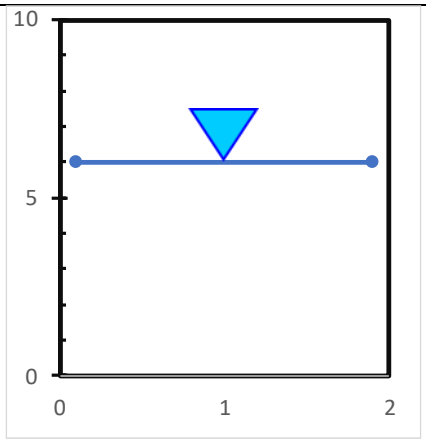
Uncheck Y Value. Check Value from Cells. “Data Label Range” form will appear.	
Select range A19:A29. Click OK.	
Names of wells appear in labels.	

Labels were moved manually for clarity.	

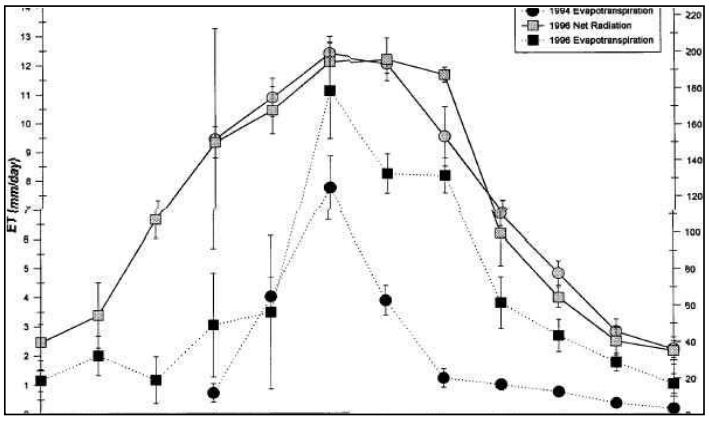
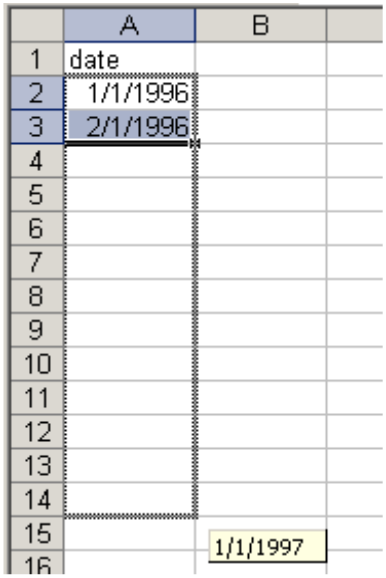
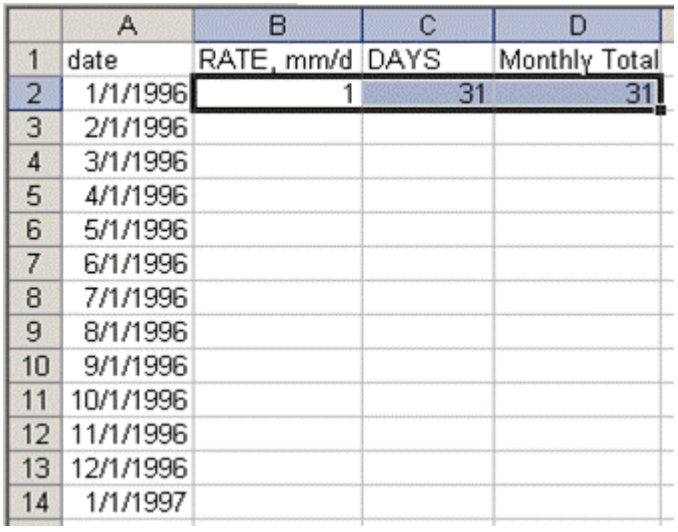
Adding custom symbols – 05_sir2012-5196_app3.xlsm

Custom markers can be created from pictures as shown in an example from Fenelon and others (2012). Nuclear detonations,  , and estimated water levels, ▽, were depicted with illustration shapes.	
Copy, ctrl+c, a symbol into memory. Select a data point in a series or the whole series. Paste, ctrl+v, to selection.	
Symbol is added, but result is wrong because triangle does not rest on line.	

The original triangle is duplicated, flipped, and displaced to the bottom of the original triangle. Fill was removed and border would be removed for an application. A new symbol is created by grouping original and duplicated triangles.	
Copy, ctrl+c, new symbol into memory. Select old data point in series. Paste, ctrl+v, to selection.	
Triangle appears to rest on line with revised symbol.	

Effect is complete after removing border from lower balancing triangle.	

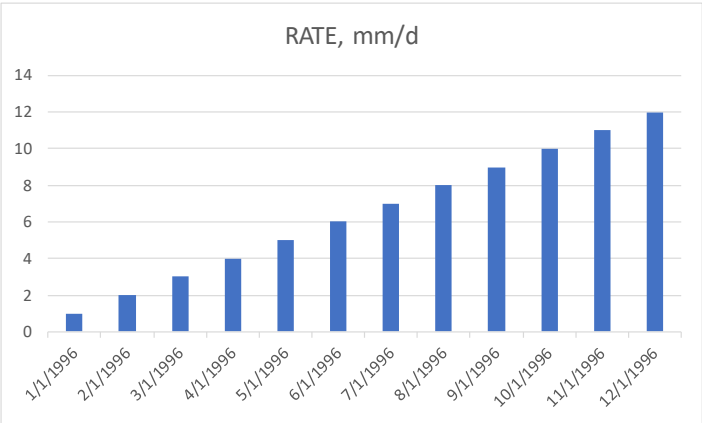
Digitize data with chart – 06_Digitize_from_Picture-in-a-Chart.xlsx

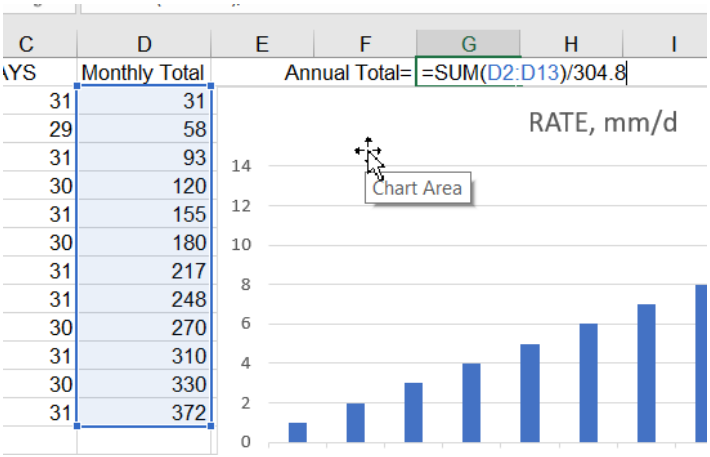
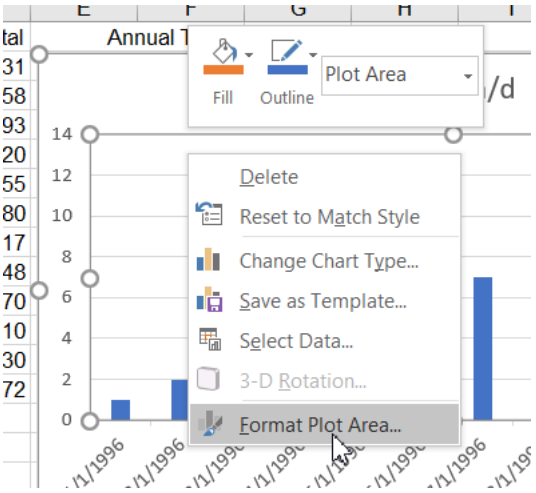
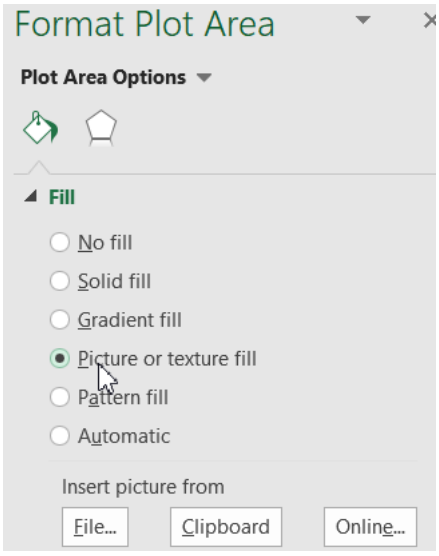
General problem: monthly ET rates from a published paper look "odd" and you want to check the annual ET in units that are comprehensible to you.	
Create a dummy table of dates and rates in the units of the published paper, mm/d. Type 1/1/96 into cell A2 and 2/1/96 into cell A3. Highlight cells A2:A3. Grab lower, right corner. Drag to fill through cell A14.	
Type 1 into cell B2. Calculate days/month in column C by typing "=A3-A2" in cell C2. Compute monthly total in column D by typing "=B2*C2" in cell D2. Highlight cells B2:D2. Double-click lower, right corner.	

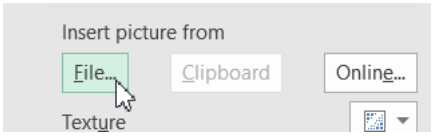
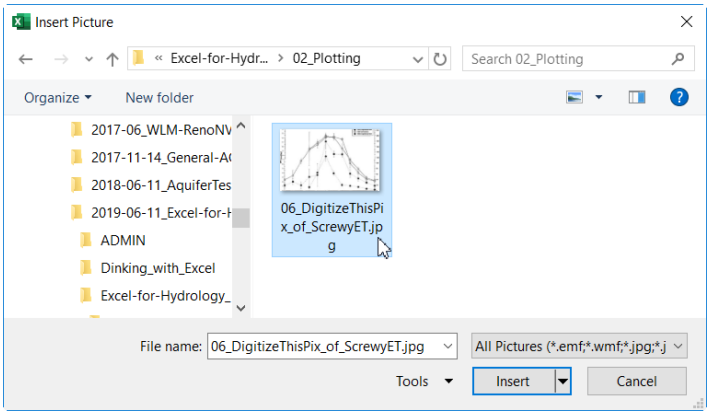
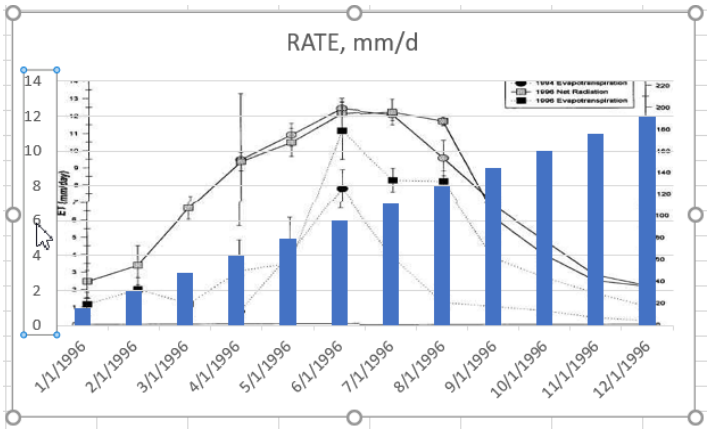
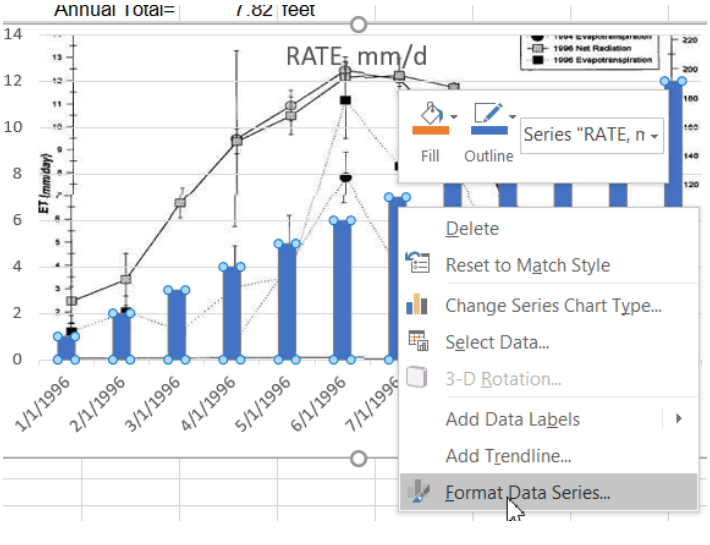
Delete cells B14:c14.	
Highlight cells A1:B13.	
Create a column chart.	

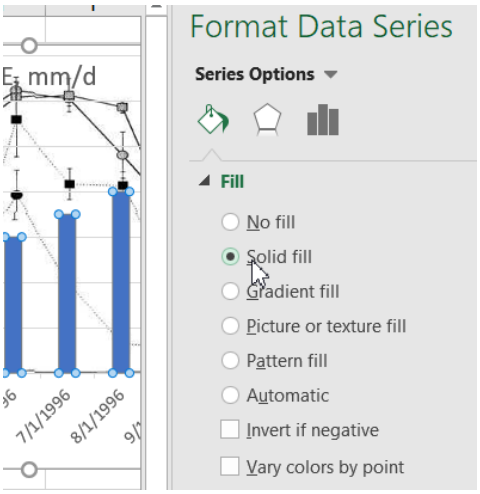
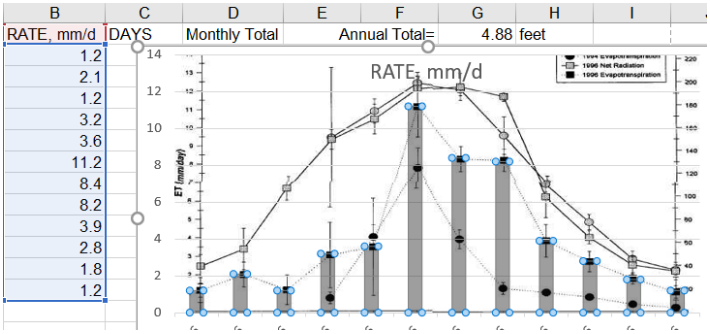
	A	B	C	D
1	date	RATE, mm/d	DAYS	Monthly Total
2	1/1/1996	1	31	31
3	2/1/1996	2	29	58
4	3/1/1996	3	31	93
5	4/1/1996	4	30	120
6	5/1/1996	5	31	155
7	6/1/1996	6	30	180
8	7/1/1996	7	31	217
9	8/1/1996	8	31	248
10	9/1/1996	9	30	270
11	10/1/1996	10	31	310
12	11/1/1996	11	30	330
13	12/1/1996	12	31	372
14	1/1/1997	13	-35431	-460603
15				

	A	B	C
1	date	RATE, mm/d	DAYS
2	1/1/1996	1	
3	2/1/1996	2	
4	3/1/1996	3	
5	4/1/1996	4	
6	5/1/1996	5	
7	6/1/1996	6	
8	7/1/1996	7	
9	8/1/1996	8	
10	9/1/1996	9	
11	10/1/1996	10	
12	11/1/1996	11	
13	12/1/1996	12	
14	1/1/1997		

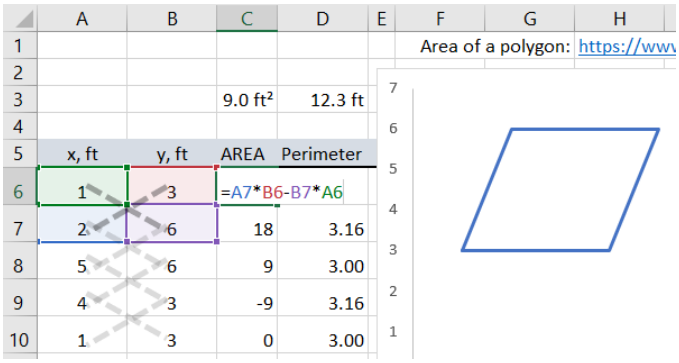
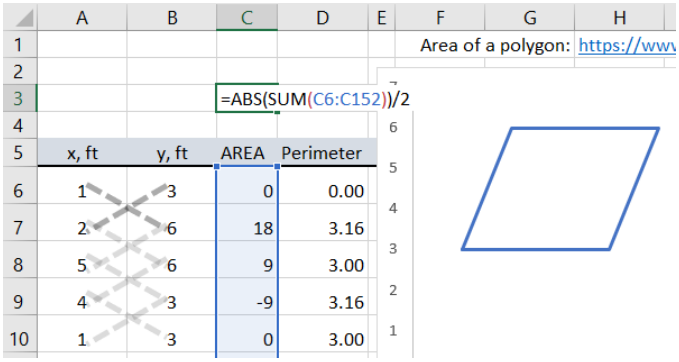
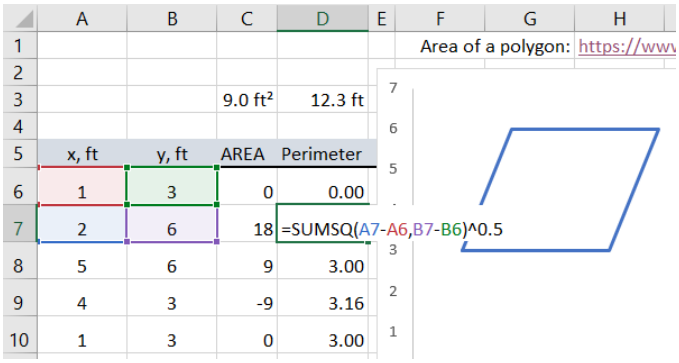
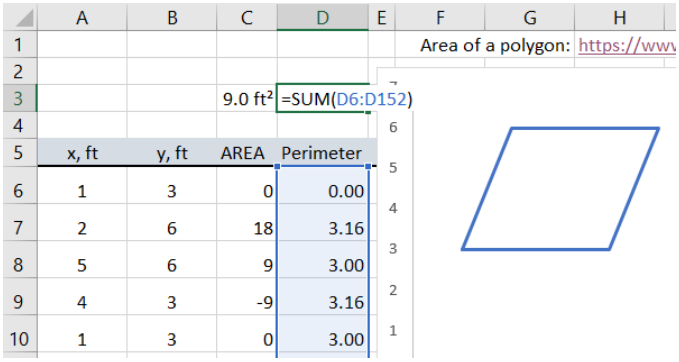


Find annual total in feet. Type "=SUM(D2:D13)/304.8" in cell G1. Type “feet” in cell H1.	
Select the plot area. Right-click to activate dialog. Select “Format Plot Area…” from dialog.	
Select “Label Options,” Leftmost symbol,  , Fill&Line Expand Fill Options and select “Picture or texture fill”.	

Click File under “Insert picture from”.	
The “Insert picture” form will appear. Navigate to the 02_Plotting directory. Select the picture 06_DigitizeThisPix_of_ScrewyET.jpg.	
Set Y-axis range. Minimum = 0 Maximum = 14	
Select “RATE, mm/d” series. Right-click to activate dialog. Select “Format Data Series…” from dialog.	

Select “Series Options,” Leftmost symbol,  , Fill&Line Expand Fill and select “Solid Fill” option.	
Set fill color to black and transparency to 60%.	
Adjust values in column B so that bars intersect  symbols in underlying picture being digitized. Annual ET of 4.9 ft is estimated and is repeatable.	

Compute area and perimeter of polygon – 07_XY_Perimeter+Area.xlsx

Area of polygon computed with easy to remember equation. Calculate Xn*Yn+1 - Yn*Yn+1 for each row. EXAMPLE	
Area of polygon is half of absolute value of sum of results from Xn*Yn+1 - Yn*Yn+1 for each row. “=ABS(SUM(range))/2” is equation.	
Perimeter is sum of segment lengths between each pair of XY points. Length between rows, ΔL = (ΔX²+ ΔY²)^½. Equation for first row, “=SUMSQ(A7-A6,B7-B6)^0.5”	
Perimeter of polygon is sum of results from each row, “=SUM(range)” is equation.	

Applied example is area and perimeter of former Nevada Test Site (NTS).

Area = 873,751 acres
Perimeter = 185 miles