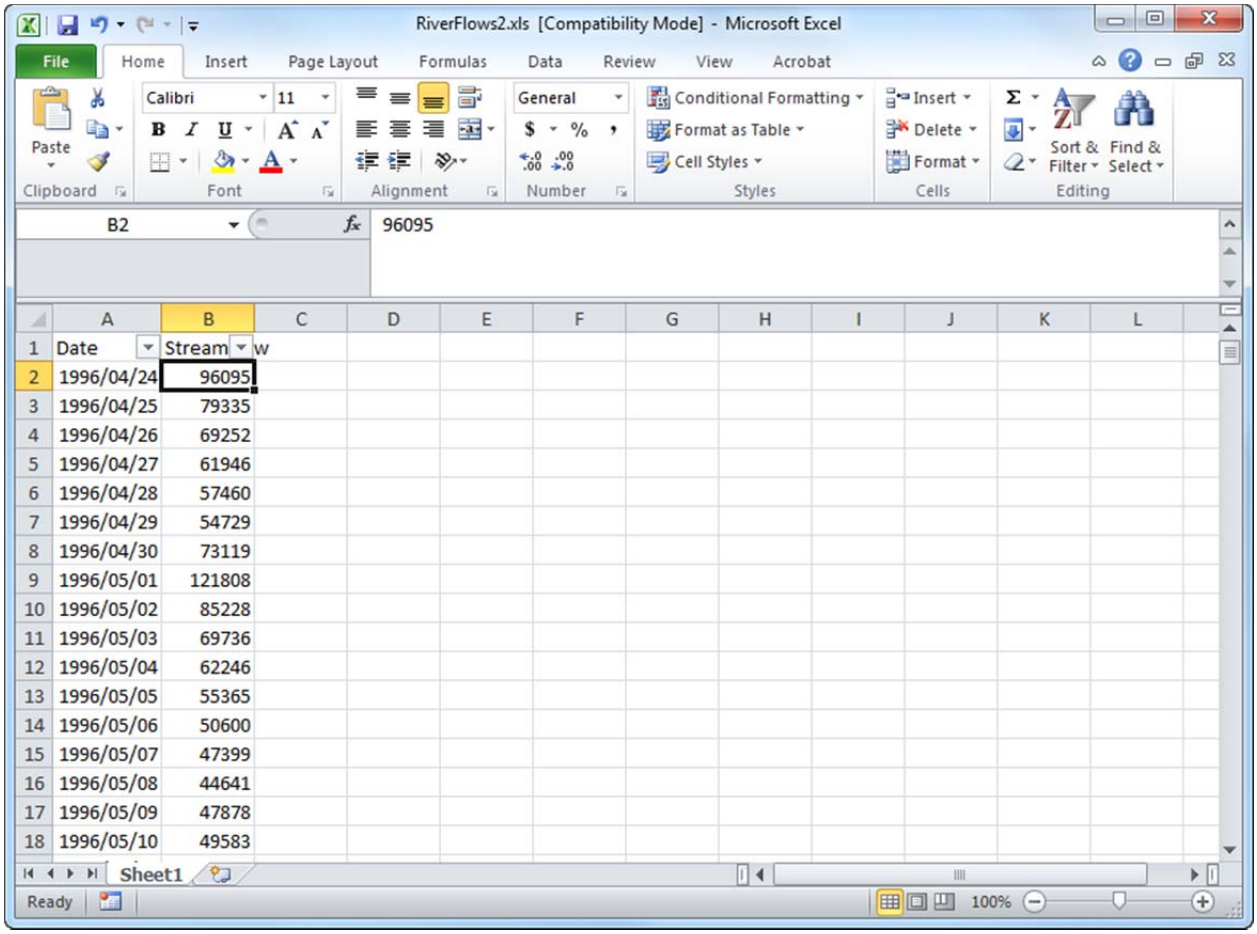
Groundwater Toolbox Tutorial

Using Scripting in the Groundwater Toolbox to import data from an Excel file

April 30, 2015

This document describes steps that can be taken to use the Scripting functionality of the Groundwater (GW) Toolbox to import data stored in an Excel file, such as data collected at a streamgage that is not part of the USGS National Water Information System (NWIS). There are two primary steps for using this functionality: preparing data in the Excel file for use in the GW Toolbox and then importing the data using the Scripting functionality.

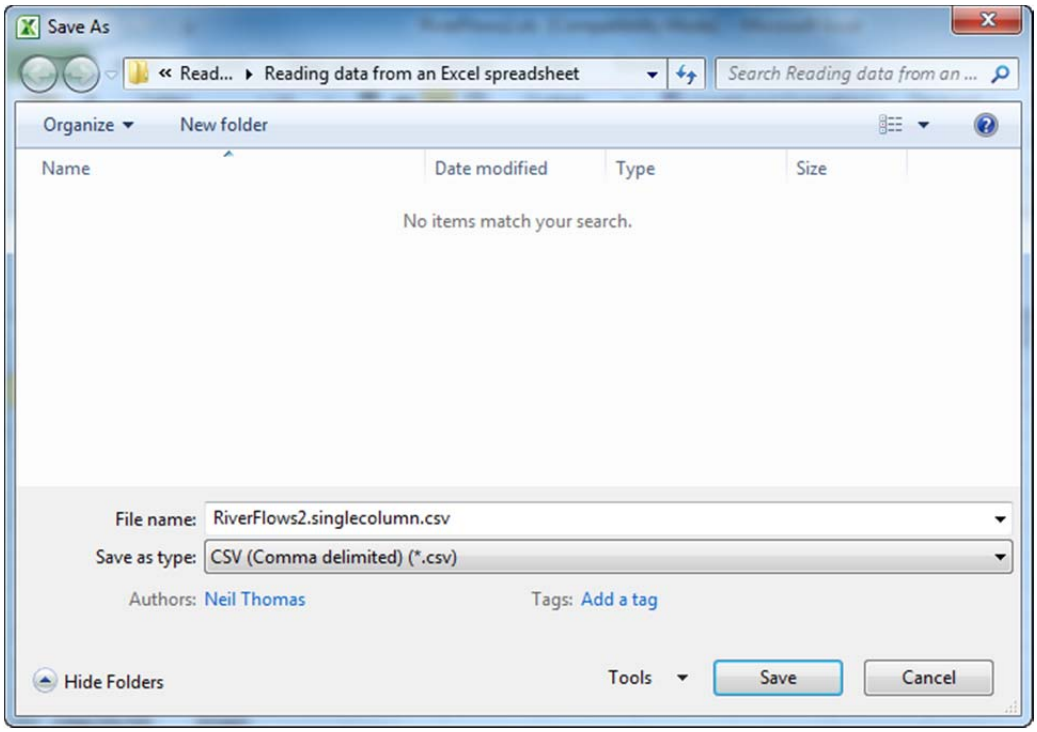
If the Excel data consist of a column of date entries and a column of streamflow entries, as shown below, there are two approaches for importing the data into the Groundwater (GW) Toolbox. These two approaches are possible because data can be imported into the GW Toolbox in either a single-column date format, as shown below, or a three-column format of Month, Day, and Year.



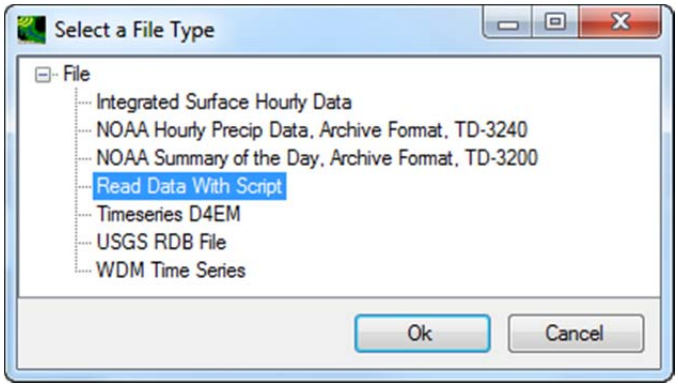
The first approach, which can be the simpler of the two approaches and therefore described first, is to directly read in the 2-column format into the GW Toolbox. The second approach, which is described beginning on page 11, is to first convert the 2-column format into a 4-column format, in which the single date column is converted to a 3-column date format (Month, Day, Year).

Approach A: Reading single-column date formatted data into the GW Toolbox:

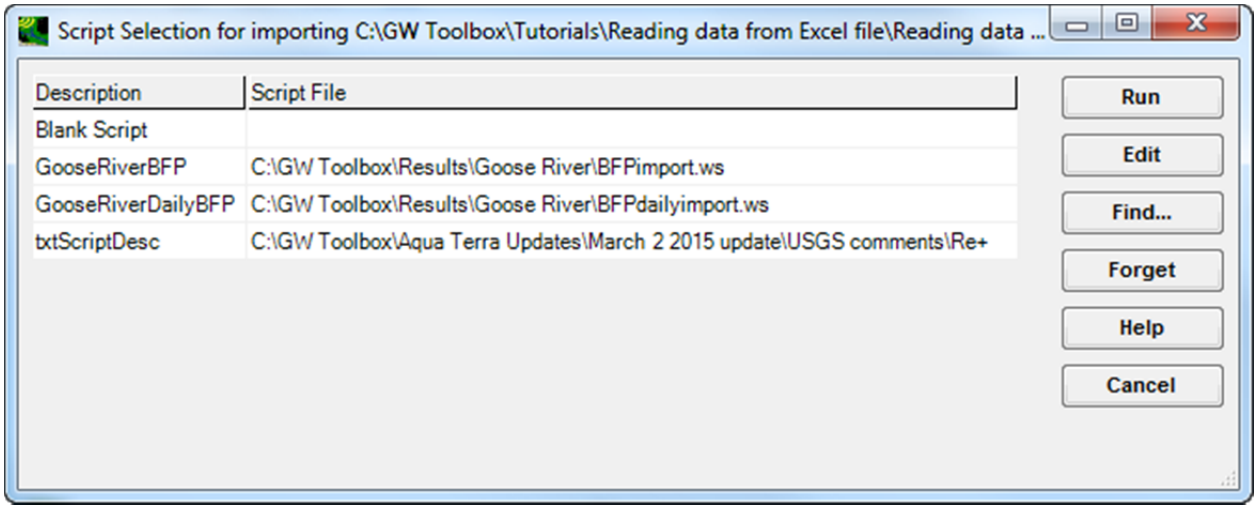
1. **Working with Excel data**: If data are in the '.xls' format, they must first be saved to a comma delimited ('.csv') file format. Using the Excel file shown on page 1, this is done simply in Excel as:



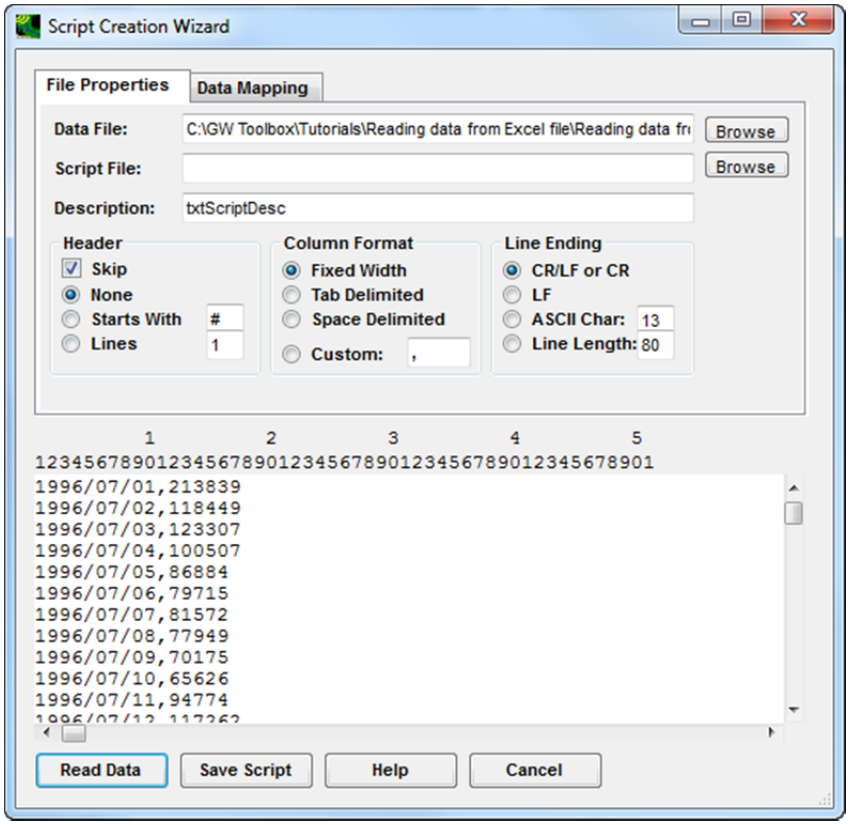
2. **Importing the data into the Groundwater Toolbox**: Next, open the Groundwater Toolbox. It is not necessary to have a project area defined in the GW Toolbox in order to import data, so close the 'Welcome to USGS GW Toolbox' dialog box and go directly to "**File>Open Data"** menu option, which gives the following dialog box:



Select the "**Read Data With Script"** option, as shown above. Navigate to the '.csv' file of interest and '**Open**' it. The 'Script Selection for importing …data' dialog box will appear. At this point, the user can select a previously saved script, or simply select '**Edit**' to read data without a script:

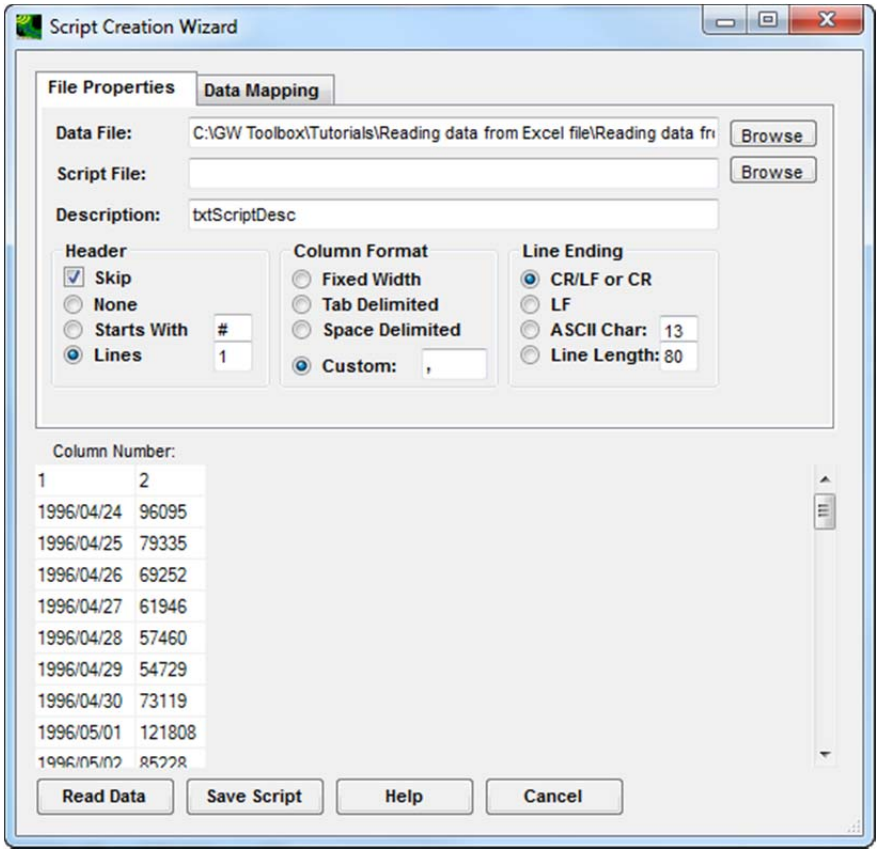


In this example, we select '**Edit**,' which brings the user to the 'Script Creation Wizard' dialog box:

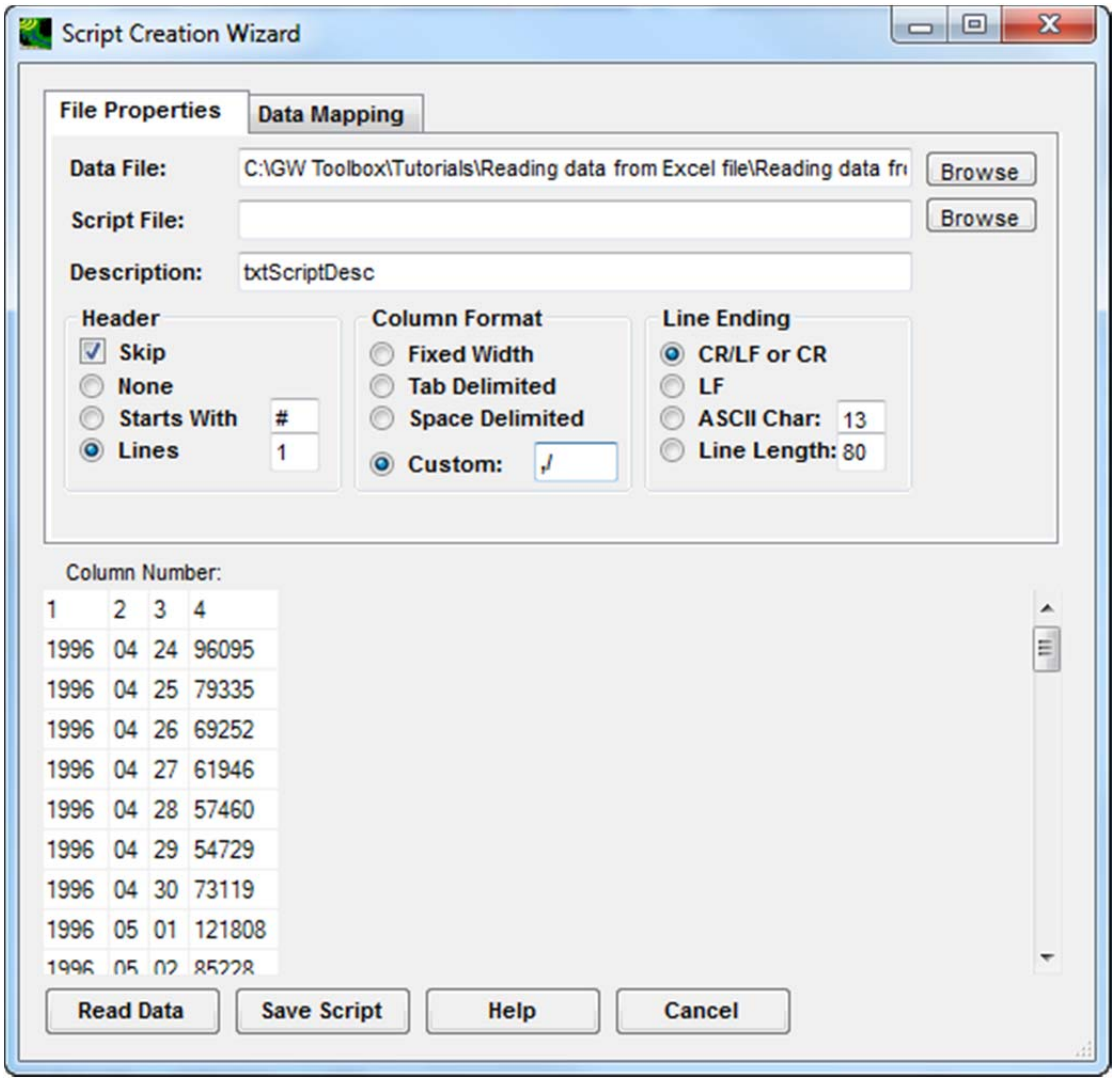


Under '**Header**' select the '**Lines**' radio button (and enter '1' in the white box if it doesn't already show). Under '**Column Format**' select the '**Custom**' radio button and ',' delimiter.

The following dialogue box results:

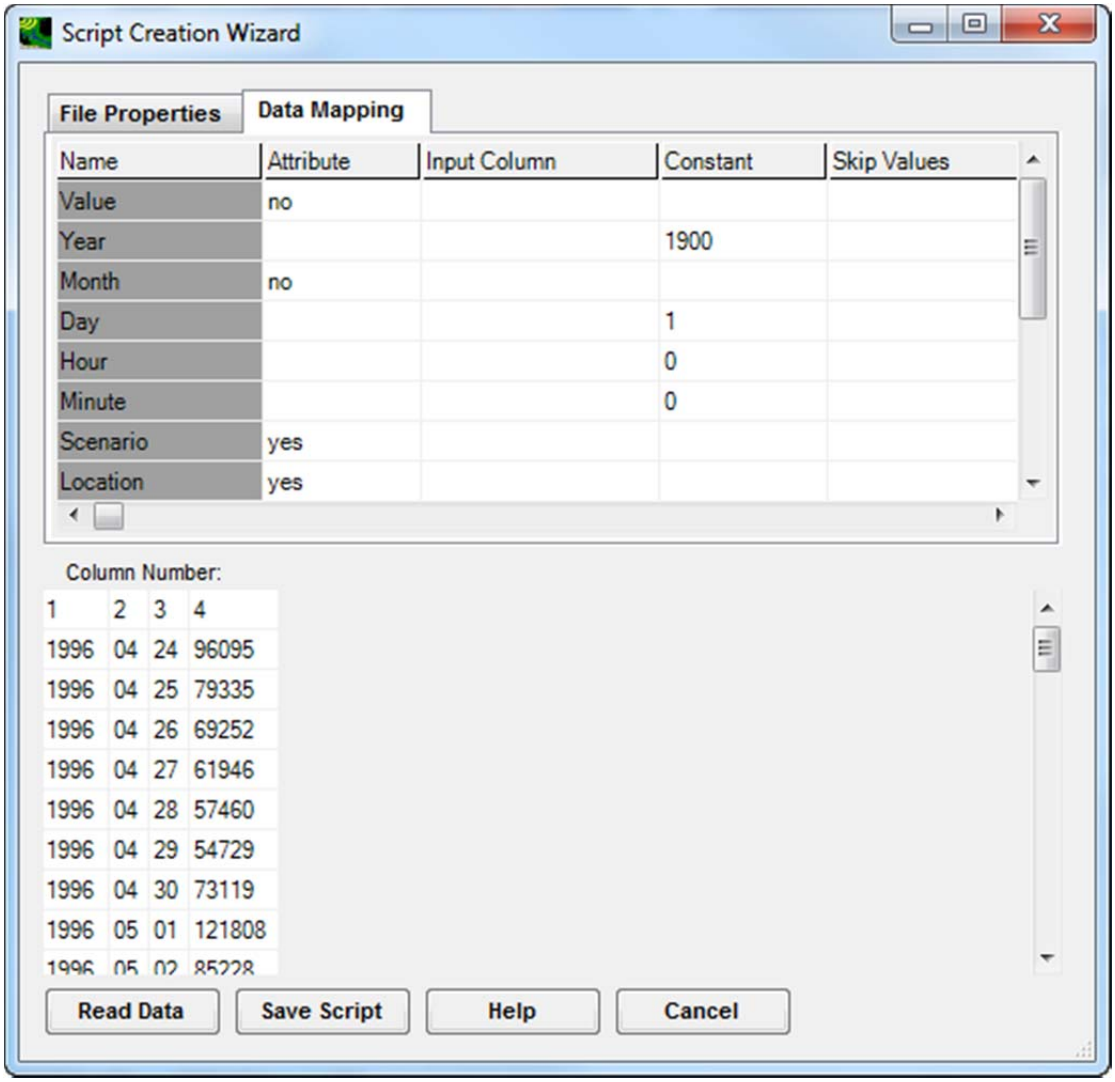


Now, by adding '/' to the the '**Custom**' radio button, in addition to the ',' delimiter, the GW Toolbox will create a 3-column format as shown below:

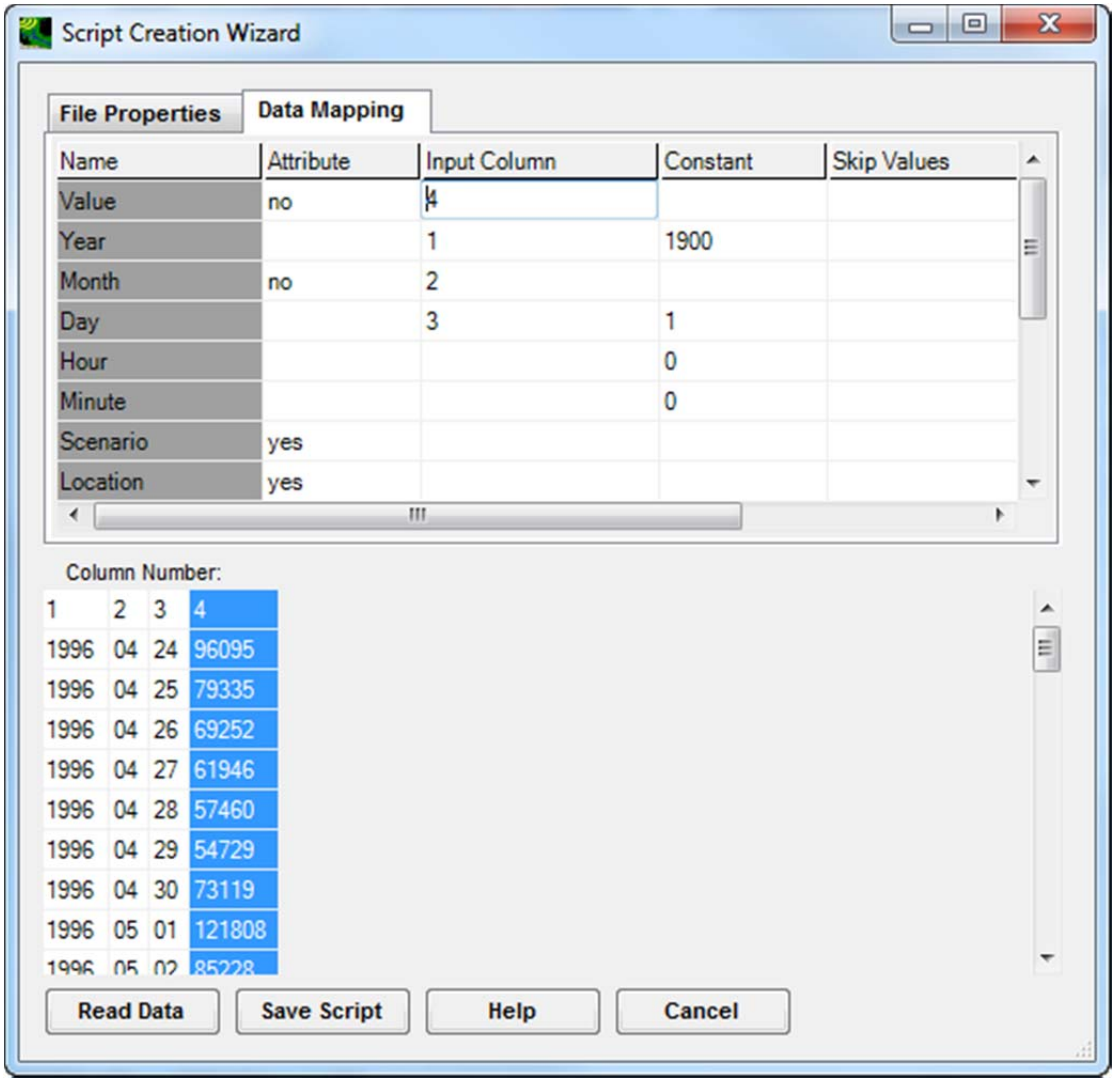


Now, select the "**Data Mapping"** option in the above dialogue box.

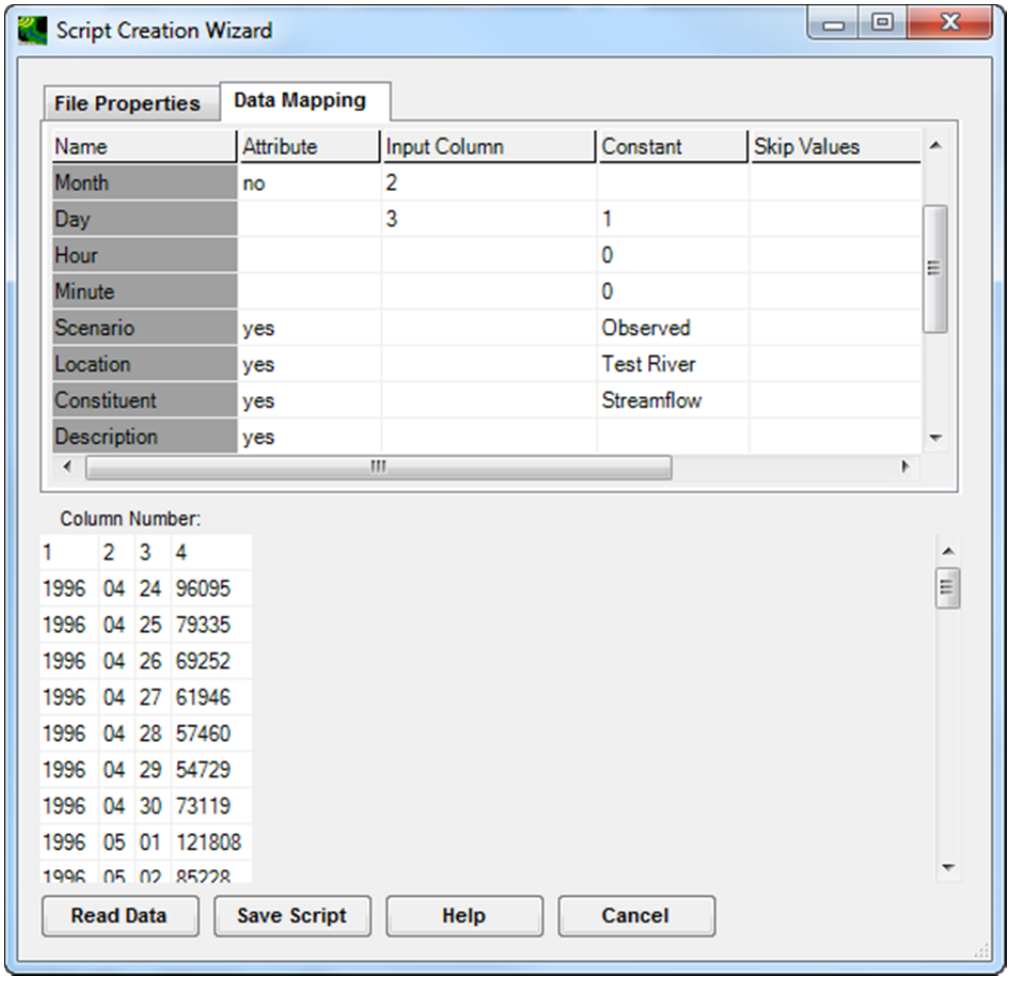
Below is the initial dialogue box that results:



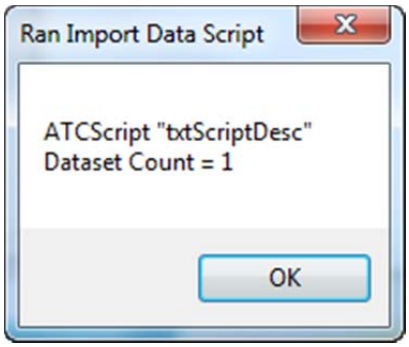
The first step is to associate each column of data with an ‘Input Column:’



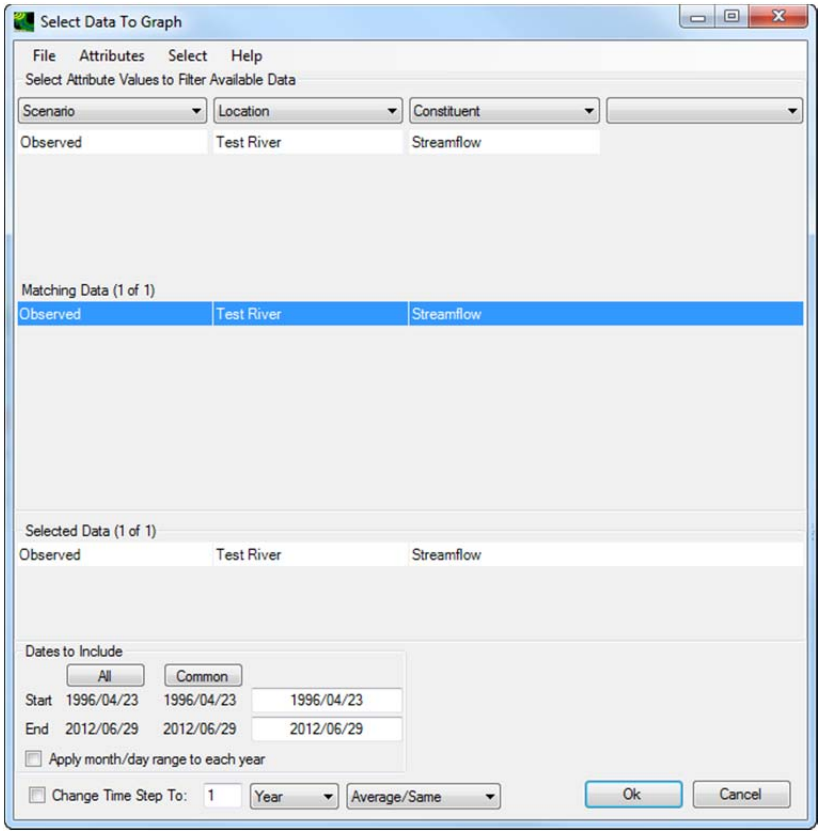
The user also might want to assign descriptive attributes to the data using the 'Scenario,' 'Location,' and other options under the '**Name**' column. This is done by specifying the attribute values in the '**Constant**' column, such as the following:

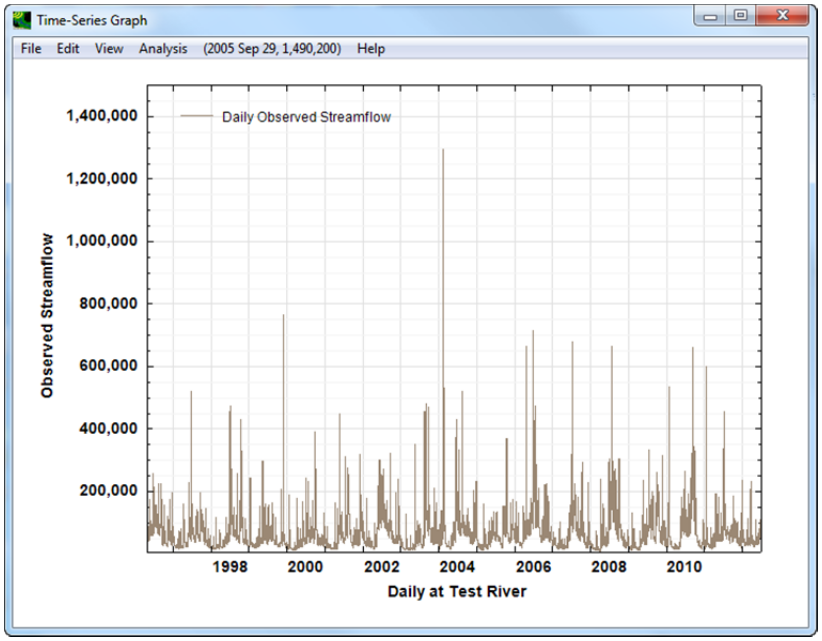


The user can now either read the data into the Toolbox ('Read Data') or save these scripting instructions to a script for later use. First, we'll save the script for later use using the "**Save Scrip"**' option. This command results in the creation of a '.ws' file that can be used to read similar .csv files in the future. Now, the user can read the data ("**Read Data**"), which leads to the following message:



The user can now close ‘Ran Import Data Script’ dialog box, and then use the data for analyses, such as graphing:

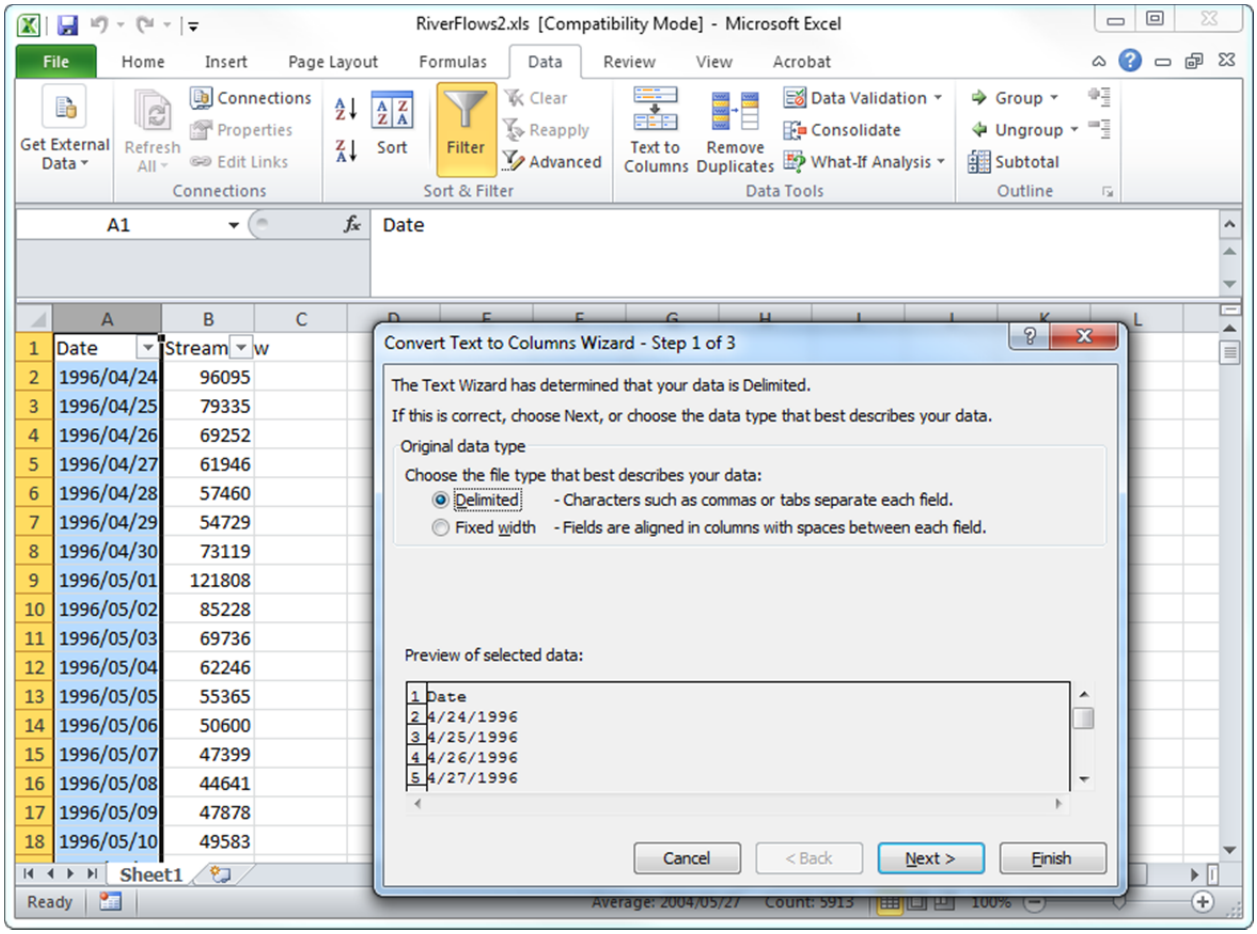




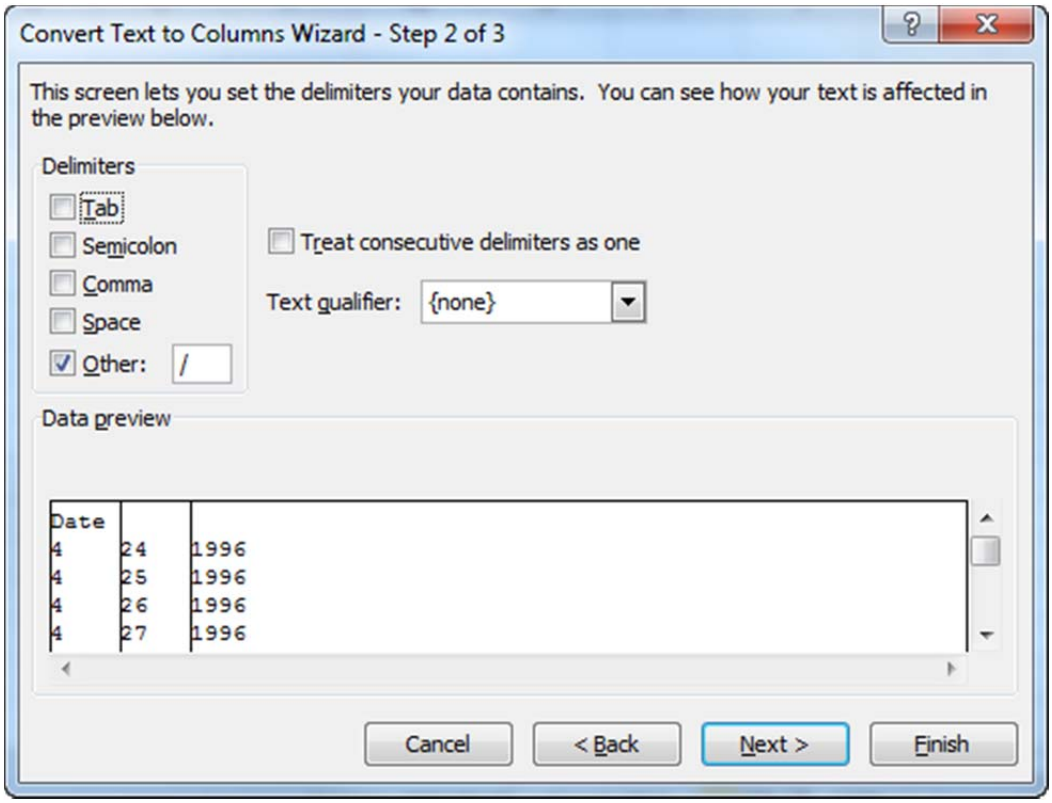
Note, however, that if the Base-Flow Separation methods are selected for analysis, the drainage area (in square miles) must be entered manually into the dialog box.

Approach B: Converting single-column date formatted data into 3-column date format before reading data into the GW Toolbox:

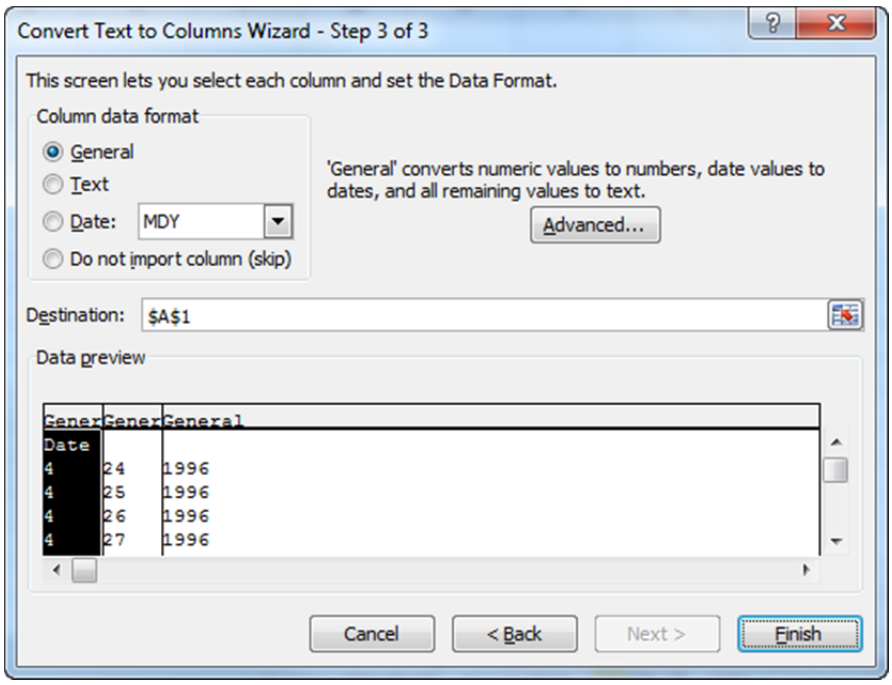
1. **Working with Excel data**: The first step is to convert the single-column format to a three-column format by first selecting the Date column and the command '**Text to Columns**' under the '**Data**' tab, which results in the following 'Convert Text to Columns Wizard – Step 1 of 3' dialog box:



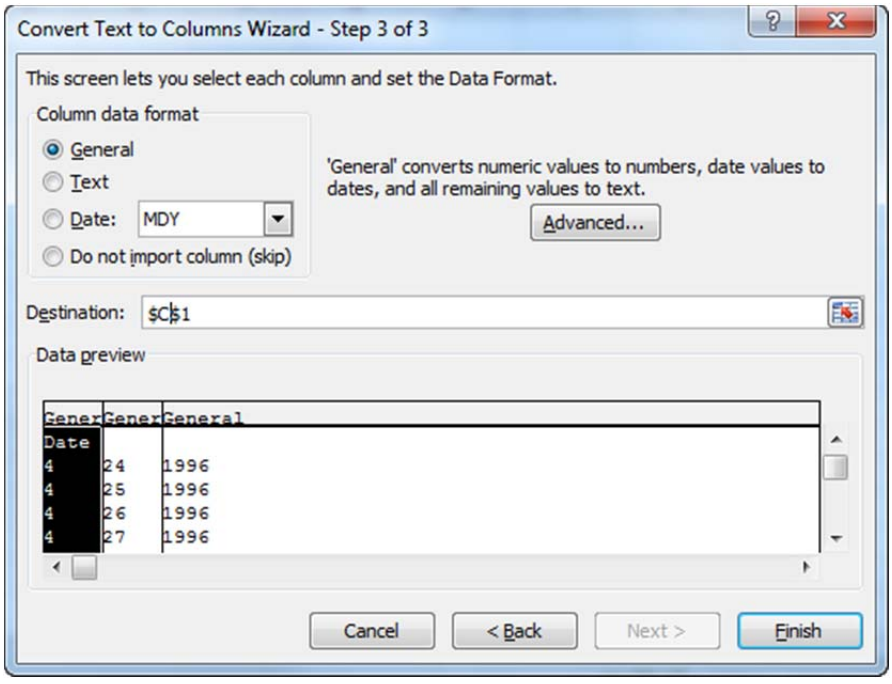
First, select ‘Delimited’, and then ‘Next,’ which results in the ‘Step 2 of 3’ dialog box below. Select ‘Other:’, add ‘/’ to the white box after ‘Other:’, and ‘Text qualifier: {none}’ as follows:



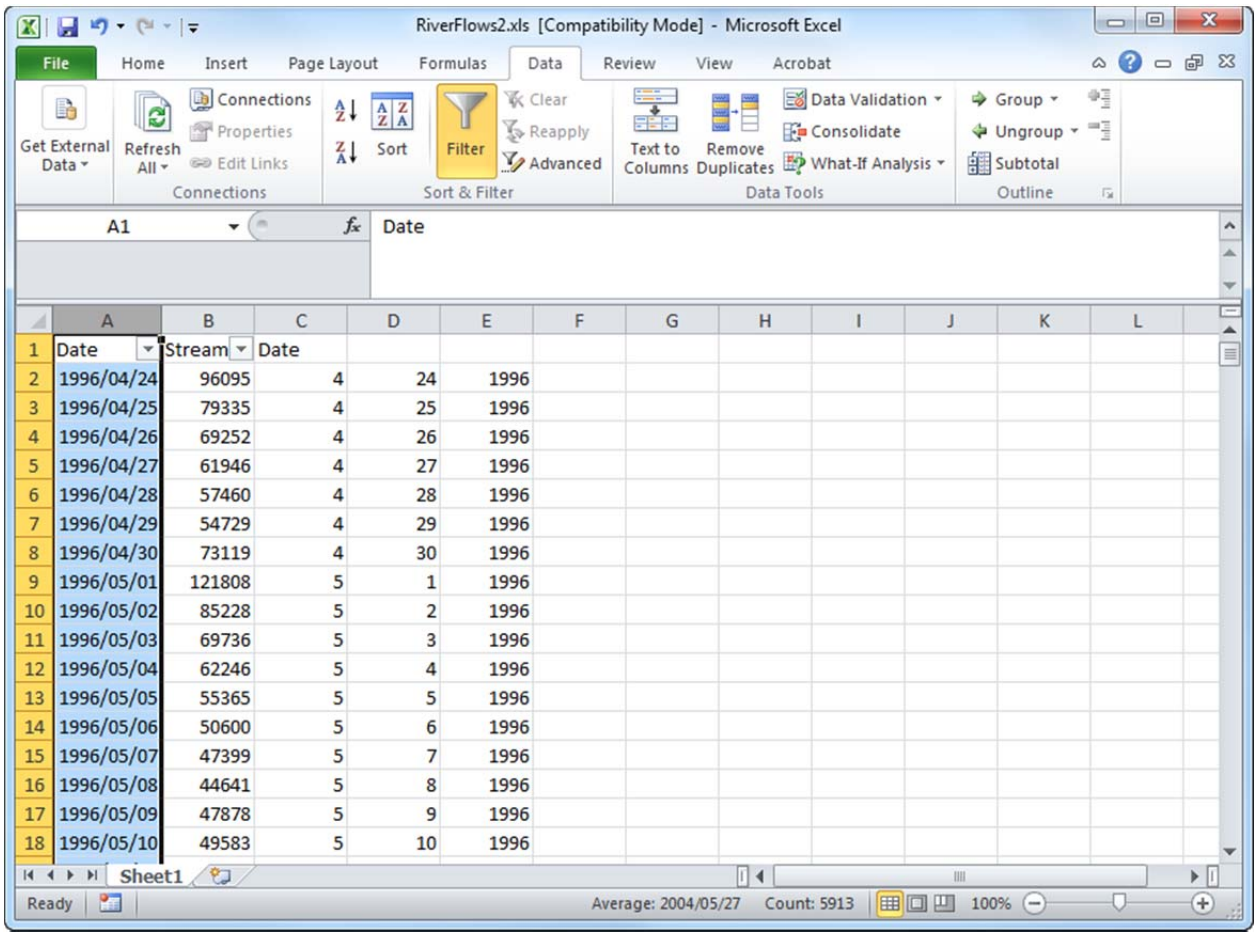
Now select ‘Next’ which results in the final step (next page).



In the dialogue box above, select 'General' for each column, then use the 'Destination' function to select three columns into which the new (separated) data will be placed. In this case, columns C, D, and E, are chosen as the destination columns simply by specifying a starting column C1 in the 'Destination' option:

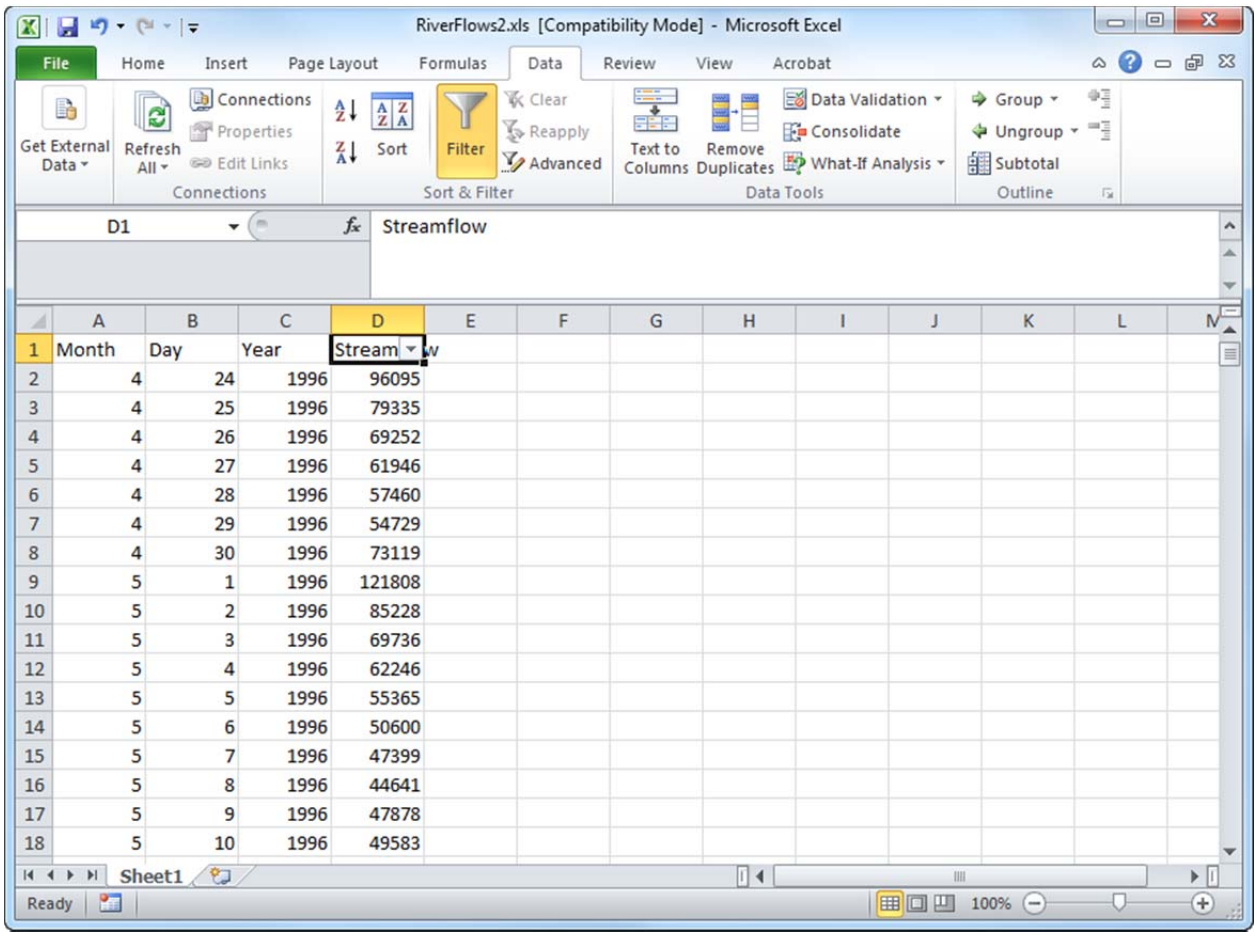


By specifying column C as the destination for the first date column (month), the following modified spreadsheet results (after hitting 'Finish' in the screen above):



	A	B	C	D	E
1	Date	Stream	Date		
2	1996/04/24	96095	4	24	1996
3	1996/04/25	79335	4	25	1996
4	1996/04/26	69252	4	26	1996
5	1996/04/27	61946	4	27	1996
6	1996/04/28	57460	4	28	1996
7	1996/04/29	54729	4	29	1996
8	1996/04/30	73119	4	30	1996
9	1996/05/01	121808	5	1	1996
10	1996/05/02	85228	5	2	1996
11	1996/05/03	69736	5	3	1996
12	1996/05/04	62246	5	4	1996
13	1996/05/05	55365	5	5	1996
14	1996/05/06	50600	5	6	1996
15	1996/05/07	47399	5	7	1996
16	1996/05/08	44641	5	8	1996
17	1996/05/09	47878	5	9	1996
18	1996/05/10	49583	5	10	1996

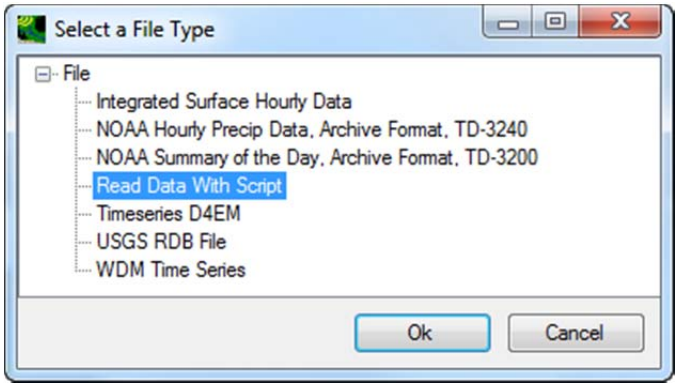
The user can then delete column A, which contains the original date format, and use ‘Delete,’ ‘Cut,’ and ‘Paste,’ commands to modify the spreadsheet to the following format:



	A	B	C	D
1	Month	Day	Year	Stream
2	4	24	1996	96095
3	4	25	1996	79335
4	4	26	1996	69252
5	4	27	1996	61946
6	4	28	1996	57460
7	4	29	1996	54729
8	4	30	1996	73119
9	5	1	1996	121808
10	5	2	1996	85228
11	5	3	1996	69736
12	5	4	1996	62246
13	5	5	1996	55365
14	5	6	1996	50600
15	5	7	1996	47399
16	5	8	1996	44641
17	5	9	1996	47878
18	5	10	1996	49583

The user then saves the file in ‘.csv’ format (in this case, saved as file ‘RiverFlows2.fourcolumn.csv’). Close all Excel files.

2. **Importing the data into the Groundwater Toolbox**: Next, open the Groundwater Toolbox. It is not necessary to have a project area defined in the GW Toolbox in order to import data, so close the 'Welcome to USGS GW Toolbox' dialog box and go directly to "**File>Open Data"** menu option, which gives the following dialog box:



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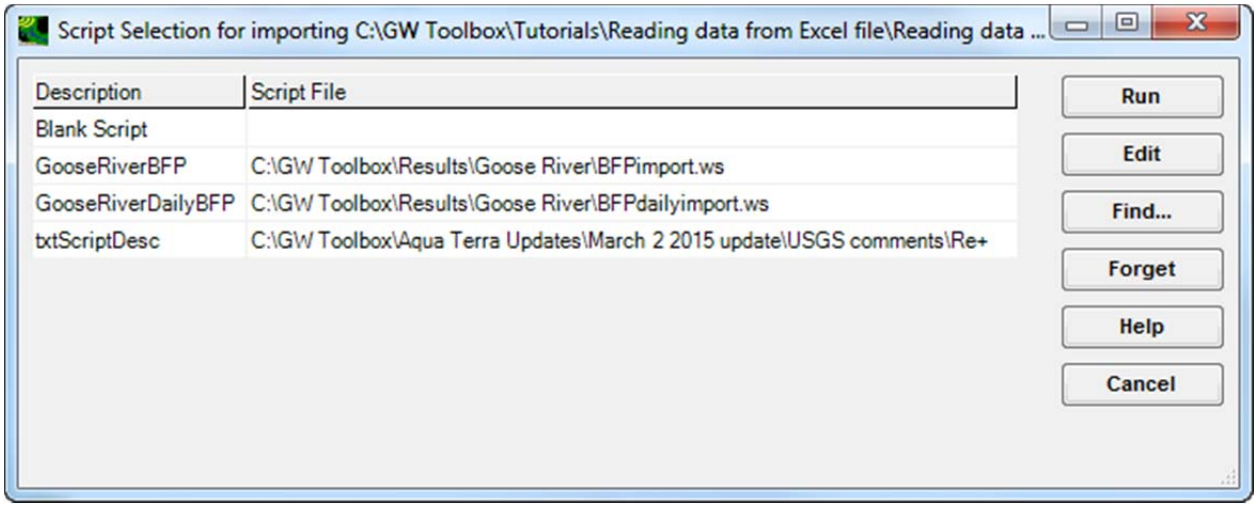
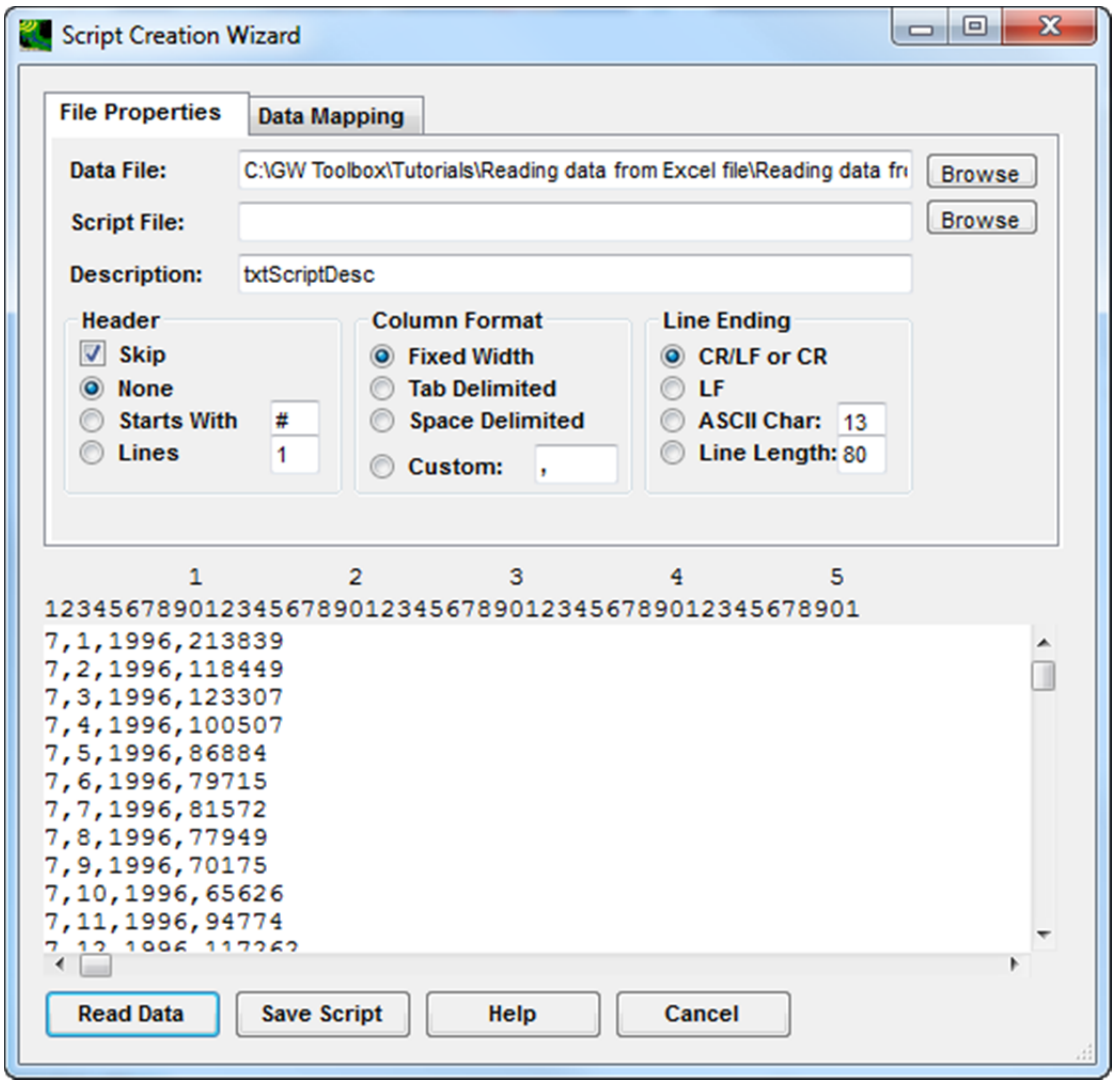
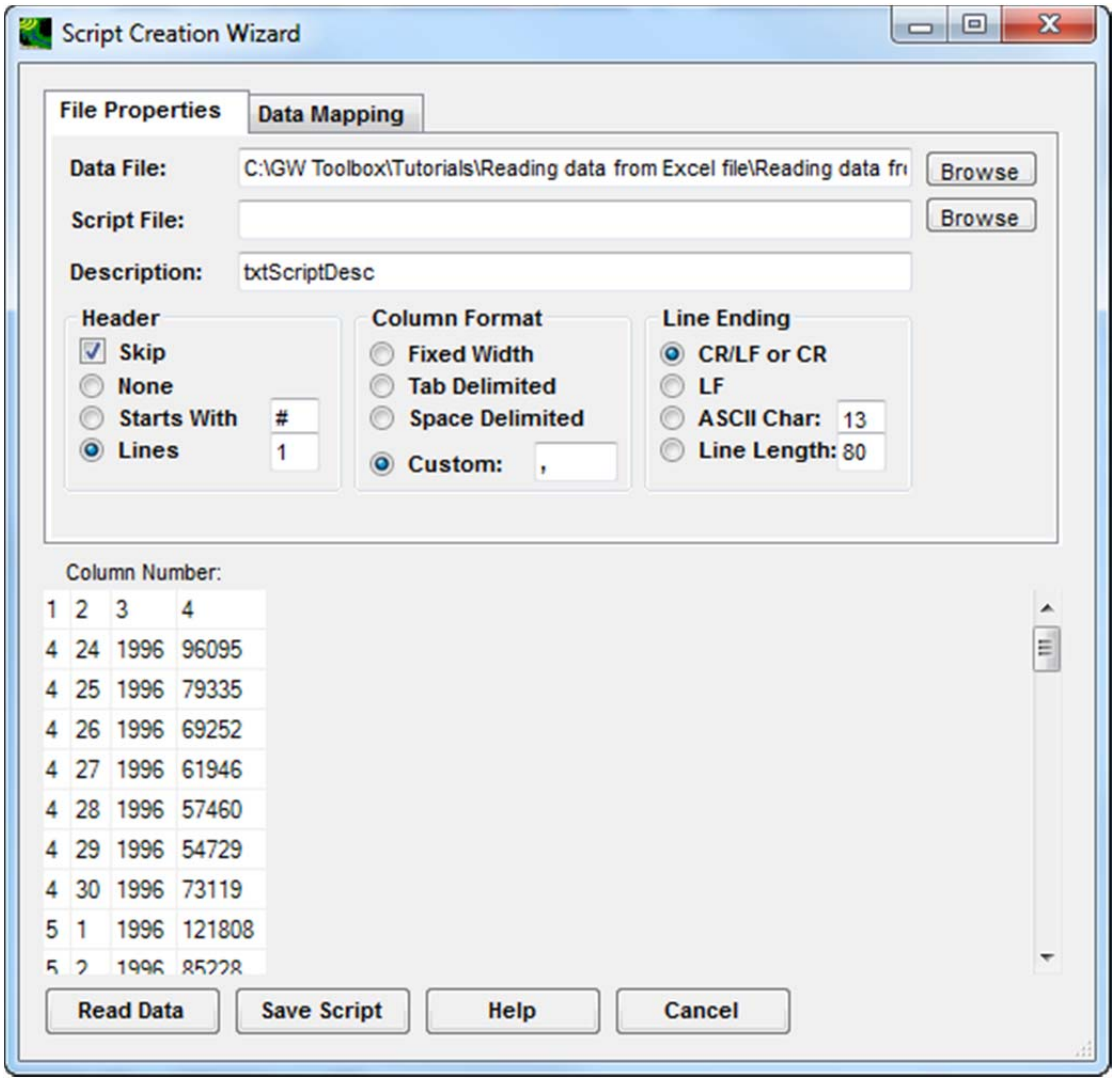


In this example, we select '**Edit**,' which brings the user to the 'Script Creation Wizard' dialog box:



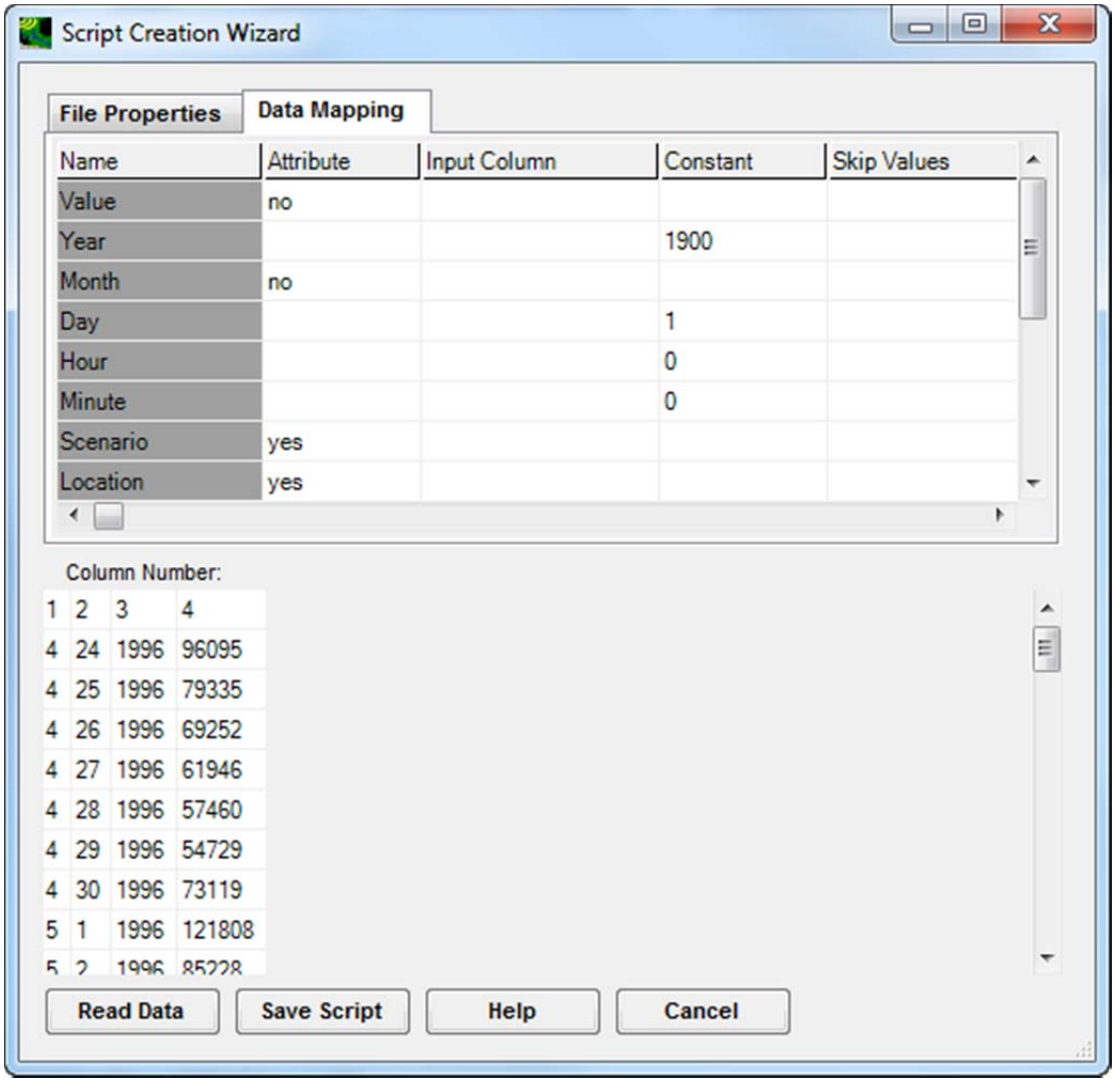
Under '**Header**' select the '**Lines**' radio button (and enter '1' in the white box if it doesn't already show). Under '**Column Format**' select the '**Custom**' radio button and ',' delimiter.

The following dialogue box results:

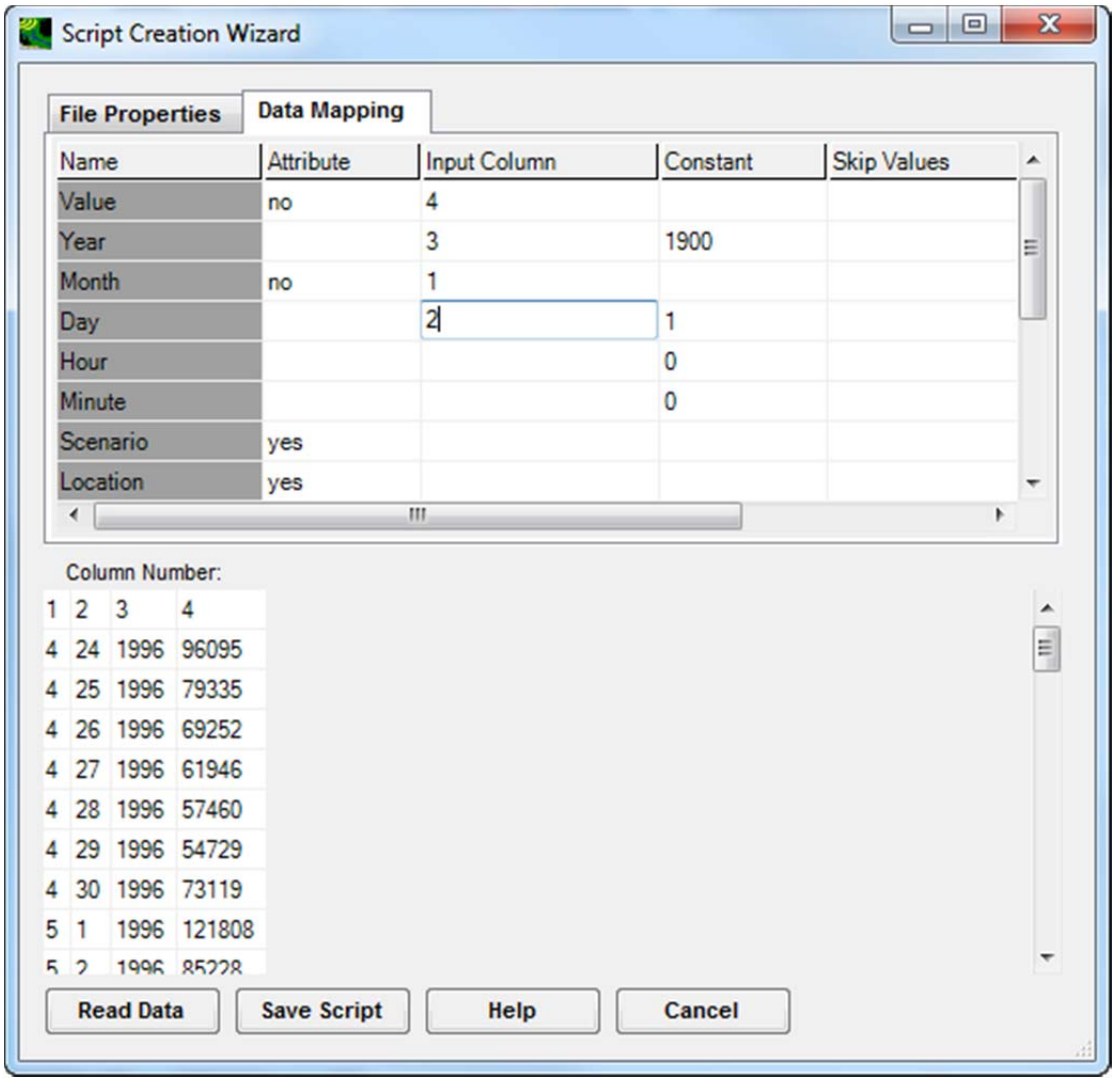


Now select the '**Data Mapping**' option in the above dialogue box.

The following dialog box results:



The first step is to associate each column of data with an ‘Input Column:’



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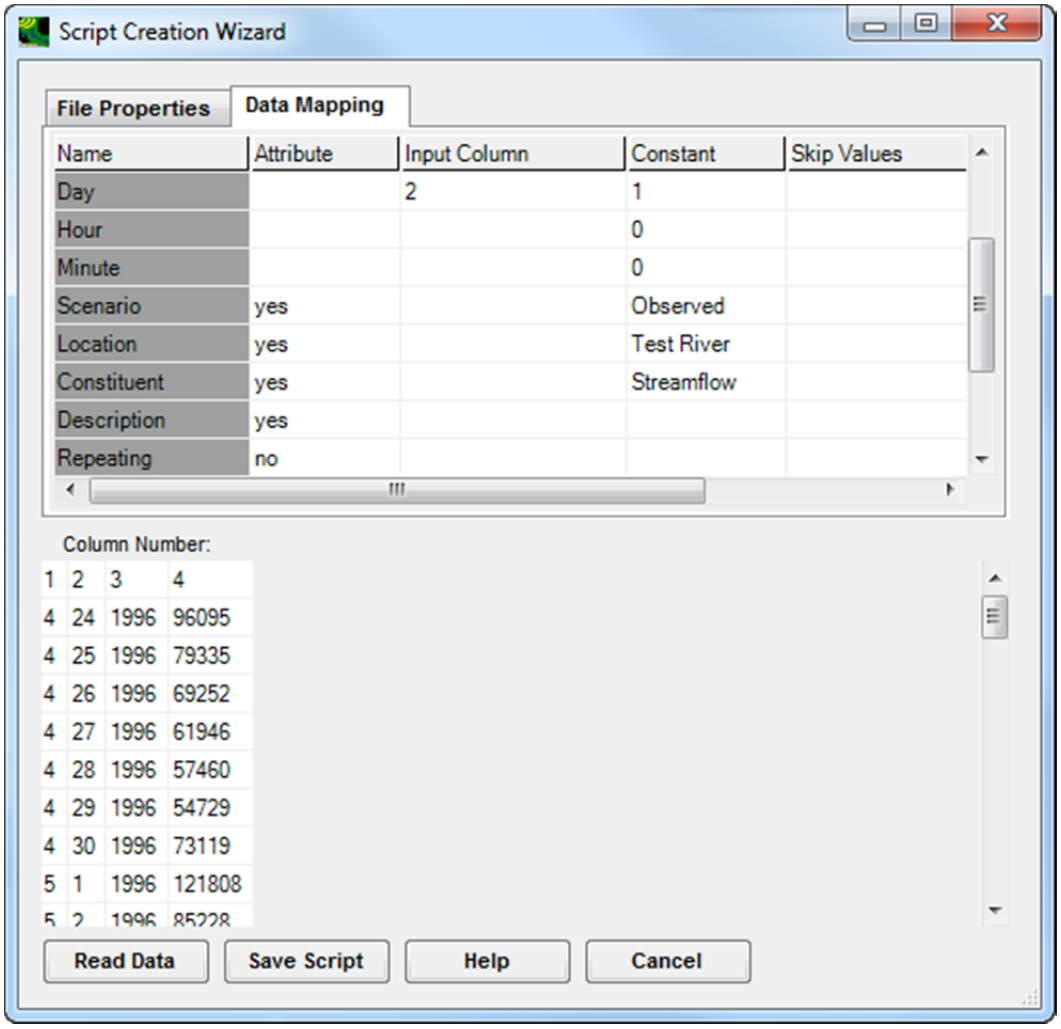
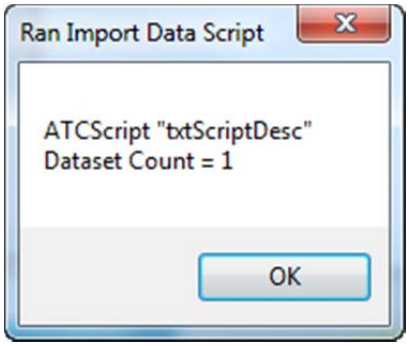
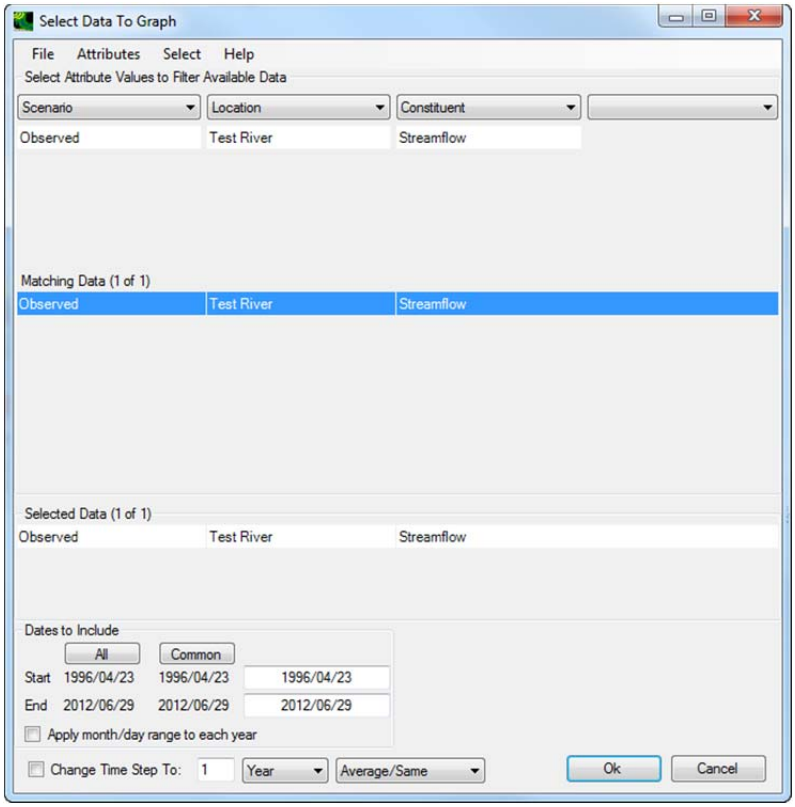
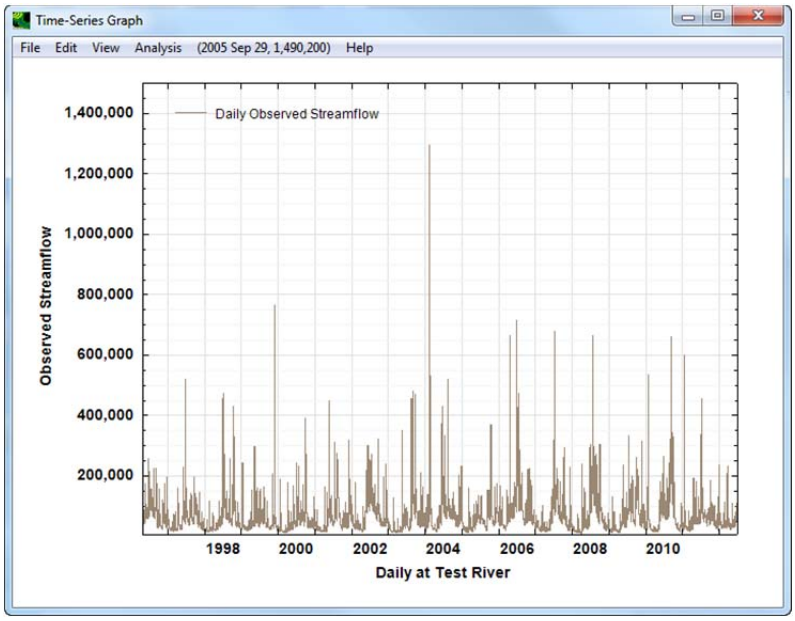


The user can now either read the data into the Toolbox ('**Read Data**') or save these read instructions to a script for later use. In this case, we'll read the data ('**Read Data**'), which leads to the following message:



The user can now close ‘Ran Import Data Script’ dialog box, and then use the data for analyses, such as graphing:





Note, however, that if the Base-Flow Separation methods are selected for analysis, the drainage area (in square miles) must be entered manually into the dialog box.