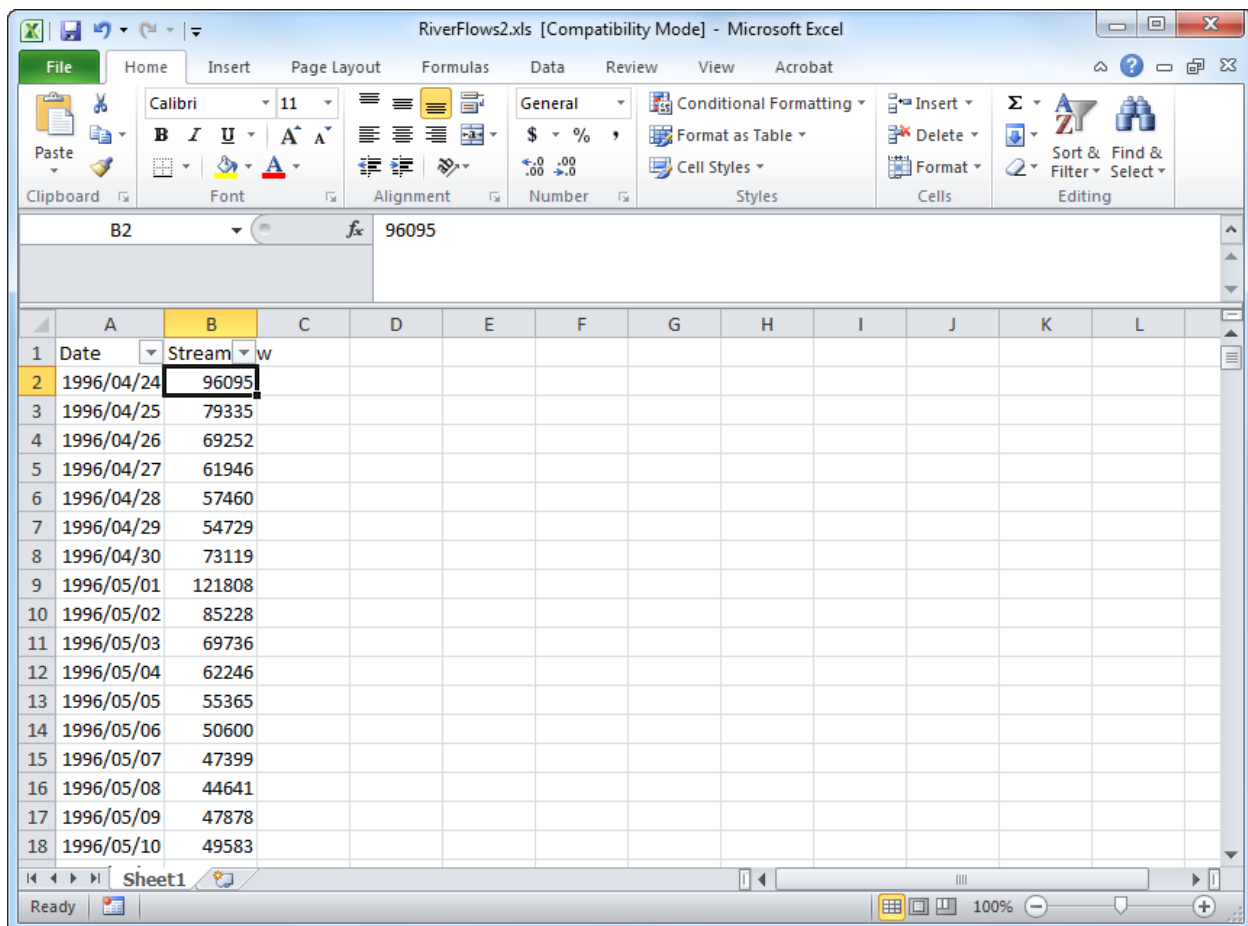


Using Scripting in the Hydrologic Toolbox to import data from an Excel file

Version 1.0 Release

This document describes use of the Scripting functionality of the Hydrologic 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 Hydrologic 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. These two approaches are possible because data can be imported in either a single-column date format, as shown below, or a three-column format of Month, Day, and Year.



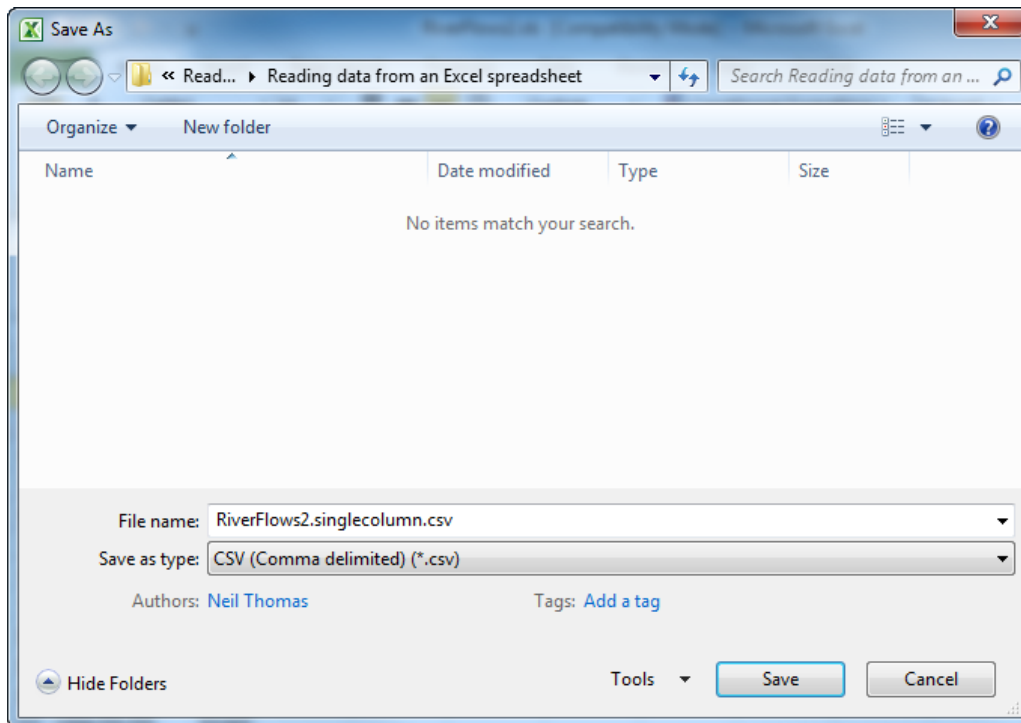
The screenshot shows a Microsoft Excel window titled "RiverFlows2.xls [Compatibility Mode] - Microsoft Excel". The ribbon is set to "Home". The active cell is B2, which contains the value 96095. The data table is as follows:

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

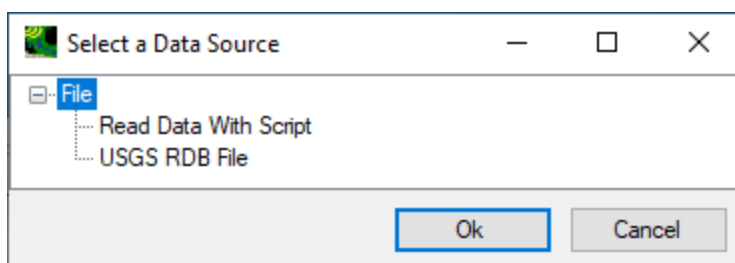
The first approach, which can be the simpler of the two and therefore described first, is to directly read in the 2-column format into the Hydrologic Toolbox. The second approach is to first convert the 2-column format into a 4-column format, in which the single date column is converted to a 3-column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

Approach A: Reading data with a single-column date format into the Hydrologic Toolbox:

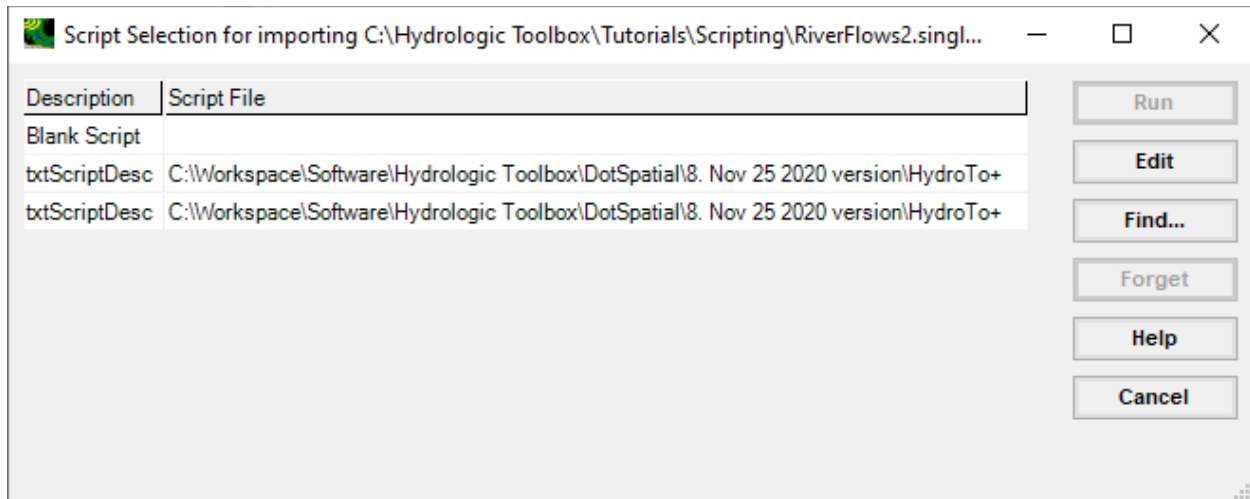
1. **Working with Excel data:** If data are in the “.xls” format, they must first be saved to a comma delimited (“.csv”) file format. Using the Excel file shown above, this is done simply in Excel as:



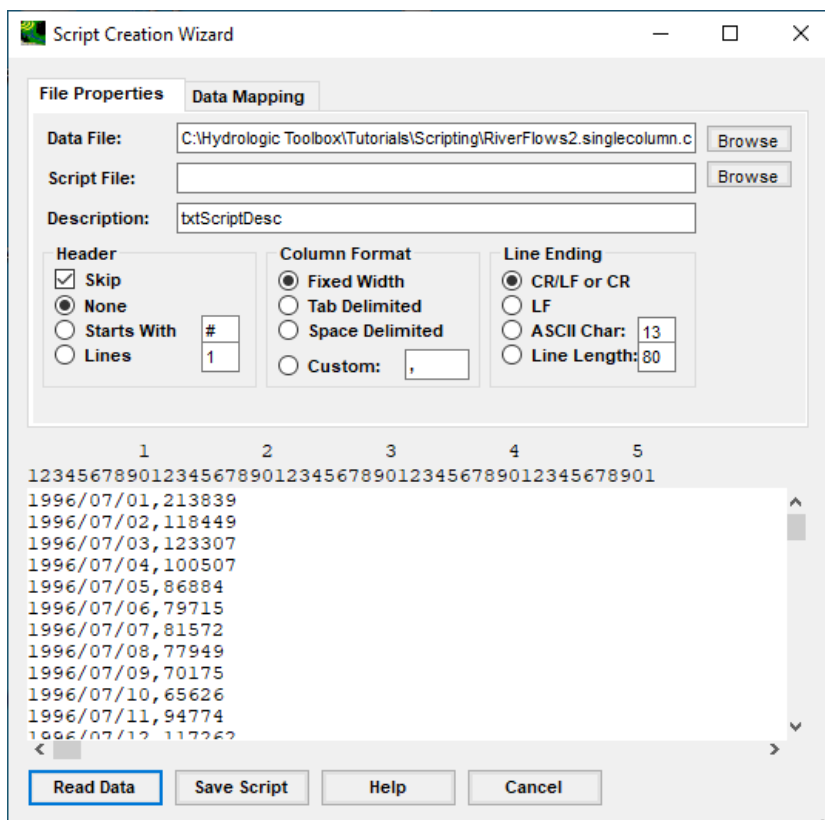
2. **Importing the data into the Hydrologic Toolbox:** Next, open the Hydrologic Toolbox. It is not necessary to have a project area defined in order to import data, so close the “Welcome to USGS Hydrologic Toolbox” dialog box and go directly to “**Data>Open...**” menu option, which gives the following 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 isn’t already shown). Under “**Column Format**” select the “**Custom**” radio button and “,” delimiter. The following dialogue box results:

The screenshot shows the 'Script Creation Wizard' dialog box with the 'Data Mapping' tab selected. The 'Data File' is set to 'C:\Hydrologic Toolbox\Tutorials\Scripting\RiverFlows2.singlecolumn.c'. The 'Script File' and 'Description' fields are empty. The 'Header' section has 'Skip' checked and 'Lines' selected with a value of 1. The 'Column Format' section has 'Custom' selected with a comma delimiter. The 'Line Ending' section has 'CR/LF or CR' selected. Below these sections is a table of data with two columns: 'Column Number' and a list of dates and values. At the bottom are buttons for 'Read Data', 'Save Script', 'Help', and 'Cancel'.

Column Number:	
1	2
1996/04/24	96095
1996/04/25	79335
1996/04/26	69252
1996/04/27	61946
1996/04/28	57460
1996/04/29	54729
1996/04/30	73119
1996/05/01	121808
1996/05/02	85228

Now, by adding “/” to the the “**Custom**” radio button, in addition to the “,” delimiter, the Hydrologic Toolbox will create -column format as shown below:

Script Creation Wizard

File Properties | **Data Mapping**

Data File: C:\Hydrologic Toolbox\Tutorials\Scripting\RiverFlows2.singlecolumn.c **Browse**

Script File: **Browse**

Description: txtScriptDesc

Header

☒ Skip
☐ None
☐ Starts With #
☒ Lines 1

Column Format

☐ Fixed Width
☐ Tab Delimited
☐ Space Delimited
☒ Custom: /

Line Ending

☒ CR/LF or CR
☐ LF
☐ ASCII Char: 13
☐ Line Length: 80

Column Number:

1	2	3	4
1996	04	24	96095
1996	04	25	79335
1996	04	26	69252
1996	04	27	61946
1996	04	28	57460
1996	04	29	54729
1996	04	30	73119
1996	05	01	121808
1996	05	02	85228

Read Data **Save Script** **Help** **Cancel**

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

Below is the initial dialogue box that results:

The image shows a 'Script Creation Wizard' dialog box with two tabs: 'File Properties' and 'Data Mapping'. The 'Data Mapping' tab is active, displaying a table with five columns: Name, Attribute, Input Column, Constant, and Skip Values. Below this table is a 'Column Number:' section showing a preview of data with four columns numbered 1 to 4. At the bottom are four buttons: 'Read Data', 'Save Script', 'Help', and 'Cancel'.

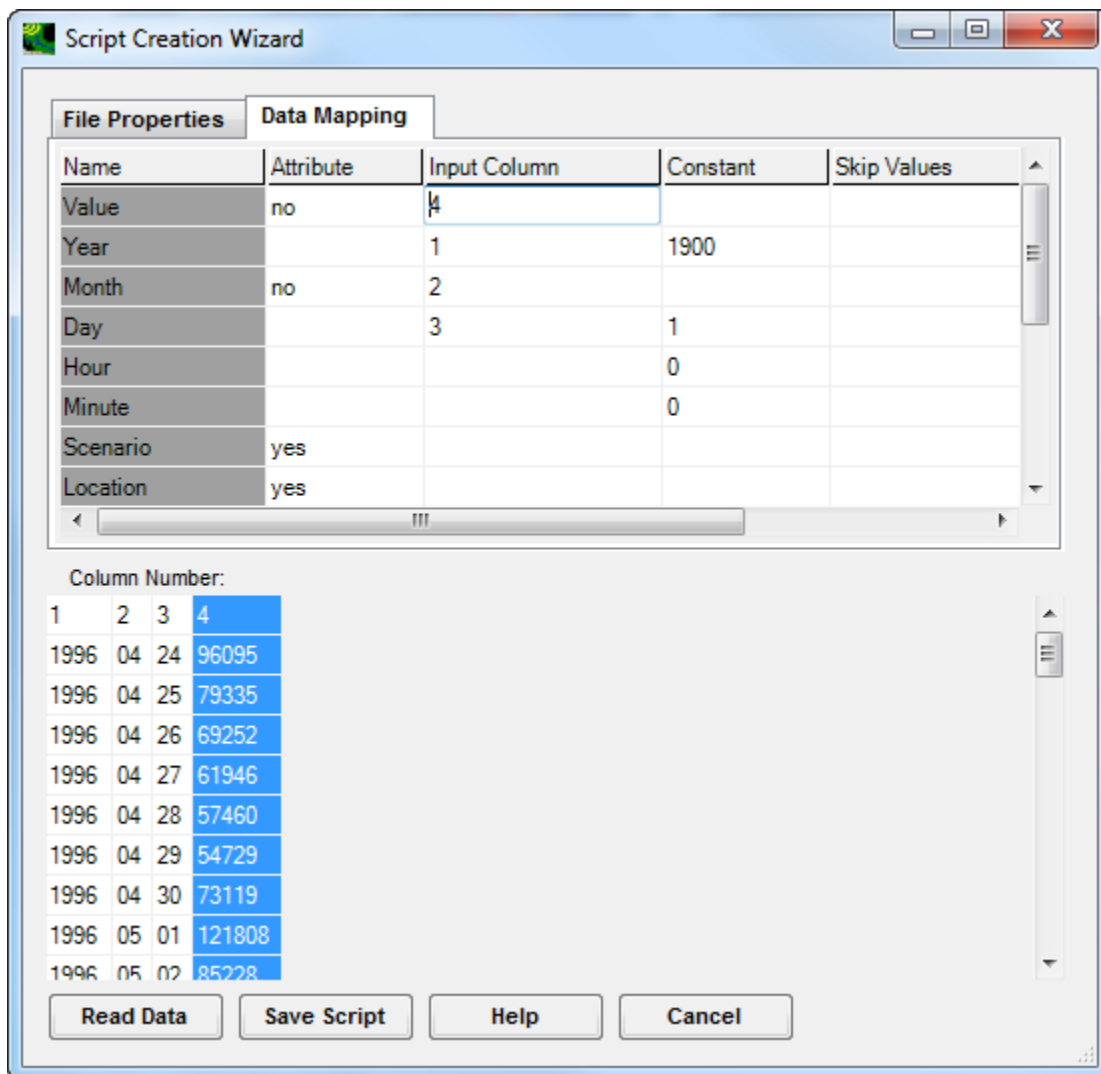
Name	Attribute	Input Column	Constant	Skip Values
Value	no			
Year			1900	
Month	no			
Day			1	
Hour			0	
Minute			0	
Scenario	yes			
Location	yes			

Column Number:

1	2	3	4
1996	04	24	96095
1996	04	25	79335
1996	04	26	69252
1996	04	27	61946
1996	04	28	57460
1996	04	29	54729
1996	04	30	73119
1996	05	01	121808
1996	05	02	85228

Read Data Save Script Help Cancel

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



The image shows a 'Script Creation Wizard' window with the 'Data Mapping' tab selected. It contains a table for mapping data attributes to input columns and constants. Below the table is a preview of the data columns and values.

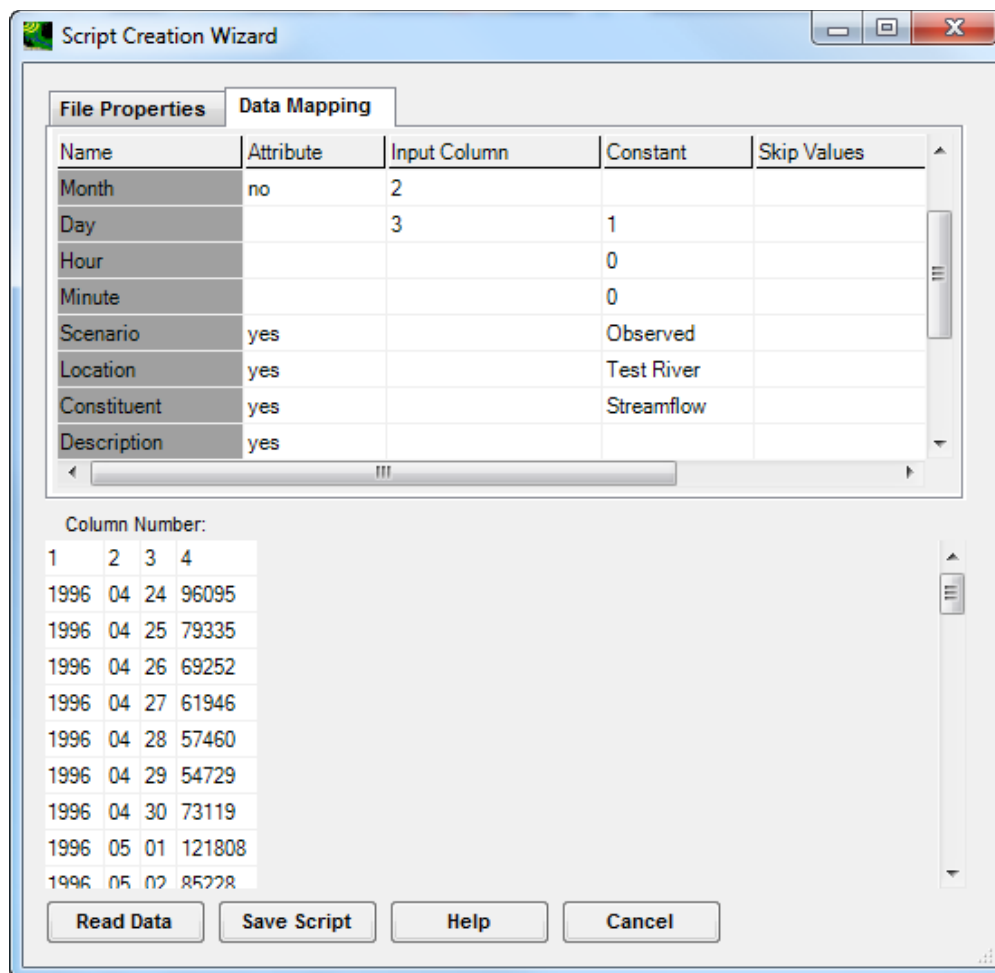
Name	Attribute	Input Column	Constant	Skip Values
Value	no	4		
Year		1	1900	
Month	no	2		
Day		3	1	
Hour			0	
Minute			0	
Scenario	yes			
Location	yes			

Column Number:

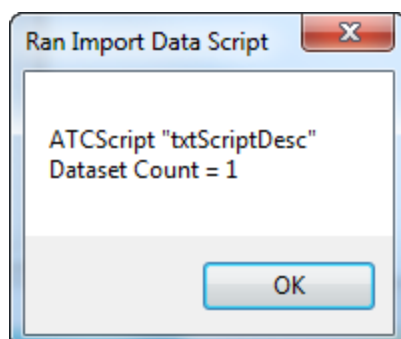
1	2	3	4
1996	04	24	96095
1996	04	25	79335
1996	04	26	69252
1996	04	27	61946
1996	04	28	57460
1996	04	29	54729
1996	04	30	73119
1996	05	01	121808
1996	05	02	85228

Buttons: Read Data, Save Script, Help, Cancel

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 Hydrologic 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 Script**” 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:

Select Data To Graph

File Attributes Select Help

Select Attribute Values to Filter Available Data

Scenario Location Constituent

Observed Test River Streamflow

Matching Data (1 of 1)

Observed	Test River	Streamflow
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Selected Data (1 of 1)

Observed	Test River	Streamflow
----------	------------	------------

Date Range of Selected Data

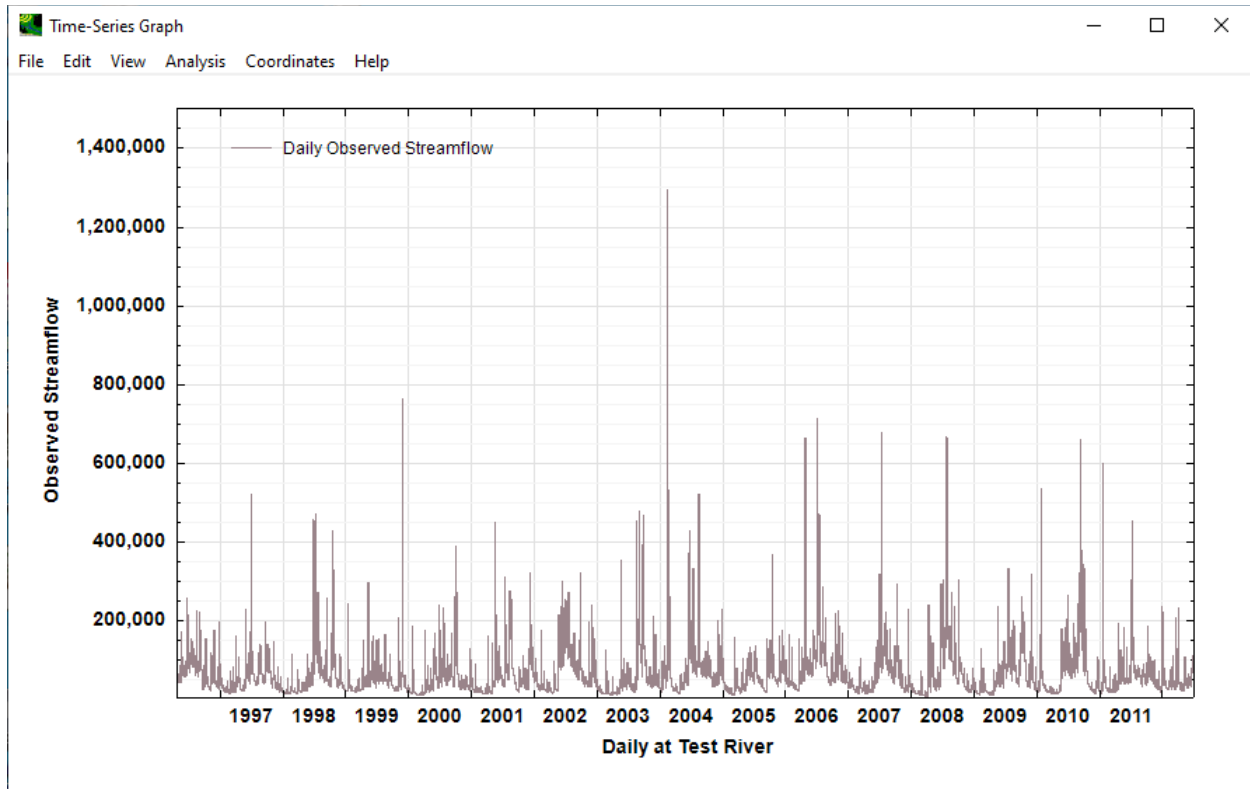
All Common

Start 1996/04/23 1996/04/23

End 2012/06/29 2012/06/29

☐ Subset and Filter Time Series

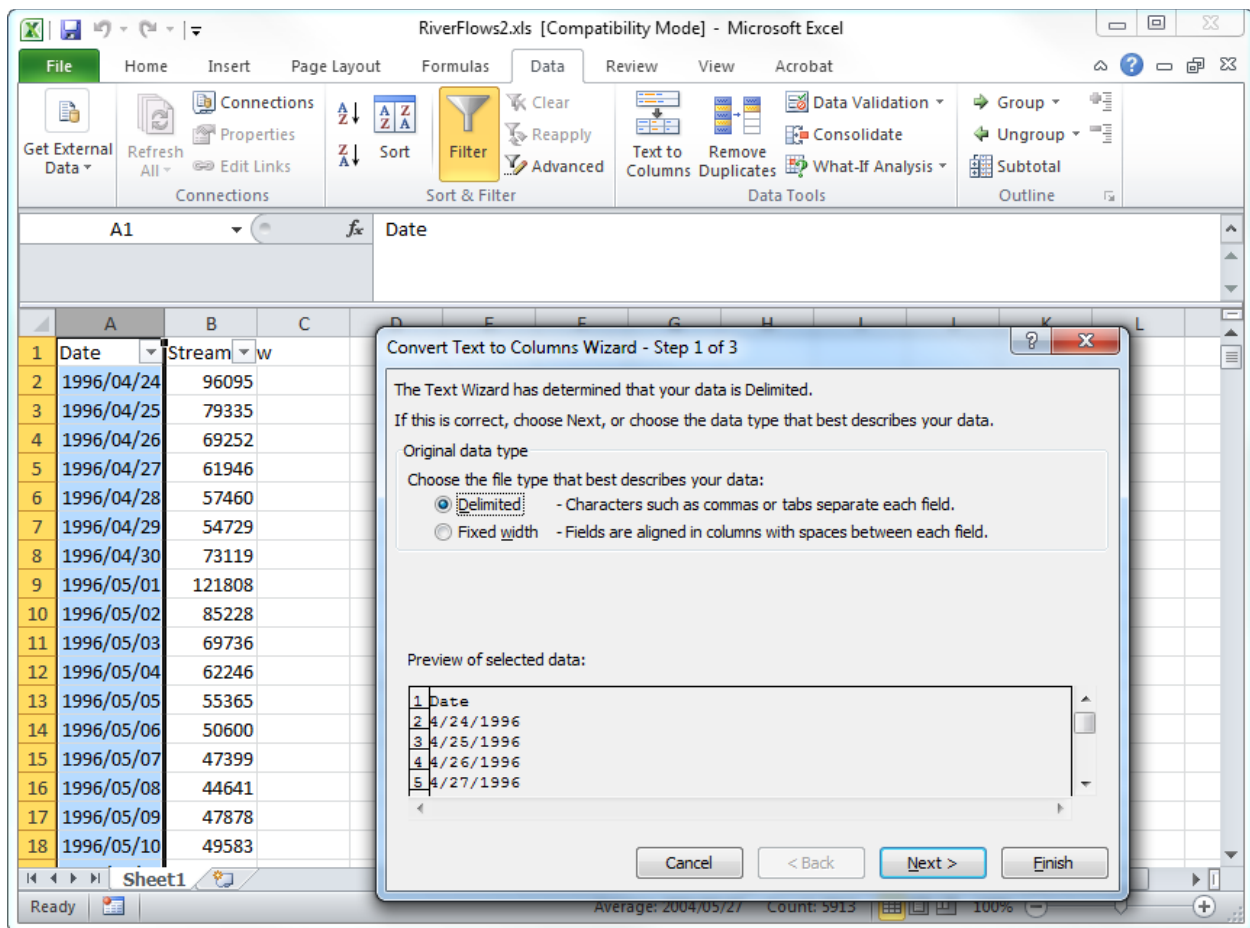
Ok Cancel



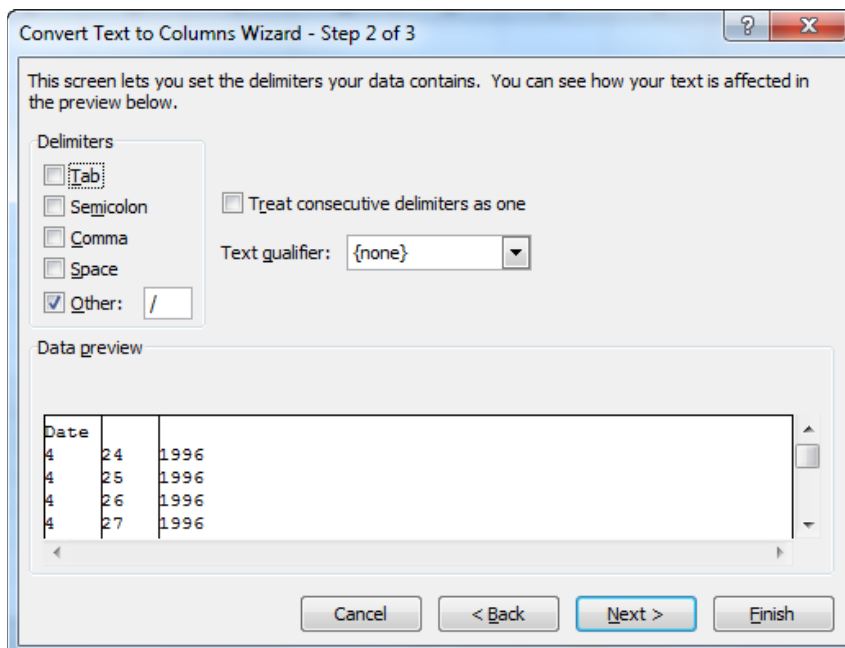
Note that if the Base-Flow Separation methods are selected for analysis, the drainage area (in square miles) must be entered manually into the dialog box.

Approach B: Converting data with a single-column date format into 3-column date format before reading data into the Hydrologic Toolbox:

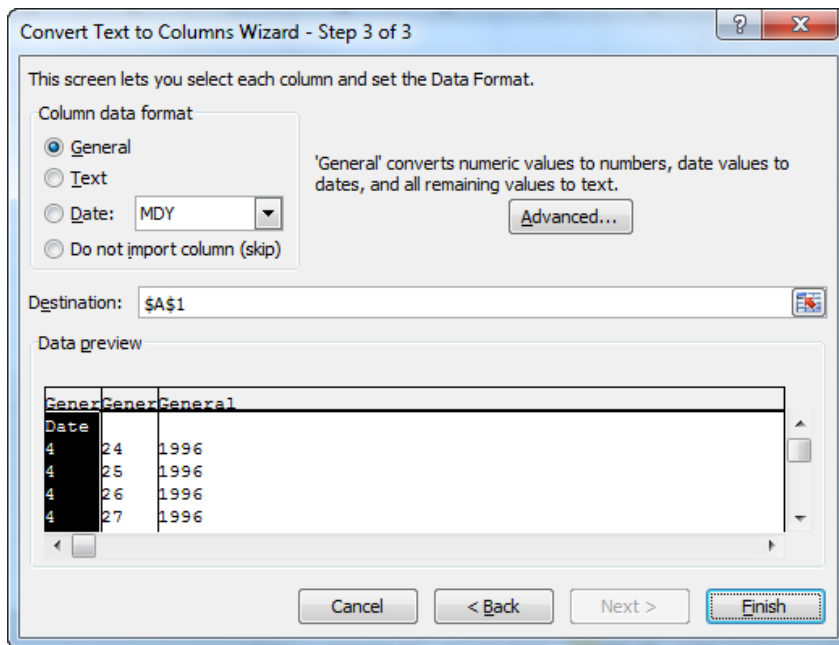
1. **Working with Excel data:** The first step is to convert the single-column format to a three-column format by first selecting the Date column and the command "**Text to Columns**" under the "**Data**" tab, which results in the following "Convert Text to Columns Wizard – Step 1 of 3" dialog box:



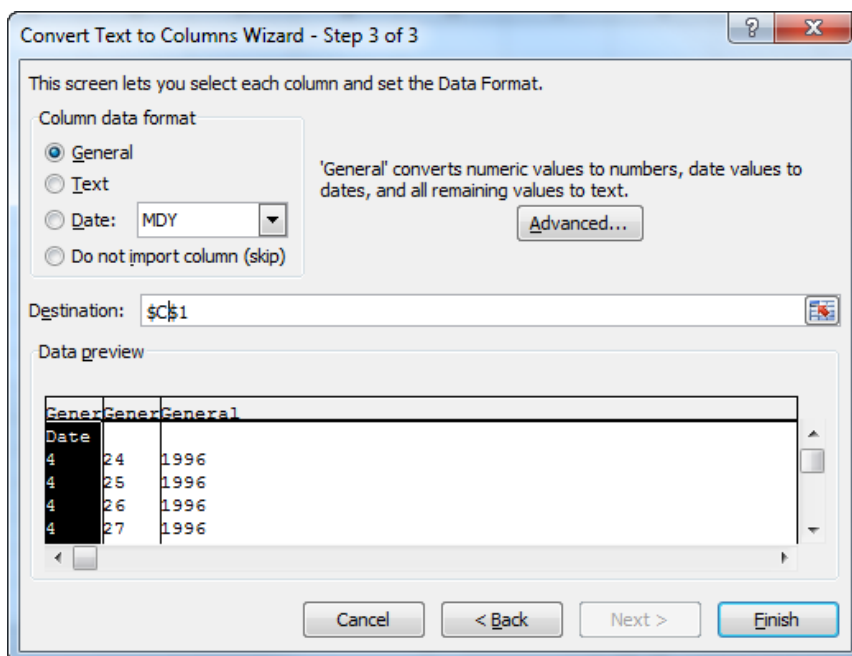
First, select “Delimited”, and then “Next,” which results in the “Step 2 of 3” dialog box below. Select “Other:”, add “/” to the white box after “Other:”, and “Text qualifier: {none}” as follows:



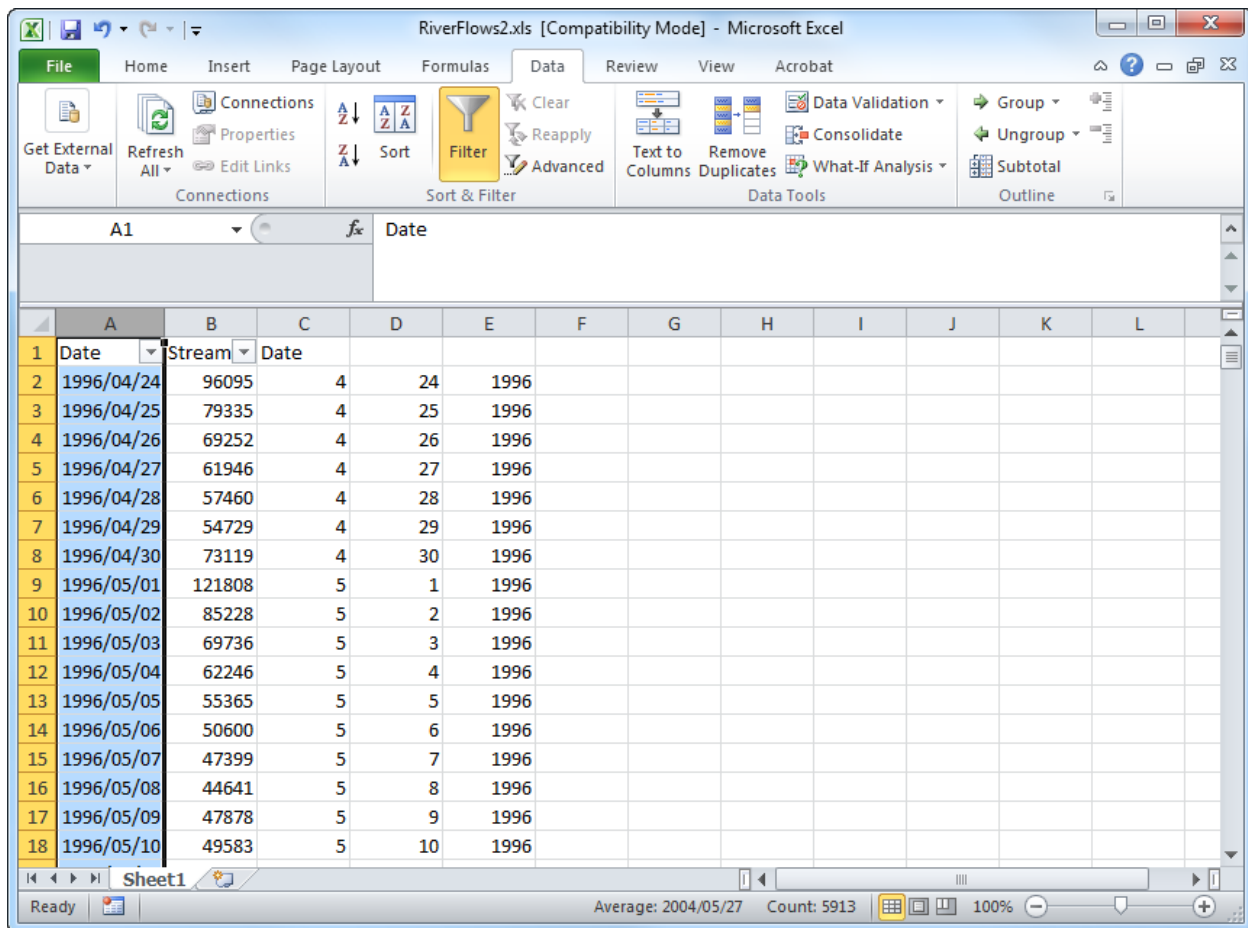
Now select “Next” which results in the final step (next page).



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 \$C\$1 in the “Destination” option:

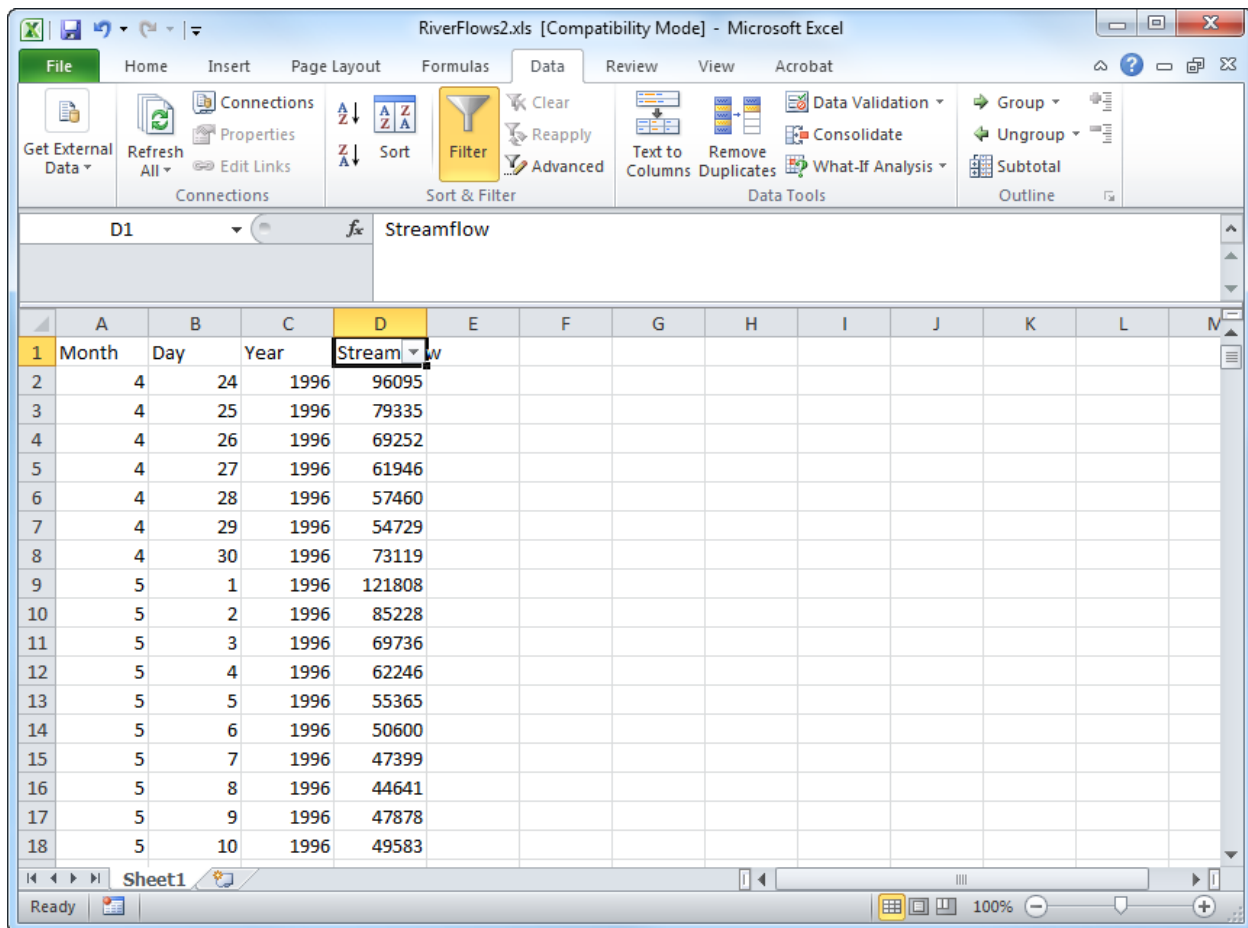


By specifying column C as the destination for the first date column (month), the following modified spreadsheet results (after hitting “Finish” in the preceding screen):



	A	B	C	D	E	F	G	H	I	J	K	L
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							

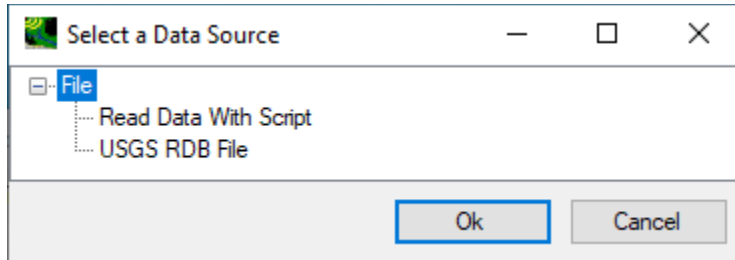
The user can then delete column A, which contains the original date format, and use “Delete,” “Cut,” and “Paste,” commands to modify the spreadsheet to the following format:



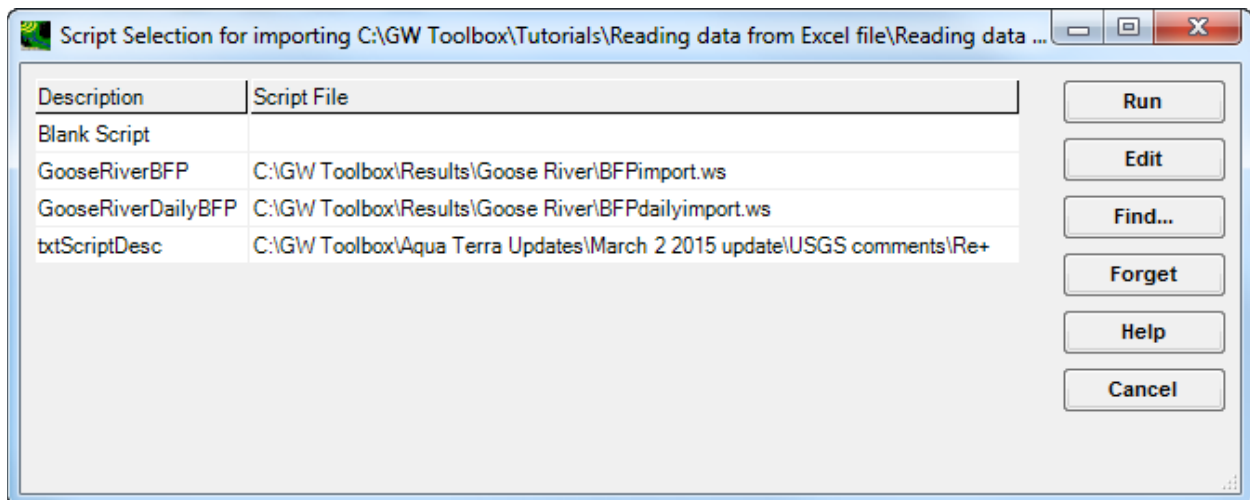
	A	B	C	D	E	F	G	H	I	J	K	L	M
1	Month	Day	Year	Streamflow									
2		4	24	1996	96095								
3		4	25	1996	79335								
4		4	26	1996	69252								
5		4	27	1996	61946								
6		4	28	1996	57460								
7		4	29	1996	54729								
8		4	30	1996	73119								
9		5	1	1996	121808								
10		5	2	1996	85228								
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 Hydrologic Toolbox: Next, open the Hydrologic Toolbox. It is not necessary to have a project area defined in order to import data, so close the “Welcome to USGS Hydrologic Toolbox” dialog box and go directly to “**Data>Open...**” menu option, which gives the following dialog box:



Select the “**Read Data With Script**” option. 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:

Script Creation Wizard

File Properties | **Data Mapping**

Data File: C:\Hydrologic Toolbox\Tutorials\Scripting\RiverFlows2.fourcolumn.csv **Browse**

Script File: **Browse**

Description: txtScriptDesc

Header

☒ Skip

☐ None

☐ Starts With #

☐ Lines 1

Column Format

☒ Fixed Width

☐ Tab Delimited

☐ Space Delimited

☐ Custom: ,

Line Ending

☒ CR/LF or CR

☐ LF

☐ ASCII Char: 13

☐ Line Length: 80

1 2 3 4 5

12345678901234567890123456789012345678901

7,1,1996,213839

7,2,1996,118449

7,3,1996,123307

7,4,1996,100507

7,5,1996,86884

7,6,1996,79715

7,7,1996,81572

7,8,1996,77949

7,9,1996,70175

7,10,1996,65626

7,11,1996,94774

7,12,1996,117262

Read Data **Save Script** **Help** **Cancel**

Under “**Header**” select the “**Lines**” radio button (and enter “1” in the white box if it isn’t already shown). Under “**Column Format**” select the “**Custom**” radio button and “,” delimiter.

The following dialogue box results:

The dialog box is titled "Script Creation Wizard" and has two tabs: "File Properties" and "Data Mapping". The "File Properties" tab is currently selected. It contains the following fields and options:

- Data File:** A text box containing "C:\Hydrologic Toolbox\Tutorials\Scripting\RiverFlows2.fourcolumn.csv" and a "Browse" button.
- Script File:** An empty text box and a "Browse" button.
- Description:** A text box containing "txtScriptDesc".
- Header:** A group box containing four radio buttons: "Skip" (checked), "None", "Starts With" (with a text box containing "#"), and "Lines" (with a text box containing "1").
- Column Format:** A group box containing four radio buttons: "Fixed Width", "Tab Delimited", "Space Delimited", and "Custom:" (with a text box containing a comma ",").
- Line Ending:** A group box containing four radio buttons: "CR/LF or CR" (checked), "LF", "ASCII Char:" (with a text box containing "13"), and "Line Length:" (with a text box containing "80").

Below the "File Properties" tab, there is a section titled "Column Number:" with a table of data. The table has 4 columns and 10 rows of data. The data is as follows:

1	2	3	4
4	24	1996	96095
4	25	1996	79335
4	26	1996	69252
4	27	1996	61946
4	28	1996	57460
4	29	1996	54729
4	30	1996	73119
5	1	1996	121808
5	2	1996	85228

At the bottom of the dialog box, there are four buttons: "Read Data", "Save Script", "Help", and "Cancel".

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

The following dialog box results:

The dialog box is titled "Script Creation Wizard" and has two tabs: "File Properties" and "Data Mapping". The "Data Mapping" tab is active, showing a table with five columns: "Name", "Attribute", "Input Column", "Constant", and "Skip Values". The table contains the following data:

Name	Attribute	Input Column	Constant	Skip Values
Value	no			
Year			1900	
Month	no			
Day			1	
Hour			0	
Minute			0	
Scenario	yes			
Location	yes			

Below the table is a section labeled "Column Number:" with a table showing column indices and values:

1	2	3	4
4	24	1996	96095
4	25	1996	79335
4	26	1996	69252
4	27	1996	61946
4	28	1996	57460
4	29	1996	54729
4	30	1996	73119
5	1	1996	121808
5	2	1996	85228

At the bottom of the dialog box are four buttons: "Read Data", "Save Script", "Help", and "Cancel".

The first step is to associate each column of data with an “Input Column:”

The screenshot shows the 'Script Creation Wizard' dialog box with the 'Data Mapping' tab selected. The dialog has two tabs: 'File Properties' and 'Data Mapping'. The 'Data Mapping' tab contains a table with five columns: 'Name', 'Attribute', 'Input Column', 'Constant', and 'Skip Values'. Below the table is a section labeled 'Column Number:' with a grid of data. At the bottom are four buttons: 'Read Data', 'Save Script', 'Help', and 'Cancel'.

Name	Attribute	Input Column	Constant	Skip Values
Value	no	4		
Year		3	1900	
Month	no	1		
Day		2	1	
Hour			0	
Minute			0	
Scenario	yes			
Location	yes			

Column Number:

1	2	3	4
4	24	1996	96095
4	25	1996	79335
4	26	1996	69252
4	27	1996	61946
4	28	1996	57460
4	29	1996	54729
4	30	1996	73119
5	1	1996	121808
5	2	1996	85228

Read Data Save Script Help Cancel

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:

Script Creation Wizard

File Properties Data Mapping

Name	Attribute	Input Column	Constant	Skip Values
Day		2	1	
Hour			0	
Minute			0	
Scenario	yes		Observed	
Location	yes		Test River	
Constituent	yes		Streamflow	
Description	yes			
Repeating	no			

Column Number:

1	2	3	4
4	24	1996	96095
4	25	1996	79335
4	26	1996	69252
4	27	1996	61946
4	28	1996	57460
4	29	1996	54729
4	30	1996	73119
5	1	1996	121808
5	2	1996	85228

Read Data Save Script Help Cancel

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:

Ran Import Data Script

ATCScript "txtScriptDesc"
Dataset Count = 1

OK

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

Select Data To Graph

File Attributes Select Help

Select Attribute Values to Filter Available Data

Scenario Location Constituent

Observed Test River Streamflow

Matching Data (1 of 1)

Observed	Test River	Streamflow
----------	------------	------------

Selected Data (1 of 1)

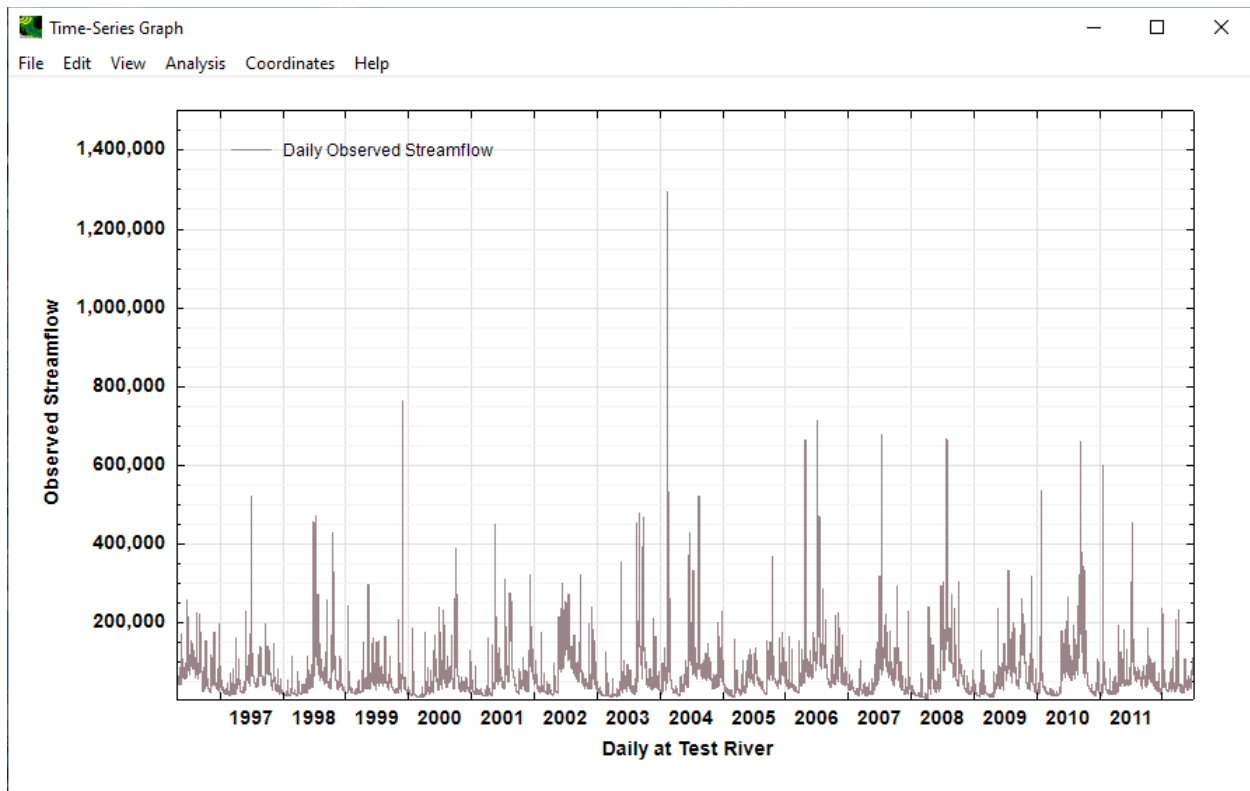
Observed	Test River	Streamflow
----------	------------	------------

Date Range of Selected Data

	All	Common
Start	1996/04/23	1996/04/23
End	2012/06/29	2012/06/29

☐ Subset and Filter Time Series

Ok Cancel



Note 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.