Missouri
Department of
Natural Resources
Water Protection Program
Water Pollution Control Branch

LOW FLOW CALCULATIONS FROM USGS GAGE STATION DATA

This document provides a method for calculating low flow values from USGS gage station data that seems to give consistent results.

There are three (3) sections of instruction:

I. **Retrieving Data from USGS Gage Station**

II. **Formatting the .txt file for the automatic calculator**

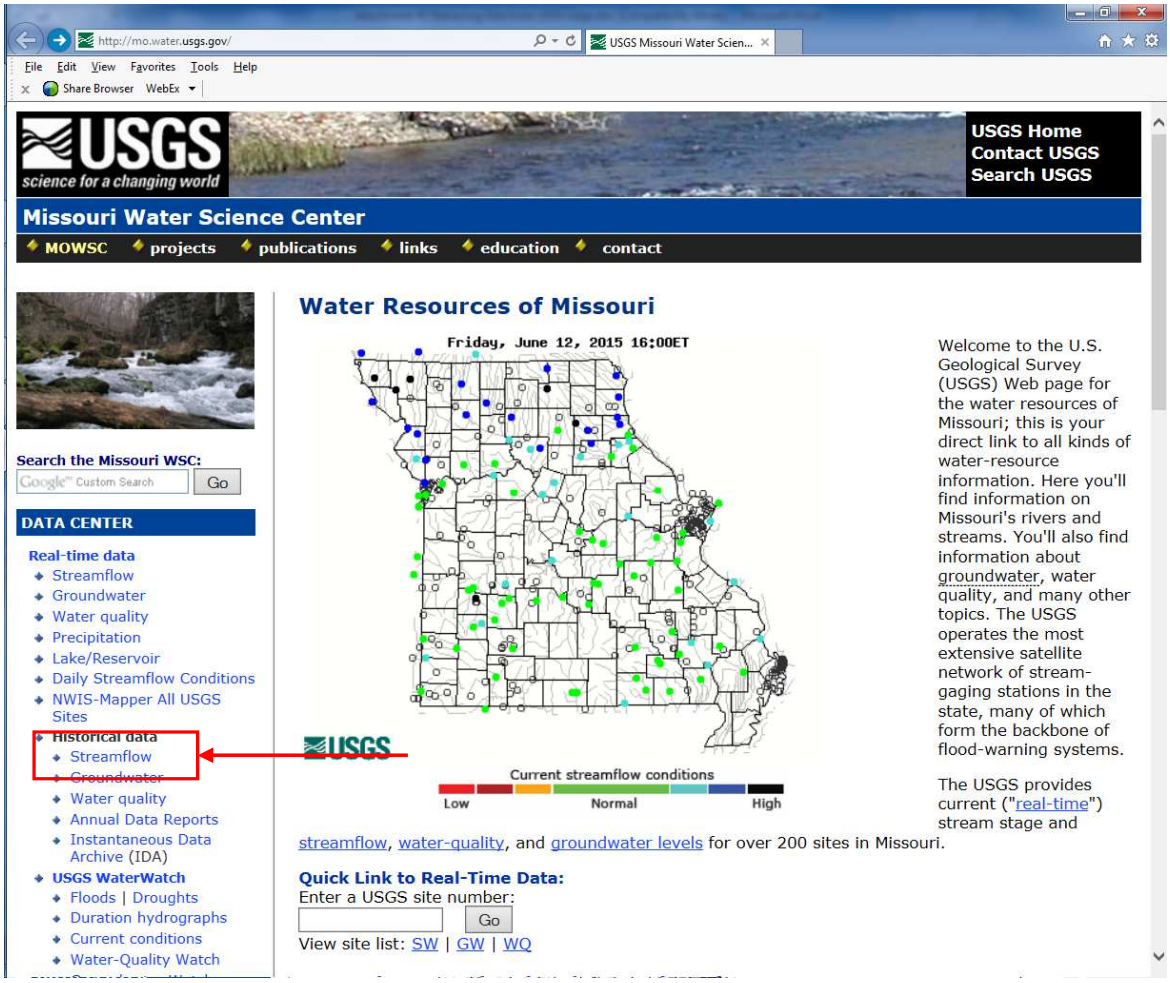
III. **Calculating 1Q10, 7Q10, and 30Q10 values**

The instructions were made using MS Office Excel 2010 (part of MS Office Professional Plus 2010), MS Internet Explorer 11.0, and the USGS website that was accessed June 12, 2015. Any program edition differences and/or information extracted from the USGS website after June 15, 2015, may require slightly different instructions than those detailed here.

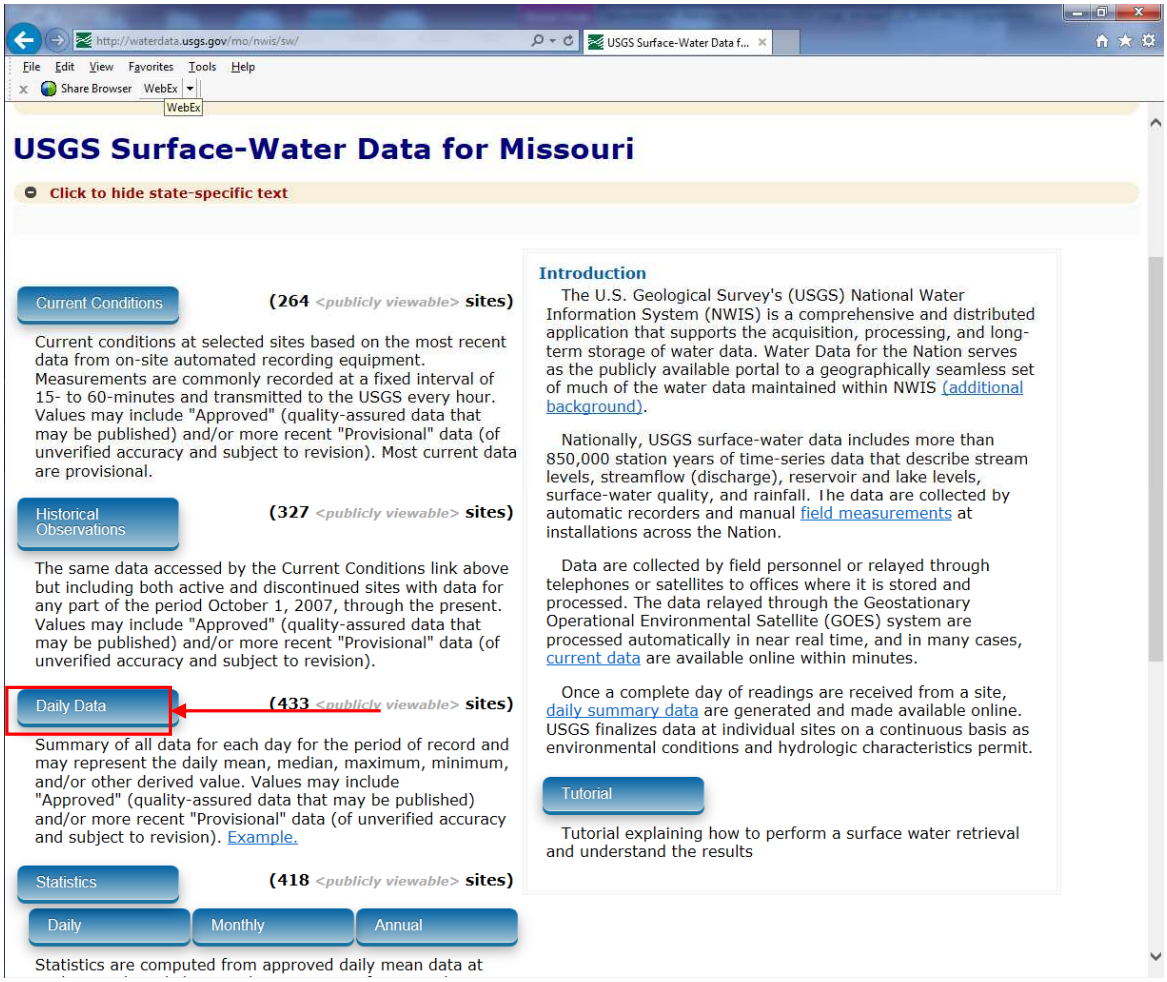
I. RETRIEVING DATA FROM USGS GAGE STATION

1. Go to http://mo.water.usgs.gov/

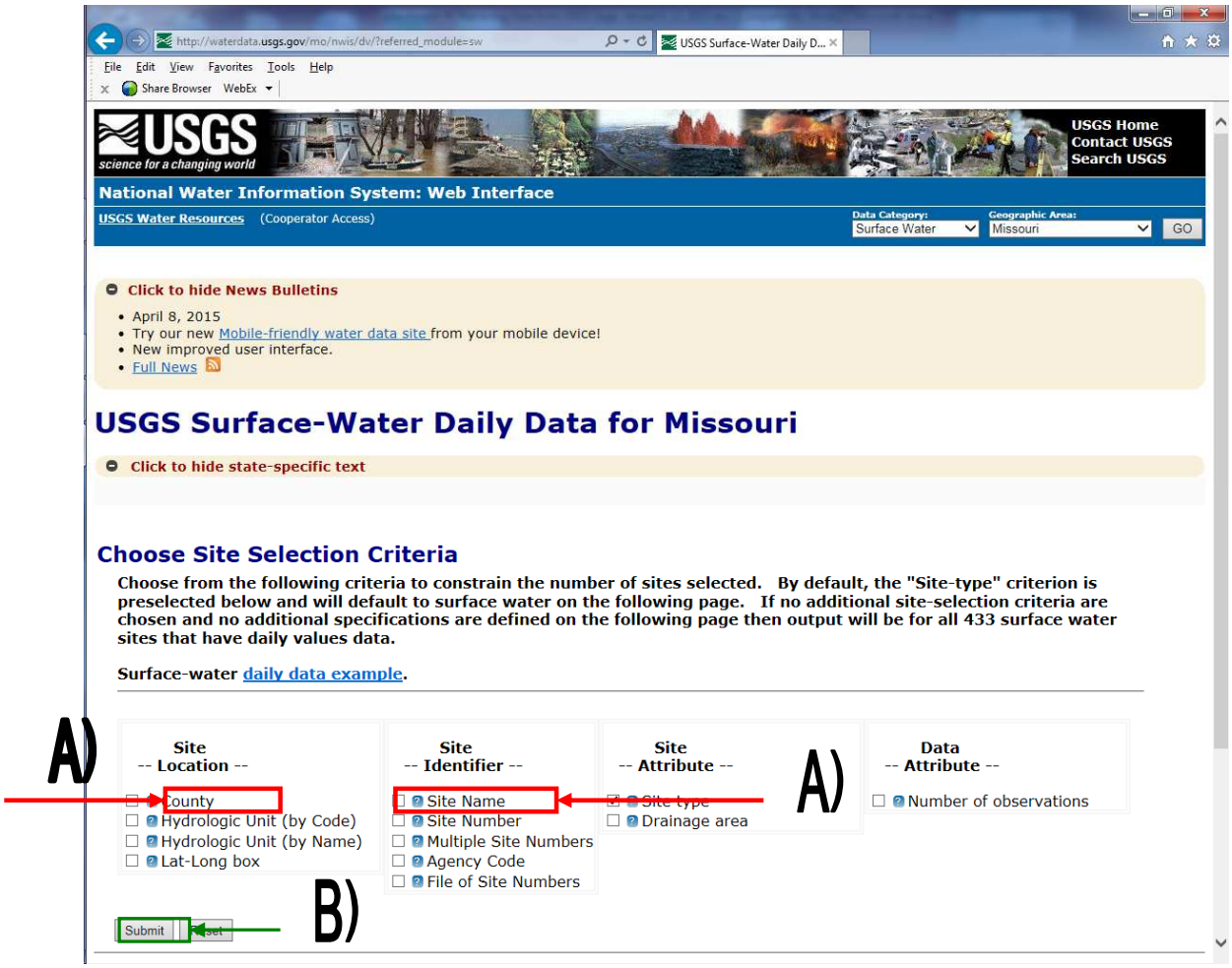
2. Choose “Historical Data -- Stream Flow”



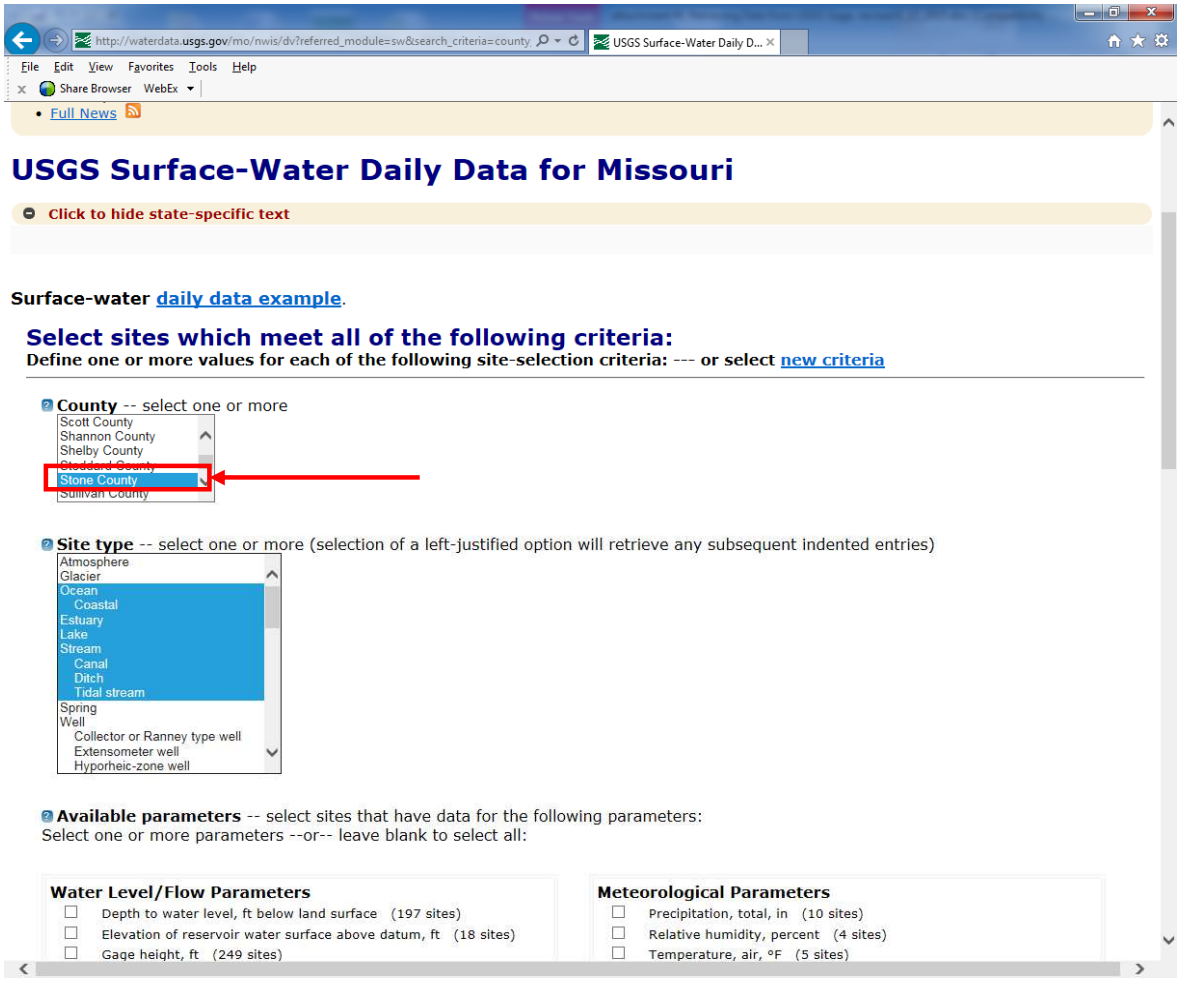
3. Choose “Daily Data” button



4. A) Check "site selection criteria" if one is known. For example, if you already know the gage station #, check only the "site number" checkbox. If you only know the county, check only the "County" checkbox. etc. B) Click on the "Submit" button.



5. (**IF selecting by county**) Highlight the county name.



Scroll to bottom and click on “Submit” button

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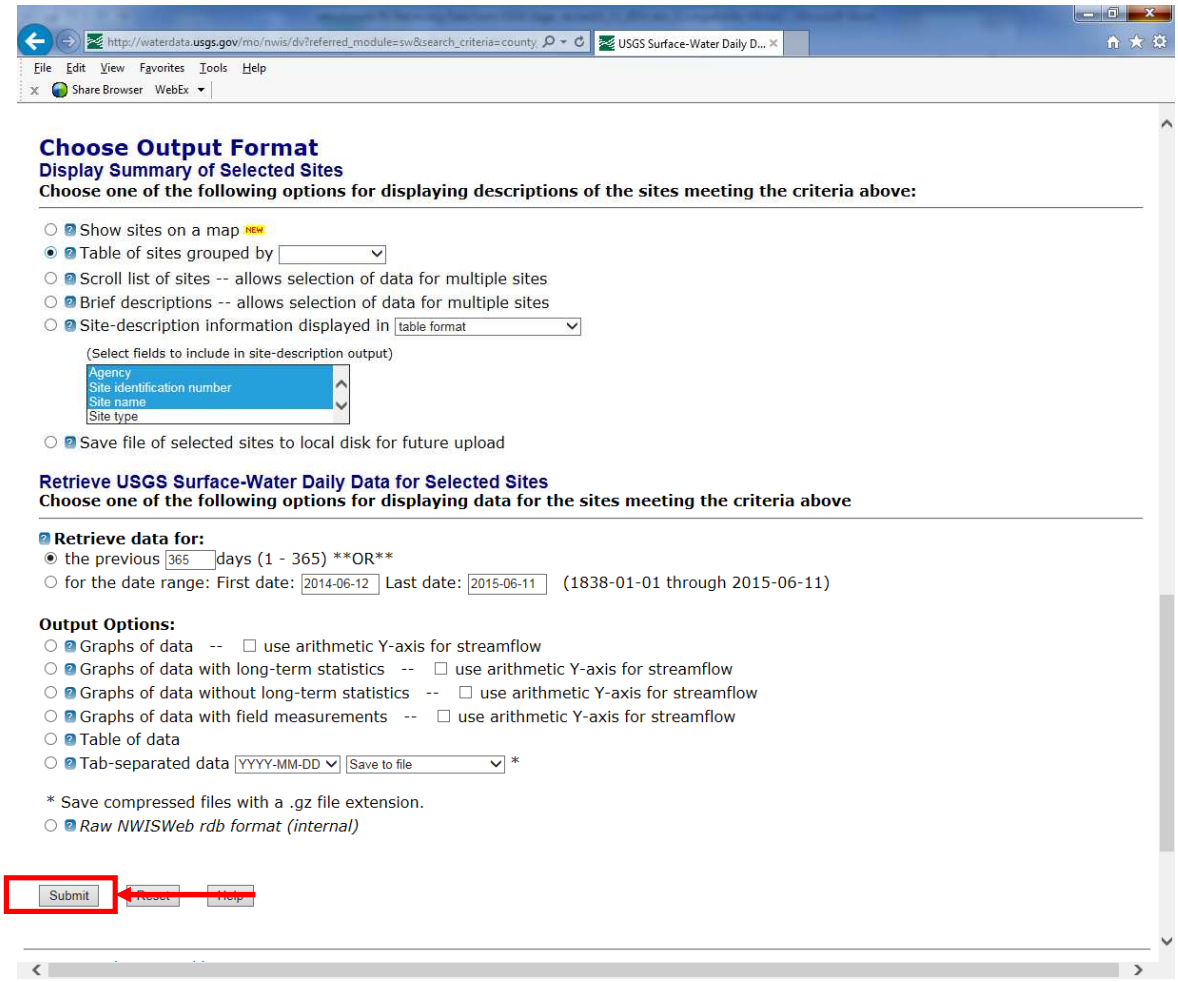
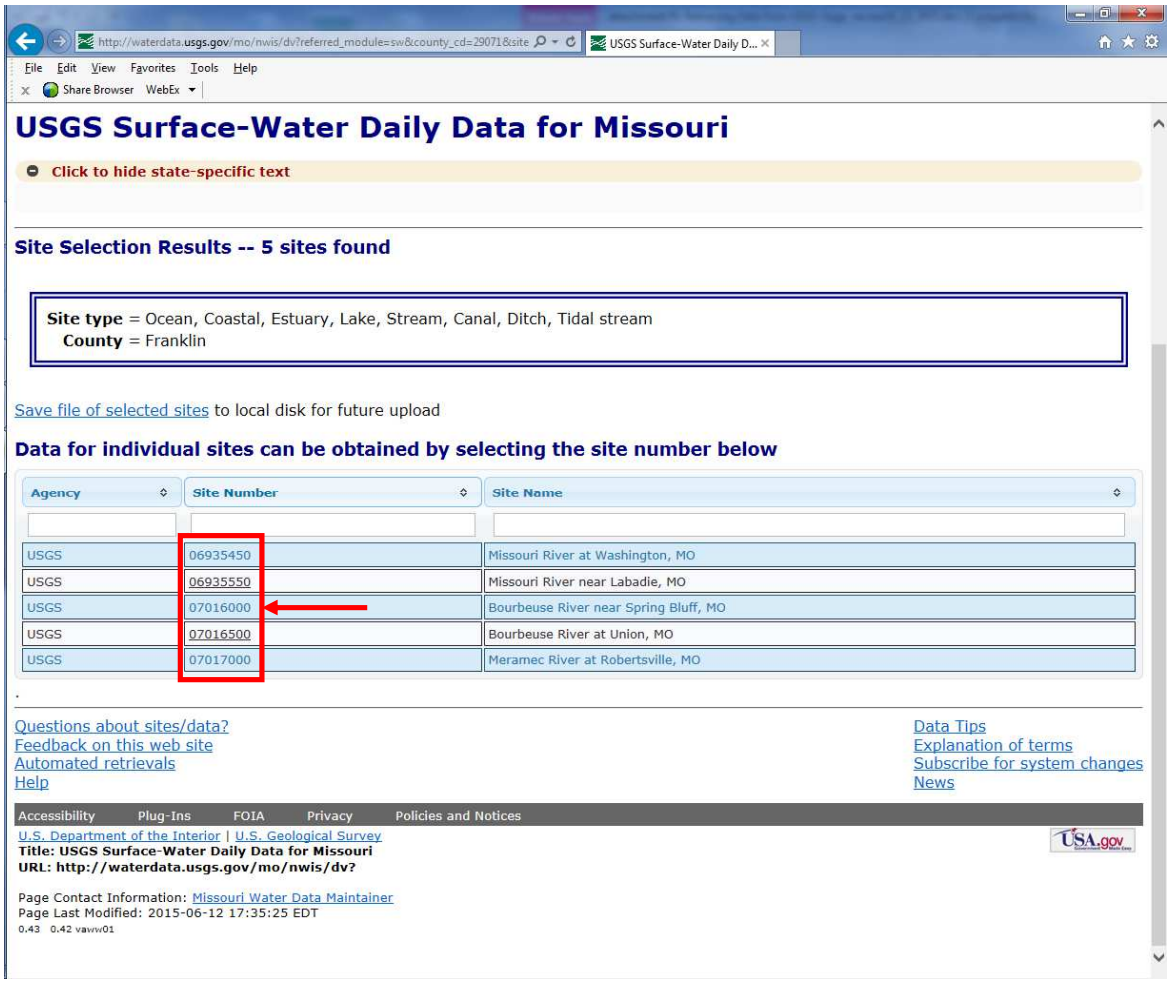
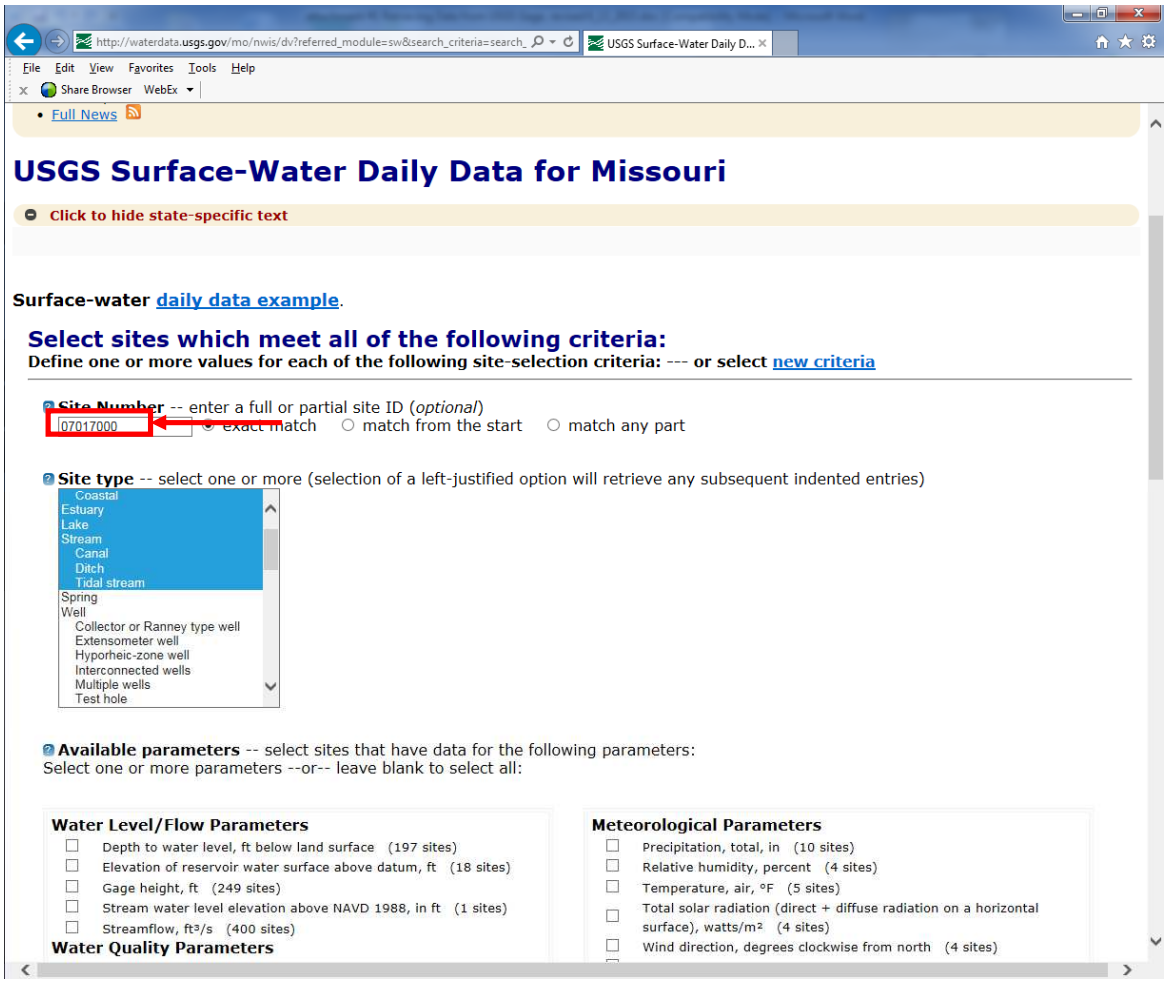


6. Select site relevant to permit and click on corresponding "site number"

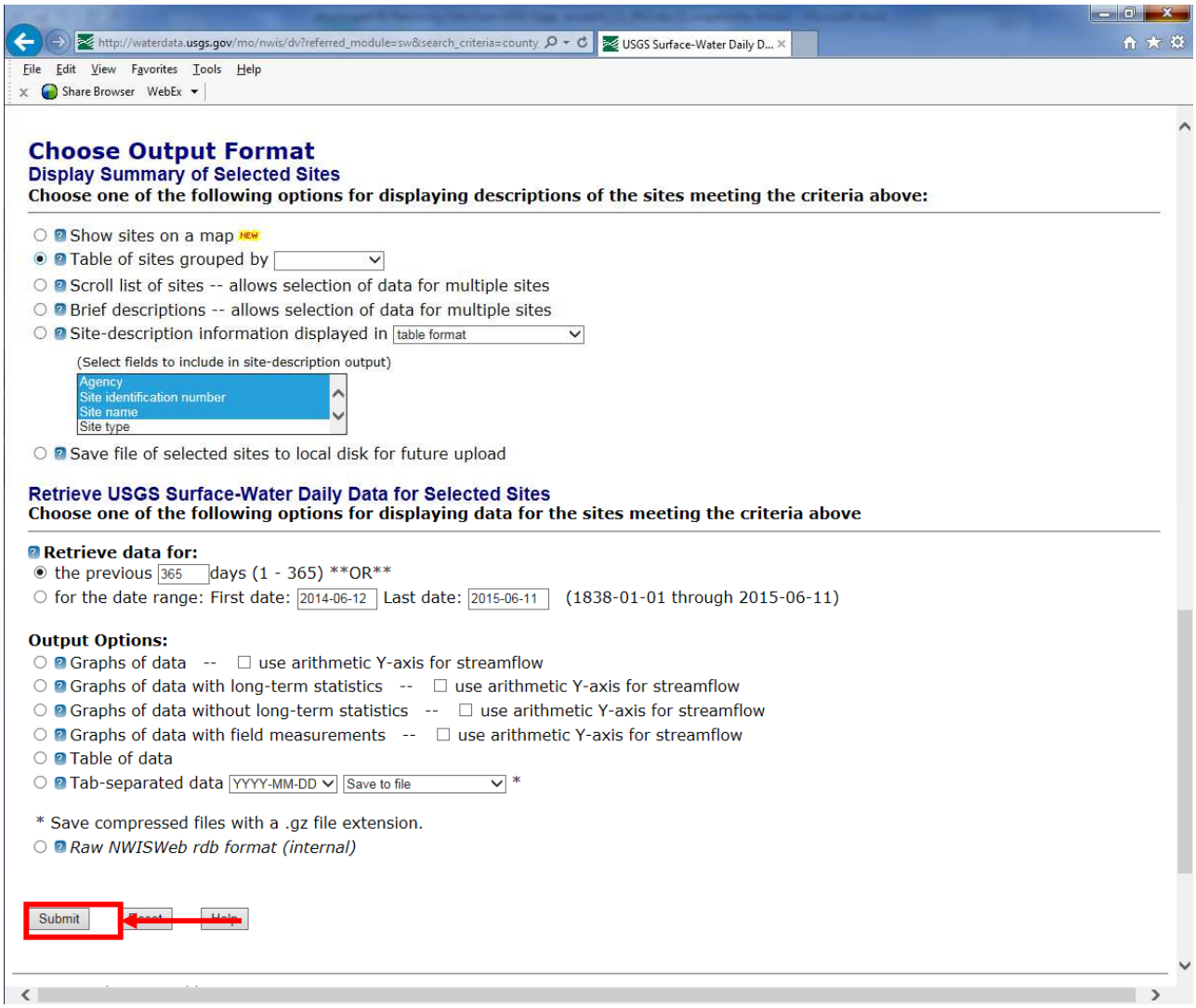


Go to Step 9

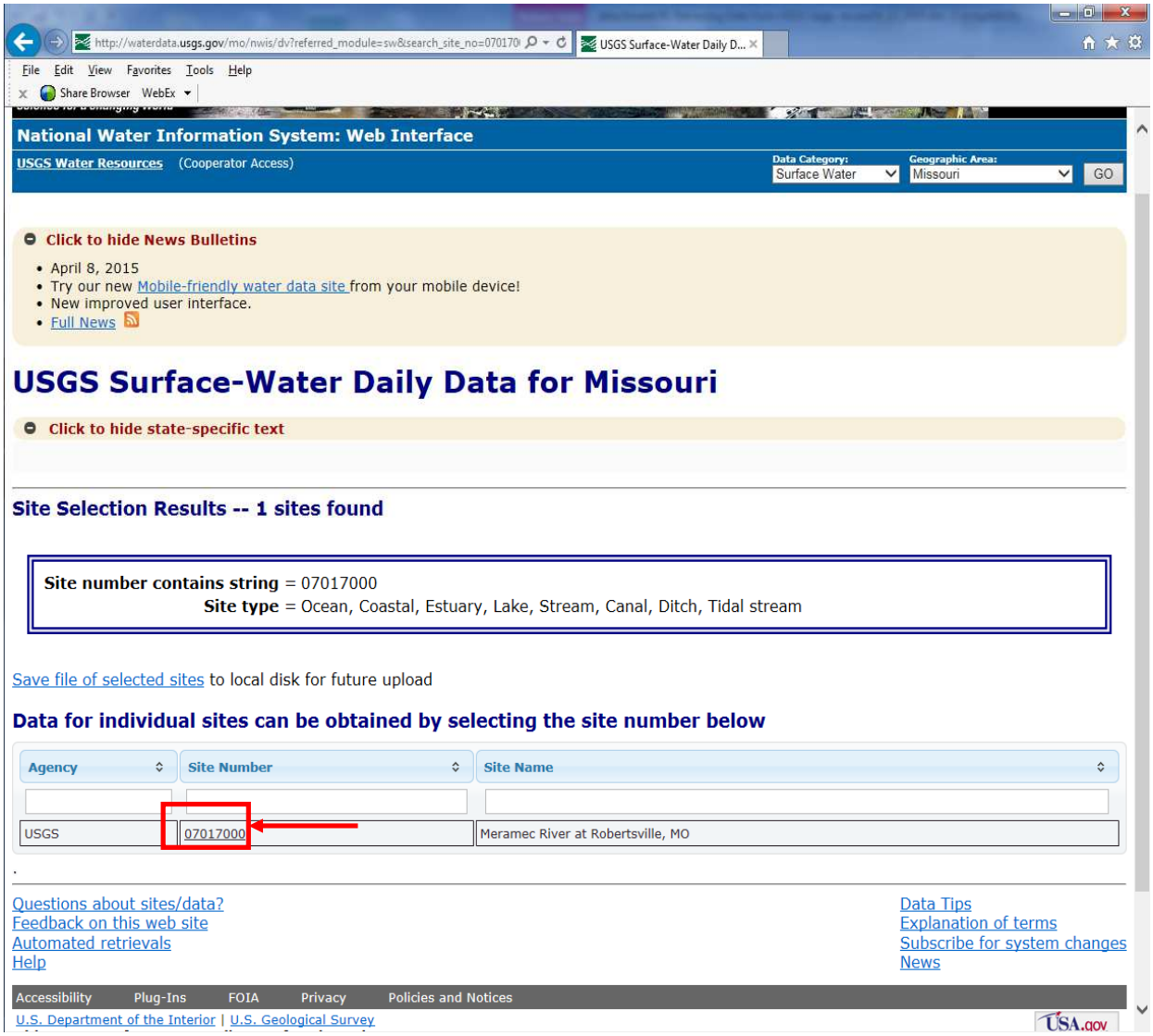
7. (**IF selecting by site number**). Type in gage number into "site number" fill-in box



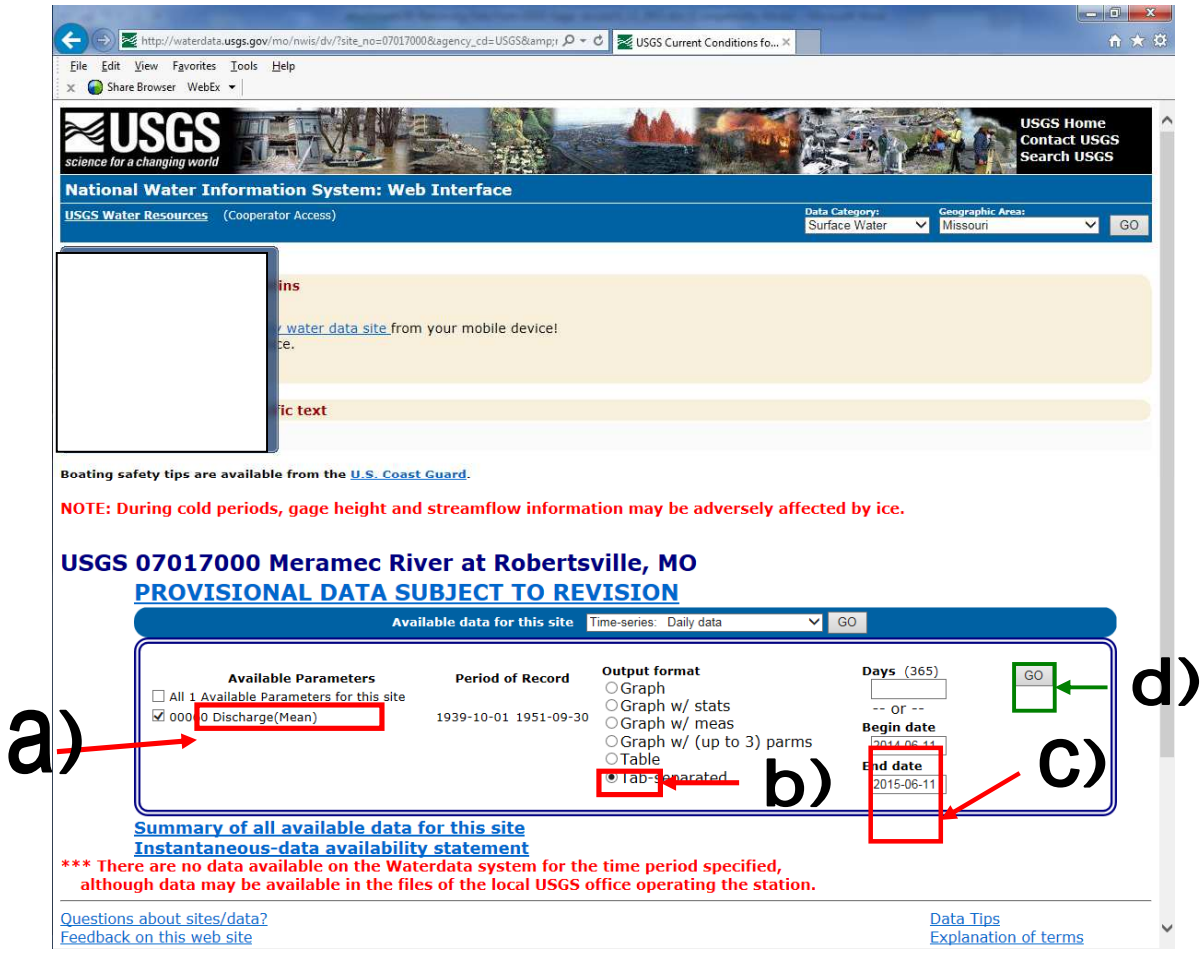
Scroll down to bottom and select the “submit” button



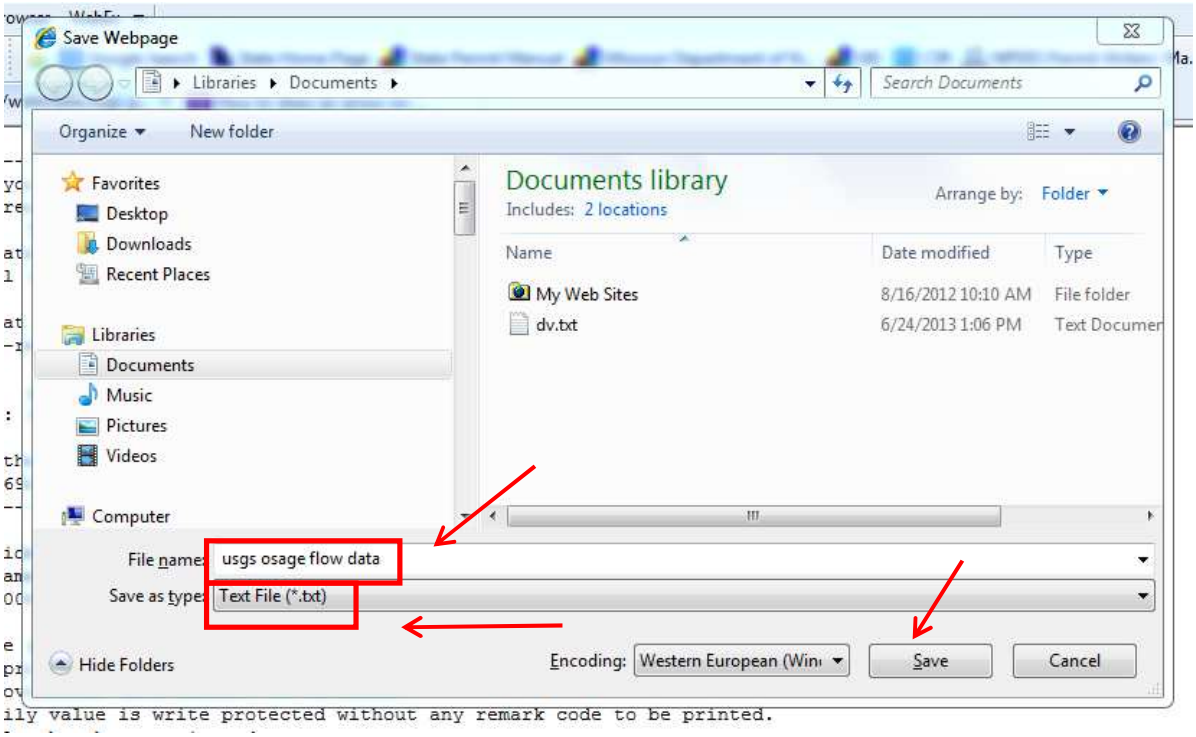
8. Click on corresponding “site number”



9. Make sure only the following are checked: a) 00060 Discharge (Mean), b) Tab-separated. c) Enter the dates ranges, and d). Click on the "GO" button.



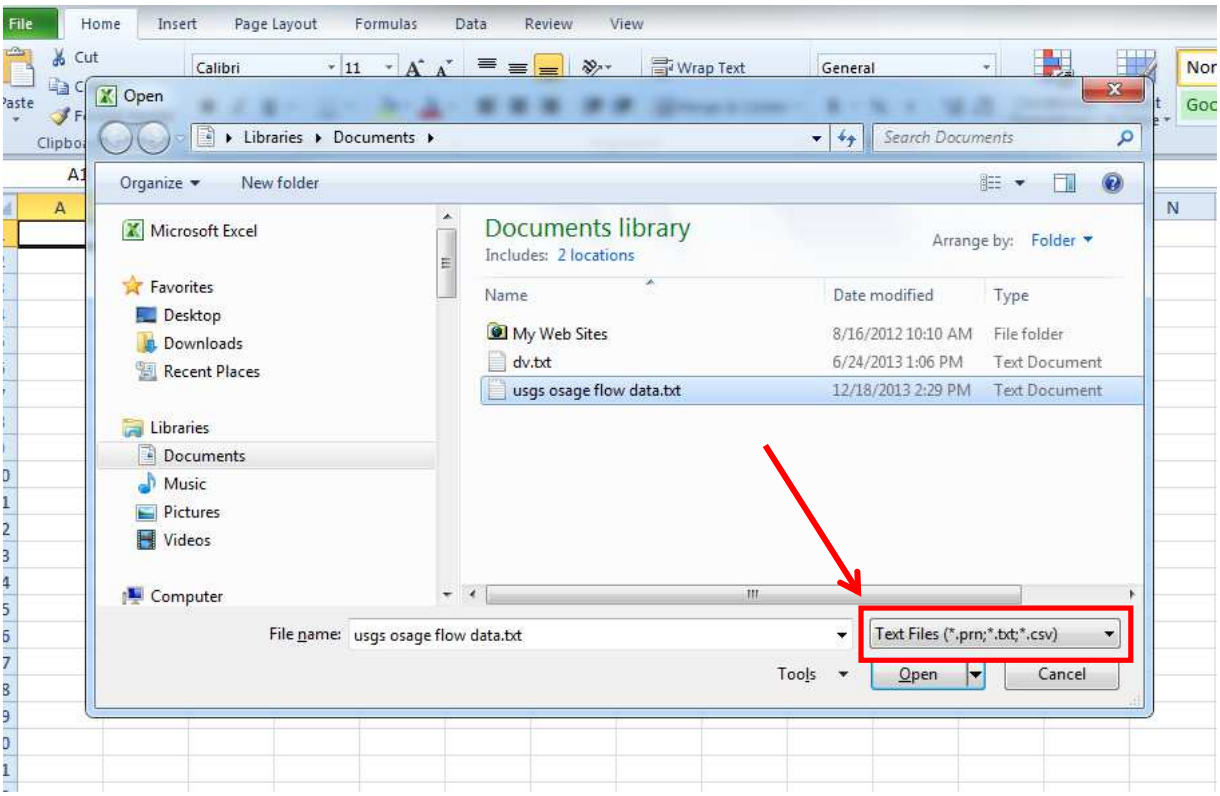
10. Save results as a text file (*.txt). Go to “File”, “Save as…” Type in desired file name and select “Text File (*.txt)” as file type. Click on the “Save” button.



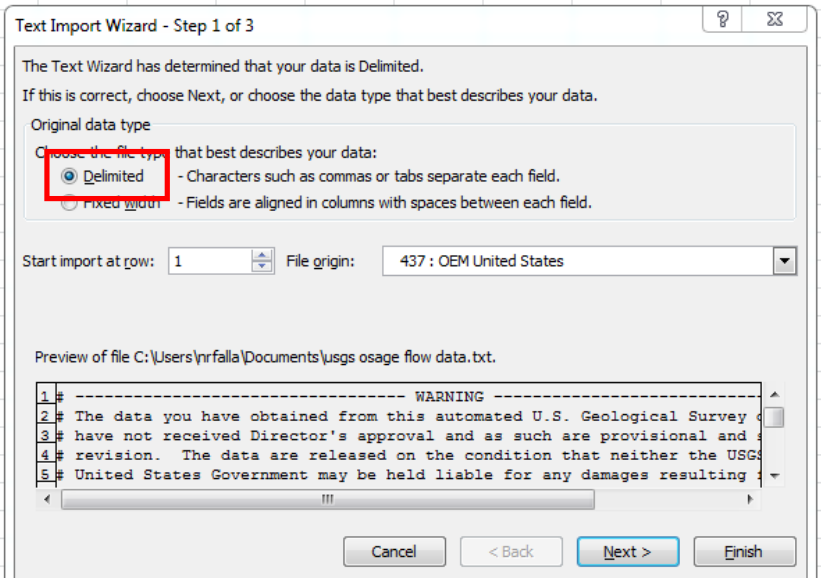
11. Close file but don’t forget where you saved this file… you’re going to need it soon!!!!!!

II. FORMATTING THE .TXT FILE FOR THE AUTOMATIC CALCULATOR

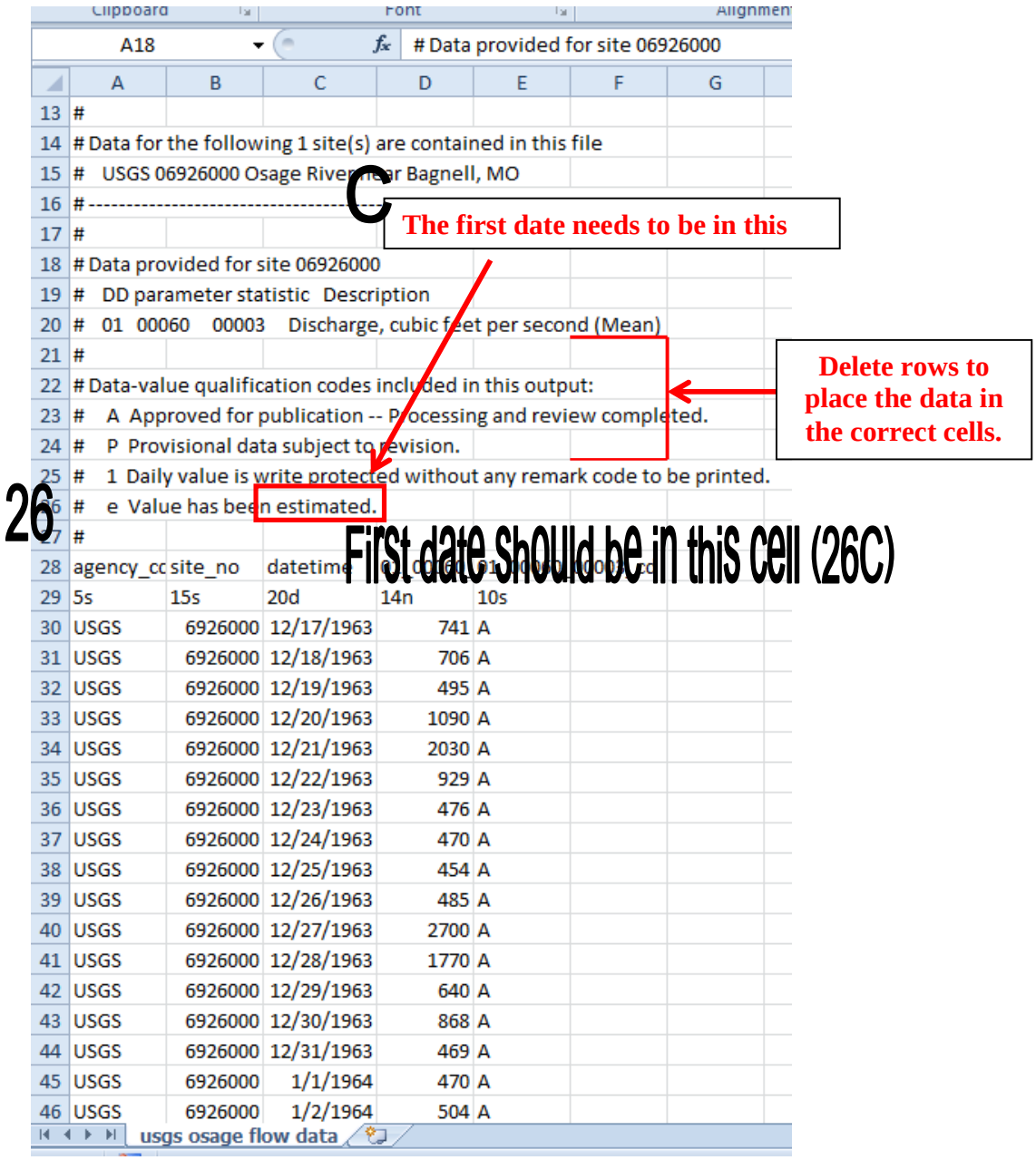
1. Open the .txt file you just saved in Microsoft Excel. Make sure that either "All Files" or "Text Filed is selected from the dropdown box in order to see your .txt file.



2. Excel will automatically open the "Text Import Wizard". Make sure "Delimited" is selected. Click the "Finish" button.

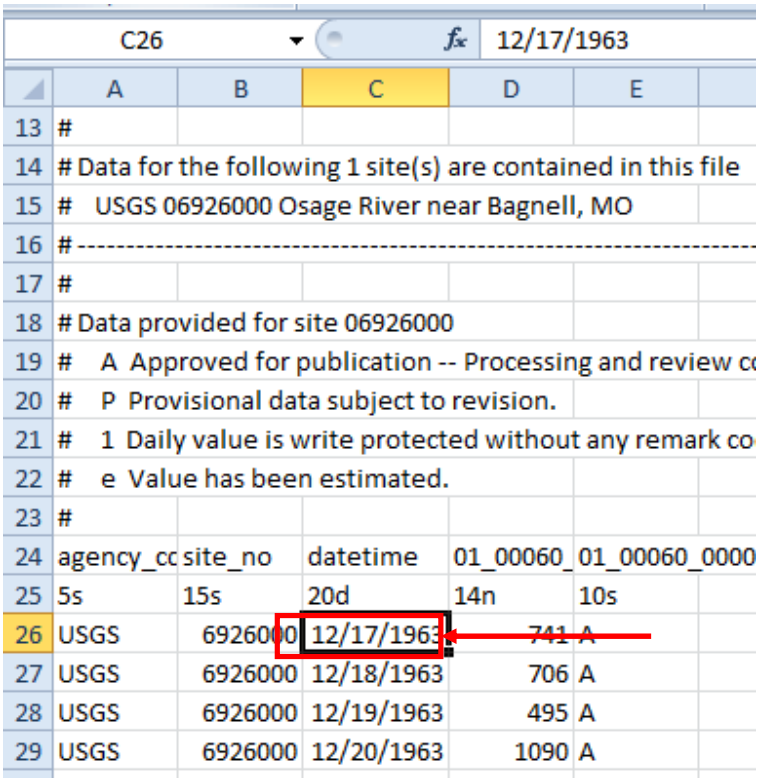


3. In order for the automatic calculator to work, the first data set date MUST be in cell C26. The first data set flow value MUST be in D26. If the data starts in the wrong cells, then you must delete or add rows in order to make the data start in the correct cells.



	A	B	C	D	E
13	#				
14	# Data for the following 1 site(s) are contained in this file				
15	# USGS 06926000 Osage River near Bagnell, MO				
16	#----------				
17	#				
18	# Data provided for site 06926000				
19	# DD parameter statistic Description				
20	# 01 00060 00003 Discharge, cubic feet per second (Mean)				
21	#				
22	# Data-value qualification codes included in this output:				
23	# A Approved for publication -- Processing and review completed.				
24	# P Provisional data subject to revision.				
25	# 1 Daily value is write protected without any remark code to be printed.				
26	# e Value has been estimated.				
27	#				
28	agency_cc	site_no	datetime	[illegible]	[illegible]
29	5s	15s	20d	14n	10s
30	USGS	6926000	12/17/1963	741	A
31	USGS	6926000	12/18/1963	706	A
32	USGS	6926000	12/19/1963	495	A
33	USGS	6926000	12/20/1963	1090	A
34	USGS	6926000	12/21/1963	2030	A
35	USGS	6926000	12/22/1963	929	A
36	USGS	6926000	12/23/1963	476	A
37	USGS	6926000	12/24/1963	470	A
38	USGS	6926000	12/25/1963	454	A
39	USGS	6926000	12/26/1963	485	A
40	USGS	6926000	12/27/1963	2700	A
41	USGS	6926000	12/28/1963	1770	A
42	USGS	6926000	12/29/1963	640	A
43	USGS	6926000	12/30/1963	868	A
44	USGS	6926000	12/31/1963	469	A
45	USGS	6926000	1/1/1964	470	A
46	USGS	6926000	1/2/1964	504	A

It should look something like this…



C26 | 12/17/1963

	A	B	C	D	E
13	#				
14	# Data for the following 1 site(s) are contained in this file				
15	# USGS 06926000 Osage River near Bagnell, MO				
16	#----------				
17	#				
18	# Data provided for site 06926000				
19	# A Approved for publication -- Processing and review c				
20	# P Provisional data subject to revision.				
21	# 1 Daily value is write protected without any remark co				
22	# e Value has been estimated.				
23	#				
24	agency_cc	site_no	datetime	01_00060_	01_00060_0000
25	5s	15s	20d	14n	10s
26	USGS	6926000	12/17/1963	741	A
27	USGS	6926000	12/18/1963	706	A
28	USGS	6926000	12/19/1963	495	A
29	USGS	6926000	12/20/1963	1090	A

IF DATA STARTS ON THE WRONG ROW, THEN YOU MUST EITHER DELETE OR ADD ROWS IN ORDER TO MAKE THE DATA START ON THE CORRECT ROW

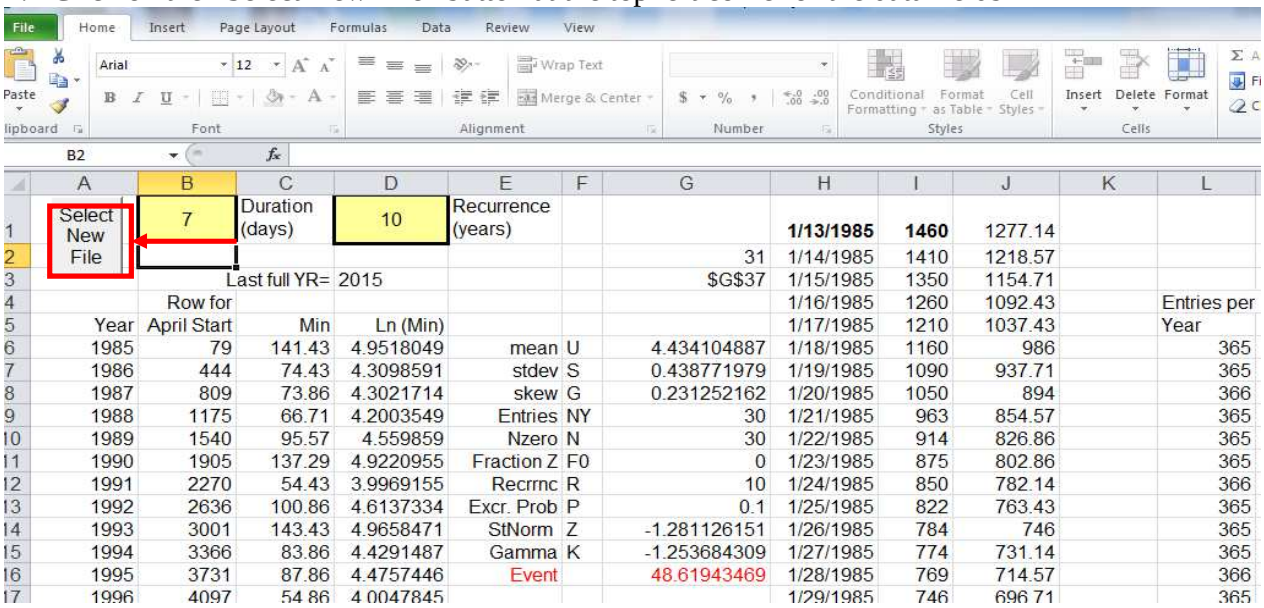
4. Save and Close the file. Make sure the file is being saved as a .txt file. Click “Yes” to the dialog box that asks if you want to keep the workbook in its current format.

You’re just a few clicks away from having low flow values!!!!!!!!!!!!

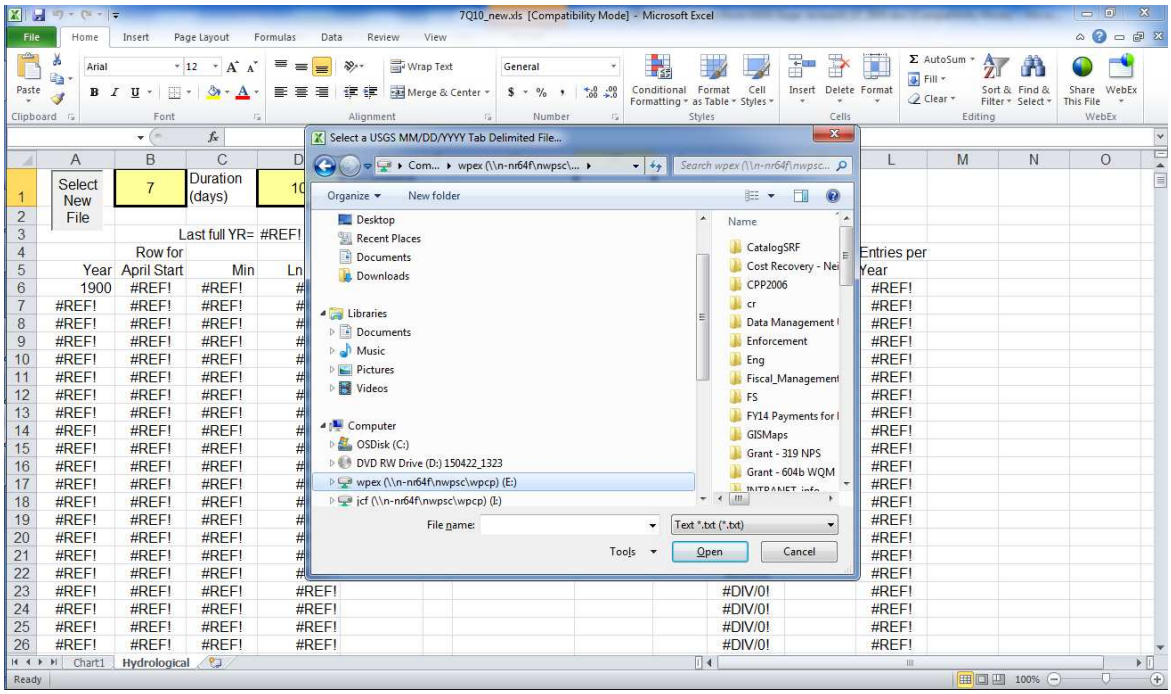
III. CALCULATING 1Q10, 7Q10, AND 30Q10 VALUES

1. Open the "xQy_Low Flow Calculator.xls" file. You can request a copy. Send us an email.

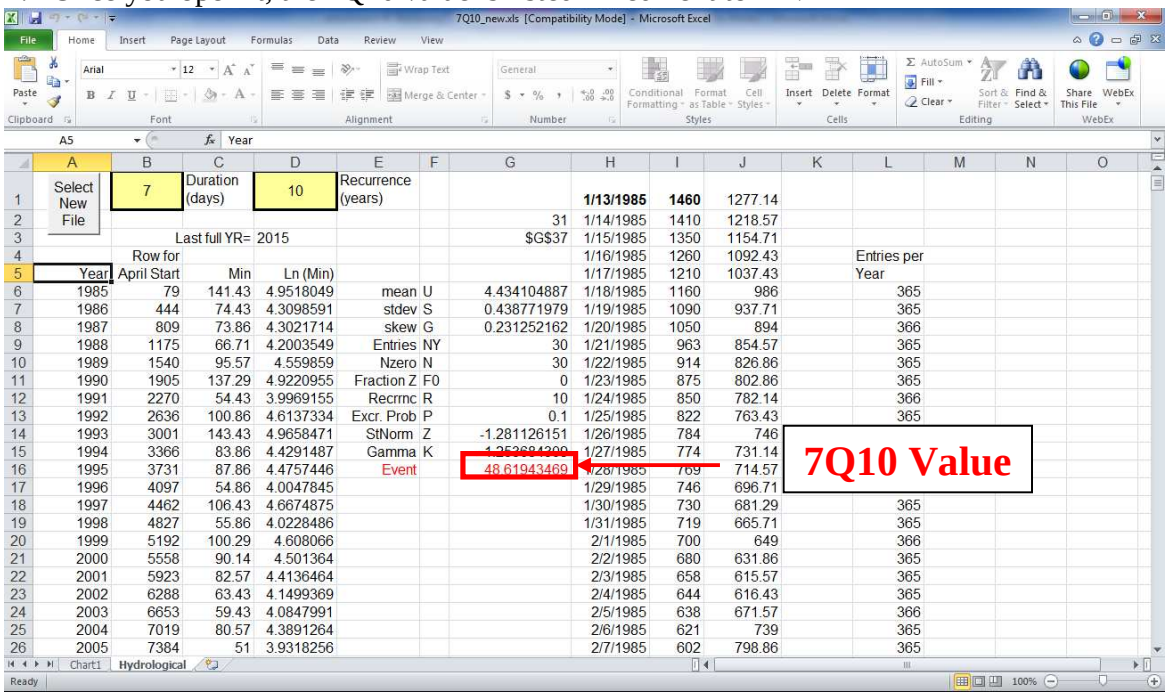
2. Click on the "Select New File" button at the top left corner of the data fields



3. Select the .txt file you just formatted and saved

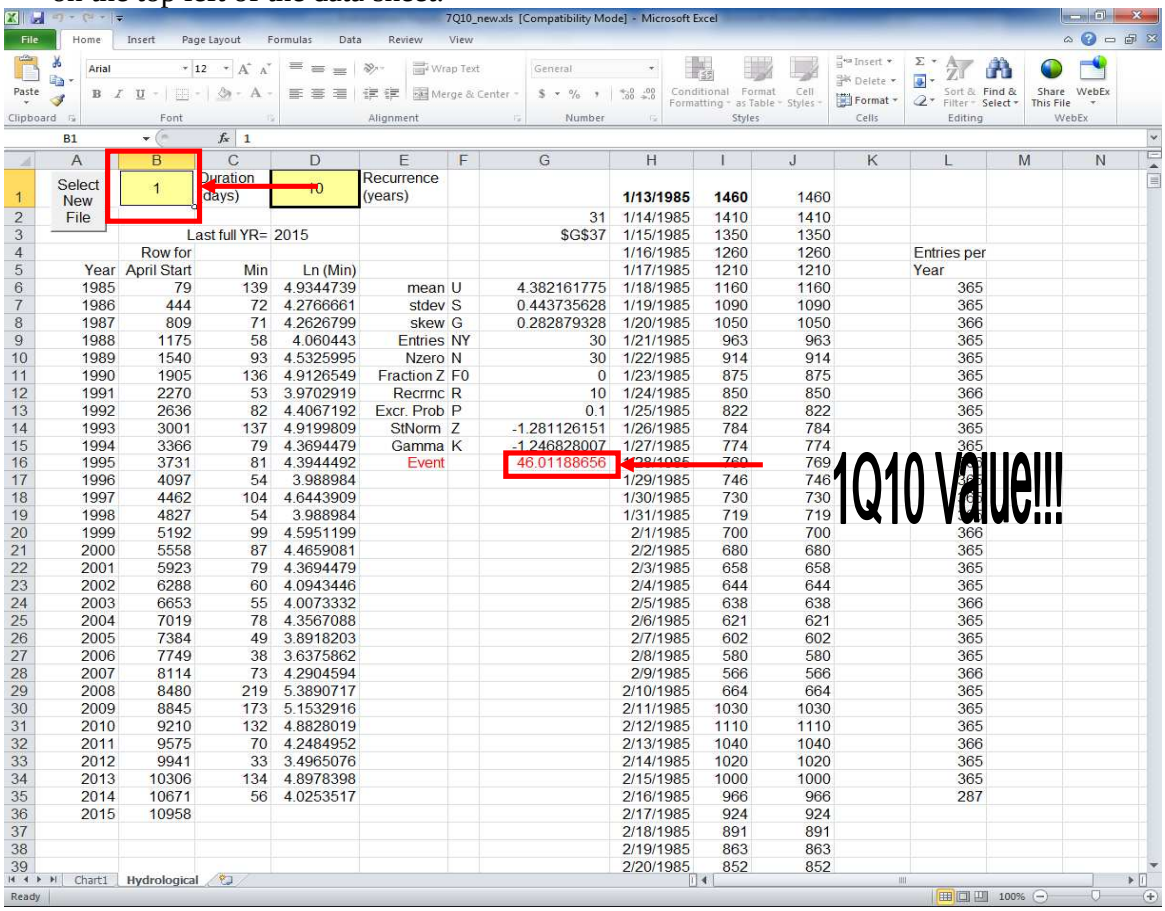


4. Once you open it, the 7Q10 value is listed in red next to "EVENT"



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	Select New File	7	Duration (days)	10	Recurrence (years)			1/13/1985	1460	1277.14					
2							31	1/14/1985	1410	1218.57					
3			Last full YR=	2015			G37	1/15/1985	1350	1154.71					
4		Row for						1/16/1985	1260	1092.43		Entries per			
5	Year	April Start	Min	Ln (Min)				1/17/1985	1210	1037.43		Year			
6	1985	79	141.43	4.9518049	mean	U	4.434104887	1/18/1985	1160	986		365			
7	1986	444	74.43	4.3098591	stdev	S	0.438771979	1/19/1985	1090	937.71		365			
8	1987	809	73.86	4.3021714	skew	G	0.231252162	1/20/1985	1050	894		366			
9	1988	1175	66.71	4.2003549	Entries	NY	30	1/21/1985	963	854.57		365			
10	1989	1540	95.57	4.559859	Nzero	N	30	1/22/1985	914	826.86		365			
11	1990	1905	137.29	4.9220955	Fraction Z	F0	0	1/23/1985	875	802.86		365			
12	1991	2270	54.43	3.9969155	Recrrnc	R	10	1/24/1985	850	782.14		366			
13	1992	2636	100.86	4.6137334	Excr. Prob	P	0.1	1/25/1985	822	763.43		365			
14	1993	3001	143.43	4.9658471	StNorm	Z	-1.281126151	1/26/1985	784	746					
15	1994	3366	83.86	4.4291487	Gamma	K	-1.253684399	1/27/1985	774	731.14					
16	1995	3731	87.86	4.4757446	Event		48.61943469	1/28/1985	769	714.57					
17	1996	4097	54.86	4.0047845				1/29/1985	746	696.71					
18	1997	4462	106.43	4.6674875				1/30/1985	730	681.29		365			
19	1998	4827	55.86	4.0228486				1/31/1985	719	665.71		365			
20	1999	5192	100.29	4.608066				2/1/1985	700	649		366			
21	2000	5558	90.14	4.501364				2/2/1985	680	631.86		365			
22	2001	5923	82.57	4.4136464				2/3/1985	658	615.57		365			
23	2002	6288	63.43	4.1499369				2/4/1985	644	616.43		365			
24	2003	6653	59.43	4.0847991				2/5/1985	638	671.57		366			
25	2004	7019	80.57	4.3891264				2/6/1985	621	739		365			
26	2005	7384	51	3.9318256				2/7/1985	602	798.86		365			

5. You can get the 1Q10, 30Q10, etc. by changing the value in the yellow-colored duration cell on the top left of the data sheet.



	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	Select New File	1	Duration (days)	10	Recurrence (years)			1/13/1985	1460	1460				
2							31	1/14/1985	1410	1410				
3			Last full YR=	2015			G37	1/15/1985	1350	1350				
4		Row for						1/16/1985	1260	1260		Entries per		
5	Year	April Start	Min	Ln (Min)				1/17/1985	1210	1210		Year		
6	1985	79	139	4.9344739	mean	U	4.382161775	1/18/1985	1160	1160		365		
7	1986	444	72	4.2766661	stdev	S	0.443735628	1/19/1985	1090	1090		365		
8	1987	809	71	4.2626799	skew	G	0.282879328	1/20/1985	1050	1050		366		
9	1988	1175	58	4.060443	Entries	NY	30	1/21/1985	963	963		365		
10	1989	1540	93	4.5325995	Nzero	N	30	1/22/1985	914	914		365		
11	1990	1905	136	4.9126549	Fraction Z	F0	0	1/23/1985	875	875		365		
12	1991	2270	53	3.9702919	Recrrnc	R	10	1/24/1985	850	850		366		
13	1992	2636	82	4.4067192	Excr. Prob	P	0.1	1/25/1985	822	822		365		
14	1993	3001	137	4.9199809	StNorm	Z	-1.281126151	1/26/1985	784	784		365		
15	1994	3366	79	4.3694479	Gamma	K	-1.246828007	1/27/1985	774	774		365		
16	1995	3731	81	4.3944492	Event		46.01188656	1/28/1985	769	769		365		
17	1996	4097	54	3.988984				1/29/1985	746	746		365		
18	1997	4462	104	4.6443909				1/30/1985	730	730		365		
19	1998	4827	54	3.988984				1/31/1985	719	719		365		
20	1999	5192	99	4.5951199				2/1/1985	700	700		366		
21	2000	5558	87	4.4659081				2/2/1985	680	680		365		
22	2001	5923	79	4.3694479				2/3/1985	658	658		365		
23	2002	6288	60	4.0943446				2/4/1985	644	644		365		
24	2003	6653	55	4.0073332				2/5/1985	638	638		366		
25	2004	7019	78	4.3567088				2/6/1985	621	621		365		
26	2005	7384	49	3.8918203				2/7/1985	602	602		365		
27	2006	7749	38	3.6375862				2/8/1985	580	580		365		
28	2007	8114	73	4.2904594				2/9/1985	566	566		366		
29	2008	8480	219	5.3890717				2/10/1985	664	664		365		
30	2009	8845	173	5.1532916				2/11/1985	1030	1030		365		
31	2010	9210	132	4.8828019				2/12/1985	1110	1110		365		
32	2011	9575	70	4.2484952				2/13/1985	1040	1040		366		
33	2012	9941	33	3.4965076				2/14/1985	1020	1020		365		
34	2013	10306	134	4.8978398				2/15/1985	1000	1000		365		
35	2014	10671	56	4.0253517				2/16/1985	966	966		287		
36	2015	10958						2/17/1985	924	924				
37								2/18/1985	891	891				
38								2/19/1985	863	863				
39								2/20/1985	852	852				

NOTES:

- There are some hangups with this calculator when you have null flow values in your dataset and you may need to make formats to the dataset (during section II) before the calculator can work properly.