

# Lesson 2

What is water quality?

# Water Quality Indicators

<b>Precipitation (rainfall + snowfall)</b>	<b>Q - Daily Discharge</b>	<b>SS - Suspended Solid</b>	<b>TP - Total Phosphorus Load</b>	<b>SRP - Soluble Reactive Phosphorus Load</b>	<b>NO - Nitrate + Nitrite Load</b>	<b>TKN - Total Kjeldahl Nitrogen Load</b>	<b>Average Biomass or Biovolume</b>
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The data you are working with come from the area shown on this map.

Precipitation data was Collected along the river and into the lake basin and averaged.

Water discharge data was collected where the Maumee River enters the lake.

Water quality data was collected at the river mouth and in the western basin of the lake.



The Maumee River enters the lake here:



Turn and Talk:  
Why do you think one part of the lake has green in it and the other part does not?





The city of Toledo is at the mouth of the Maumee River.  
Why might this matter?

The lighter blue color for this western part of the lake means that it is shallower.

# *What data will you work with?*

- Precipitation and water quality data for every day from 2002-2014.
- You need to think about the relationship between severe weather and water quality... but what counts as a severe storm? How much rain has to fall for it to be “severe?”
- A common standard is one inch, or about 25 mm, in the span of one day. **Your data is in millimeters!**
- These variables are reported by day. How else can you group the data to look at it? What “chunks” of time can you use? How can you group or organize the days?



	A	B	C	D	E	F	G	H	I
1	date	Precipitation (rainfall+sno wfall, mm H2O/day)	Q - daily discharge	SS- suspended solid	TP - total phosphorous load	Soluble reactive phos. Load	NO - nitrate + nitrite load	TKN- total Kjeldahl Nitrogen load	
2	10/11/06	6.534	41.9027981	164.72828	0.68063553	0.15929768	6.87876333	5.21337853	
3	10/12/06	4.8926	42.1859251	140.327261	0.6670101	0.19317779	7.65421425	4.48318263	
4	10/13/06	0.8883	39.920909	148.659078	0.61050248	0.16211083	8.14003303	4.10450818	
5	10/14/06	0.081915	42.1859251	95.1309485	0.59411282	0.20775724	9.0028139	3.75420985	
6	10/15/06	0	31.9933526	72.699135	0.41739808	0.13821128	6.93820642	2.98536372	
7	10/16/06	4.416	24.9151772	61.5663996	0.33904573	0.09256487	5.20946458	2.49709872	
8	10/17/06	32.676	114.100187	1195.80647	3.4602479	1.04004602	36.3769651	13.3086458	
9	10/18/06	2.8021	690.829914	14360.8617	36.369708	10.4851401	342.607424	128.527524	
10	10/19/06	2.1745	676.673564	16079.7127	46.0506134	13.3494161	323.698979	153.761887	
11	10/20/06	3.1436	554.928948	8761.30701	28.5437693	9.79693761	270.095017	90.2980384	
12	10/21/06	0.94574	444.509412	5869.65789	21.8783977	8.25720684	216.863696	69.6421786	
13	10/22/06	4.5372	278.596982	1977.01333	11.2972191	5.43197251	139.369812	37.8713593	
14	10/23/06	1.2819	222.537833	1592.33781	8.18440741	4.25563549	110.17225	25.251813	
15	10/24/06	0.31489	155.436731	616.424769	5.13015821	2.96797111	74.6693185	15.4441936	
16	10/25/06	0.0031915	142.129761	448.220415	4.31028399	2.65248245	59.0668546	13.6308126	8

new format w									
<div> <div> </div> <div> <div>Home</div> <div>Layout</div> <div>Tables</div> <div>Charts</div> <div>SmartArt</div> <div>Formulas</div> <div>Data</div> <div>Review</div> </div> <div> <div> <div>Edit</div> <div> <div>Fill</div> <div>Clear</div> </div> </div> <div> <div>Font</div> <div> <div>Calibri (Body)</div> <div>11</div> <div>A</div> <div>A</div> <div>B</div> <div>I</div> <div>U</div> <div></div> <div></div> <div>A</div> </div> </div> <div> <div>Alignment</div> <div> <div>abc</div> <div>Wrap Text</div> <div></div> <div></div> <div>Merge</div> </div> </div> </div> <div>F23</div> </div>									
	A	B	C	D	E	F	G	H	I
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4	10/13/06	0.8883	39.920909	148.659078	0.61050248	0.16211083	8.14003303	4.10450818	
5	10/14/06	0.081915	42.1859251	95.1309485	0.59411282	0.20775724	9.0028139	3.75420985	
6	10/15/06	0	31.9933526	72.699135	0.41739808	0.13821128	6.93820642	2.98536372	
7	10/16/06	4.416	24.9151772	61.5663996	0.33904573	0.09256487	5.20946458	2.49709872	
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16	10/25/06	0.0031915	142.129761	448.220415	4.31028399	2.65248245	59.0668546	13.6308126	9

# Breaking down the data

- What is the average for each variable, and then which days are above and below average? Are there patterns?
- Which days have over 25 mm of precipitation, and are the other variables higher then?
  - What about days that come right after days with heavy precipitation?
- What happens if you look at data for entire months, seasons, or years? Are there patterns there?
- What do you see if look at data by identifying the top 10% of days with the most precipitation? Do you see patterns in the other variables?



Excel File Edit View Insert Format Tools Data Window Help

new format water data to 10% coded.xlsx

Home Layout Tables Charts SmartArt Formulas Data Review

Edit Font Alignment Number Format

Paste Fill Calibri (Body) 11 A A Wrap Text Merge Conditional Formatting

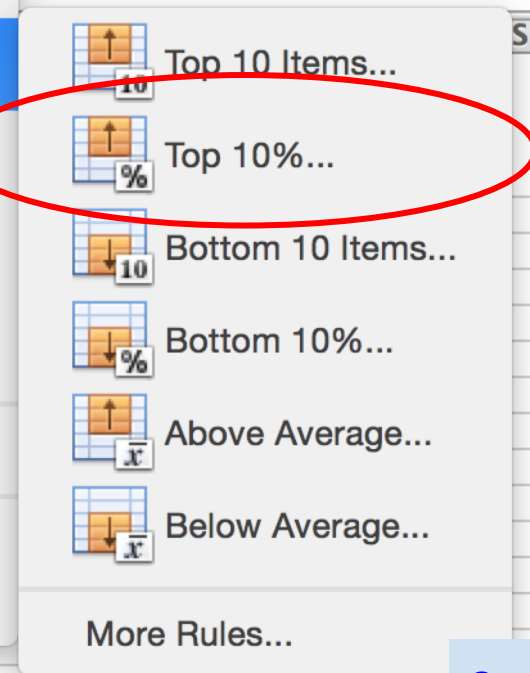
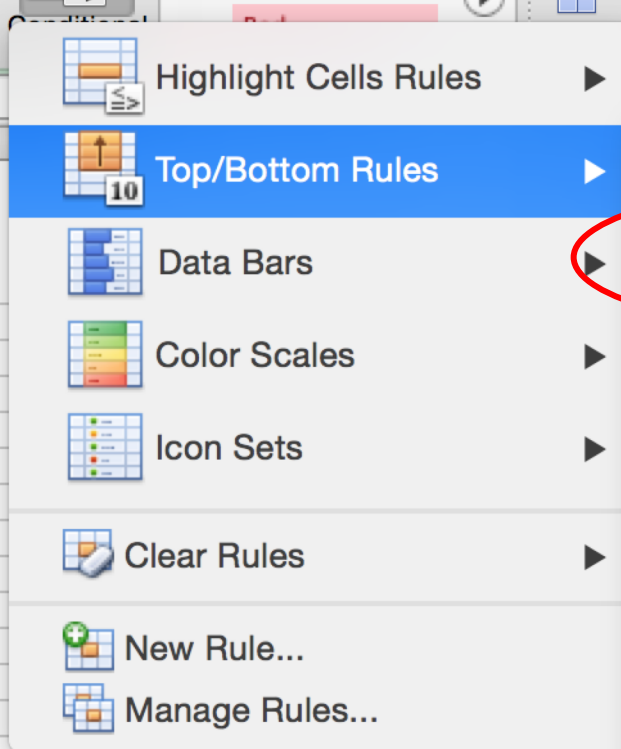
E471 1.77521996851843

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
	date	Precipitation (rainfall+snowfall, mm H2O/day)	Q - daily discharge	SS- suspended solid	TP - total phosphorous load	Soluble reactive phos. Load	NO - nitrate + nitrite load	TKN- total Kjeldahl Nitrogen load	Avg. biovolume from Bridgeman	WaterTemp_C				
1	1/1/02	0.095745	46.7159573	59.736629	0.58929377	0.330973	26.47786	4.157346		0.0200				
2	1/2/02	0	43.8846872	61.424519	0.50428772	0.242665	19.26152	3.260808		0.0100				
3	1/3/02	0.68085	41.053417	47.884706	0.46111198	0.219915	19.08294	3.050433		0.0100				
4	1/4/02	0.026596	39.637782	53.767858	0.43151275	0.205482	19.17834	3.424704		0.0100				
5	1/5/02	0.60532	38.2221469	37.317046	0.38307765	0.191539	18.16316	3.038202		0.0100				
6	1/6/02	2.3755	36.8065118	30.210785	0.35298917	0.178085	17.39505	2.766672		0.0100				
7	1/7/02	1.5638	35.9571308	26.717586	0.33086313	0.158442	12.05398	2.687292		0.1000				
8	1/8/02	0.091489	34.8246227	23.769894	0.30389359	0.138407	15.9168	2.587609		0.0800				
9	1/9/02	0	34.2583687	21.311446	0.29007246	0.085838	15.06601	2.427137		0.0800				
10	1/10/02	0.011702	33.9752417	19.961134	0.27886878	0.105677	15.05891	2.436433		0.0800				
11	1/11/02	0.046809	33.4089877	17.896527	0.28576712	0.118348	14.86566	2.569018		0.0800				
12	1/12/02	0.67021	40.77029	19.726297	0.32759743	0.133857	16.556	2.99417		0.0700				
13	1/13/02	1.333	38.7884009	17.761985	0.31837519	0.134053	15.88525	3.217265		0.0700				
14	1/14/02	0.59149	37.0896388	12.818179	0.31564766	0.171443	14.48454	2.916136		0.1500				
15	1/15/02	0.74362	38.5052739	16.301593	0.28610959	0.172996	14.10587	2.794559		0.1500				
16	1/16/02	1.1128	37.6558929	17.568733	0.27979835	0.162673	13.98992	2.960657		0.1700				
17	1/17/02	1.5574	36.8065118	16.53643	0.26076678	0.143104	13.13374	2.512265		0.2000				
18	1/18/02	0.11277	37.9390199	13.439518	0.26551244	0.144229	13.80009	2.753462		0.1300				
19	1/19/02	0.058511	43.6015602	13.185112	0.32397703	0.177057	16.2742	3.164427		0.1100				
20	1/20/02	0.045745	41.3365441	11.428728	0.28571819	0.12143	15.00021	3.250044		0.1100				
21	1/21/02	0.28723	31.9933526	11.471537	0.21146326	0.111951	11.76178	2.169917		0.1100				

In this screenshot, the Conditional Formatting tool is circled. You can use this to do a lot data sorting and highlighting. You would first select the column you want to look at by clicking in the box at the top of that column. In this example, you would be looking at Total Phosphorous.



1



2

### New Formatting Rule

Style: Classic

3

Format only top or bottom ranked values

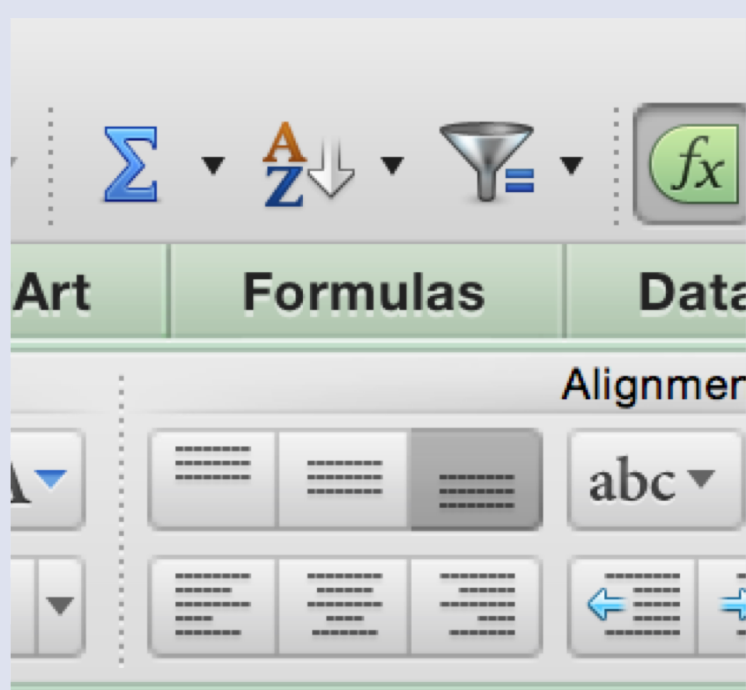
Top 10 ☒ Percent

Format with: light red fill with dark red text

AaBbCcYyZz

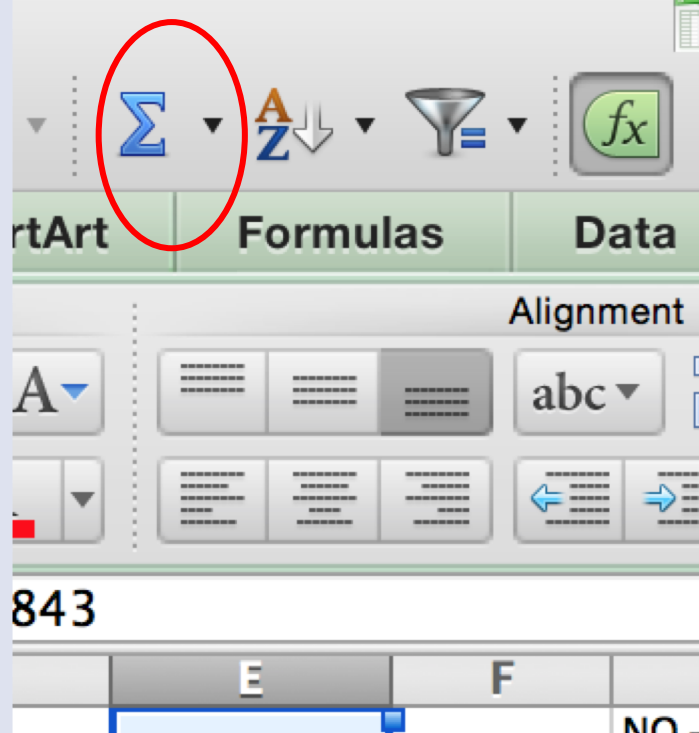
Cancel

OK



phos. Load

	E	F	
	TP - total phosphorous load	Soluble reactive phos. Load	NO <sub>3</sub> - nitrate load
529	0.58929377	0.330973	2
519	0.50428772	0.242665	1
706	0.46111198	0.219915	1
358	0.43151275	0.205482	1
046	0.38307765	0.191539	1



3	2.35394608
	4.68777697

To find the average for a column, or the sum, click on the top box for a variable column. Then click on the function symbol (circled above), and choose Average or Sum. Then click, and scroll all the way down to the bottom of the column. There you will see the average or the sum.