Chittenden County STREAM TEAM

2016 Volunteer Water Quality Monitoring Report

Monitoring Team

The Chittenden County Stream Team (CCST) is a program that engages citizens across a nine-town region to engage the community and implement projects that reduce non-point source pollution and stormwater volume at the local level. The participating towns are Burlington, Colchester, Essex, Essex Junction, Milton, Shelburne, South Burlington, Williston, and Winooski. The project is managed by the Chittenden County's Municipal Stormwater Separate System Committee and coordinated by the Winooski Natural Resources Conservation District. This report describes the results from the 2016 collection season, CCST's fifth, consecutive year facilitating a volunteer-led stream water quality monitoring effort in Chittenden County.

When, Where, and What CCST Monitors

The CCST has collected biweekly water quality samples at several pollutant "impaired" or "stressed" stream sites in Chittenden County since 2012. These urban or suburban streams suffer from excessive nutrient loads, sodium chloride, sedimentation, high temperatures, bacteria, or other pollutants. Samples were collected on seven different dates in 2016: on five bi-weekly "base-flow" (i.e. low flow) dates on two "high-flow" dates (i.e. during a rain event). High-flow sampling provides a snapshot of the potentially, elevated pollutant-loads moving through these systems when it rains. Samples were taken and analyzed for turbidity, total phosphorous, and chloride for all 15 sites. *E. coli* was sampled and analyzed at Wheeler Nature Park. The specific sampling sites and their locations are listed in Table 1 and a map of the sites is shown in Figure 1.

Table 1. Chittenden County Stream Team 2015 Water Quality Sampling Sites

Stream	*Location*	*Site ID*	*Lat / Long*
Centennial Brook	Grove Street in Burlington	Cent 10	44.48453 / -73.18423
Englesby Brook	Champlain School Community Gardens	Englesby 10	44.45627 / -73.21394
Indian Brook	Essex High School	Indian 10	44.49668 / -73.11093
	Lang Farm in Essex	Indian 20	44.50442 / -73.09190
Malletts Creek	McMullen Road	Milton 10	44.60779/ -73.20103
Monroe Brook	Route 7 and Bay Road	Monroe 10	44.38987/ -73.21730
	Spear & Webster Intersection	Monroe 20	44.38984 / -73.20103
Morehouse Brook	Landry Park Winooski	Morehouse 10	44.50037 / -73.19370
Muddy Brook	River Cove Road in Williston	Muddy 10	44.47293 / -73.13505
	Marshall Avenue in South Burlington	Muddy 20	44.45340 / -73.13833
	Van Sicklen Road in Williston	Muddy 30	44.42823 / -73.14622
Potash Brook	Kindness Court in South Burlington	Potash 10	44.44572 / -73.21348
	Farrell Street in South Burlington	Potash 20	44.44660 / -73.20415
	Dorset Street in South Burlington	Potash 30	44.45150 / -73.17849
Tributary to Potash Brook	Wheeler Nature Park, S. Burlington	Wheeler 10	44.44188 / -73.16740

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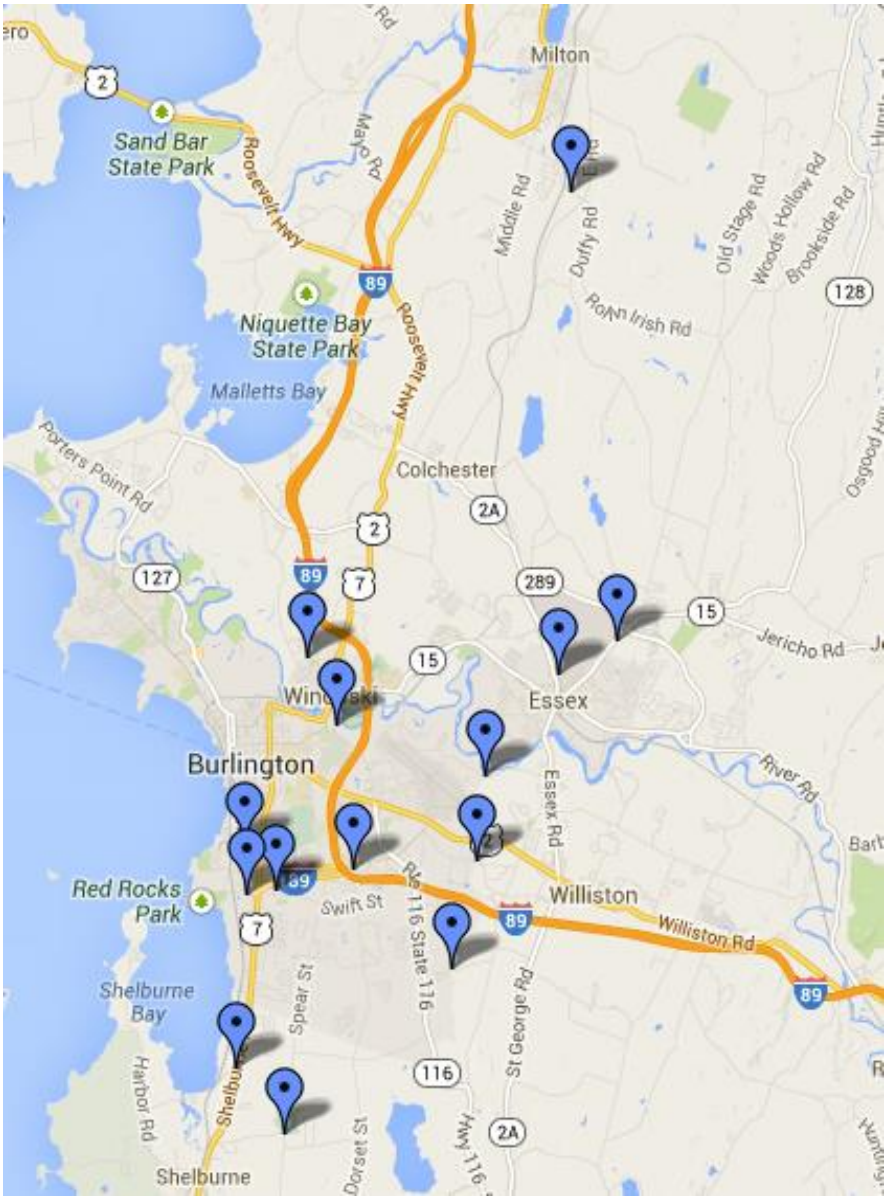

Figure 1 - 2016 Chittenden County Stream Team water quality monitoring sites

Base-flow sampling dates occurred: July 5th, July 19th, August 2nd, August 17th, and August 30th. Sampling during "high-flow" events occurred at Indian, Muddy, Potash, Centennial and Morehouse brooks on August 2nd and October 13th. Data is presented during both baseflow and high-flow conditions to illustrate of the difference in pollutant concentration between dry and rain events.

The 2016 results are similar to those obtained from the past four years (2012-2015), and indicate that all Chittenden County streams sampled have sustained phosphorus levels well above the Vermont standard. Chloride levels also continue to exceed the standard on several streams and turbidity surpassed standards on several occasions over this five-year span.

Chloride Results

Chloride is a component of salt found naturally in minerals and in oceans. Elevated chloride levels in surface waters can lead to poor health and reduced reproduction in aquatic species, according to the Vermont Surface Water Management Strategy. Chloride in water is most commonly sourced by road deicing salts. The Environmental Protection Agency's (EPA) and State of Vermont's (VT) current water quality standard for chloride is 230 mg/L (chronic criteria) and 860 mg/L (acute criteria). This is the concentration of chloride above which chronic or acute health effects have been observed in of aquatic species.

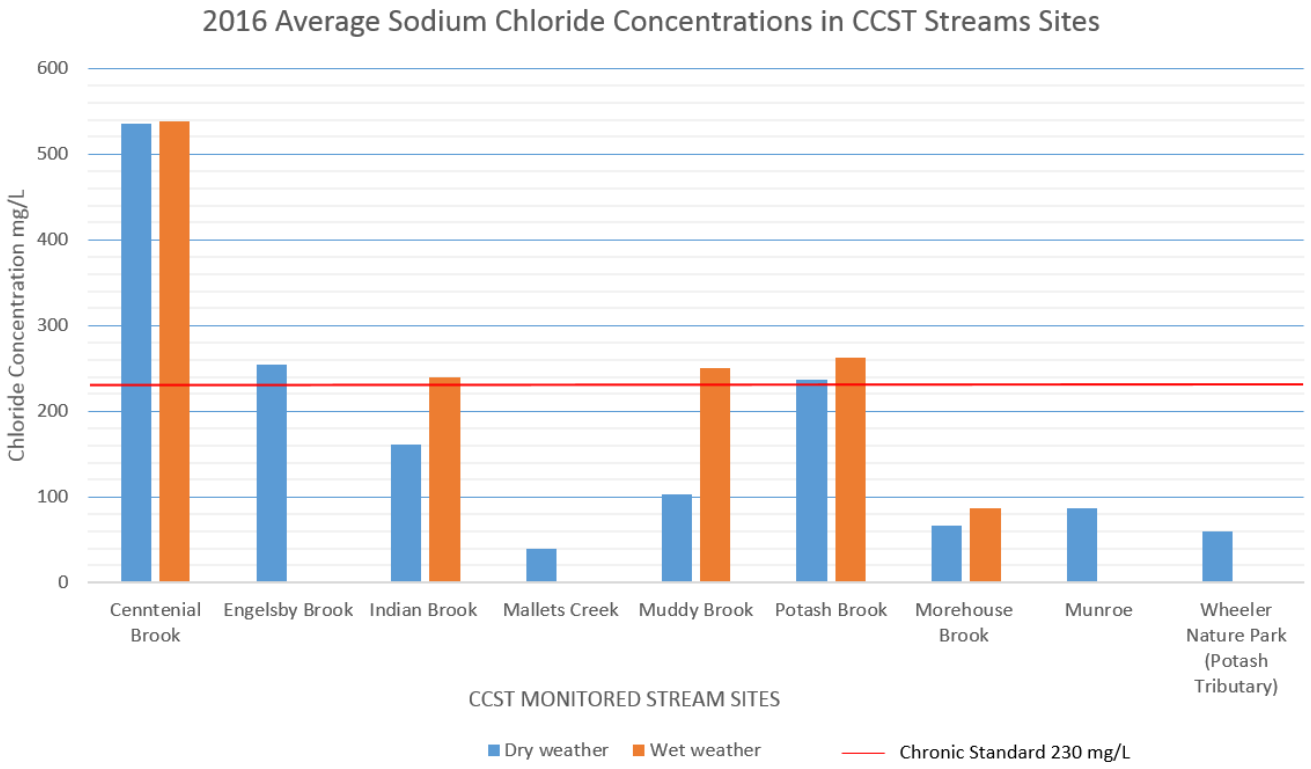

Figure 2 – Comparison of baseflow and high-flow mean chloride levels in Chittenden County Streams in 2016

The mean concentration of chloride in CCST stream sites during both baseflow (dry weather) and high-flow (wet weather) events in 2016 is illustrated in Figure 2. Average chloride levels exceeded the proposed Vermont state standard of 230 mg/L in Centennial, Englesby, Muddy and Potash Brooks. While a low level of chloride in streams can originate from natural sources, higher levels are generally due to the use of road salt. Chloride levels in Chittenden County streams were higher during wet conditions, but in most cases only slightly. This is a typical pattern seen in streams affected by chloride in the groundwater with rain having a diluting effect resulting in lower chloride readings. A summary of average 2016 chloride data for CCST streams is shown in Table 2. Raw chloride data can be found in Appendix C.

Table 2 - 2016 CCST Chloride Results Summary: This graph depicts mean chloride levels in mg/L during baseflow conditions and high flow rain events in 2016. Overall mean values exceeding the Vermont chronic chloride standard of 230 mg/L are shown in red. Note that the mean rain event values were calculated based only on two samples.

Site ID	Average Chloride in Dry Conditions Only	Average Chloride during Rain Events	Average Chloride Concentrations
Centennial 10	535.5	537.75	536.14
Englesby 10	254.4	--	254.4
Indian 10	221.08	239.75	226.41
Indian 20	102.38	--	102.38
Milton 10	39.4	--	39.4
Munroe 10	121.41	--	121.41
Munroe 20	51.52	--	51.2
Morehouse 10	66.63	86.8	72.39
Muddy 10	150.2	--	150.2
Muddy 20	131.25	250	170.83
Muddy 30	29.26	--	29.26
Potash 10	259.08	--	259.08
Potash 20	239.4	262.5	245.74
Potash 30	212.7	--	212.7
Wheeler 10	59.6	--	59.6

Chloride levels in Chittenden County Streams 2012-2016

A comparison of the mean levels of chloride from 2012-2016 is shown in Figure 3. Average chloride level exceeded the EPA and VT's chronic criterion of 230 mg/L in Centennial and Potash Brook in all five years. From 2014-2016, mean chloride levels also exceeded this standard in Englesby Brook. None of the individual samples for any of the CCST monitoring sites in any year had chloride levels that exceeded the EPA's and VT's acute standard, which is 860 mg chloride/L.

In 2016, Centennial Brook had the highest average chloride value of all five years of sampling appears to be in an upward trend. The highest known chloride concentration was collected on 8/2/16, at 608 mg/L, 260% over EPA's and VT's chronic standard. Of the 29 samples the CCST has collected in Centennial Brook over the past five years, only 1 sampling date had a chloride level below 230 mg/L (210 mg/L on 9/10/13). Potash and Englesby Brook are similarly affected and while their chloride levels are somewhat lower than those of Centennial Brook, most samples collected from these brooks surpassed the 230mg/L from 2012 – 2014.

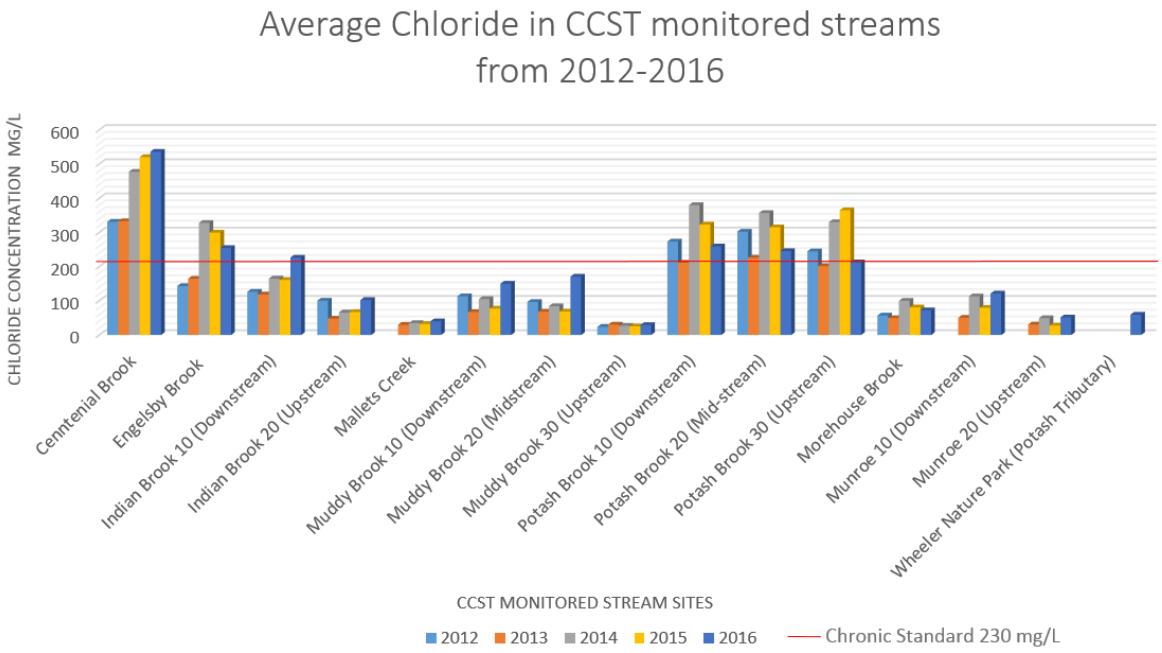

Figure 3 - Mean chloride levels in Chittenden County Streams 2012-2016. Overall mean chloride levels for each year were calculated by averaging baseflow and high-flow pollutant concentrations at each site (Note: CCST only began collecting samples during rain events in 2015; however, several regular sampling dates fell during rain events). EPA's and Vermont's standard for 4-day average chloride levels (230 mg/L) is shown by the red line.

The high chronic levels of chloride in Centennial, Potash, and Englesby Brooks are of major concern since sustained elevated chloride can interfere with the survival and reproduction of freshwater aquatic organisms. When recommending the 230mg/L criterion, the EPA stated, "Freshwater aquatic organisms and their uses should not be affected unacceptably if the four-day average concentration of dissolved chloride, when associated with sodium, does not exceed 230 mg/L more than once every three years on the average."

Phosphorus Results

Phosphorus is an essential nutrient for plants and animals in the aquatic food web and is naturally limited in most fresh waters. Therefore, even a modest increase can set off a chain of undesirable events. Such events include algal blooms, accelerated plant growth, low dissolved oxygen, and death of aquatic animals. Although phosphorus naturally occurs in soils and rocks, additional phosphorus enters waterways through runoff from wastewater treatment plants, fertilized lawns and cropland, failing septic systems, animal manure storage areas, pet waste, and from erosion. The VT water quality standard for phosphorus in Class B warm water medium-gradient streams is 27 µg/L.

The mean concentration of total phosphorus in CCST stream sites during baseflow (dry weather) and high-flow (wet weather) events in 2016 is depicted in Figure 4. Mean phosphorus levels exceeded the proposed Vermont state standard of 27 µg/L in all samples and at all sites in 2016. Even though Vermont experienced a drought in the summer of 2016, which reduced the amount of runoff moving phosphorus overland into these streams systems, phosphorus concentrations still more than doubled the

chronic standard in all streams. Morehouse Brook experienced a significant flush of phosphorus on 10/13, exceeding 789 µg/L in that sample. This is the highest collected phosphorus sample collected to date. A summary of the 2016 phosphorus results in shown in Table 3. Raw data is presented in Appendix C.

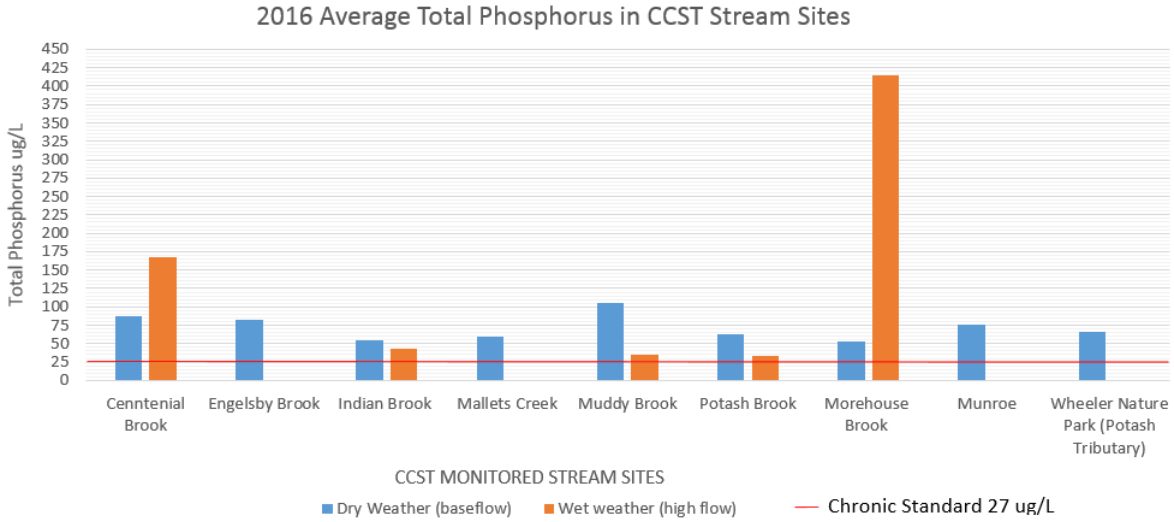

Figure 4 - Comparison of baseflow and high-flow mean phosphorus levels in Chittenden County Streams in 2016

Table 3 - 2016 CCST Phosphorus Results Summary: This graph depicts mean phosphorus levels in µg/L during both baseflow conditions and high flow rain events. Overall mean values exceeding the Vermont chronic chloride standard of 27 µg/L are shown in red. Note that the mean rain event values were calculated based on only one or two samples.

Site ID	Average Phosphorus in Dry Conditions Only	Average Phosphorus during Rain Events	Average Phosphorus Concentrations
Centennial 10	87.28	167.5	110.2
Englesby 10	81.9	--	81.9
Indian 10	50.86	43.75	48.83
Indian 20	58.08	--	58.08
Milton 10	59.98	--	59.98
Munroe 10	67.32	--	67.32
Munroe 20	85.14	--	85.14
Morehouse 10	52.5	415.1	156.1
Muddy 10	64.24	--	64.24
Muddy 20	131.6	35.65	104.19
Muddy 30	122.08	--	122.08
Potash 10	50.94	--	50.94
Potash 20	50.6	33	43.3
Potash 30	85.94	--	85.94
Wheeler 10	66.18	--	66.18

Phosphorous levels in Chittenden County Streams 2012-2016

Mean phosphorous levels in base-flow conditions exceeded the 27 µg/L standard at all stream sites and all sampling dates since the onset of this monitoring program in 2012. Muddy Brook, which forms the border between South Burlington and Williston, had particularly high levels in all years, especially at the most upstream site (Muddy 30). The Muddy Brook watershed upstream from Muddy 30 includes the Vermont National Country Club, Shelburne Pond, agricultural farmland, and suburban development. As of 2016, the small Morehouse Brook stream system showed the highest known annual phosphorus concentration, surpassing an average of 156 µg/L for the whole year; nearly six times above the standard.

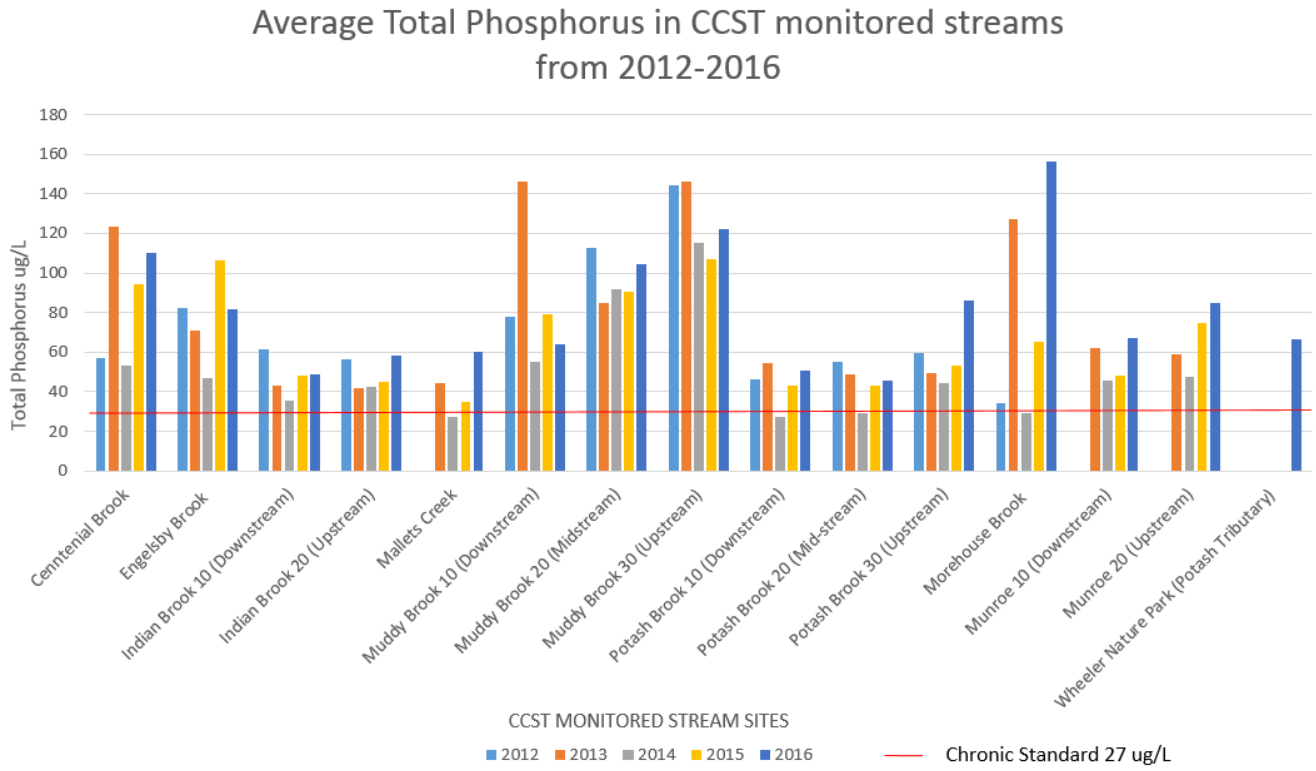

Figure 5 - Comparison of mean total phosphorus levels 2012-2016 during dry conditions. Overall mean total phosphorus levels for each year were calculated by averaging baseflow and high-flow pollutant concentrations at each site. (Note: CCST only began collecting samples during rain events in 2015; however, several regular sampling dates fell during rain events). The standard proposed by the State of Vermont for mean total phosphorus at base-flow in medium gradient, warm water streams (27 µg/L) is indicated by the red line.

The State of Vermont's base-flow phosphorus standard is 27 µg/L for class B, "warm water medium-gradient" streams. We are assuming most of the streams monitored by the CCST would fall under the first category, although the streams monitored are not listed as warm-water streams in the 2014 Vermont Water Quality Standards.

Turbidity Results

The turbidity of a water sample refers to its cloudiness. This measurement is based on the amount of algae, microbes, and sediment suspended in the water. High turbidity levels can negatively impact aquatic life by raising water temperature, decreasing forage and cover, and harming gill function, and has the potential to increase the presence and number disease-causing organisms. Turbidity measurements can also be used as an indicator for erosion and increase nutrient levels in streams. The Vermont Water Quality Standards state that turbidity should not exceed 10 NTU (nepholometric turbidity units) in cold-water fish habitat and 25 NTU in warm-water fish habitat.

The mean concentration of turbidity in CCST stream sites during baseflow (dry weather) and high-flow (wet weather) events in 2016 is depicted in Figure 6. Average turbidity levels exceeded the VT Water Quality standard for turbidity of 25 nephelometric units (NTU) for warm-water fish habitat at Centennial, Morehouse, Munroe Brook (see Table 4) in 2016. Turbidity levels at some sites were quite high after some rain events, particularly Centennial Brook where the average turbidity was more than 7 times that of baseflow conditions. A summary of the 2016 turbidity results in shown in Table 4. Raw data is presented in Appendix C.

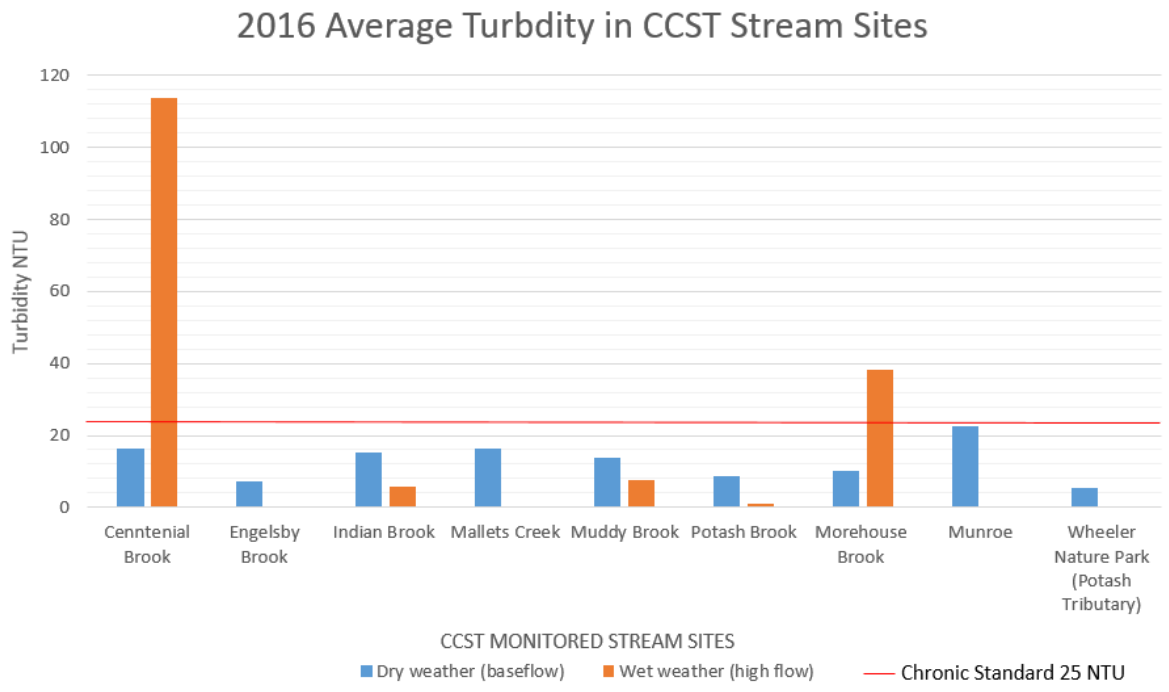

Figure 6 – Comparison of baseflow and high-flow mean turbidity levels in Chittenden County Streams in 2016

Table 4. 2016 CCST Turbidity Results Summary: This graph depicts mean turbidity levels in NTU during both baseflow conditions and high flow rain events. Overall mean values exceeding the Vermont standard of 25 NTU are shown in red. Note that the mean rain event values were calculated based on only one or two samples.

Site ID	Average Turbidity in Dry Conditions Only	Average Turbidity during Rain Events	Average Turbidity Concentrations
Centennial 10	16.34	113.9	44.22
Englesby 10	7.1	--	7.1
Indian 10	16.35	5.8	12.81
Indian 20	14.06	--	14.06
Milton 10	16.41	--	16.41
Munroe 10	13.96	--	13.96
Munroe 20	31.5	--	31.5
Morehouse 10	10.1	38.1	18.1
Muddy 10	11.52	--	11.52
Muddy 20	14.22	7.73	12.1
Muddy 30	15.89	--	15.89
Potash 10	6.27	--	6.27
Potash 20	5.22	1.17	4.1
Potash 30	6.5	--	6.5
Wheeler 10	5.32	--	5.32

Turbidity Levels in Chittenden County Streams 2012-2016

Figure 4 shows a comparison of turbidity levels from all four years of CCST sampling. Mean values exceeded the VT standard for warm-water streams of 25 NTU over this five-year span in Centennial, Munroe, Morehouse, and Muddy Brook. Mean turbidity levels surpassed the 10 NTU standard for cold-water fish habitat in all streams from 2012 – 2016.

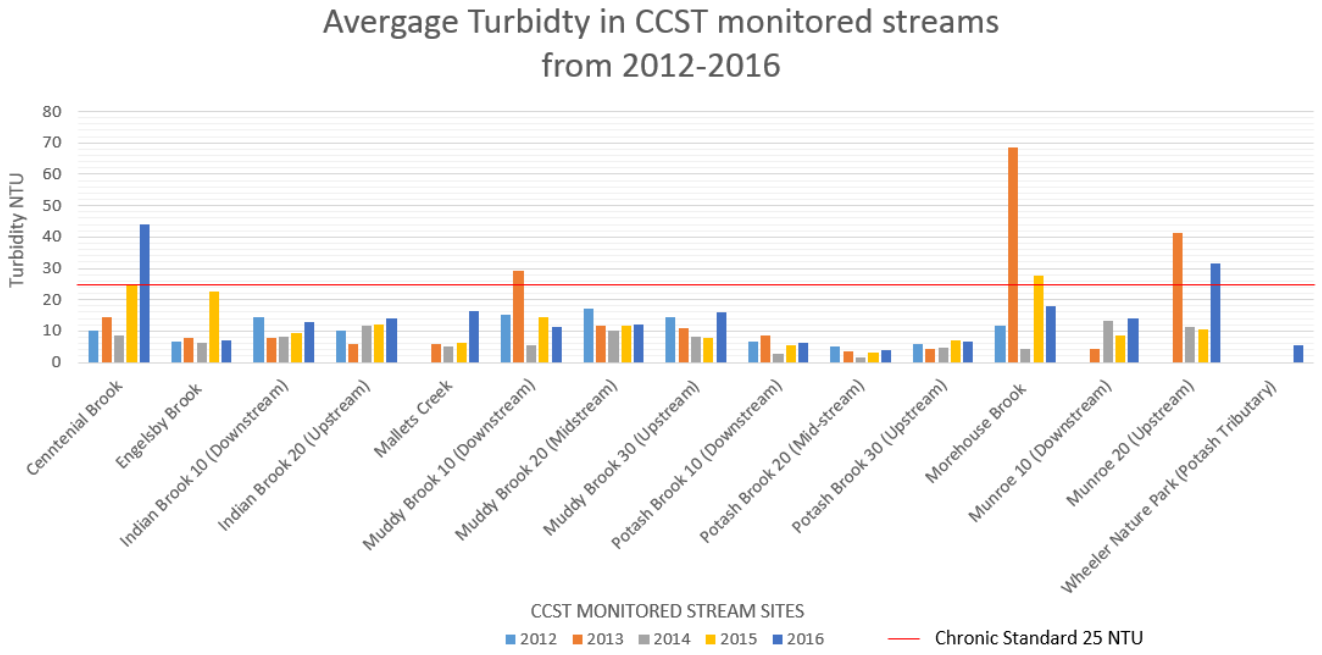

Figure 7 - Comparison of mean turbidity levels 2012-2016 during dry conditions. Overall mean turbidity levels for each year were calculated by averaging baseflow and high-flow pollutant

concentrations at each site. (Note: CCST only began collecting samples during rain events in 2015; however, several regular sampling dates fell during rain events). The standard proposed by the State of Vermont for mean turbidity at base-flow in medium gradient, warm water streams (25 NTU) is indicated by the red line.

E. coli Results

The presence of *E. coli* in surface waters is used as an indicator of fecal contamination. Sources of fecal matter in streams include leaks or overflows from sewer or septic systems, pet waste, and wildlife. While not necessarily a health hazard per se, the presence of *E. coli* is often associated with the presence of pathogenic bacteria or viruses that can cause illness in humans. In 2015, CCST began *E. coli* sampling at Wheeler Brook at the request of one of its volunteers and continued sample collection in 2016. The results of the 2015 and 2016 *E. coli* sampling is shown in Table 5.

The Vermont standard for *E. coli* is a geometric mean of <126 mpn (most probable number)/100mL over a 60-day "representative period", with no more than 10% of samples above 235 mpn/100mL. The geometric mean level of *E. coli* at the Wheeler Brook sampling site in 2016 was 816.35 mpn/mL, with 100% of the samples had E. coli counts of over 235 mpn/mL. This result is nearly eight times over standard, and is up from 2015.

Table 5. 2015-2016 CCST *E. coli* Results: Geometric mean *E. coli* level at Wheeler Nature Park.

Year	Geometric Mean E. Coli	% of samples above 235 mpn/100mL
2016	816.35	100%
2015	750.6	83%

Conclusion

The Chittenden County Stream Team has monitored chloride, phosphorus, and turbidity in Burlington area streams for the past five years (2012-2016). Phosphorus levels in these mainly urban and suburban streams are consistently above the 2014 Vermont water quality standard of 27 µg/L, even in dry summers like that of 2016. Muddy Brook continues to have especially high levels, with one site averaging concentrations of over 100 µg/L in all sampling years. Centennial, Englesby, and Morehouse Brooks also had particularly high phosphorus concentrations over this five-year span.

Chloride levels are also a problem in several streams, most notably in Centennial Brook where the average chloride concentration in 2016 was more than double the Vermont chronic standard. While turbidity has been slightly elevated in Centennial, Morehouse, Munroe, and Muddy Brooks over the past five years, this pollutant is not as much of a concern as these stream sites don't regularly surpass state standards.

CCST monitored E. *coli* at a tributary to Potash Brook in South Burlington's Wheeler Nature Park in 2015 and 2016. *E. coli* was well above the 126 mpn/100 ml standard in both years, showing that fecal contamination is likely a concern at this site. This sampling analysis does not determine where the *E. coli* is likely sourced from, and these high numbers could be from upstream beaver activity or other wildlife. However, it is likely some of the problem is due to dog owners not picking up after their pets, and CCST will work on raising awareness in this park about this important practice.

As expected, concentrations of phosphorus and turbidity tended to be higher during rain events. Going forward, CCST will continue to monitor and compare results between baseflow and high-flow conditions to better capture and understand the pollutant loads moving through these stream systems during and immediately after rainfall. Climatologists predict that the Northeast will continue to experience increased and more flashy rain events in future years, so it is important to understand how these stream systems are affected by these events.

Appendix A. Quality Assurance Measures for phosphorus, chloride, and turbidity and *E. coli* sampling in 2016.

Site ID	Date	Sample Type	Relative Percent Difference Between Duplicate Pairs (RPD)
Centennial 10	7/5/16	Chloride	0.48 %
		Phosphorus	0.73 %
		Turbidity	0.77 %
Wheeler 10		*E. coli*	6.8%
Indian 10	7/19/16	Chloride	0.66 %
		Phosphorus	3.74%
		Turbidity	3.7 %
Wheeler 10		*E. coli*	23.53%
Munroe 10	8/2/16	Chloride	0.84 %
		Phosphorus	33.46 %
		Turbidity	14.3 %
Wheeler 10		*E. coli*	15 %
Morehouse 10	8/17/16	Chloride	0.61 %
		Phosphorus	1.9 %
		Turbidity	15.4 %
Potash 30	8/30/16	Chloride	0.81 %
		Phosphorus	2.2 %
		Turbidity	3.7 %
Wheeler 10		*E. coli*	60 %
Indian 10 (rain)	8/1/16	Chloride	1.8 %
		Phosphorus	3.4 %
		Turbidity	6.6 %
Centennial 10 (rain)	10/13/16	Chloride	1.5 %
		Phosphorus	2.8 %
		Turbidity	2.4 %
Mean Relative Percent Difference (Mean RPD)		**Chloride**	**0.96 %**
		Phosphorus	**6.89 %**
		Turbidity	**6.7 %**
		E. coli	**26.33 %**

Target RPD for duplicate field samples:
Chloride ≤5%, Phosphorus ≤30%, Turbidity ≤15%, *E. coli* ≤50%

Chittenden County STREAM TEAM

Winooski Natural Resources Conservation District

Appendix B – Project Completeness

Parameter	Number of Samples Anticipated	Number of Valid Samples Collected & Analyzed	Percent Complete *
Chloride	119	118	99
Total phosphorus	119	119	100
Turbidity	119	116	97
E. coli	15	12	80

Appendix C – Individual Sample Results

Sample Number	Location	Date	Chloride (mg/L)	E. coli (mpn/ 100 ml)	TP (µg P/L)	Turbidity (NTU)	Flow category from field sheet*
161231-19	Wheeler 10-Blank	8/30/2016		< 1			Baseflow
161231-18	Wheeler 10-Dup	8/30/2016		160.71			Baseflow
161231-17	Wheeler 10	8/30/2016	33.6	298.66	46.3	4.78	Baseflow
161231-16	Potash 30-blank	8/30/2016	33.4		< 5	< 0.2	Baseflow
161231-15	Potash 30-Dup	8/30/2016	248		137	5.08	Baseflow
161231-14	Potash 30	8/30/2016	246		134	5.27	Baseflow
161231-13	Potash 20	8/30/2016	252		35.5	0.81	Baseflow
161231-12	Potash 10	8/30/2016	320		41.1	2.98	Baseflow
161231-11	Muddy 30	8/30/2016	30		114	9.63	Baseflow
161231-10	Muddy 20	8/30/2016	147		184	23.9	Baseflow
161231-09	Muddy 10	8/30/2016	172		62.3	16.4	Baseflow
161231-08	Morehouse 10	8/30/2016	75		107	36.4	Baseflow
161231-07	Munroe 20	8/30/2016	47.85		72.7	26.8	Baseflow
161231-06	Monroe 10	8/30/2016	166		70.8	4.84	Baseflow
161231-05	Milton 10	8/30/2016	51.5		38	6.67	Baseflow
161231-04	Indian 20	8/30/2016	190.8		44.6	4.04	Baseflow
161231-03	Indian 10	8/30/2016	297.5		37.3	7.92	Baseflow
161231-02	Engelsby 10	8/30/2016	235.5		77.3	7.48	Baseflow
161231-01	Centennial 10	8/30/2016	550		54.2	7.11	Baseflow
161088-17	Potash 30	8/17/2016	27		52.9	8.24	Baseflow
161088-16	Wheeler 10	8/17/2016	135		139	5.97	Baseflow
161088-15	Potash 20	8/17/2016	122		105	15.4	Baseflow
161088-14	Potash 10	8/17/2016	119		105	14.1	Baseflow
161088-13	Muddy 30	8/17/2016	25.8		176	34.9	Baseflow
161088-12	Muddy 20	8/17/2016			185		Baseflow
161088-11	Muddy 10	8/17/2016	160		73.6	8.03	Baseflow
161088-10	Morehouse 10-Blank	8/17/2016	< 2		< 5	< 0.2	Baseflow
161088-09	Morehouse 10-Dup	8/17/2016	40.9		41.9	4.06	Baseflow
161088-08	Morehouse 10	8/17/2016	40.65		41.1	3.48	Baseflow
161088-07	Munroe 20	8/17/2016	27.6		141	23.3	Baseflow
161088-06	Monroe 10	8/17/2016	40.65		94.5	25.1	Baseflow
161088-05	Milton 10	8/17/2016	40.9		62.1	20.2	Baseflow

161088-04	Indian 20	8/17/2016	109		47.8		Baseflow
161088-03	Indian 10	8/17/2016	280		36.2		Baseflow
161088-02	Englesby 10	8/17/2016	324			5.38	Baseflow
161088-01	Centennial 10	8/17/2016	442.5		108	11.8	Baseflow
161087-07	Potash 20	10/13/2016	235		22.9	1.25	Freshet
161087-06	Muddy 20	10/13/2016	374		38.6	4.76	Freshet
161087-05	Morehouse 10	10/13/2016	106		789	68.6	Freshet
161087-04	Indian 10	10/13/2016	317.5		45.8	5.14	Freshet
161087-03	Cent 10 - Blank	10/13/2016	< 2		< 5	0.25	Freshet
161087-02	Cent 10 -Dup	10/13/2016	520		148	167.8	Freshet
161087-01	Cent 10	10/13/2016	528		144	163.8	Freshet
160954-07	Potash 20	8/1/2016	290		43.1	1.09	Freshet
160954-06	Muddy 20	8/1/2016	126		32.7	10.7	Freshet
160954-05	Morehouse 10	8/1/2016	67.6		41.2	7.59	Freshet
160954-04	Indian 10 -Blank	8/1/2016	< 2		< 5	< 0.2	Freshet
160954-03	Indian 10 - Dup	8/1/2016	165		40.3	6.04	Freshet
160954-02	Indian 10	8/1/2016	162		41.7	6.45	Freshet
160954-01	Cent 10	8/1/2016	547.5		191	64	Freshet
160953-19	Wheeler 10-Blank	8/2/2016		< 1			Baseflow
160953-18	Wheeler 10-Dup	8/2/2016		1299.65			Baseflow
160953-17	Wheeler 10	8/2/2016	36.6	1119.87	37.4	4.29	Baseflow
160953-16	Potash 30	8/2/2016	244		84.9	5.27	Baseflow
160953-15	Potash 20	8/2/2016	318		140	1.01	Baseflow
160953-14	Potash 10	8/2/2016	366		28	2.31	Baseflow
160953-13	Muddy 30	8/2/2016	30.75		96.7	11.5	Baseflow
160953-12	Muddy 20	8/2/2016	137		94	11.7	Baseflow
160953-11	Muddy 10	8/2/2016	148		63.1	12.8	Baseflow
160953-10	Morehouse 10	8/2/2016	64		35	3.11	Baseflow
160953-09	Munroe 20	8/2/2016	35.8		50.4	6.61	Baseflow
160953-08	Monroe 10-Blank	8/2/2016	< 2		5	< 0.2	Baseflow
160953-07	Monroe 10-Dup	8/2/2016	118		76.7	18.2	Baseflow
160953-06	Monroe 10	8/2/2016	119		54.6	21	Baseflow
160953-05	Milton 10	8/2/2016	47.1		65.5	17.8	Baseflow
160953-04	Indian 20	8/2/2016	92.2		49.2	12.1	Baseflow
160953-03	Indian 10	8/2/2016	173.4		36.6	9.38	Baseflow
160953-02	Englesby 10	8/2/2016	290		83.6	10.1	Baseflow
160953-01	Centennial 10	8/2/2016	607.5		99.5	26.3	Baseflow
160794-19	Wheeler-Blank	7/19/2016		< 1			Baseflow
160794-18	Wheeler-Dup	7/19/2016		920.84			Baseflow
160794-17	Wheeler	7/19/2016	33.8	726.99	46.2	7.14	Baseflow
160794-16	Potash 30	7/19/2016	262.5		66.2	5.55	Baseflow
160794-15	Potash 20	7/19/2016	165.2		49.6	7.86	Baseflow
160794-14	Potash 10	7/19/2016	172.4		52.2	9.23	Baseflow
160794-13	Muddy 30	7/19/2016	26.8		136	17.2	Baseflow
160794-12	Muddy 20	7/19/2016	104		105	31.3	Baseflow
160794-11	Muddy 10	7/19/2016	103		127	56.3	Baseflow
160794-10	Morehouse 10	7/19/2016	54.5		52.6	3.88	Baseflow
160794-09	Munroe 20	7/19/2016	37.85		72.8	45.2	Baseflow

160794-08	Munroe 10	7/19/2016	75.4		66.4	9.32	Baseflow
160794-07	Milton 10	7/19/2016	24.4		89.9	29.7	Baseflow
160794-06	Indian 20	7/19/2016	20.9		90.4	26.8	Baseflow
160794-05	Indian 10-Blank	7/19/2016	< 2		9.56	0.24	Baseflow
160794-04	Indian 10-Dup	7/19/2016	76		105	44	Baseflow
160794-03	Indian 10	7/19/2016	76.5		109	42.4	Baseflow
160794-02	Engelsby 10	7/19/2016	155		95.9	6.59	Baseflow
160794-01	Centennial 10	7/19/2016	552.5		106	23.4	Baseflow
160792-19	Wheeler 10-Blank	7/5/2016		1299.65			Baseflow
160792-18	Wheeler 10-Dup	7/5/2016		1046.24			Baseflow
160792-17	Wheeler 10	7/5/2016	59	1119.87	62	4.73	Baseflow
160792-16	Potash 30	7/5/2016	284		91.7	8.14	Baseflow
160792-15	Potash 20	7/5/2016	290		34.9	1.03	Baseflow
160792-14	Potash 10	7/5/2016	318		28.4	2.71	Baseflow
160792-13	Muddy 30	7/5/2016	29		127	11.9	Baseflow
160792-12	Muddy 20	7/5/2016	104		101	9.59	Baseflow
160792-11	Muddy 10	7/5/2016	123		59.1	7.56	Baseflow
160792-10	Morehouse 10	7/5/2016	99		26.8	3.46	Baseflow
160792-09	Munroe 20	7/5/2016	108.5		88.8	55.6	Baseflow
160792-08	Munroe 10	7/5/2016	206		50.3	9.55	Baseflow
160792-07	Milton 10	7/5/2016	35.8		44.4	7.66	Baseflow
160792-06	Indian 20	7/5/2016	99		58.4	13.3	Baseflow
160792-05	Indian 10	7/5/2016	278		35.2	5.56	Baseflow
160792-04	Englesby 10	7/5/2016	268		70.8	5.96	Baseflow
160792-03	Centennial 10-Blank	7/5/2016	< 2		< 5	< 0.2	Baseflow
160792-02	Centennial 10-Dup	7/5/2016	522.5		69.2	13	Baseflow
160792-01	Centennial 10	7/5/2016	525		68.7	13.1	Baseflow