2015 Volunteer Water Quality Monitoring Report

The Monitoring Team

The Chittenden County Stream Team (CCST) is a program to engage citizens across an eight-town area to implement projects to reduce non-point source pollution and stormwater volume at the local level. The participating towns are Burlington, Essex, Essex Junction, Milton, Shelburne, South Burlington, Williston, and Winooski. The project is managed by the Chittenden County Regional Planning Commission, and run by the Winooski Natural Resource Conservation District and the Friends of the Winooski River. This report describes the results of the forth year of a stream water quality monitoring effort by the CCST.

When, Where, and What We Monitor

During the summers of 2012-2015, the CCST has collected biweekly water quality samples at fourteen sites on eight area streams. These urban or suburban streams suffer from sedimentation, excessive nutrient loads, high temperatures, bacteria, and other pollutants. In 2015, samples were collected on a total of six sampling dates and analyzed for turbidity, total phosphorous, and chloride. These parameters were also sampled at five of the sites during a rain event on 8/11. 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

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

Report prepared by:
Shawn White
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Friends of the Winooski River
PO Box 777
Montpelier VT 05601

info@winooskiriver.org • 802-882-8276

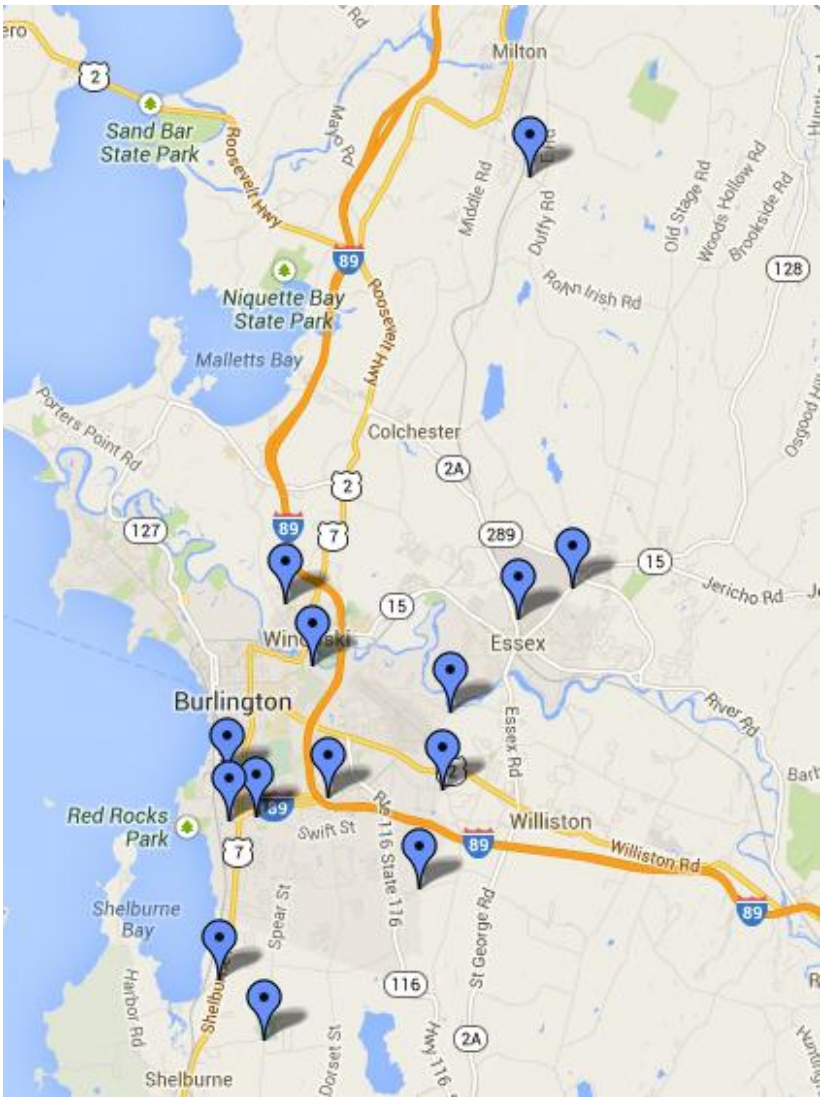

Figure 1. Chittenden County Stream Team water quality monitoring sites.

2015 Water Quality in Chittenden County Streams

All of the monitoring sites were sampled on each of the biweekly sampling dates during both rainy and dry conditions. The only regular biweekly sampling date that was not dry was on 6/23. Rain was falling at most sites during the sampling on this date, and most streams' flow categories were described as "freshets". On all other dates (with the exception of a designated rain event sampling on 8/11), stream flows were categorized as "baseflow" at all sites, with medium or low flow levels (see field sheet flow data in Appendix C). Since stormwater runoff has a great affect on water quality, we analyzed the sampling data in two ways: one method in which only the dry weather, baseflow conditions are included, and another where only rain event data are included. In the case of chloride data, an overall mean was also calculated because Vermont's standards for chloride levels in streams do not consider flow levels.

The 2015 results are similar to those obtained in 2012-2014, and indicate that all Chittenden County streams sampled have phosphorus levels well above the Vermont standard. Chloride levels also exceed the standard on several streams. Turbidity levels, however, are below state standards on all streams sampled.

Chloride Results

A summary of 2015 chloride data for CCST streams is shown in Table 2. Mean chloride levels were high in Centennial, Englesby, and Potash Brooks, where they exceeded the proposed state standard of 230 mg/L. While a low level of chloride in streams can originate from natural sources, higher levels are usually due to the use of road salt. Chloride levels in Chittenden County streams were generally highest during dry conditions. 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. Raw chloride data can be found in Appendix C.

Site ID	Min Chloride	Mean Chloride	Mean Chloride, Dry Conditions Only	Mean Chloride, Rain Events	Max Chloride
Centennial 10	433.8	520.5	525.5	508.0	582.3
Engelsby 10	99.9	278.5	314.3	99.9	423.5
Indian 10	45.7	161.2	182.0	109.0	286.2
Indian 20	11.7	67.1	77.8	13.4	183.6
Milton 10	17.6	30.7	33.3	17.6	48.4
Monroe 10	43.9	79.5	85.8	48.1	152.9
Monroe 20	18.0	27.9	29.4	20.0	43.0
Morehouse 10	42.3	80.8	84.1	72.7	103.0
Muddy 10	54.1	77.2	79.7	65.0	111.8
Muddy 20	49.3	68.8	70.1	65.7	104.5
Muddy 30	23.9	25.5	25.6	25.1	27.5
Potash 10	185.0	327.8	380.0	185.0	424.0
Potash 20	205.7	339.6	361.9	315.1	424.4
Potash 30	161.8	260.3	291.5	161.8	313.2
Wheeler 10	21.1	50.6	56.5	21.1	68.6

Table 2. 2015 CCST Chloride Results Summary: Minimum, mean, and maximum chloride levels in Chittenden County Streams. Mean values are given for all samples, samples taken only during dry, low flow conditions, and samples taken during rain events. Overall mean values exceeding the Vermont chronic chloride standard of 230 mg/L are highlighted in orange. Note that the mean rain event values were calculated based on only one or two samples.

Chloride levels in Chittenden County Streams 2012-2015

A comparison of the mean levels of chloride at each of the sampling sites for sampling years 2012-2105 are shown in Figure 2. Centennial and Potash Brooks had mean chloride levels that exceeded the EPA chronic criterion of 230 mg/L in all years. In 2014 and 2015, mean chloride levels exceeded this standard in Englesby Brook as well. Chloride levels in these three problem streams were higher in 2014 than in other years, likely due to the drier summer that year. None of the individual samples for any of the CCST monitoring sites in any year had chloride levels that exceeded the EPA's acute standard, which is 860 mg chloride/L.

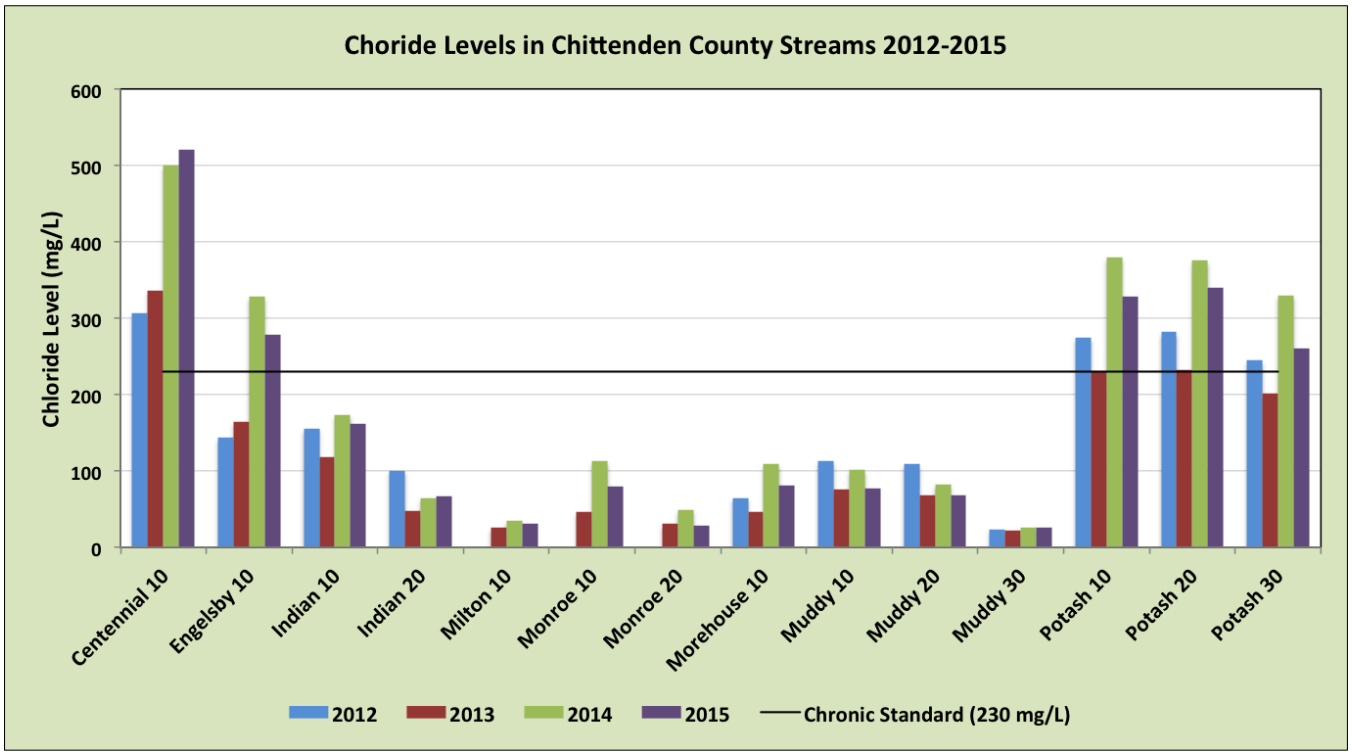

Figure 2. Mean chloride levels in Chittenden County Streams 2012-2015. Chloride levels in samples collected in all weather conditions were used to calculate the mean. The EPA and Vermont standard for 4-day average chloride levels (230 mg/L) is shown by the dotted line. This is the concentration of chloride above which chronic health effects have been observed in of aquatic species.

The high chronic levels of chloride in Centennial, Potash, and Engelsby Brooks are of major concern since sustained elevated chloride can interfere with the survival and reproduction of freshwater aquatic organisms. The EPA, when recommending the 230mg/L criterion, 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." In 2015 Centennial Brook had the highest average chloride value of all four years of sampling by the CCST. Of the 26 samples the CCST has collected in Centennial Brook over the past four years, only 3 have had chloride levels below 230mg/L. Potash and Englesby Brook are similarly affected, and while their chloride levels are somewhat lower than those of Centennial Brook, most of the samples collected from both brooks in 2014 and 2015 are well over 230mg/L, and chloride levels in these streams appears to be on an upward trend.

Phosphorus Results

A summary of the 2015 phosphorus results in shown in Table 3. Mean phosphorus levels exceeded the proposed Vermont state standard of 27ug/L in all samples at all sites in 2015 and were especially high on Muddy Brook. All streams had total phosphorus levels well above 10ug/L, the target phosphorus concentration for Lake Champlain (Main Lake). Raw data is presented in Appendix C.

Site ID	Min Phosphorus	Mean Phosphorus	Mean Phosphorus, Dry Conditions Only	Mean Phosphorus, Rain Event(s)	Max Phosphorus
Centennial 10	65.7	94.1	84.7	117.4	164.0
Engelsby 10	41.7	106.6	56.6	357.0	357.0
Indian 10	32.7	47.9	38.7	71.0	78.5
Indian 20	26.9	44.7	43.3	51.4	62.7
Milton 10	23.5	35.1	35.0	35.9	47.2
Monroe 10	37.0	48.0	45.6	59.8	59.8
Monroe 20	38.2	75.0	50.2	199.0	199.0
Morehouse 10	27.4	65.1	31.3	149.8	208.0
Muddy 10	66.4	79.2	75.7	96.5	96.5
Muddy 20	57.4	90.8	92.1	87.7	114.0
Muddy 30	56.7	106.7	116.2	58.9	165.0
Potash 10	23.5	39.7	30.7	83.1	83.1
Potash 20	26.6	35.5	31.7	46.5	58.3
Potash 30	50.9	56.3	57.6	56.8	67.4
Wheeler 10	35.3	56.5	46.1	108.0	108.0

Table 3. 2015 CCST Phosphorus Results Summary: Minimum, mean, and maximum phosphorus levels in Chittenden County Streams. Mean values are given for all samples, samples taken only during dry/low flow conditions, and samples taken during rain events (freshet flows). Overall mean values exceeding the Vermont chronic chloride standard of 27 ug/L are highlighted in orange. Note that the mean rain event values were calculated based on only one or two samples.

Phosphorous Levels in Chittenden County Streams 2012-2015

The state of Vermont's base-flow phosphorous standard is 27 ug/L for class B, "warm water medium-gradient streams" and 15 ug/L for "medium (sized) high-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. This concentration is indicated by a dotted line in Figure 3, which shows a comparison of the mean phosphorus levels during dry conditions for all four years of CCST monitoring.

Mean phosphorous levels in dry, base-flow conditions at the majority of the sites sampled were well above the 27ug/L standard. 2014 and 2015 phosphorus levels were generally lower than in 2012 and 2013, probably because both years were relatively dry, and phosphorus enters streams when fertilizers, animal waste, sediment, etc., get washed into streams via surface runoff. 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.

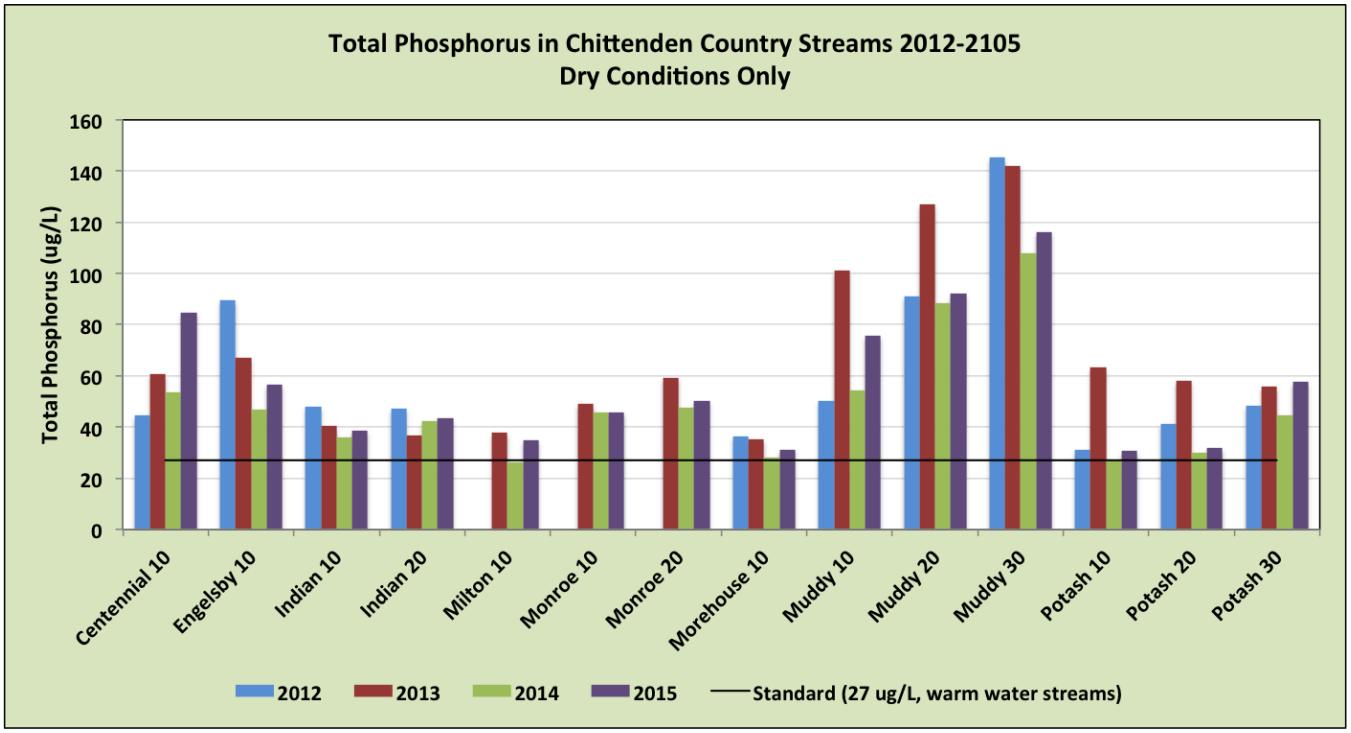

Figure 3. Comparison of mean total phosphorus levels 2012-2015 during dry conditions. The standard proposed by the State of Vermont for mean total phosphorus at base-flow in medium gradient, warm water streams (27 ug/L) is indicated by the dotted black line.

Turbidity Results

None of the 2015 mean turbidity values from any of the sampled streams exceeded the VT Water Quality standard for turbidity of 25 nephelometric units (NTU) for warm-water fish habitat. However, average turbidity levels in Centennial, Indian, and Muddy Brooks were above the 10 NTU standard for cold-water fish habitat, and turbidity levels at some sites were quite high after rain events.

Site ID	Min Turbidity	Mean Turbidity	Mean Turbidity, Dry Conditions Only	Mean Turbidity, Rain Events	Max Turbidity
Centennial 10	7.0	24.4	21.1	32.5	58.0
Engelsby 10	5.0	22.5	6.7	101.4	101.4
Indian 10	6.8	9.5	7.5	14.4	20.3
Indian 20	4.6	12.0	10.8	17.7	19.5
Milton 10	3.2	6.1	5.9	7.1	8.2
Monroe 10	3.8	8.6	8.0	11.5	11.5
Monroe 20	3.9	10.4	6.0	32.5	32.5
Morehouse 10	3.2	27.5	5.9	81.7	137.2
Muddy 10	6.6	14.4	11.1	30.8	30.8
Muddy 20	8.4	11.8	10.9	14.0	15.9
Muddy 30	4.6	7.8	8.0	6.7	12.3
Potash 10	2.6	5.0	2.7	15.8	15.8
Potash 20	1.3	3.1	1.9	6.6	10.6
Potash 30	6.3	7.3	7.6	6.8	9.3
Wheeler 10	2.9	8.8	4.6	29.8	29.8

Table 4. 2015 CCST Phosphorus Results Summary: Minimum, mean, and maximum phosphorus levels in Chittenden County Streams. Mean values are given for all samples, samples taken only during dry/low flow conditions, and samples taken during rain events (freshet flows). Note that the mean rain event values were calculated based on only one or two samples, while the dry condition values are based on 5 data points.

Turbidity Levels in Chittenden County Streams 2012-2015

Figure 4 shows a comparison of turbidity levels from all four years of CCST sampling. Mean values in all four years fell below the VT standard for warm-water streams of 25 NTU (Nephelometric Turbidity Units) but exceeded the standard for cold-water streams at several sites.

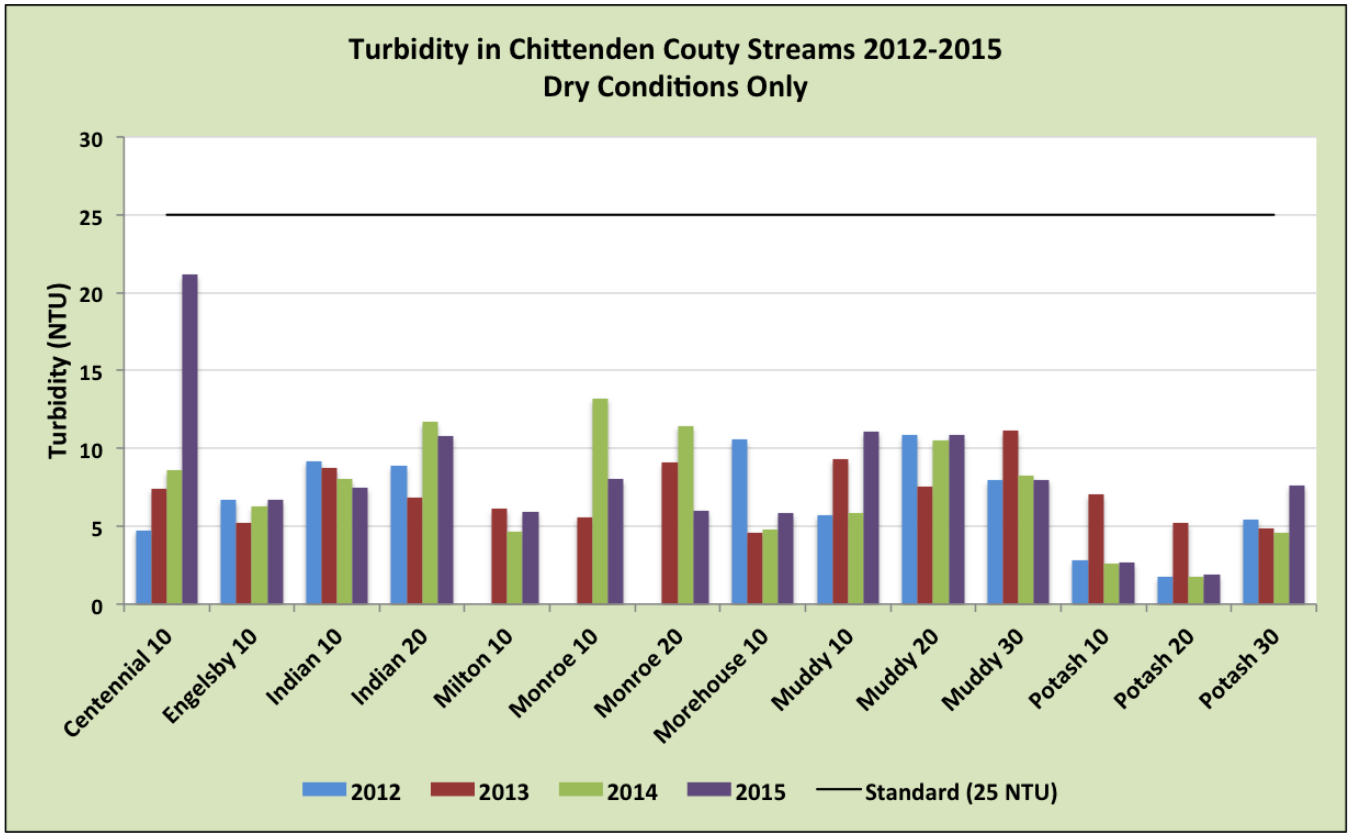

Figure 4. Comparison of mean turbidity levels 2012-2015 during dry conditions. The standard proposed by the State of Vermont for mean turbidity at base-flow in medium gradient, warm water streams (25 NTU) is indicated by the dotted black line.

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 the Chittenden County Stream Team began *E. coli* sampling at Wheeler Brook at the request of one of its volunteers. The results of the 2015 *E. coli* sampling is shown in Table 5.

The Vermont standard for *E. coli* is a geometric mean of <126 mpn/100mL over a 60-day "representative period", with no more than 10% of samples above 235 mpn/100mL. The geometric mean levels of *E. coli* at the Wheeler Brook sampling site in 2015 was 594 mpn/mL, and 83% of the samples had E. coli counts of over 235 mpn/mL– well over the standard with both criteria.

Site ID	Min *E.coli*	Geometric Mean, All Conditions	GeoMean *E.coli*, Dry Conditions Only	Max *E.coli*	% of samples above 235 mpn/100mL
Wheeler 10	98.4	750.6	594.0	>2419.6	83

Table 5. 2015 CCST *E. coli* Results Summary: Minimum, geometric mean, and maximum *E. coli* levels in Chittenden County Streams. Geometric mean values exceeding the Vermont chronic *E. coli* standard of 126 mpn/mL are highlighted in orange.

Conclusion

The Chittenden County Stream Team has monitored chloride, phosphorus, and turbidity in Burlington area streams for the past four years (2012-2015). Phosphorus levels in these mainly urban and suburban streams are consistently above the 2014 Vermont water quality standard of 27 ug/L, even in dry summers like that of 2014. Muddy Brook had especially high levels, with one site averaging concentrations of over 100 ug/L in all sampling years. Centennial and Englesby Brooks also had particularly high phosphorus concentrations.

Chloride levels are also a problem in several streams, most notably Centennial, Engelsby, and Potash Brooks. 2014 and 2015 Chloride levels in these streams were significantly higher than in the past two years of CCST monitoring, and are likely to be causing a negative impact on aquatic organisms in those streams. Turbidity levels, while slightly elevated in Indian, Monroe, and Muddy Brooks, do not seem to be as much of a concern. As expected, concentrations of phosphorus were much higher during rain events, especially in Centennial, Englesby, Monroe, and Morehouse Brooks, perhaps indicating that these streams are more susceptible to the effects of stormwater runoff.

Appendix A. Quality Assurance Measures for phosphorous, chloride, and turbidity and *E. coli* sampling in 2015.

Site ID	Date	Sample Type	Relative Percent Difference Between Duplicate Pairs (RPD)
Centennial 10	6/23/15	Chloride	3.8 %
		Phosphorus	40.7 %
		Turbidity	8.5 %
Wheeler 10		*E. coli*	43.6%
Englesby 10	7/7/15	Chloride	1 %
		Phosphorus	0.7%
		Turbidity	4 %
Wheeler 10		*E. coli*	19.6%
Indian 10	7/21/15	Chloride	2%
		Phosphorus	1 %
		Turbidity	1.7 %
Wheeler 10		*E. coli*	0%
Morehouse 10	8/4/15	Chloride	0.1 %
		Phosphorus	2.1 %
		Turbidity	1.9 %
Wheeler 10		*E. coli*	35.2%
Muddy 20	8/11/15	Chloride	0.8 %
		Phosphorus	0 %
		Turbidity	4.2 %
Muddy 20	8/18/15	Chloride	0.5 %
		Phosphorus	0 %
		Turbidity	0.9 %
Wheeler 10		*E. coli*	0%
Potash 10	9/1/15	Chloride	1.4 %
		Phosphorus	38.5 %
		Turbidity	14.1 %
Wheeler 10		*E. coli*	23.1%
Mean Relative Percent Difference (Mean RPD)		**Chloride**	**1.1%**
		Phosphorus	**11.9%**
		Turbidity	**5.0%**
		E. coli	**20.2%**

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

Appendix B– Project Completeness

Parameter	Number of Samples Anticipated	Number of Valid Samples Collected & Analyzed	Percent Complete *
Chloride	102	109	107
Total phosphorus	116	108	93
Turbidity	116	109	94
E. coli	18	18	100

Appendix C – Individual Sample Results

Sample Number	Location	Date	Chloride (mg/L)	E. coli (mpn/ 100 ml)	TP (ug P/L)	Turbidity (NTU)	Flow level from field sheet	Fiow category from field sheet*
150346-01	Cent 10	6/23/15	433.75		70.8	7	H	freshet
150346-03	Cent 10 - Blank	6/23/15	2		5	0.2	H	freshet
150346-02	Cent 10 - Duplicate	6/23/15	450.4		107	7.62	H	freshet
150347-01	Cent 10	7/7/15	481.5		65.7	12.2	L	baseflow
150532-01	Cent 10	7/21/15	528.25		68.5	16.8	M	baseflow
150635-01	Cent 10	8/4/15	565.5		101	29.6	M	baseflow
140539-01	Cent 10	8/11/15	582.25		164	58	M	baseflow
150695-01	Cent 10	8/18/15	500.75		99.9	24.3	L	freshet
150699-01	Cent 10	9/1/15	551.5		88.6	22.8	L	baseflow
150346-04	Engelsby 10	6/23/15	99.93		357	101.4	H	freshet
150347-02	Engelsby 10	7/7/15	187.02		57.8	4.95	M	baseflow
150347-04	Engelsby 10 - Blank	7/7/15	2		5	0.2	M	baseflow
150347-03	Engelsby 10 - Duplicate	7/7/15	185.08		58.2	5.15	M	baseflow
150532-02	Engelsby 10	7/21/15	254		61.5	5.41	L	baseflow
150635-02	Engelsby 10	8/4/15	337.75		67.3	9.57	M	baseflow
150695-02	Engelsby 10	8/18/15	369		54.5	6.95	L	baseflow
150699-02	Engelsby 10	9/1/15	423.5		41.7	6.71	L	baseflow
150346-05	Indian 10	6/23/15	45.74		78.5	20.3	H	freshet
150347-05	Indian 10	7/7/15	55.1		32.7	7.35	M	baseflow
150532-03	Indian 10	7/21/15	123.8		39.6	7.45	M	(baseflow)
150532-05	Indian 10 - Blank	7/21/15	2		5	0.2	M	(baseflow)
150532-04	Indian 10 - Duplicate	7/21/15	124.1		40	7.58	M	(baseflow)
150635-03	Indian 10	8/4/15	202		38.1	6.8	L	baseflow
140539-02	Indian 10	8/11/15	172.32		63.5	8.54	M	freshet
150695-03	Indian 10	8/18/15	243		40.6	7.28	L	baseflow
150699-03	Indian 10	9/1/15	286.2		42.6	8.6	L	baseflow
150346-06	Indian 20	6/23/15	13.39		51.4	17.7	H	freshet
150347-06	Indian 20	7/7/15	11.72		26.9	4.55	M	baseflow
150532-06	Indian 20	7/21/15	29.46		62.7	15.2	M	freshet
150635-04	Indian 20	8/4/15	64.46		52.5	19.5	L	baseflow
150695-04	Indian 20	8/18/15	99.82		41.7	7.8	L	baseflow
150699-04	Indian 20	9/1/15	183.6		32.8	7.11	L	baseflow
150346-16	Milton 10	6/23/15	17.6		35.9	7.14	M	baseflow
150347-16	Milton 10	7/7/15	17.62		23.5	3.23	L	baseflow
150532-16	Milton 10	7/21/15	26.97		33.3	8.22	L	baseflow
150635-16	Milton 10	8/4/15	34.95		32.6	6.49	L	baseflow
150695-16	Milton 10	8/18/15	38.7		47.2	4.07	L	baseflow
150699-16	Milton 10	9/1/15	48.4		38.3	7.69	L	baseflow
150346-14	Monroe 10	6/23/15	48.05		59.8	11.5	M	freshet
150347-14	Monroe 10	7/7/15	43.89		38	7.98	M	baseflow
150532-14	Monroe 10	7/21/15	53.75		54.9	11.2	L	baseflow
150635-14	Monroe 10	8/4/15	84.04		46.7	10.8	M	baseflow
150695-14	Monroe 10	8/18/15	94.46		51.4	6.33	L	baseflow
150699-14	Monroe 10	9/1/15	152.9		37	3.83	L	baseflow
150346-15	Monroe 20	6/23/15	20.02		199	32.5	H	freshet
150347-15	Monroe 20	7/7/15	18.03		38.2	3.93	M	baseflow
150532-15	Monroe 20	7/21/15	26.755		52.3	7.94	L	baseflow

150635-15	Monroe 20	8/4/15	28.854		49.7	6.36	L	baseflow
150695-15	Monroe 20	8/18/15	30.45		66.4	5.74	L	baseflow
150699-15	Monroe 20	9/1/15	42.98		44.5	6.08	L	baseflow
150346-07	Morehouse 10	6/23/15	42.34		91.6	26.1	M	(freshet)
150347-07	Morehouse 10	7/7/15	70.51		30.4	7.45	M	baseflow
150532-07	Morehouse 10	7/21/15	87.05		27.4	3.49	L	baseflow
150635-05	Morehouse 10	8/4/15	85.87		28.2	3.72	L	baseflow
150635-07	Morehouse 10 - Blank	8/4/15	2		5	0.2	L	baseflow
150635-06	Morehouse 10 - Duplicate	8/4/15	85.79		28.8	3.79	L	baseflow
140539-03	Morehouse 10	8/11/15	103		208	137.2	M	freshet
150695-05	Morehouse 10	8/18/15	80.45		31.2	3.2	L	baseflow
150699-05	Morehouse 10	9/1/15	96.66		39.1	11.5	L	baseflow
150346-08	Muddy 10	6/23/15	65.03		96.5	30.8	M	freshet
150347-08	Muddy 10	7/7/15	58.56		66.4	11.1	M	baseflow
150532-08	Muddy 10	7/21/15	54.05		86.7	15	H	baseflow
150635-08	Muddy 10	8/4/15	70.23		80.2	8.98	L	baseflow
150695-06	Muddy 10	8/18/15	103.7		77.1	6.63	L	baseflow
150699-06	Muddy 10	9/1/15	111.8		68.1	13.8	M	baseflow
150346-09	Muddy 20	6/23/15	65.1		72.3	15.9	H	baseflow
150347-09	Muddy 20	7/7/15	53.23		57.4	8.38	M	baseflow
150532-09	Muddy 20	7/21/15	49.3		86	10.7	M	baseflow
150635-09	Muddy 20	8/4/15	61.75		105	10.8	M	receding
140539-04	Muddy 20	8/11/15	66.26		103	12.1	L	freshet
140539-05	Muddy 20 - Blank	8/11/15	2		< 5	0.6	L	freshet
140539-06	Muddy 20 - Duplicate	8/11/15	66.78		103	11.6	L	freshet
150695-07	Muddy 20	8/18/15	81.6		114	11.2	L	baseflow
150695-09	Muddy 20 - Blank	8/18/15	2		8.15	0.2	L	baseflow
150695-08	Muddy 20 - Duplicate	8/18/15	81.22		114	11.3	L	baseflow
150699-07	Muddy 20	9/1/15	104.5		98	13.3	L	baseflow
150346-10	Muddy 30	6/23/15	25.095		58.9	6.72	M	freshet
150347-10	Muddy 30	7/7/15	23.91		56.7	4.57	M	baseflow
150532-10	Muddy 30	7/21/15	23.9		98.4	6.73	L	baseflow
150635-10	Muddy 30	8/4/15	26.28		110	8.15	L	baseflow
150695-10	Muddy 30	8/18/15	26.16		151	8.26	L	baseflow
150699-08	Muddy 30	9/1/15	27.5		165	12.3	L	baseflow
150346-11	Potash 10	6/23/15	185		83.1	15.8	H	freshet
150347-11	Potash 10	7/7/15	234.4		51	6.29	M	baseflow
150532-11	Potash 10	7/21/15	315.8		45	2.67	M	baseflow
150635-11	Potash 10	8/4/15	419.25		25	2.71	M	baseflow
150695-11	Potash 10	8/18/15	361		29.1	2.55	L	baseflow
150699-09	Potash 10	9/1/15	424		23.5	2.7	L	baseflow
150699-11	Potash 10- Blank	9/1/15	2		5	0.2	L	baseflow
150699-10	Potash 10- Duplicate	9/1/15	430		34.7	3.11	L	baseflow
150346-12	Potash 20	6/23/15	205.7		58.3	10.6	H	freshet
150347-12	Potash 20	7/7/15	252.8		32.5	3.07	M	baseflow
150532-12	Potash 20	7/21/15	299.4		28.4	1.73	M	baseflow
150635-12	Potash 20	8/4/15	422.25		26.6	1.33	M	baseflow
140539-07	Potash 20	8/11/15	424.4		34.6	2.52	L	freshet
150695-12	Potash 20	8/18/15	369.8		41.4	1.3	L	baseflow
150699-12	Potash 20	9/1/15	402.5		26.6	1.33	L	baseflow
150346-13	Potash 30	6/23/15	161.8		56.8	6.83	H	freshet
150347-13	Potash 30	7/7/15	261.8		32.6	3.75	M	baseflow

150532-13	Potash 30	7/21/15	263.4		56	7.48	M	baseflow
150635-13	Potah 30	8/4/15	313.2		50.9	7.14	M	baseflow
150695-13	Potash 30	8/18/15	295.8		67.4	6.68	L	baseflow
150699-13	Potash 30	9/1/15	293.4		55.9	9.27	L	baseflow
150346-17	Wheeler 10	6/23/15	21.07	2419.57	108	29.8	H	freshet
150346-18	Wheeler 10 - Blank	6/23/15		1			H	freshet
150346-19	Wheeler 10 - Duplicate	6/23/15		1553.12			H	freshet
150347-17	Wheeler 10	7/7/15	45.33	98.42	35.3	2.93	M	baseflow
150347-18	Wheeler 10 - Blank	7/7/15		1			M	baseflow
150347-19	Wheeler 10 - Duplicate	7/7/15		119.83			M	baseflow
150532-17	Wheeler 10	7/21/15	51.45	365.4	41.8	4	M	baseflow
150532-18	Wheeler 10 - Blank	7/21/15		1			M	baseflow
150532-19	Wheeler 10 - Duplicate	7/21/15		365.4			M	baseflow
150635-17	Wheeler 10	8/4/15	68.63	980.39	40	3.33	L	baseflow
150635-18	Wheeler 10 - Blank	8/4/15		1			L	baseflow
150635-19	Wheeler 10 - Duplicate	8/4/15		686.67			L	baseflow
150695-17	Wheeler 10	8/18/15	64.25	2419.6	76.3	7.04	L	baseflow
150695-18	Wheeler 10 - Blank	8/18/15		1			L	baseflow
150695-19	Wheeler 10 - Duplicate	8/18/15		2419.6			L	baseflow
150699-17	Wheeler 10	9/1/15	52.95	866.44	37.3	5.89	L	baseflow
150699-18	Wheeler 10 - Blank	9/1/15		1			L	baseflow
150699-19	Wheeler 10 - Duplicate	9/1/15		686.67			L	baseflow