

## Four Rivers Partnership Volunteer Water Quality Monitoring 2015

### Background:

The Four Rivers Partnership is an affiliation of nonprofit organizations, state and local government entities, citizens, and schools focused on Winooski River watershed projects including water quality monitoring. The partnership is named after the four major rivers in the Barre-Montpelier region of central Vermont: the Steven's Branch, North Branch, Dog River, and Winooski Rivers. Water quality monitoring by the Four Rivers Partnership has focused on these rivers and their tributaries and is managed by the Friends of the Winooski River. Volunteer members of the Four Rivers Partnership have been collecting *E. coli* data since 2008. In 2014 and 2015, chloride, phosphorus, and turbidity levels were also tested. Laboratory services were provided by the Vermont Department of Environmental Conservation's La Rosa Program. This report was compiled by Shawn White, Project Manager of the Friends of the Winooski River.

### 2015 Water Quality Monitoring Results

In the summer of 2015, the Four Rivers Partnership collected samples for chloride, phosphorus, turbidity, and *E. coli* testing at ten sites in the Barre-Montpelier-Riverton area on six dates: June 23, July 7, July 28, Aug 4, Aug 18, and Sept 1. A list of these ten sites and their locations is shown in Table 1. One site, ALLENL, behind Allen Lumber on the Winooski River, had to be moved upriver about 200 feet to above the Granite Street Bridge due to accessibility problems. Samples were collected at ALLENL on June 23, July 28, and August 4, and from GRANITE on the remaining dates. Samples for chloride testing only were also taken on the above dates at four additional sites on tributaries where chloride levels were found to be elevated in previous years. In addition, phosphorus, turbidity, and chloride samples were collected from 7 sites on a single rain event date (8/11/15). The sites where rain event sampling occurred are listed in Table 3.

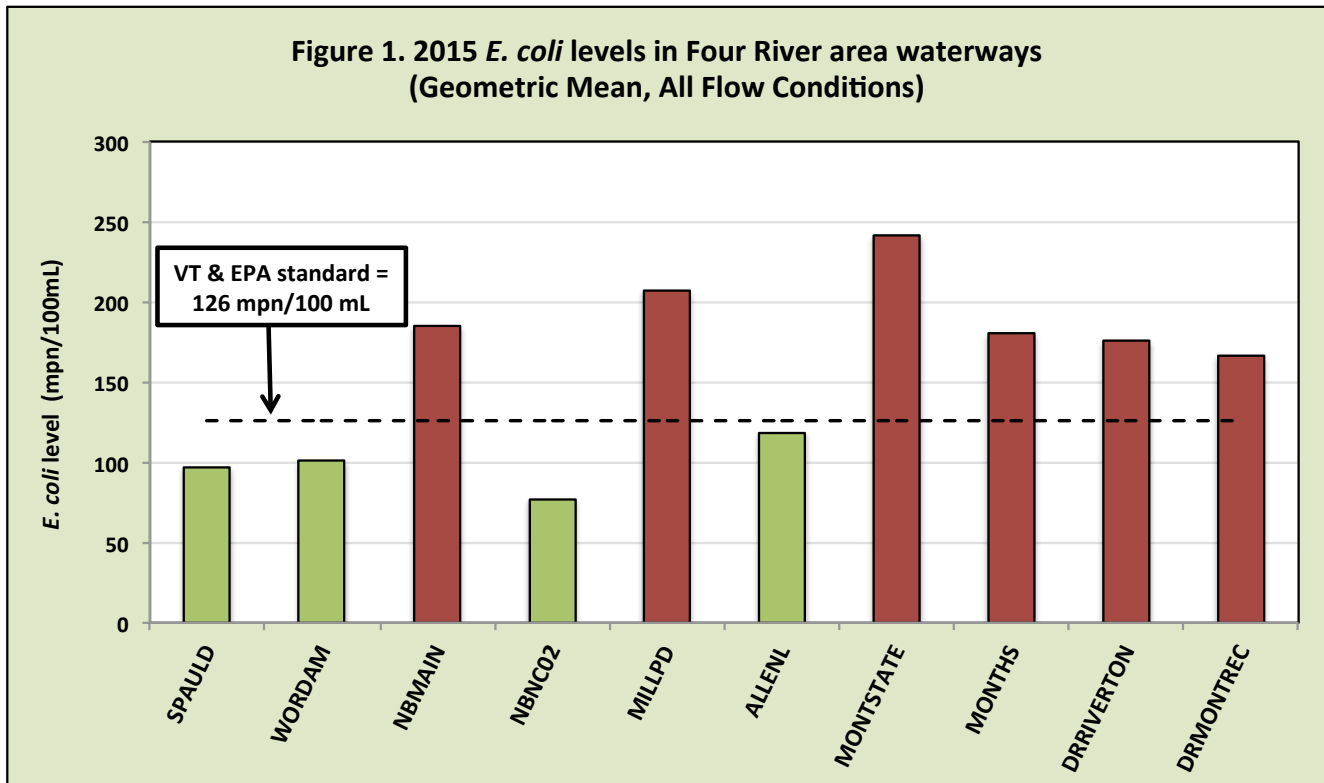
**Table 1. Four Rivers Partnership Biweekly Water Quality Testing Sites, 2015**

<u>Location</u>	<u>Waterbody</u>	<u>Site ID</u>	<u>Lat / Long</u>	<u>Parameters monitored</u>
Mill Road Swimming Hole	North Branch	NBMAIN	44.385342 / -72.550879	<i>E. coli</i> , TP, Turbidity
Worcester Dam Swimming Hole	North Branch	WORDAM	44.373441 / -72.5453	<i>E. coli</i> , TP, Turbidity
North Branch Nature Center Bridge	North Branch	NBNC02	44.28355 / -72.57133	<i>E. coli</i> , TP, Turbidity
Mill Pond Park Canoe Access	North Branch	MILLPOND	44.26766 / -72.56882	<i>E. coli</i> , TP, Turbidity
Allen Lumber/Granite St Bridge	Winooski River	ALLENL/ GRANITE	44.25216 / -72.57114 44.25180 / -72.57064	<i>E. coli</i> , TP, Turbidity
VSECU parking lot	Winooski River	MONTSTATE	44.260668 / -72.583174	<i>E. coli</i> , TP, Turbidity
Montpelier High School Access	Winooski River	MONTHS	44.261859 / -72.586412	<i>E. coli</i> , TP, Turbidity
Montpelier Recreation Fields	Dog River	DRMONTREC	44.25188 / -72.60126	<i>E. coli</i> , TP, Turbidity

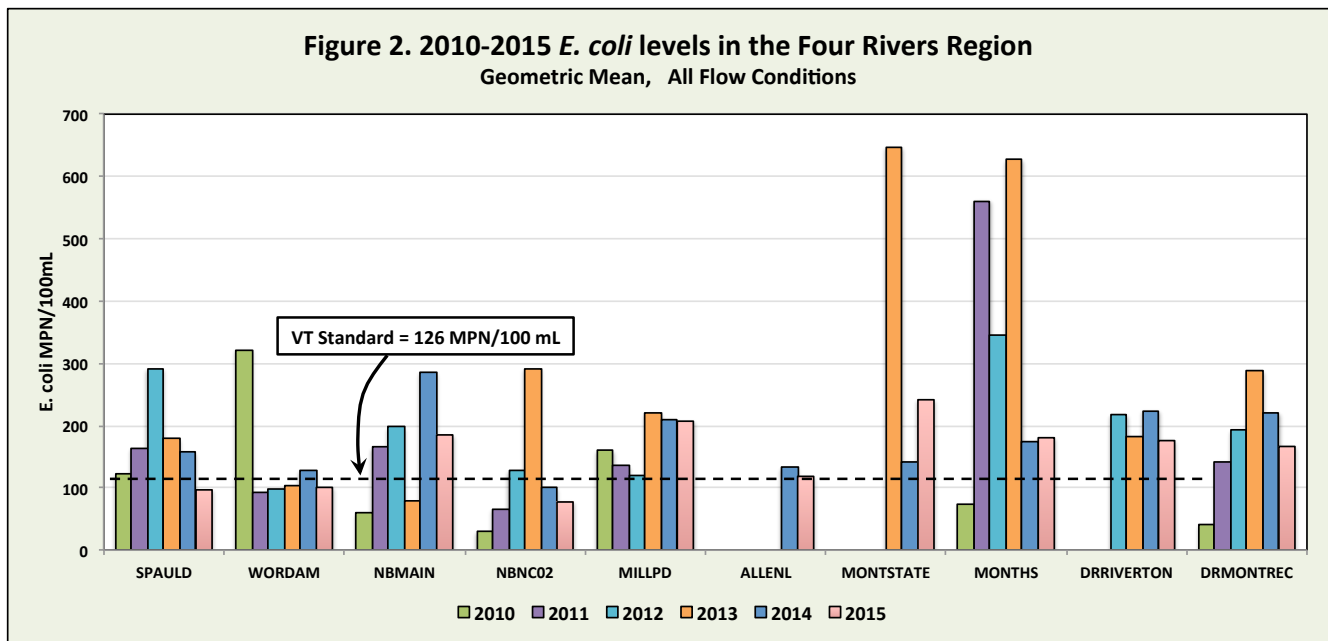
Riverton canoe access	Dog River	DRRIVERTON	44.1994 / -72.6338	<i>E. coli</i> , TP, Turbidity
Spaulding Falls	Jail Branch	SPAULD	44.111917 / -72.489982	<i>E. coli</i> , TP, Turbidity
Mouth of unnamed trib near Bailey Ave and State St in Montpelier	Unnamed trib	Bailey10	44.154318 / -72.351288	chloride
Blanchard Brook above confl. with Winooski, below Sabins pasture	Blanchard Brook	Sabin10	44.150259 / -72.334766	chloride
Pond Brook below footbridge at VTRANS bldg. on Rte 302	Pond Brook	VTRANS10	44.135739 / -72.331140	chloride
Trib behind MacDos on Rte 302	Unnamed trib	Macs10	44.227861/ -72.550924	chloride

***E. coli***

*Escherichia coli* (*E. coli*) is a species of bacteria found in the fecal matter of mammals and is commonly used as an indicator of fecal contamination in rivers, streams, lakes, and oceans. While most strains of *E. coli* do not cause disease, their presence may be associated with other bacteria and viruses that may be pathogenic. *E. coli* amounts are often given as “most probable number” – a reflection of the laboratory test used to measure *E. coli* levels. Both the Vermont and US EPA standards for *E. coli* are based on single sample measurements and/or the geometric mean of samples taken over a period of time. The Vermont and EPA standards for the geometric mean *E. coli* level for Class B waters is 126 mpn /100mL. This corresponds to a level in which there is a probability that 32-36 individuals/1000 would get sick from water contact. To meet both the geometric mean and single sample measurement standards, less than 10% of the single sample measurements should have *E. coli* levels above 235 mpn/100mL. Figure 1 shows the geometric mean of all samples taken at each site in 2015.



The VT and EPA standard for the geometric mean of *E. coli* (126 mpn/100mL) was exceeded at six sites in 2015: NBMAIN (the Mill Road swimming hole on the North Branch River), MILLPD (the Mill Pond Park on the North Branch River), MONTSTATE (on the Winooski River behind the Vermont State Employees Credit Union), MONTHS (on the Winooski River at the Montpelier High School canoe access), DRRIVERTON (at the Dog River recreational access and swim hole), and DRMONTREC (on the Dog River at the Montpelier Recreational Fields). These sites have typically had high *E. coli* levels in years past as well. A comparison of the geometric mean *E. coli* values for Four Rivers Partnership monitoring years 2010-2015 is shown in Figure 2.



*E. coli* levels are usually influenced by precipitation amounts, with high levels associated with rainfall and the resulting surface runoff into streams. 2014 levels were among the highest at many sites, however, despite it being a relatively dry year. All sampling in 2014 was done during dry conditions in which less than 0.25 inches of rain had fallen in the 48 hours prior to sampling. Geometric mean *E. coli* levels were generally lower in 2015 than in 2014 at all sites with the exception of MONTSTATE and MONTHS. The very high levels of *E. coli* in some years are due to spikes observed after rainfall or, in the case of some sites, an anomalously high level in an individual sample.

2015 single sample measurements The Vermont Water Quality Standards states that less than 10% of samples should have *E. coli* levels greater than 235 mpn/100 mL. Table 2 lists the percentage of 2015 single samples with *E. coli* numbers above this level taken at each site. Note that since only six samples were taken over the course of the sampling season at most sites, however, one sample constitutes 16.7% of the total samples taken. Of ten sites where *E. coli* was sampled, 7 had more than 10% above 235 mpn/100 mL. At MILLPD, where five samples were taken over the course of the season, 60% had levels above this standard. The MILLPD site is a canoe access point at Mill Pond Park in Montpelier.

Table 2. Percentage of samples at each site with *E. coli* levels above 235 mpn/ 100 mL.

Sampling Site	% of samples with <i>E. coli</i> > 235 mpn/100mL
SPAULD	0 %
WORDAM	0 %
NBMAIN	16.7%
NBNC02	0 %
MILLPD	60 %
ALLENL/GRANITE	16.7%
MONTSTATE	33 %
MONTHS	33 %
DRRIVERTON	33 %
DRMONTREC	16.7%

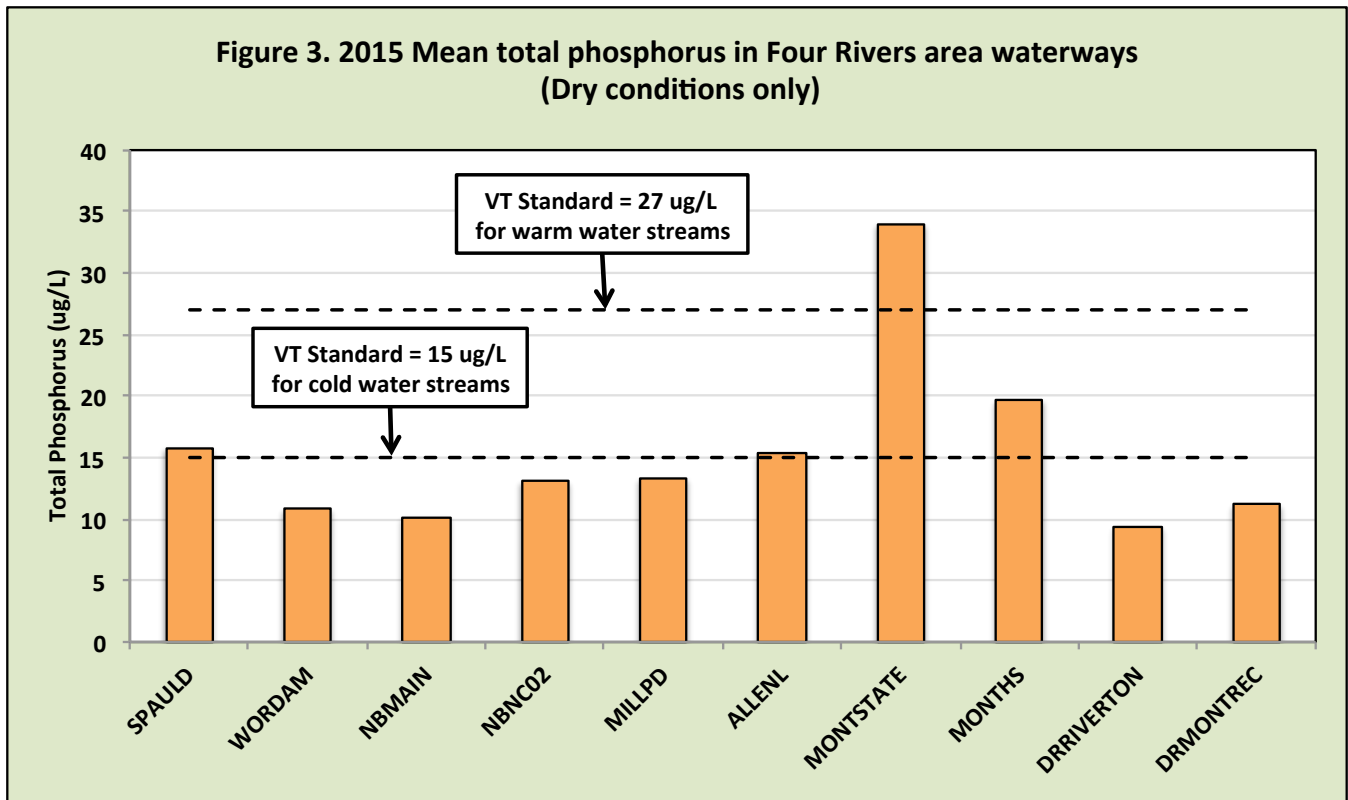
Finding potential sources of *E. coli* One of the goals of the Four Rivers partnership is to monitor the overall effects of Montpelier’s 6 CSOs (see Rain Event Monitoring, below) and to locate other potential sources of fecal matter, such as leaking sewer or septic systems. The overall variability of the *E. coli* measurements from year to year makes locating sources difficult, however. One possible trend in the data is that there seems to be a consistent jump in *E. coli* levels in the North Branch between NBNC02 (the North Branch Nature Center swimming hole) and MILLPD (the Mill Park canoe access), where 60% of single samples had levels above 235 mpn/ 100 mL in 2105. This may be due to illicit discharge of sewage into the stormdrain system or the river itself. Failing septic systems can also leak raw sewage into waterways via groundwater, and/or pet waste from the residential area between the nature center and the park may provide a fairly consistent source of *E. coli*. The Friends of the Winooski will be working with Stone Environmental during the summer of 2016 to assess stormwater outfalls with the goal of locating and eliminating any illicit discharges.

In 2014, the Friends added a new site, ALLENL, in order to help pinpoint the sources of the chronically high levels of *E. coli* in the Winooski River (which is listed as impaired for *E. coli* downstream of the city). The ALLENL site is upstream from the downtown area and from all of the known Montpelier CSOs. MONTSTATE is downstream from four of them (CSOs 001, 007, 008, and 009), and MONTHS is downstream from the remaining two (CSOs 003 and 023).

The geometric mean at ALLENL/GRANITE in 2015 fell below the VT standard of 126 mpn/ 100 mL, while MONTSTATE had the highest geometric mean *E. coli* levels. *E. coli* levels at MONTSTATE and MONTHS have exceeded the geometric mean standard for 3 and 5 years in a row, respectively. The Four Rivers Partnership will continue to monitor these sites during our regular sampling season and hope to sample the Winooski mainstem during more rain events in 2016 in order to determine the relative contribution of the CSOs to *E. coli* levels. Montpelier stormwater outfall monitoring with Stone Environmental may also shed light on the chronically high levels of *E. coli* observed at MONTSTATE and MONTHS. Since CSOs would only be likely to contribute *E. coli* to the river during heavy rainstorms, there is a good chance the chronically high *E. coli* levels in the river are due to illicit discharge into the city’s rivers via the stormwater system.

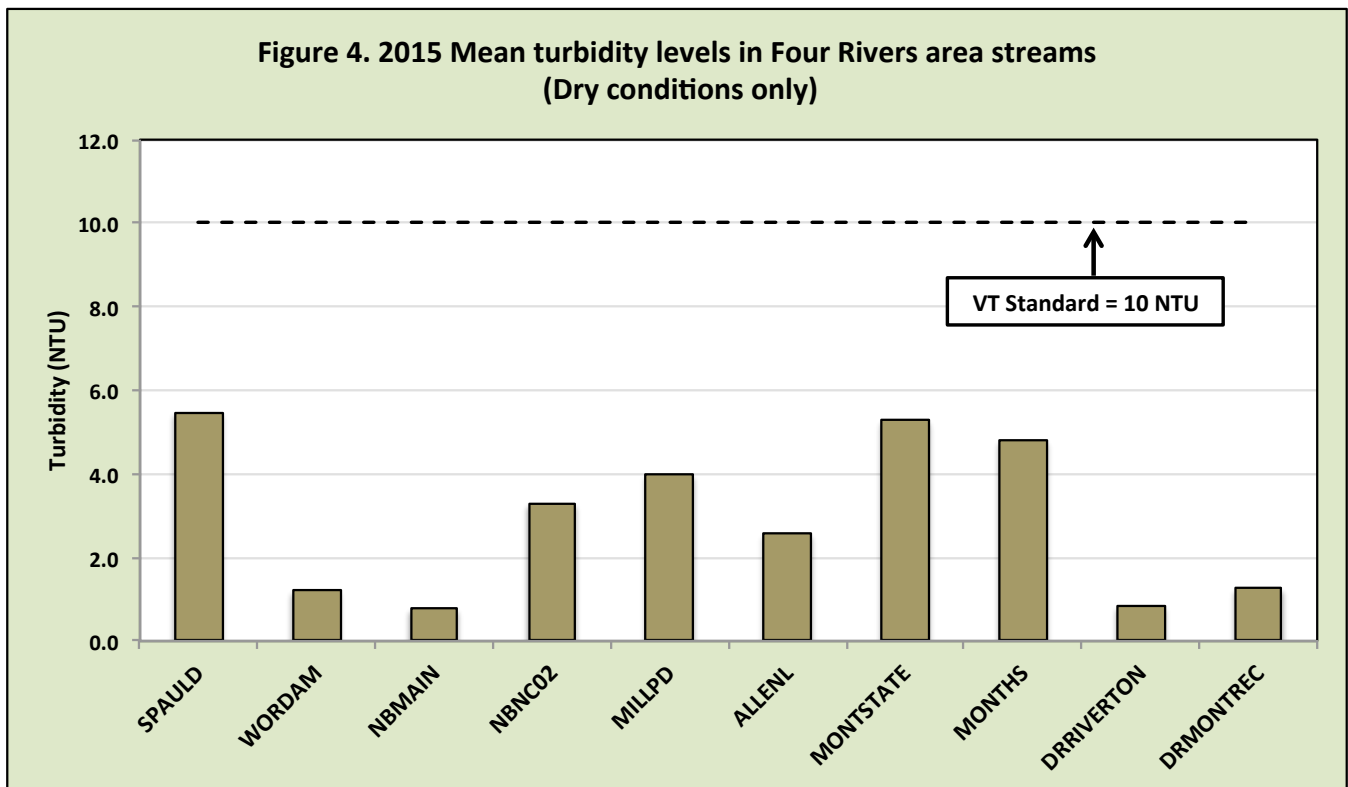
## Phosphorus

The mean phosphorus level during dry weather, low- or medium-flow conditions for each site is shown in Figure 3. The phosphorus level at four sites were at or greater than the VT standard for medium gradient, cold water streams (15 ug/L). The SPAULD site on the Jail Branch, a cold-water stream, just exceeded the standard, as it did in 2014. All three sites on the Winooski River (ALLENL, MONTSTATE, and MONTHS) also exceeded this standard. At only one site, MONTSTATE, did the mean phosphorous level exceed the standard for warm-water streams.



## Turbidity

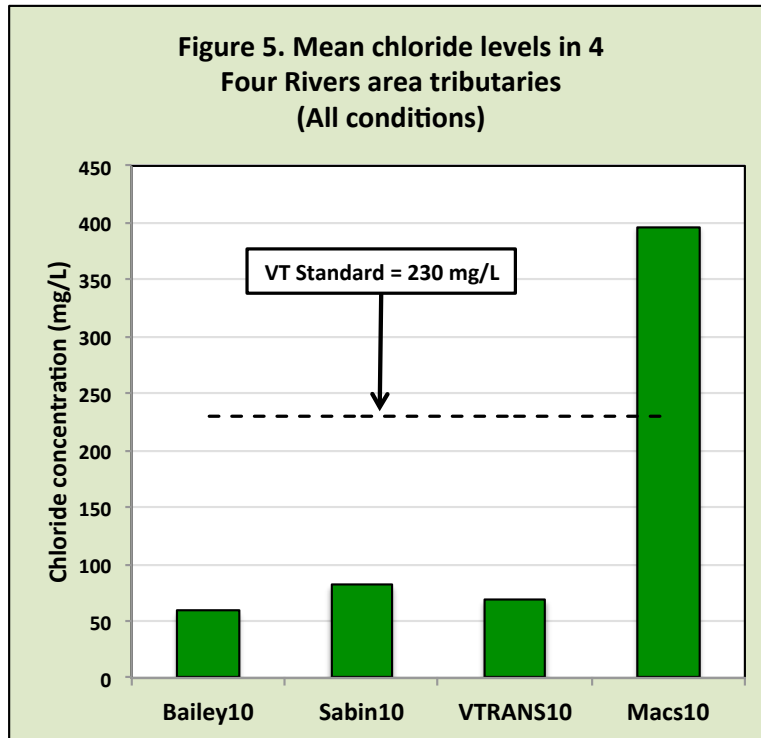
The results of turbidity sampling are shown in Figure 4. Turbidity levels at all sites were well below the Vermont standard of an annual average of 10 nephelometric units (NTU) for Class B, cold water habitat under dry, baseflow conditions.



## Chloride

According to the Vermont Surface Water Management Strategy, chloride levels above 230 mg/L can lead to poor health and reduced reproduction in aquatic species and may increase stratification in ponds and lakes, thereby inhibiting natural mixing and limiting oxygen availability. Chloride levels in streams tend to be higher during dry times of the year when ground water contributes a larger proportion of water than in wetter times of the year, when rainfall has a diluting effect. Chloride sources include road deicing salts, wastewater, and leachate from landfills. Predictably, chloride levels tend to spike in the spring when road salts are washed into streams during spring rains and snowmelt.

The Four Rivers Partnership sampled four sites for chloride in 2015. These sites, all on tributary streams, had been found to have elevated chloride levels during dry weather in previous years. Sampling was performed on five dates (6/23/15, 8/4/15, 8/11/15, 8/18/15, and 9/1/15). Two of these dates were rainy (6/23/15 and 8/11/15). The mean chloride levels for each site sampled are shown in Figure 5.



In 2015 one of the four sites, Macs 10, located at the mouth of a small tributary to Steven’s Branch, had mean chloride concentrations well above Vermont’s average allowable concentration standard of 230 mg/L. The average allowable concentration standard is the highest concentration of a pollutant to which aquatic life can be exposed for an extended period of time (4 days) once every three years without deleterious effects. All four samples we have taken during dry weather at Macs 10 has had levels above 535 mg/L (Table 3). There is a high likelihood, therefore, that the chloride levels exceed 230 mg/L for more than 4 days at a time. All of the individual samples taken at all four sites, however, had chloride levels below the VT “acute” maximum allowable concentration (MAC) standard for chloride of 860 mg/L.

Table 3. Chloride levels during dry, low flow conditions at Macs 10, a site on an unnamed tributary to the Steven’s Branch, in mg/L.

Site ID	Date	Chloride (mg/L)
Macs 10	8/12/12	555
Macs 10	8/4/15	571
Macs 10	8/18/15	541
Macs 10	9/1/15	596

A potential source of the high chloride levels in the unnamed tributary at Macs 10 may have been located during stormwater outfall monitoring done by the Friends of the Winooski River in Berlin in 2015. High conductivity readings, associated with high chloride concentrations, were detected in the discharge from three outfalls adjacent to the Central Vermont Medical Center Parking lots. The discharge from these outfalls feed into streams that flow to the Macs 10 site. The Four Rivers partnership hopes to sample chloride above and below the CVMC parking lots in 2016 to confirm this source. The Friends of the Winooski River will also send a letter to the facilities manager at the hospital alerting them to this potential concern.

### Rain Event Sampling

In 2012-2015, Four Rivers Partnership volunteers sampled for chloride, phosphorus and turbidity at six sites on small tributaries of the Winooski River and Stevens Branch during rain events to get an idea of how stormwater runoff is affecting these streams and the Winooski River. These streams drain watersheds of varying land use in the Barre-Montpelier area. An additional rain event site (GRANITE) on the Winooski River above downtown Montpelier was added in 2015. The locations of these monitoring sites used are given in Table 4.

Table 4. Four Rivers Partnership Rain Event Sampling Sites 2015

<b>Site ID</b>	<b>Tributary</b>	<b>Description</b>	<b>Watershed land use</b>	<b>Lat /Long</b>
Macs 10	Unnamed	Trib behind MacDos on 302	Commercial development	44.227861/ -72.550924
Gunner 10	Gunners Brook	@ Blackwell St & 302	Rural and urban residential	44.121391/-72.303450
Bailey 10	Unnamed	Bailey & State, Montpelier	Suburban residential	44.154318/-72.351288
VTRANS 10	Pond Brook	Below footbridge at VTRANS bldg.	Wetlands; some commercial development	44.135739/-72.331140
Sabin 10	Blanchard Brook	@ mouth	Suburban residential	44.150259/-72.334766
GRANITE	Winooski River	Above Granite St Bridge, Montpelier	Urban	44.25180 / -72.57064
MONTHS	Winooski River	Montpelier HS access	Urban	44.261859 /-72.586412

Rain event monitoring sites were sampled on a baseline dry day (8/21/12 or 8/19/14), and during rain events on 9/5/12, 9/10/13, 9/11/14, and 8/11/15. An effort was made to sample during “first flush” –between 30 minutes and 2 hours after the rain began falling. This was not always achieved, however, since 1 to 2 volunteers were often trying to sample several sites during an event. Note, also, that the rain event of 2014 turned out to be a light rain with only 0.03 inches recorded at the Barre-Montpelier Knapp State Airport in Berlin. A summary of the 2012-2015 results is shown in Table 5. The 9/11/14 results more closely match the dry baseline data of 8/21/12, probably because the rainfall this day was so slight and because the summer of 2014 as a whole was quite dry.



Table 5. Chloride, phosphorous, and turbidity in five Winooski River tributaries and the Winooski main stem during rainstorm events in 2012-2015.

Location	Date	Chloride (mg/L)	TP (ug P/L)	Turbidity (NTU)
<b>Winooski River Main Stem</b>				
GRANITE	8/11/15	34	17	2
MONTHS	dry 8/19/2014	26	13	2
	9/10/13	22	27	4
	9/11/14	40	18	1.5
	8/11/15	33	21	4
	Average rain event	32	22	3
<b>Winooski River Tributaries</b>				
BAILEY10	dry 8/21/12	85	11	0.8
	9/5/12	64	61	8
	9/10/13	56	35	(no data)
	9/11/14	145	29	19
	8/11/15	72	120	27
	Average rain event	84	61	18
SABIN10	dry 8/21/12	120	6	1.7
	9/5/12	71	108	37
	9/10/13	79	66	28
	9/11/14	119	13	0.6
	8/11/15	91	77	30
	Average rain event	89	50	19
<b>Steven's Branch Tributaries</b>				
VTRANS10	dry 8/21/12	65	10	0.58
	9/5/12	198	28	3
	9/10/13	73	14	1.5
	9/11/14	103	42	15
	8/11/15	62	17	3
	Average rain event	109	25	6
MACS10	dry 8/21/12	555	6	0.94
	9/5/12	231	62	43
	9/10/13	186	110	92
	9/11/14	535	14	0.6
	8/11/15	240	176	17
	Average rain event	298	90	38
GUNNER10	dry 8/21/12	57	6	1.5
	9/5/12	26	75	41
	9/10/13	43	40	10
	9/11/14	56	10	2
	8/11/15	43	56	17
	Average rain event	42	46	17

Chloride: Chloride levels during our rain event monitoring were generally higher during dry (baseline) conditions than during rain events, likely due to high chloride in ground water (rainwater having a diluting effect). All samples had chloride levels below the Vermont acute standard of 860 mg/L, and

most sites had average chloride levels that fell below the mean (chronic) standard of 230 mg/L. The average chloride at the Macs-10 site (298 mg/L), however, was above the chronic standard. It appears that the chloride concentration in this stream may be generally elevated, especially in dry conditions or the absence of much rainfall. The VTRANS-10 site on Pond Brook had somewhat elevated chloride relative to the other streams sampled.

Phosphorus: Phosphorus levels during the 8/11/15 rain event were particularly high at Bailey 10, Sabin 10, and Macs 10, and the average phosphorus levels for all rain events were highest at these sites. Both Bailey 10 and Sabin 10 are on fairly steep streams that flow through residential areas. The VT Water Quality Standards sets no specific standard for phosphorus levels in Class B waters during rain events (only for base-flow conditions). One way of considering the phosphorous levels detected during the storm events (without discharge data), however, could be to ask whether the phosphorus levels in a stream are contributing to or diluting the phosphorus that eventually gets transported to Lake Champlain. The target phosphorus standard for the Main Lake of Lake Champlain is 10 ug/L. Therefore, since the total phosphorus levels in the samples taken during rain events were all well above 10 ug/L, these tributaries can be considered to have contributed to the overall phosphorus reaching Lake Champlain.

Turbidity: Turbidity levels, as expected, were higher during the two heavier rain events we monitored, and were mostly low during dry periods (and during the light rain event monitored in 2014). Two sites, Sabin 10 and Macs 10 appear to be more susceptible to an increase in turbidity during storm events, although more data is needed to confirm a trend.

Quality assurance data and project completeness for the 2015 sampling effort is presented in **Appendices A and B**. The data from this report was used on a poster displayed at the Montpelier Farmer's market in the fall of 2015. This report will be posted on the Friends of the Winooski website, sent to the Montpelier Conservation Commission, given to the 2015 sampling volunteers, and will be used to educate the public about the water quality conditions of area streams.

**Appendix A. Quality assurance measures for chloride, *E. coli*, total phosphorus, and turbidity sampling in 2015**

Test	Site	Date	A	D	B	Relative % Difference	
Chloride	Bailey 10	6/23/15	13.82	13.76	<2	0.4	
	Bailey 10	7/7/15	22.51	22.55	<2	0.2	
	VTRANS 10	8/4/15	28.4	28.5	<2	0.4	
	Macs 10	8/11/15	240.4	244	<2	1.5	
	Macs 10	8/18/15	541	538.2	<2	0.5	
	Bailey 10	9/1/15	98.72	99.16	<2	0.4	
<b>Chloride Mean Relative % Difference</b>							<b>0.6</b>
<b>Chloride Mean Blank Concentration</b>							<b>&lt;2</b>
<i>E. coli</i>	NBMAIN	6/23/15	150.0	133.4	<1	11.7	
	NBMAIN	7/7/15	77.12	75.41	<1	2.2	
	NBNC02	7/28/15	172.2	123.6	<1	32.9	
	MILLPD	8/4/15	218.7	166.4	<1	27.2	
	MONTHS	8/18/15	101.7	160.7	<1	45.0	
	DRMONTREC	9/1/15	125.0	108.6	(missing)	14.0	
<b><i>E. coli</i> Mean RPD</b>							<b>22.2</b>
<b><i>E. coli</i> Mean Blank Concentration</b>							<b>&lt;1</b>
Total P	NBMAIN	6/23/15	9.43	9.59	< 5	1.7	
	NBMAIN	7/7/15	7.19	7.08	< 5	1.5	
	NBNC02	7/28/15	20	19.4	< 5	3.0	
	MILLPD	8/4/15	13.8	13	<5	6.0	
	Macs 10	8/11/15	176	174	< 5	1.1	
	MONTHS	8/18/15	13.3	13.4	<5	0.7	
	DRMONTREC	9/1/15	15.1	13	(missing)	14.9	
<b>Total Phosphorus Mean RPD</b>							<b>4.2</b>
<b>Total Phosphorus Mean Blank Concentration</b>							<b>&lt;5</b>
Turbidity	NBMAIN	6/23/15	0.63	0.66	<0.2	4.7	
	NBMAIN	7/7/15	1.03	1.08	0.58	4.7	
	NBNC02	7/28/15	8.72	8.84	< 0.2	1.4	
	MILLPD	8/4/15	3.27	3.33	< 0.2	1.8	
	Macs 10	8/11/15	17.2	17.1	< 0.2	0.6	
	MONTHS	8/18/15	1.95	2.13	< 0.2	8.8	
	DRMONTREC	9/1/15	1.54	1.6	(missing)	3.8	
<b>Turbidity Mean RPD</b>							<b>3.7</b>
<b>Turbidity Mean Blank Concentration</b>							<b>&lt;0.254</b>

## Appendix B. Project Completeness

<b>Parameter</b>	<b>Number of Samples Anticipated</b>	<b>Number of Valid Samples Collected &amp; Analyzed</b>	<b>Percent Complete *#</b>
Chloride	30	31	103%
Total Phosphorus	100	73	73%
<i>E. coli</i>	80	65	81%
Turbidity	100	73	73%

\* Percent Complete = # of Valid Samples Collected and Analyzed / # of Samples Anticipated

# Low percentage complete numbers were due to the lack of substantial rain events in 2015, which prevented us from collecting some of our anticipated *E. coli*, phosphorus and turbidity samples.

## Appendix C. Individual Sample Data

Location	Date	Chloride (mg/L)	Final E. Coli.(mpn/100ml)	TP(ug P/L)	Turbidity (NTU)	Sample Number
Macs 10	6/23/15	33.16				150519-18
VTRANS 10	6/23/15	46.35				150519-17
Sabin 10	6/23/15	35.48				150519-16
Bailey 10 - Blank	6/23/15	< 2				150519-15
Bailey 10 - Duplicate	6/23/15	13.76				150519-14
Bailey 10	6/23/15	13.82				150519-13
SPAULD	6/23/15		67.66	42.7	7.52	150519-12
DRRIVERTON	6/23/15		517.21	17.7	2.05	150519-11
DRMONTREC	6/23/15		218.72	12	2	150519-10
MONTHS	6/23/15		248.09	71.4	15.4	150519-09
ALLENL	6/23/15		866.44	84.9	14.6	150519-08
MONSTATE	6/23/15		547.5	59.7	40.5	150519-07
MILLPD	6/23/15		298.66	19.7	6.73	150519-06
NBNC02	6/23/15		156.48	24.3	11.5	150519-05
WORDAM	6/23/15		111.9	9.62	0.72	150519-04
NBMAIN - Blank	6/23/15		< 1	< 5	< 0.2	150519-03
NBMAIN - Duplicate	6/23/15		133.44	9.59	0.66	150519-02
NBMAIN	6/23/15		150.01	9.43	0.63	150519-01
Bailey 10 - Blank	7/7/15	< 2				150406-15
Bailey 10 - Duplicate	7/7/15	22.55				150406-14
Bailey 10	7/7/15	22.51				150406-13
SPAULD	7/7/15		60.53	14.7	5.17	150406-12
DRRIVERTON	7/7/15		204.59	11.8	0.57	150406-11
DRMONTREC	7/7/15		167.43	7.78	1.26	150406-10
MONTHS	7/7/15		186	19.7	5.02	150406-09
MONSTATE	7/7/15		461.11	18.8	2.97	150406-08
ALLENL	7/7/15		183.47	20.7	3.9	150406-07
MILLPD	7/7/15		75.89	12.6	5.42	150406-06
NBNC02	7/7/15		90.97	13.5	5.71	150406-05
WORDAM	7/7/15		81.26	8.23	1.14	150406-04
NBMAIN - Blank	7/7/15		< 1	< 5	0.58	150406-03
NBMAIN - Duplicate	7/7/15		75.41	7.08	1.08	150406-02
NBMAIN	7/7/15		77.12	7.19	1.03	150406-01
Bailey 10	7/28/15	52.15				150533-13
SPAULD	7/28/15		206.35	25	12.6	150533-12
DRRIVERTON	7/28/15		290.93	8.68	0.81	150533-11
DRMONTREC	7/28/15		435.17	8.25	1.09	150533-10
MONTHS	7/28/15		517.21	28	11.6	150533-09

MONSTATE	7/28/15		214.26	26.6	9.55	150533-08
ALLENL	7/28/15		166.4	34.6	7.95	150533-07
MILLPD	7/28/15		325.54	19.2		150533-06
NBNC02-Blank	7/28/15	< 1		< 5	< 0.2	150533-05
NBNC02-Duplicate	7/28/15		123.56	19.4	8.84	150533-04
NBNC02	7/28/15		172.16	20	8.72	150533-03
WORDAM	7/28/15		218.72	10.7	0.83	150533-02
NBMAIN	7/28/15		2419.57	11	1.79	150533-01
Macs 10	8/4/15	571				150636-18
VTRANS 10 - Blank	8/4/15	< 2				150636-17
VTRANS 10 - Duplicate	8/4/15	56.9				150636-16
VTRANS 10	8/4/15	55.9				150636-15
Sabin 10	8/4/15	86.48				150636-14
Bailey 10	8/4/15	77.53				150636-13
SPAULD	8/4/15		131.35	17.5	4.54	150636-12
DRRIVERTON	8/4/15		166.95	8.12	1.18	150636-11
DRMONTREC	8/4/15		139.58	13.2	0.98	150636-10
MONTHS	8/4/15		166.4	28.1	9.21	150636-09
MONSTATE	8/4/15		172.33	85.4	12	150636-08
ALLENL	8/4/15		82.3	13.7	2.21	150636-07
MILLPD-Blank	8/4/15	< 1		< 5	< 0.2	150636-06
MILLPD-Duplicate	8/4/15		166.4	13	3.33	150636-05
MILLPD	8/4/15		218.72	13.8	3.27	150636-04
NBNC02	8/4/15		143.87	16	2.45	150636-03
WORDAM	8/4/15		77.57	13.4	1.26	150636-02
NBMAIN	8/4/15		116.19	17.3	0.59	150636-01
Gunner 10	8/11/15	42.76		56	16.9	150933-09
Macs 10 Blank	8/11/15	< 2		< 5	< 0.2	150933-08
Macs 10 Dup	8/11/15	244		174	17.1	150933-07
Macs 10	8/11/15	240.4		176	17.2	150933-06
VTRANS 10	8/11/15	61.7		17.2	2.78	150933-05
Sabin 10	8/11/15	90.6		77.2	30.2	150933-04
GRANITE	8/11/15	34.2		16.7	2.38	150933-03
Months	8/11/15	33.32		21.6	3.56	150933-02
Bailey 10	8/11/15	71.64		120	26.8	150933-01
Macs 10 - Blank	8/18/15	538.25				150696-18
Macs 10 - Duplicate	8/18/15	< 2				150696-17
Macs 10	8/18/15	541				150696-16
VTRANS 10	8/18/15	74.12				150696-15
Sabin 10	8/18/15	91				150696-14
Bailey 10	8/18/15	73.74				150696-13
SPAULD	8/18/15		108.6	14	4.51	150696-12
DRRIVERTON	8/18/15		107.12	8.52	0.78	150696-11

DRMONTREC	8/18/15		76.65	8.59	1.21	150696-10
MONTHS-Blank	8/18/15		< 1	< 5	< 0.2	150696-09
MONTHS-Duplicate	8/18/15		160.71	13.4	2.13	150696-08
MONTHS	8/18/15		101.68	13.3	1.95	150696-07
MONTSTATE	8/18/15		209.82	13.6	2.75	150696-06
ALLENL	8/18/15		111.23	13.3	2.19	150696-05
MILLPD	8/18/15		235.93	13.6	3.23	150696-04
NBNC02	8/18/15		38.93	11.8	3.14	150696-03
WORDAM	8/18/15		118.74	9.93	1.05	150696-02
NBMAIN	8/18/15		191.79	7.74	0.56	150696-01
Mac3 10	9/1/15	595.8				150704-18
VTRANS 10	9/1/15	118.4				150704-17
Sabin 10	9/1/15	103.2				150704-16
Bailey 10 - Blank	9/1/15	< 2				150704-15
Bailey 10 - Duplicate	9/1/15	99.16				150704-14
Bailey 10	9/1/15	98.72				150704-13
SPAULD	9/1/15		68.28	17	7.61	150704-12
DRRIVERTON	9/1/15		53.81	9.18	0.8	150704-11
DRMONTREC-Blank	9/1/15		88.59	11.5	0.32	150704-10
DRMONTREC-Duplicate	9/1/15		108.6	13	1.6	150704-09
DRMONTREC	9/1/15		124.98	15.1	1.54	150704-08
MONTHS	9/1/15		117.76	17.6	2.97	150704-07
MONTSTATE	9/1/15		101.44	18.2	3.35	150704-06
GRANITE	9/1/15		83.61	13.4	1.99	150704-05
NBNC02	9/1/15		15.63	11	1.83	150704-03
WORDAM	9/1/15		57.31	11.7	1.34	150704-02
NBMAIN	9/1/15		64.37	8.52	0.9	150704-01