



Southeastern Vermont Watershed Alliance

2015 WQMP End of Year Report

LaRosa Program 137-09

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Introduction

Southeastern Vermont Watershed Alliance's (SeVWA's) water quality monitoring program (WQMP) was made possible in 2015 by the LaRosa Partnership Program, dedicated teams of local volunteers, and *E. coli* analysis services provided by the laboratory at the Connecticut River Watershed Council (CRWC) in Greenfield, MA. SeVWA's membership contributions and dues, funds contributed by some towns in southeastern Vermont, and funds provided by a few businesses and organizations helped to support this program. The 2015 monitoring season was organized and run by SeVWA's WQMP Coordinator, Ryan O'Donnell, WQMP Committee, and Local Stream Teams. They were assisted by Vermont Agency of Natural Resources summer intern, Chris Yurek; Chris also assisted Ottauquechee River Group and Black River Action Team.

In 2015, 32 volunteers monitored 27 sites that were sampled every two weeks on Wednesday mornings. 21 sites were sampled for all parameters, *E. coli*, NO_x, total nitrogen, total phosphorous, turbidity, and specific conductivity, while 6 sites were sampled just for *E. coli*. There were five regularly scheduled sampling days to collect all parameters and a sixth sampling day to collect *E. coli* samples as well as a make-up round of the other parameters at any sites that had missed a regular sampling day. Chris Yurek assisted with processing the samples at the CRWC lab. In 2010, Laurie Callahan was successful at procuring an incubator to be utilized by the CRWC lab through the EPA Region 1 Equipment Loan grant program. This incubator, in addition to CRWC's incubator, ensures that CRWC will have adequate capacity for incubating SeVWA *E. coli* samples along with any other samples the CRWC lab processes.

Table 1 - 2015 Site Roster

Site ID	Site Name	City/Village	LAT	LON
West_38.5	West River, below Mountain Marketplace	Londonderry	43.22291	-72.8194
West_38.5A	West River, 1/2 way between Londonderry & South Londonderry, Rte 100 just below Rte 100 bridge	Londonderry	43.21038	-72.82441
West_36	West River, Rowes Rd.	South Londonderry	43.185	-72.8026
West_13	West River, Brookline bridge, Hill Rd.	Brookline	42.9959	-72.6371
West_6.4	West River, Dummerston covered bridge swimming hole	Dummerston	42.9368	-72.6132
West_1.42	West River, swimming hole behind Brattleboro Professional Center	Brattleboro	42.87967	-72.5738
West_.08	West River, Milk House Meadows	Brattleboro	42.8694	-72.5605
NBranchBrk_4.5	North Branch Brook, Pikes Falls swimming hole	Jamaica	43.0976	-72.8515
Rock_.38	Rock River, Indian Love Call swimming hole, just above West R. confluence & Rte 30 bridge	Newfane	42.94678	-72.6467
Williams_14.2¹	Williams River, Church St.	Chester	43.26833	-72.6013
MBrWilliams_2.1	Middle Branch Williams, Blue Hill Rd. crossing	Chester	43.26666	-72.6166
MBrWilliams_.02	Middle Branch Williams, just above Williams R. confluence	Chester	43.2599	-72.5798
SBrWilliams_.25¹	South Branch Williams, above Route 103 & above confluence with Middle Branch Williams River	Chester	43.25674	-72.5834
Williams_10.7	Williams River, Rainbow Rock swimming hole	Chester	43.25903	-72.5785
Williams_10.3	Williams River, below Chester WWTF	Chester	43.25537	-72.5741
Williams_8.6	Williams River, at railroad bridge below Missing Link Rd. & just below Halls Brook	Chester	43.24018	-72.5561
Williams_7.0	Williams River, Bartonsville bridge	Rockingham	43.224	-72.5369
Williams_.92	Williams River, Golden Hill Rd. swimming hole	Rockingham	43.18295	-72.4627
Saxtons_5.6	Saxtons River, Stickney's field swimming hole	Saxtons River	43.13507	-72.5147
Saxtons_5.0	Saxtons River, below Saxtons River village WWTF	Saxtons River	43.13743	-72.5038
Saxtons_5.15	Saxtons River, just above Saxtons River village WWTF	Saxtons River	43.13661	-72.5064
Saxtons_1.0¹	Saxtons River, below Twin Falls	Westminster	43.11847	-72.451
Saxtons_.19	Saxtons River, "sandy beach", just south of Bellows Falls & just above Rte 5 bridge	Westminster	43.123	-72.4424
Sacketts_.15¹	Sacketts Brook, above I-91	Putney	42.96604	-72.5156
Whetstone_3.7	Whetstone Brook, Vermont Land Trust Farm parcel	Brattleboro	42.85753	-72.6013
Whetstone_2.4	Whetstone Brook, Brattleboro Farmers Market, Western Ave.	Brattleboro	42.84894	-72.5871
Whetstone_.2	Whetstone Brook, behind the former Brattleboro Coop	Brattleboro	42.8507	-72.5594

¹ New in 2015

Figure 1 - Map of 2015 Sites

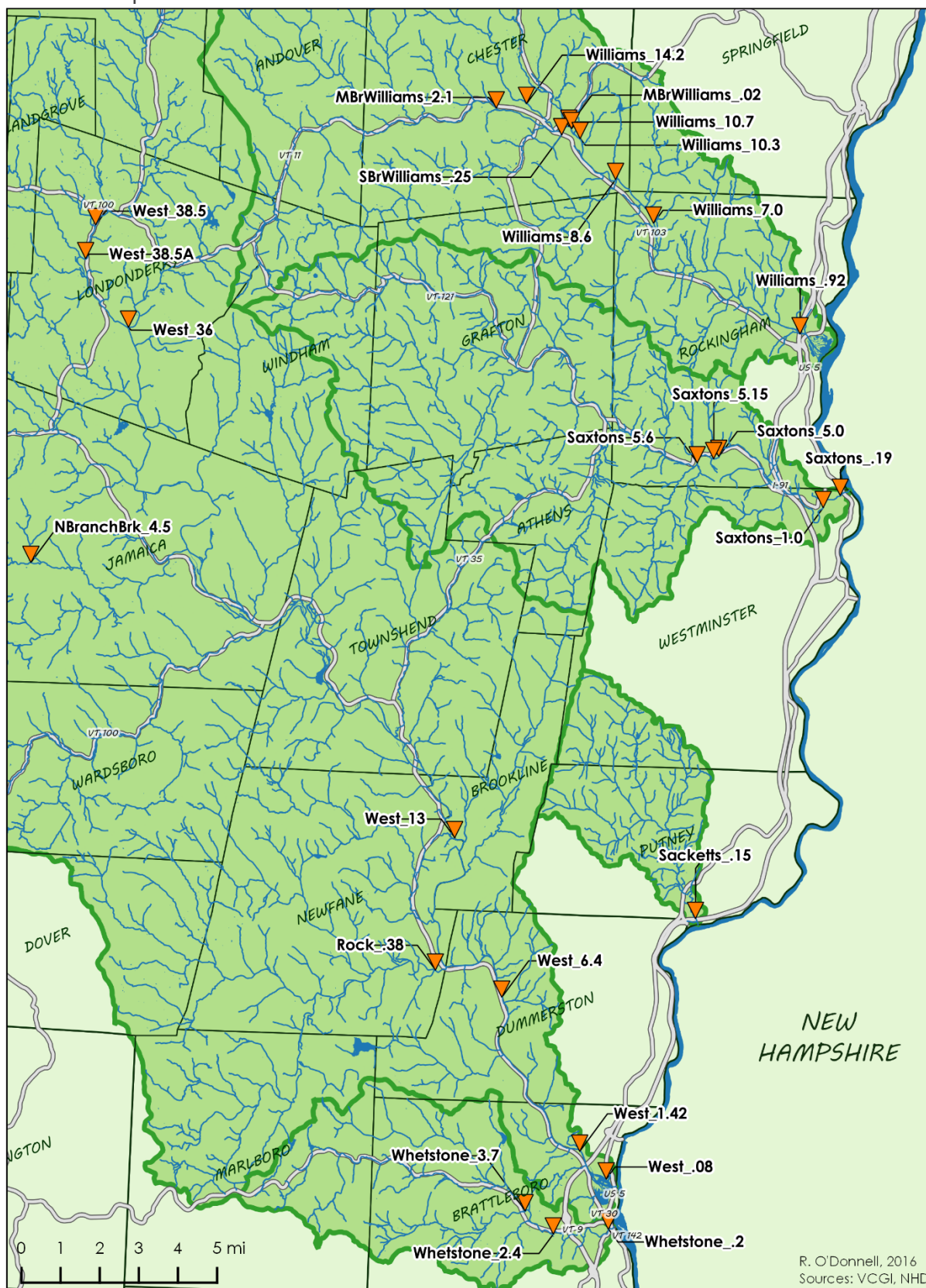


Table 2 - Sampling Dates & Parameters Measured, Sampled, or Analyzed

Site ID	6/17/2015							7/1/2015							7/15/2015						
	EC	NO _x	TN	TP	Trb	Cn	T	EC	NO _x	TN	TP	Trb	Cn	T	EC	NO _x	TN	TP	Trb	Cn	T
West_38.5	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
West_38.5A	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
West_36	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
West_13	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
West_6.4	•	•	•	•	•	•	•								•	•	•	•	•	•	•
West_1.42	•	•	•	•	•	•	•								•	•	•	•	•	•	•
West_.08	•						•	•						•	•						•
NBranchBrk_4.5	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Rock_.38	•	•	•	•	•	•	•								•	•	•	•	•	•	•
Williams_14.2	•						•	•						•	•						•
MBrWilliams_2.1	•	•	•	•	•	•	•								•	•	•	•	•	•	•
MBrWilliams_.02	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
SBrWilliams_.25	•						•	•						•	•						•
Williams_10.7	•	•	•	•	•	•	•								•	•	•	•	•	•	•
Williams_10.3	•	•	•	•	•	•	•								•	•	•	•	•	•	•
Williams_8.6	•						•								•						•
Williams_7.0	•	•	•	•	•	•	•								•	•	•	•	•	•	•
Williams_.92	•	•	•	•	•	•	•														
Saxtons_5.6	•						•	•						•	•						•
Saxtons_5.0	•	•	•	•	•	•	•	•	•	•	•	•	•	•							
Saxtons_5.15	•	•	•	•	•	•	•								•	•	•	•	•	•	•
Saxtons_1.0	•						•	•						•	•						•
Saxtons_.19	•	•	•	•	•	•	•								•	•	•	•	•	•	•
Sacketts_.15	•	•	•	•	•	•	•								•	•	•	•	•	•	•
Whetstone_3.7	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Whetstone_2.4	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Whetstone_.2	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•

Parameters: *E. coli* (EC), NO_x, Total Nitrogen (TN), Total Phosphorous (TP), Turbidity (Trb), Specific Conductivity (Cn), Temperature (T)

Table 2 – Continued

Site ID	7/29/2015							8/12/2015							8/26/2015						
	EC	NO _x	TN	TP	Trb	Cn	T	EC	NO _x	TN	TP	Trb	Cn	T	EC	NO _x	TN	TP	Trb	Cn	T
West_38.5	•	•	•	•	•	•	•								•	•	•	•	•	•	•
West_38.5A	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•						•
West_36	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•						•
West_13	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•						•
West_6.4	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
West_1.42	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
West_.08	•							•						•	•						•
NBranchBrk_4.5	•	•	•	•	•	•	•	•		•	•	•	•	•	•						•
Rock_.38	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Williams_14.2	•						•	•							•						•
MBrWilliams_2.1	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
MBrWilliams_.02								•	•	•	•	•	•	•	•	•	•	•	•	•	•
SBrWilliams_.25	•						•	•						•	•						•
Williams_10.7	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Williams_10.3	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Williams_8.6	•						•	•						•	•						•
Williams_7.0	•	•	•	•	•	•	•	•	•	•	•			•	•	•	•	•	•	•	•
Williams_.92	•	•	•	•	•	•	•								•	•	•	•	•	•	•
Saxtons_5.6	•						•								•						•
Saxtons_5.0	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Saxtons_5.15	•	•	•	•	•	•	•	•	•	•	•	•	•	•							
Saxtons_1.0	•						•	•						•	•						•
Saxtons_.19	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•						•
Sacketts_.15	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Whetstone_3.7	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•						•
Whetstone_2.4	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•						•
Whetstone_.2	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•						•

Parameters: *E. coli* (EC), NO_x, Total Nitrogen (TN), Total Phosphorous (TP), Turbidity (Trb), Specific Conductivity (Cn), Temperature (T)

Quality Assurance & Determinations

Table 3 - Data Completeness

Parameter	Analyzed By	# Anticipated Samples (including QC)	# Valid Samples Collected & Analyzed (including QC)	% Complete
E. Coli	CRWC	181	170	94%
Total NO _x	LaRosa	115	115	100%
Total Nitrogen		115	117	102%
Total Phosphorous		115	115	100%
Turbidity	SeVWA	115	117	102%
Specific Conductivity		115	117	102%

Table 4 - Quality Control Completeness

	Parameter					
	E. Coli	NO _x	TN	TP	Turb	Cond
Total Number of Samples	147	104	104	101	103	103
Total Number of Field Duplicates	14	6	8	8	9	9
% of Field Dups (Goal is ≥ 10%)	10%	6%	8%	8%	9%	9%
Total Number of Field Blanks	11	7	7	6	7	7
% of Field Blanks (Goal is ≥ 10%)	7%	7%	7%	6%	7%	7%

Table 5 - Relative Percent Difference (RPD)

Site ID	Date	CRWC	LaRosa			SeVWA	
		E. Coli.	NO _x	TN	TP	Turb	Spec. Cond.
West_1.42	6/17/2015	26%	0%	7%	2%	48%	1%
Rock_.38	6/17/2015	102%	15%	0%	27%	46%	1%
West_.08	6/17/2015	11%					
NBranchBrk_4.5	7/1/2015	4%		7%	30%	15%	2%
West_13	7/15/2015	8%	0%		2%	9%	0%
Williams_14.2	7/15/2015	7%					
West_36	7/29/2015	29%		5%	2%	33%	1%
Williams_7.0	7/29/2015	28%	5%	1%	14%	9%	2%
MBrWilliams_2.1	7/29/2015	42%					
Williams_10.3	8/12/2015	4%		11%	22%	6%	2%
Saxtons_1.0	8/12/2015	7%					
Williams_14.2	8/26/2015	8%					
Williams_10.7	8/26/2015	7%	0%	0%	14%	5%	3%
SBrWilliams_.25	8/26/2015	3%	0%	0%	106%	46%	1%
Mean RPD		20%	3%	4%	24%	24%	1%
RPD Goal		≤50%	≤10%	≤20%	≤30%	≤15%	ND
		≤125 % (< 25 mpn)				≤50% (< 2 NTU)	

$$\text{RPD formula used: } RPD_{\text{field duplicate pair}} = \frac{|sample_1 - sample_2|}{\text{Average}(sample_1, sample_2)}$$

In 2015, SeVWA collected samples to test for *E. coli*, NO_x, total nitrogen (TN), total phosphorous (TP), turbidity, and specific conductivity; volunteers also recorded air and water temperature measurements at each site while collecting their samples. *E. coli* samples were analyzed by the CRWC lab in Greenfield, MA; NO_x, TN, and TP samples were analyzed by LaRosa lab; and turbidity and conductivity samples were analyzed by SeVWA.

Field Duplicates: All field duplicates were within acceptable RPD goals except for 2 sets of duplicates (see Table 5 - Relative Percent Difference (RPD)). One set was accepted due to low initial values and one set was rejected due to a possible data mix-up. See the discussion of QA anomalies below for more information. All RPD means for the 2015 season were within acceptable ranges.

Field Blanks: Prior to 2015, SeVWA had assigned the collection of field blanks to the two volunteers in charge of transporting samples, effectively making them travel blanks. Starting in 2015, field blanks were assigned to volunteers to collect with their regular samples and it was a rocky transition. Adding to the rocky transition was a series of miscommunications resulting in difficulties receiving enough sterile DI water to collect the number of field blanks required to achieve the 10% goal. Five full sets of blanks were rejected due to improper sampling technique; some or all of the parameters were not sampled as blanks. The results were too high to be considered mishandling of the samples or the sterile DI water and many of them came back within acceptable RPD ranges of the regular samples at the same sites. Most of these occurred toward the end of the season and it is possible that volunteers had forgotten what was explained about field blanks at the training sessions. This issue will be thoroughly addressed at future volunteer trainings and throughout future seasons. The only other field blank anomaly resulting in data rejection was a possible data mix-up. See the discussion of QA anomalies below for more information.

***E. coli*:** All *E. coli* samples were delivered to the CRWC lab within the 6 hours of sample collection and were set up for testing within the allotted 8-hour time frame. Although not all samples were below 4°C upon delivery, all samples showed evidence of cooling during transport. The CRWC lab met all other QA criteria for *E. coli* testing. No *E. coli* results were rejected. All *E. coli* field duplicates were below the RPD goal of 50% for samples ≥25 MPN or 125% for <25 MPN.

NO_x: No NO_x results were rejected. Three sample bottles were empty upon receipt presumably due to improperly tightened caps. All NO_x field duplicates were below the RPD goal of 10% except for one, which was not rejected due to low initial values (see QA anomaly discussions below).

Total Nitrogen: No TN results were rejected. One sample bottle was empty upon receipt presumably due to an improperly tightened cap. All TN field duplicates were below the RPD goal of 20%.

Total Phosphorous: Two TP results were rejected due to exceeding the RPD goal. All other TP field duplicates were below the RPD goal of 30%. See QA anomaly discussion below for more information regarding sample rejection.

Turbidity: SeVWA decided to conduct its own turbidity analysis in 2015 after several years of highly inconsistent RPDs from field duplicate pair results from the LaRosa lab. Results were recorded on a log sheet for each analysis run and those log sheets are retained with field data sheets from the same sampling day. No turbidity results were rejected. In January 2015, e-mail discussions between SeVWA and Jim Kellogg resulted in SeVWA deciding to accept turbidity RPD values of up to 50% for initial values below 2 NTU in addition to the accepted RPD goal of up to 15%. All turbidity field duplicates met these newer RPD goals. On August 12th, the turbidity result at Saxton_.19 came back extremely high; this result is consistent with the volunteer's observation that the water was an opaque, milky green color. One sample, Williams_7.0 on 8/12, was tested for other parameters but the bottle used for turbidity and conductivity was misplaced in transport.

Specific Conductivity: SeVWA continued conductivity analysis in 2015. Conductivity results were recorded on a log sheet for each analysis run and those log sheets are retained with field data sheets from the same sampling day. No conductivity results were rejected. SeVWA does not have information regarding RPD criteria for conductivity but all RPDs were $\leq 3\%$. One sample, Williams_7.0 on 8/12, was tested for other parameters but the bottle used for turbidity and conductivity was misplaced in transport.

Temperature: All thermometers used for air and water temperatures were calibrated with a NIST thermometer at the CRWC laboratory before the 2015 monitoring season began.

Sampling sites' data completeness met or exceeded 100% for all parameters except for *E. coli*, which was 94% (see Table 3 - Data Completeness). Some parameters exceeded 100% due to a large number of samples not being collected on July 2nd, and those parameters and their associated QC samples being rescheduled for the make-up/*E. coli* only day. Consequently, a few more samples were collected than originally scheduled.

All parameters except for *E. coli* failed to meet the QC goal of 10% for field duplicates (see Table 4 - Quality Control Completeness). When the field duplicate schedule was created, there were only 20 sites scheduled for the full suite of parameters and an extra site was added right before the sampling season, resulting in only 9% field duplicate completeness for turbidity and conductivity. Of the 4 NO_x or TN bottles that were empty upon receipt, 3 were part of field duplicate pairs, reducing field duplicate completeness to 6% and 8% for NO_x and TN, respectively. Finally, one TP field duplicate pair was rejected due to exceeding the RPD and a possible data mix-up.

All parameters failed to meet the QC goal of 10% for field blanks. 5 full sets of blanks were rejected due to improper sampling technique; see the discussion of field blanks above or QA anomalies below for more information. Enough blanks were scheduled (and collected), however, to meet or exceed the 10% goal.

QA Anomalies not resulting in data rejection:

- 6/17/15, Rock_.38 & Rock_.38 DUPLICATE, NO_x – RPD exceeds goal of 10%, but due to low initial values and difference of one point on test, results were not rejected

QA Anomalies resulting in data rejection:

- 6/17/15, H1/SBrWilliams_.25 BLANK, All Parameters – The full suite of blanks for this site were rejected due to some parameters being sampled as duplicates.
- 8/12/15, H1/Saxtons_5.15 BLANK, All Parameters – The full suite of blanks for this site were rejected due to some parameters being sampled as duplicates.
- 8/12/15, H4/Saxtons_5.15 BLANK, All Parameters – The full suite of blanks for this site were rejected due to all parameters being sampled as duplicates.
- 8/26/16, SBrWilliams_.25, SBrWilliams_.25 DUPLICATE, & H1/Rock_.38 BLANK, TP – The TP RPD for SBrWilliams_.25 and its duplicate exceeded the goal of 30%; upon closer inspection of results, SBrWilliams_.25 came back as below the detectable limit while Rock_.38 BLANK came back positive. It is possible that results for SBrWilliams_.25 & Rock_.38 were switched. All three results were rejected.
- 8/26/15, H2/Saxtons_5.15 BLANK, All Parameters – The full suite of blanks for this site were rejected due to some parameters being sampled as duplicates.
- 8/26/15, H3/Williams_10.3 BLANK, All Parameters – The full suite of blanks for this site were rejected due to all parameters being sampled as duplicates.

Preliminary Synopsis of Results

This overview is intended as a preliminary synopsis of results generated by the project. A more descriptive data review for 2015 will be synthesized in the near future in SeVWa's 2015 Summary Report. Full results can be found in the Appendix of this report.

Table 6 - *E. coli* Summary

Site ID	Geometric Mean	N	Seasonal Max	Date of Seasonal Max	
West_38.5	135.7	5	658.6	8/26/15	State of VT TMDL Project Area
West_38.5A	214.2	6	1299.7	8/12/15	
West_36	292.1	6	1553.1	8/12/15 & 8/26/15	
West_13	142.3	6	517.2	8/12/15	
West_6.4	118.7	5	648.8	8/12/15	
West_1.42	261.9	5	920.8	8/12/15	
West_.08	195.4	6	727.0	8/26/15	
NBranchBrk_4.5	105.9	6	387.3	8/12/15	
Rock_.38	44.1	5	137.6	8/12/15	
MBrWilliams_2.1	121.7	6	686.7	8/12/15	
MBrWilliams_.02	168.3	5	517.2	8/12/15	State of VT TMDL Project Area
SBrWilliams_.25	100.7	5	517.2	7/1/15	
Williams_14.2	259.8	6	1299.7	8/26/15	
Williams_10.7	273.6	5	1203.3	8/26/15	
Williams_10.3	321.8	5	1299.7	8/26/15	
Williams_8.6	371.5	5	1732.9	8/26/15	
Williams_7.0	527.7	5	1299.7	8/26/15	
Williams_.92	354.1	3	1986.3	8/26/15	
Saxtons_5.6	172.0	5	648.8	8/26/15	
Saxtons_5.15	304.0	5	1046.2	8/12/15	
Saxtons_5.0	228.5	4	1119.9	8/12/15	State of VT TMDL Project Area
Saxtons_1.0	552.5	6	1119.9	7/1/15 & 8/12/15	
Saxtons_.19	401.0	5	1203.3	8/12/15	
Sacketts_.15	1638.5	5	>2419.6	8/12/15	
Whetstone_3.7	193.3	6	488.4	8/12/15	
Whetstone_2.4	438.8	6	1986.3	7/1/15	
Whetstone_.2	467.1	6	1732.9	8/12/15	

The Vermont Department of Health and the EPA have declared ≤ 235 MPN as "suitable for swimming" for a single sample. The Vermont standard for Class B Waters is a geometric mean of <126 MPN with no more than 10% of samples exceeding 235 MPN. The *E. coli* geometric means for 2015 may be slightly higher than past years due to a majority of sampling events occurring after significant rainfalls.

Table 7 - Other Parameter Summary

Site ID	NO _x		TN		TP		Turbidity		Conductivity	
	N	Mean (mg-N/l)	N	Mean (mg-N/l)	N	Mean (µg P/L)	N	Mean (NTU)	N	Mean (µS/cm)
West_38.5	5	0.04	5	0.21	5	13.24	5	1.41	5	75.7
West_38.5A	5	0.05	5	0.22	5	14.13	5	1.41	5	77.3
West_36	5	0.04	5	0.22	5	13.80	5	1.44	5	79.1
West_13	5	0.05	4	0.21	5	12.10	5	1.47	5	92.8
West_6.4	5	0.07	5	0.20	5	11.63	5	1.42	5	100.7
West_1.42	5	0.08	5	0.24	5	13.09	5	4.19	5	97.8
NBranchBrk_4.5	4	0.16	5	0.31	5	10.23	5	0.99	5	288.8
Rock_38	5	0.09	5	0.16	5	10.25	5	1.30	5	83.4
MBrWilliams_.02	5	0.09	5	0.20	5	11.22	5	1.67	5	137.2
SBrWilliams_.25	5	0.06	5	0.18	5	12.10	5	1.96	5	100.0
Williams_10.7	5	0.14	5	0.26	5	15.30	5	2.93	5	129.7
Williams_10.3	5	0.13	5	0.34	5	17.34	5	3.30	5	128.3
Williams_7.0	5	0.40	5	0.54	5	18.83	4	4.69	4	136.6
Williams_.92	3	0.28	3	0.44	3	18.64	3	5.43	3	136.9
Saxtons_5.15	5	0.08	5	0.20	5	17.29	5	4.05	5	106.7
Saxtons_5.0	4	0.57	4	0.71	4	68.68	4	2.03	4	135.2
Saxtons_.19	4	0.13	4	0.27	4	31.50	4	16.05	4	141.3
Sacketts_.15	5	0.19	5	0.35	5	47.38	5	7.02	5	190.4
Whetstone_3.7	5	0.14	5	0.24	5	12.26	5	1.60	5	126.6
Whetstone_2.4	5	0.18	5	0.33	5	40.34	5	1.88	5	152.8
Whetstone_.2	5	0.24	5	0.33	5	12.45	5	1.59	5	177.5

SeVWA continued testing for both NO_x and total nitrogen in 2015 in preparation for transitioning from NO_x to TN. As in 2014, TN results were predictably higher than NO_x, but both tests identified similar locations with higher nitrogen counts. The Vermont nitrogen standard for Class B Waters is 5.0 mg/L.

The Vermont standard for phosphorous is that "In all waters, total phosphorous loadings shall be limited so that they will not contribute to the acceleration of eutrophication or the stimulation of the growth of aquatic biota in a manner that prevents the full support of uses." Nonpoint source runoff from agricultural and developed landscapes provides the most significant source of phosphorus to waterbodies.

The Vermont standard for Turbidity in Class B waters is not to "exceed in amounts or concentrations that would prevent the full support of uses" and <10 NTU for cold water fish habitats and <25 NTU for warm water fish habitats.

There is no Vermont standard for specific conductivity. Conductivity measures the amount of conductive ions in water; these come from dissolved salts and other inorganic compounds. High conductivity measurements can reflect the underlying geology or pollution. The more saline water is, which can be indicated by conductivity, the lower the dissolved oxygen concentration.

Table 8 - Temperature Summary

Site ID	Mean Water Temp °C	Site ID	Mean Water Temp °C
West_38.5	16.7	Williams_10.3	16.8
West_38.5A	16.7	Williams_8.6	16.8
West_36	16.6	Williams_7.0	17.5
West_13	19.8	Williams_.92	18.5
West_6.4	20.7	Saxtons_5.6	17.3
West_1.42	20.3	Saxtons_5.15	16.7
West_.08	20.3	Saxtons_5.0	17.1
NBranchBrk_4.5	15.3	Saxtons_1.0	18.3
Rock_.38	17.0	Saxtons_.19	18.7
MBrWilliams_2.1	16.3	Sacketts_.15	18.3
MBrWilliams_.02	17.2	Whetstone_3.7	16.2
SBrWilliams_.25	15.8	Whetstone_2.4	15.2
Williams_14.2	15.3	Whetstone_.2	16.1
Williams_10.7	17.1		

SeVWA has documented water temperatures exceeding 20°C during the summer months for several years at all of its monitoring locations. Temperatures of over 20°C can have a negative impact on cold-water fish species. SeVWA has secured a grant for 2016 to conduct an in-depth analysis of temperatures along the Whetstone Brook using in-stream temperature loggers. If successful, SeVWA may conduct similar studies along its other reaches.

Table 9 - Flow Observations

Site ID	Flow Type					
	6/17	7/1	7/15	7/29	8/12	8/26
West_38.5	Freshet	Base	Base	Base	Not Tested	Freshet
West_38.5A	Freshet	Base	Base	Base	Freshet	Freshet
West_36	Freshet	Base	Base	Base	Freshet	Freshet
West_13	Freshet	Freshet	Base	Base	Base	Base
West_6.4	Freshet	Not Tested	Base	Base	Freshet	Freshet
West_1.42	Base	Not Tested	Base	Base	Base	Freshet
West_.08	Base	Freshet	Base	Base	Base	Base
NBranchBrk_4.5	Freshet	Freshet	Base	Base	Base	Base
Rock_.38	Base	Not Tested	Base	Base	Freshet	Freshet
MBrWilliams_2.1	Freshet	Freshet	Base	Base	Freshet	Base
MBrWilliams_.02	Freshet	Not Tested	Base	Base	Freshet	Base
SBrWilliams_.25	Base	Base	Base	Not Tested	Freshet	Base
Williams_14.2	Base	Freshet	Base	Base	Base	Base
Williams_10.7	Base	Not Tested	Base	Base	Freshet	Freshet
Williams_10.3	Freshet	Not Tested	Base	Base	Freshet	Freshet
Williams_8.6	Base	Not Tested	Base	Base	Freshet	Freshet
Williams_7.0	Freshet	Not Tested	Base	Base	Freshet	Freshet
Williams_.92	Freshet	Not Tested	Not Tested	Base	Not Tested	Base
Saxtons_5.6	Base	Freshet	Base	Base	Not Tested	Freshet
Saxtons_5.15	Base	Freshet	Not Tested	Base	Base	Base
Saxtons_5.0	Freshet	Not Tested	Freshet	Freshet	Freshet	Not Tested
Saxtons_1.0	Base	Freshet	Base	Base	Freshet	Base
Saxtons_.19	Base	Not Tested	Base	Base	Freshet	Freshet
Sacketts_.15	Base	Not Tested	Base	Base	Base	Base
Whetstone_3.7	Base	Freshet	Base	Base	Freshet	Freshet
Whetstone_2.4	Base	Freshet	Base	Base	Freshet	Freshet
Whetstone_.2	Base	Base	Base	Base	Freshet	Freshet

Color key:

High Flows

Moderate Flows

Low Flows

The above table is a compilation of flow observations made by volunteers on their field sheets while collecting samples.

Epilogue

Some of the most significant water quality issues that have been identified by the WRWA/SeVWA monitoring program from 2003-2015 have been related to *E. coli* levels. A statewide VT DEC managed *E. coli* TMDL that has included the West River in Londonderry and the Whetstone Brook in Brattleboro; elevated *E. coli* levels have been documented at most sites. Additionally, total Phosphorous results have reached levels of concern, particularly at a site on the Saxtons River since 2012 and on the Sacketts Brook, which was added to the program this year. SeVWA is initiating an in-depth temperature monitoring project on the Whetstone in 2016 as the next step in documenting elevated temperatures that have been observed as part of our regular monitoring for many years.

Starting in 2012, SeVWA's *E. coli* results have been made available to the public through a variety of sources, including publishing on its website (<http://www.sevwa.org>), CTRiver.us, Facebook, iBrattleboro, and postings by volunteers at public information kiosks and near monitoring locations.

Since 2010, VT DEC and the Connecticut River Watershed Council have entered a services exchange agreement that has provided a collaboration that enhances SeVWA's utilization of the CRWC laboratory in Greenfield, MA, for its *E. coli* testing.

This report was produced to meet the requirements of the LaRosa Lab Services Partnership Program and is intended as a preliminary synopsis of results generated by the project. SeVWA plans to produce a 2015 summary report that will include a more descriptive data review including data from past years.

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