Black River Action Team

5th Annual Monitoring Report

December 2016

Contents

Introduction –

The Black River Action Team continued a volunteer water quality monitoring program in the summer of 2016 as a result of many elements dove-tailing: Tropical Storm Irene had blasted through the area in 2011, raising many concerns about the condition of the Black River; the BRAT continued to have the invaluable help of member Bill Manner, who brought many years of experience with the Pennsylvania Department of Environmental Protection's Watershed Management Program; the Partnership Program with the La Rosa State Water Quality Laboratory accepted our application for inclusion; Endyne Laboratory in Lebanon, NH offered to donate dozens of *E. coli* tests to our cause; and volunteers began to step up and be willing to accept training and responsibility for the nine sites we chose to sample.

With the assistance of Marie Caduto, our region's Watershed Coordinator with the Agency of Natural Resources, the BRAT carefully selected fourteen sites along the main stem of the Black River and three of her tributary streams to collect samples.

Prior to monitoring for 2016 BRAT was able to enlist several new volunteers to assist with the sample collection. Lucy Georgeff, Tammy Wright, Jess Curtis, Phil Carter, Reuben Allen, Carroll Veltrop, Moira Stettner, and Rodger Capron all assisted with sampling at regularly assigned sites after attending training with the BRAT Monitoring Coordinator.

As part of the LaRosa Grant, we answered the following questions in our grant application and have listed our progress in the italicized text below.

What will be monitored?– Black River, Spoonerville Brook, Mile Brook and Great Brook will be monitored for E. Coliform, Nitrates, Phosphates, and Turbidity. The samples will be collected at a total of 14 sites, once a month for 5 months (May thru Sept.). *The Samples were collected on May 25, June 29, July 27, August 31, & September 28, 2016.*

When will monitoring occur? – Beginning in late May /early June. A specific day will be determined and all sampling will need to be done on a designated day (like 3rd Monday of the month) at the same time of day. Samples will then be transported to the respective laboratories for analysis. *Monitoring was conducted as planned, on the last Wednesday morning of every month.*

How will samples be collected? – Volunteers will collect samples in the bottles provided by the laboratories, placed on ice and then be assembled for transport to laboratory. *Volunteers collected the samples, and all chemical samples were packaged on ice and shipped to LaRosa Labs via Green Mountain Messenger. Bacteriological samples were collected carefully, packaged on ice, and transported to the Ludlow WWTF for delivery to Endyne Labs in Lebanon NH via their courier. Training for the sample collectors was provided by the BRAT Monitoring Coordinator and at least once during the monitoring period the monitoring coordinator did site visits or reviewed monitoring procedures with the sample collectors.*

Once the sample results are received from the laboratories, the results were entered into a data system, which will allow for the analysis of data, storage of data, and preparation of graphs and reports. *Sample results were entered into an Excel spreadsheet to allow analysis and graphing of the results.*

Our sites for 2016 were different from the previous year and are listed below:

Site #1- BRAT.BR.1.6: Perley Gordon Road, dock at Stettner residence. Convenient to access from a floating dock, this site is considered a “representation reach," as it is the closest to the Black River’s confluence with the Connecticut River. It is the most downstream reach of the main stem, hosting a representation of all upstream impact. The river here is wide and flat, with a silty bed and a road on either bank. About 1/3 mile upstream is Gould Mill, a rocky waterfall that once hosted a mill; the waterfall offers a scenic view for users of the recreational trail on the bank above, as

well as providing a mixing function for the river. This reach is also impacted by the dramatically-changing water levels as influenced by the operation of TransCanada's hydro dams on the CT River. Sampled by Kelly and Moira Stettner.

Site #2- BRAT.BR.2.4: Downstream of Springfield wastewater treatment facility. On the Black River -Sampled by Kelly and Moira Stettner.

Site #3- BRAT.BR.2.75: Upstream of Springfield wwtf.
This site goes hand-in-hand with Site #2; bracketing the outfall pipe for the wwtf should help the BRAT get a sense of any impact on the river from this outfall. Sampled by Kelly and Moira Stettner.

Site #4- BRAT.BR.3.6: Grout Park, behind Springfield Community Center.
This site is just below the last man-made dam on the Black River and below the main downtown industrial area of Springfield. Ducks and Canada geese are commonly seen here. This site is also downstream from Mile Brook, which has been (until recently) heavily impacted by straight-pipe sewage discharges from Valley Street. Sampled by Tammy Wright.

Site #5 – BRAT.MB.0.0: Mile Brook
This site is just above the confluence of Mile Brook with the Black River in downtown Springfield. Sampled by Lucy Georgeff and Eva Owen.

Site #6 – BRAT.MB.0.2: Mile Brook Upstream
This site is located 0.2 miles above the confluence of Mile Brook with the Black River, just before Mile Brook is channeled underground under buildings and parking areas in downtown Springfield. Sampled by Lucy Georgeff and Eva Owen.

Site #7- BRAT.BR.5.1: Riverside Middle School.
A wide, flat, sandy-bottomed reach that is influenced by slow flow as the river enters a sharp bend downstream. The water here tends to be warmer, as there is no shading canopy of tree branches overhead to shield the river from the sun. This site is also at the end of a 2-mile run that is parallel with Route 106. Sampled by Carroll Veltrop.

Site #8- BRAT.SB.0.1: Spoonerville Brook, North Springfield.
A small winding brook, the Spoonerville drains only about 5 square miles of watershed but runs very close to a number of back roads. The BRAT originally chose to sample Spoonerville Brook before a proposed biomass incinerator was approved and built, to generate baseline data that could be analyzed in the years following construction.

Although the incinerator was not approved, we hope to be better able to recognize trends and notice changes, should any other facility be approved for construction in the North Springfield Industrial Park. Sampled by Jess Curtis.

Site #9- BRAT.GB.0.3: Great Brook, North Springfield

Great Brook drains a much larger watershed than does the Spoonerville, coming into the Black River just 200' upstream from the smaller brook. Great Brook runs along Main Street in North Springfield and may be impacted negatively by the truck traffic on this street. Again, we hope to build a solid database of information on Great Brook for future reference. Sampled by Jess Curtis.

Site #10 – BRAT.BR.8.6: Mill Rd, North Springfield

This reach is just downstream from the flood control dam managed by the Army Corps of Engineers, which holds back up to 16.7 billion gallons of water from the Black River main stem and the North Branch. The site is also just upstream from the USGS gauging station. Sampled by Reuben Allen.

Site #11 – BRAT.BR.12.3: Tolles Dam, Perkinsville.

This site is located just below the defunct Tolles Power Dam, a popular swimming hole located on property controlled by the Army Corps of Engineers for the North Springfield Flood Control Reservoir. Sampled by Rodger Capron.

Site #12 – BRAT.BR.23.0: Greven Field, Cavendish

This site is located at the Greven Field Recreation area in Cavendish and is a popular public access site for bathers and paddlers. Sampled by Amy Balogh.

Site #13 – BRAT.BR.24.1: Winery Road, Cavendish

This site is located at the bridge crossing the Black River at the intersection of Winery Road and Rt. 103, just downstream from a dog day-care facility. Sampled by Amy Balogh.

Site #14- BRAT.BR.27.3: Ludlow Fire Co., Ludlow

This site is located behind the fire station on Rts. 100 & 103 at the upper end on Ludlow Village in the Town of Ludlow, at the inflatable diversion dam used by Okemo Resort for snowmaking. Sampled by Phil Carter.

Chemical Samples were analyzed by the LaRosa Analytical Laboratory through the Vermont Dept. of Environmental Conservation. The *E. Coli* samples were analyzed by Endyne Laboratory in Lebanon, New Hampshire.

Methods

The sample collection protocol is spelled out in our QAPP document and this involves the following:

1. Bacteriological samples were collected by placing the sterilized bacteria bottles into the river and filling them to the top. These samples were then labeled with the pre-printed labels and placed on ice and shipped to the Endyne Lab by courier.
2. Nitrate samples required a plastic 50 ml centrifuge tube to be filled with the river sample to the 50 ml line. These samples also required that the sample tube be rinsed three times with river water before collecting the sample. These samples were then labeled with the pre-printed labels and placed on ice and shipped to the LaRosa Lab by courier.
3. Phosphate samples were collected using 60 ml glass vials, filled to the line marked on the vial. No rinsing of these vials was to be performed, and after collection they were labeled using the pre-printed labels, placed in ice and shipped to LaRosa Lab.
4. Turbidity samples were collected in 250 ml plastic bottles that were rinsed three times with river water prior to collecting the sample. These samples were then labeled using the pre-printed labels, placed on ice and shipped to LaRosa Lab.

Care must be taken during this sampling not to touch the inside or rim of the bottles, or the inside of the bottle caps, to prevent contamination. In addition to the samples collected, field blanks were collected using deionized water for Nitrates, and Turbidity, while duplicate samples were collected for Phosphates at each sample date for quality assurance.

Summary- It should be noted that all samples were collected on the dates indicated and represent a "snap-shot" of the water quality at the time of collection due to the dynamic nature of flowing waters, but can be relied upon to indicate basic water quality. This is the fifth year for the monitoring program initiated by BRAT and long term trends can be established after monitoring for several years. These results however, can indicate potential areas to explore further and refinement of monitoring locations may occur if problem areas are identified. For long term water quality evaluations, governmental organizations have been relying on data from macro invertebrates, as these organisms reside in the water and their presence/absence and population levels give reliable indications of water quality and are generally not impacted by short term variations in water quality. Variations in water quality were indicated in this year's

results after the storm events, which significantly altered bacteriological and turbidity levels in the Black River for short periods of time. It should be noted the water levels were very low from July through September due to lack of rainfall.

Bacteriological

Sampling for *E. Coli* bacteria was performed at all sites for the time period May through September 2016, with one interest being the safety of the water for full contact activities. The safe bacteria level for swimming as set by the Vermont Dept. Of Health is 235/100 ml. Most of the sample results obtained for the Black River fell below this level. However, the sample results from our June sampling greatly exceeded this level due to very heavy rain before the sampling event. These rain events show the significance of runoff from lawns and fields on water quality. One site, BRAT.MB.0.0 previously had consistently high *E. Coli* counts exceeding the safe contact levels, reflecting some old straight-pipe discharges into the brook between this site and the upstream site BRAT.MB.0.2. The Town of Springfield has completed an extensive reconstruction of the sewer collection system in this area during the summer of 2015 to resolve this problem. During the construction project many previously unknown pipes were connected to the sewer lines rather than be allowed to discharge to the stream. The 2016 samples show marked improvement over previous years for *E. Coli* at this site.
The weekly monitoring for *E. Coli* at Buttermilk Falls was conducted by Okemo Mountain Resort – all of those samples except June 29 were below 235/100 ml, indicating good water quality for swimming at this site throughout the season. The sample on June 29th followed a heavy rain event. Greven Field in the Town of Cavendish was also monitored weekly for *E. Coli* by volunteers. These samples also indicated good water quality except for June 29th when *E. Coli* levels were above 235/100 ml after rain events.

Nitrates -

Nitrate levels on the days sampled were all below 1.02 milligram per liter. These readings indicate that there is not any significant problem at this time from failing septic systems, sewage discharges, agricultural runoff, over fertilized lawns, or industrial discharges. Continued monitoring is desirable as in the future a Total Maximum Daily Load, or TMDL will be established by EPA for the Connecticut River to reduce the impact of nitrates on Long Island Sound. In addition monitoring for nitrates is desirable to determine if changes occur which could impact water quality.

Phosphates -

The level of phosphates on the days sampled ranged from a high of .0103 mg/l to a low of .000057 mg/l. The levels found during the 2016 sampling of the Black River are below the levels recommended by EPA. EPA recommends maintaining phosphates below 0.5 mg/l for waters that discharge into lakes or reservoirs, and maintaining levels between .01 to 0.003 mg/l to reduce the impact of algal blooms.

Turbidity –
Turbidity levels found during the sampling of the Black River exhibited a range from a high of 35.78 NTU to a low of 0.0061NTU. The high readings were obtained after a major rainfall event and dropped to lower levels during dryer weather.

Next Steps –
The Black River Action Team is planning to continue sampling the Black River and selected tributaries in the future. We will apply for the LaRosa Laboratory Partnership Grant for the 2017 season, if those grants are available, and work with our partners at Endyne Labs to see if they can continue to assist with our monitoring program in 2017. Bill Manner will no longer be available to provide his crucial donation of time and expertise to the program, so BRAT Director Kelly Stettner will step in to fill his shoes as best she can; Kelly will consult with Marie Levesque-Caduto and Jim Kellogg on making adjustments and alterations to the River Dipper program that will better suit the time constraints of all volunteers yet will provide useful information for the State.

In addition to the parameters and site locations monitored in 2016, we are attempting to expand the monitoring of the Black River swimming holes by partnering with local businesses who have been asked to "Adopt a Swimming Hole" and pay for weekly monitoring for bacteria. One swimming hole, Buttermilk Falls was adopted for 2016 by Okemo Mountain Resort. An Okemo staff member was trained by Bill Manner and monitored the area weekly from June to the end of August for *E. Coli*. BRAT plans to drop the monthly turbidity and *E. Coli* monitoring as well as temperature and pH recording, while picking up Chloride sampling instead. Most (if not all) our monthly sites are situated at or downstream from heavy traffic areas, so detecting Chloride levels may offer insights into the impacts of winter road salting in our communities.

Appendix 1

Site	Date Sampled	Total N	Total P	Turb	*E. Coli*	pH
	units	mg/l	ug/l	NTU	CFU	
BRAT.BR.1.6	5/25/16	0.33	11.8	2.01	410	7.9
BRAT.BR.2.4	5/25/16	0.7	14	2.71	260	7.75
BRAT.BR.2.75	5/25/16	0.26	12	2.36	580	7.85
BRAT.BR.3.6	5/25/16	0.28	20.7	2.39	270	7.97
BRAT.MB.0.0	5/25/16	0.4	14.7	2	88	8.37
BRAT.MB.0.2	5/25/16	0.35	14.6	0.77	68	8.31
BRAT.BR.5.1	5/25/16	0.26	15.9	3.88	36	8.29
BRAT.SB.0.1	5/25/16	0.39	14.6	1.25	170	8.1
BRAT.GB.0.3	5/25/16	0.28	9.04	0.74	67	8
BRAT.BR.8.6	5/25/16	0.28	12	4.66	73	7.9
BRAT.BR.12.3	5/25/16	0.26	8.15	1.26	85	7.9
BRAT.FB	5/25/16	NS	NS	NS	NS	NS
BRAT.BR.1.6 Dup	5/25/16	0.35	11.9	2.15	310	

BRAT.BR.23.0	5/25/16	0.26	8.18	1.03	58	8.16
BRAT.BR.24.1	5/25/16	0.26	6.75	1.81	33	8.3
BRAT.BR.27.3	5/25/16	<0.1	.006	0.7	20	NS
Site	**Date**	**Total N**	**Total P**	**Turb**	***E. Coli***	**pH**
BRAT.BR.1.6	6/29/16	0.88	85.4	21.9	>2400	7.64
BRAT.BR.2.4	6/29/16	0.57	61	17.5	>2400	7.94
BRAT.BR.2.75	6/29/16	0.49	103	23.2	>2400	7.81
BRAT.BR.3.6	6/29/16	0.39	40.4	10.3	1300	8.1
BRAT.MB.0.0	6/29/16	0.58	58.4	9	2000	8.3
BRAT.MB.0.2	6/29/16	0.57	64.3	8.57	1400	8.2
BRAT.BR.5.1	6/29/16	0.37	36.6	9.34	>2400	7.9
BRAT.SB.0.1	6/29/16	0.44	73.5	24.9	>2400	7.8
BRAT.GB.0.3	6/29/16	0.49	27.4	3.79	800	7.9
BRAT.BR.8.6	6/29/16	0.27	15.3	2.49	120	7.8
BRAT.BR.12.3	6/29/16	0.42	19.5	3.11	500	7.8
BRAT. FB	6/29/16	<0.1	<5	<0.2	<1	

BRAT.BR.3.6 Dup	6/29/16	0.4	42.2	8.77	1600	
BRAT.BR.23.0	6/29/16	0.43	25.7	5.5	1600	8
BRAT.BR.24.1	6/29/16	0.36	21.5	4.26	1000	8.3
BRAT.BR.27.3	6/29/16	0.26	16.9	2.44	1000	7.9
Site	**Date**	**Total N**	**Total P**	**Turb**	***E. Coli***	**pH**
BRAT.BR.1.6	7/27/16	0.64	13.4	2.12	310	7.72
BRAT.BR.2.4	7/27/16	0.43	14.6	2.24	86	7.66
BRAT.BR.2.75	7/27/16	0.3	15.2	2.56	91	7.67
BRAT.BR.3.6	7/27/16	0.33	15.1	2.41	71	8.3
BRAT.MB.0.0	7/27/16	0.59	46.1	2.53	99	8.22
BRAT.MB.0.2	7/27/16	0.57	90.4	35.7	280	8.2
BRAT.BR.5.1	7/27/16	0.29	16	3.04	150	8.1
BRAT.SB.0.1	7/27/16	0.76	18.2	2.33	190	7.9
BRAT.GB.0.3	7/27/16	0.57	9.63	0.58	>2400	7.9
BRAT.BR.8.6	7/27/16	0.23	12.6	2.93	17	7.9

BRAT.BR.12.3	7/27/16	0.26	8.47	0.96	44	7.9
BRAT. FB	7/27/16	<0.1	<5	<0.2	<1	
BRAT.BR.1.6 Dup	7/27/16	0.63	17.9	2.16	410	
BRAT.BR.23.0	7/27/16	0.45	18.1	1.09	64	8.4
BRAT.BR.24.1	7/27/16	0.39	8.87	0.53	71	8.2
BRAT.BR.27.3	7/27/16	0.25	7.08	0.76	190	N/S
Site	**Date**	**Total N**	**Total P**	**Turb**	***E. Coli***	**pH**
BRAT.BR.1.6	8/31/16	1.02	21.1	1.59	100	7.87
BRAT.BR.2.4	8/31/16	0.37	15.6	2.01	520	7.94
BRAT.BR.2.75	8/31/16	0.25	15.9	2.61	390	7.79
BRAT.BR.3.6	8/31/16	0.26	17.2	2.76	180	8.2
BRAT.MB.0.0	8/31/16	0.47	32.5	0.76	100	8.2
BRAT.MB.0.2	8/31/16	0.66	46.1	1.14	N/S	8
BRAT.BR.5.1	8/31/16	0.26	19.9	3.05	170	8.1
BRAT.SB.0.1	8/31/16	0.69	14	1.21	110	8.2

BRAT.GB.0.3	8/31/16	0.54	9.61	0.22	31	8.7
BRAT.BR.8.6	8/31/16	0.16	14.9	2.32	11	8.5
BRAT.BR.12.3	8/31/16	0.1	9.9	0.95	31	8.6
BRAT. FB	8/31/16	<0.1	<5	<0.2		
BRAT.SB.0.1 Dup	8/31/16	0.68	19.5	0.98	120	
BRAT.BR.23.0	8/31/16	0.36	9.8	0.84	68	8.6
BRAT.BR.24.1	8/31/16	0.38	10.2	0.061	69	8.4
BRAT.BR.27.3	8/31/16	0.21	8.33	0.88	120	8.3
Site	**Date**	**Total N**	**Total P**	**Turb**	***E. Coli***	**pH**
BRAT.BR.1.6	9/28/16	0.98	15	1.82	50	8.24
BRAT.BR.2.4	9/28/16	0.47	16.4	2.51	88	7.56
BRAT.BR.2.75	9/28/16	0.35	14.5	2.88	86	7.98
BRAT.BR.3.6	9/28/16	0.36	15.2	4.18	99	8.7
BRAT.MB.0.0	9/28/16	0.53	36.5	0.54	41	8.5
BRAT.MB.0.2	9/28/16	0.58	26.5	2.82	55	8.5

BRAT.BR.5.1	9/28/16	0.35	20.6	4.7	210	8.4
BRAT.SB.0.1	9/28/16	0.71	8.71	0.78	24	8.3
BRAT.GB.0.3	9/28/16	0.52	6.98	0.39	38	8.4
BRAT.BR.8.6	9/28/16	0.2	10.3	1.8	13	N/S
BRAT.BR.12.3	9/28/16	0.16	9.96	1.27	58	8.3
BRAT. FB	9/28/16	<0.1	<5	NS	NS	NS
BRAT.BR.3.6 Dup	9/28/16	0.35	14.9	4.62	60	
BRAT.BR.23.0	9/28/16	0.48	6.2	0.66	49	8.75
BRAT.BR.24.1	9/28/16	0.56	9.09	0.73	46	8.6
BRAT.BR.27.3	9/28/16	0.27	5.77	0.88	88	8.5

Appendix 2

Buttermilk Falls	*E. Coli* Results		
5/25/2016	47	cfu	
6/1/2016	16	cfu	
6/8/2016	16	cfu	
6/15/2016	2	cfu	
6/22/2016	19	cfu	
6/29/2016	2400	cfu	heavy rain in past 24 hrs
7/6/2016	11	cfu	
7/13/2016	N/S	cfu	
7/20/2016	9	cfu	
7/27/2016	2	cfu	
8/3/2016	50	cfu	
8/10/2016	8	cfu	
8/17/2006	9	cfu	
8/24/2016	14	cfu	
8/31/2016	3	cfu	

Greven Field

5/25/2016	49	cfu	
6/1/2016	84	cfu	
6/8/2016	N/S	cfu	
6/15/2016	75	cfu	
6/22/2016	130	cfu	
6/29/2016	1600	cfu	heavy rain in past 24 hrs
7/6/2016	120	cfu	
7/13/2016	110	cfu	
7/20/2016	190	cfu	
7/27/2016	64	cfu	
8/3/2016	160	cfu	
8/10/2016	190	cfu	
8/17/2006	91	cfu	
8/24/2016	68	cfu	
8/31/2016	N/S	cfu	

Appendix 3

E.Coli

N = sample number

Site Name	5/25/16	6/29/16	7/27/16	8/31/16	9/28/16	Season GEO MEAN	MEAN	MAX	N
BRAT.BR.1.6	410	>2400	310	100	50	158.8	217.5	>2400	5
BRAT.BR.2.4	260	>2400	86	520	88	178.9	238.5	>2400	5
BRAT.BR.2.75	580	>2400	91	390	86	205.1	286.8	>2400	5
BRAT.BR.3.6	270	1300	71	180	99	213.5	384.0	1300	5
BRAT.MB.0.0	88	2000	99	100	41	148.2	465.6	2000	5
BRAT.MB.0.2	68	1400	280	N/S	55	195.7	450.8	1400	5
BRAT.BR.5.1	36	>2400	150	170	210	117.8	141.5	>2400	5
BRAT.SB.0.1	170	>2400	190	110	24	96.1	123.5	>2400	5
BRAT.GB.0.3	67	800	>2400	31	38	89.1	234.0	>2400	5
BRAT.BR.8.6	73	120	17	11	13	29.2	46.8	120	5
BRAT.BR.12.3	85	500	44	31	58	80.4	143.6	500	5
BRAT.BR.1.6 Dup	310	1600	410	120	60	271.1	500.0	1600	5
BRAT.BR.23.0	58	1600	64	68	49	135.9	445.3	1600	5
BRAT.BR.24.1	33	1600	71	69	46	94.2	243.8	1600	5
BRAT.BR.27.3	20	1000	190	120	88	126.1	132.7	1000	3

	Total N		**Dups**		
5/25/16	0.33		0.35	BRAT.BR.1.6	5.88%
6/29/16	0.39		0.4	BRAT.BR.3.6	2.53%
7/27/16	0.64		0.63	BRAT.BR.1.6	1.57%
8/31/16	0.69		0.68	BRAT.SB.0.1	1.46%
9/28/16	0.36		0.35	BRAT.BR.3.6	2.82%
	Total P		**Dups**		
5/25/16	11.8		11.9	BRAT.BR.1.6	0.84%
6/29/16	40.4		42.2	BRAT.BR.3.6	4.36%
7/27/16	13.4		17.9	BRAT.BR.1.6	28.75%
8/31/16	14		19.5	BRAT.SB.0.1	32.84%
9/28/16	15.2		14.9	BRAT.BR.3.6	1.99%
	Turb		**Dups**		
5/25/16	2.01		2.15	BRAT.BR.1.6	6.73%
6/29/16	10.3		8.77	BRAT.BR.3.6	16.05%
7/27/16	2.12		2.16	BRAT.BR.1.6	1.87%
8/31/16	1.21		0.98	BRAT.SB.0.1	21.00%
9/28/16	4.18		4.62	BRAT.BR.3.6	10.00%