

Allen Brook Water Quality Monitoring 2018 Final Report

Background

The Williston Conservation Commission (WCC) is pleased to submit this Report to summarize the results of the 2018 sampling season under the LaRosa Partnership program. The principal objectives of projects under this program are to 1) provide a perspective on the range of water quality conditions across Vermont; 2) describe water quality conditions of individual waterbodies; 3) establish a data base for waterbodies for use in documenting future changes in water quality; and, 4) educate and involve local residents in waterbody protection.

The Allen Brook is a tributary of the Winooski River that is located entirely in the Town of Williston. Its watershed is approximately 14.5 square miles in size. The mainstem of Allen Brook is approximately 11 miles long from its headwaters in the Sunset Hill area of Williston to its confluence with Muddy Brook just before Muddy Brook empties into the Winooski River. Ten small tributaries to the brook are evident on aerial photographs of the watershed, most of which are ephemeral.ⁱ According to the State of Vermont, the Allen Brook is a Class B waterway, and should therefore be suitable for “aquatic habitat, boating, swimming and public water supply with filtration and disinfection.” Since 1992, portions of the Allen brook have been designated as “impaired” by stormwater and *E.coli* on the State’s 303(d) Impaired Waters List.ⁱⁱ The Allen Brook and its watershed have experienced many stressors in the recent and not-so-recent past, including historic impacts from floodplain encroachment (especially in developed areas), road crossings (15 total), historic straightening to protect agricultural resources and infrastructure, and natural influences like beaver activity. The Town of Williston has also experienced rapid growth over the past two decades, both in its residential population (78% increase) and as a center of employment (135% increase in working population).ⁱⁱⁱ Land use changes have been equally dramatic, and development has resulted in marked increases in impervious surface within the watershed. Though municipal stormwater and stream buffer regulations have been adopted to reduce future impacts from development, the Allen Brook flows directly through several areas where the Town intends to concentrate future growth (Industrial, Medium Density Residential, and Mixed Use Zoning Districts). Therefore it is important that the current stormwater impairment of Allen Brook be accurately characterized and addressed before contamination worsens or becomes irreversible.

The Allen Brook monitoring program aims to characterize the spatial and temporal patterns of nutrient contamination in Allen Brook. The information is used by the Williston Conservation Commission to identify potential sources of pollution, target remediation efforts, and direct public education and awareness surrounding watershed health, water quality, and stormwater contamination.

Sampling Methods and Quality Assurance

In 2018, the WCC sampled 9 locations along the Allen Brook (Figure 1, Table 1). The parameters sampled included Total Phosphorus (TP) and Turbidity (NTU).

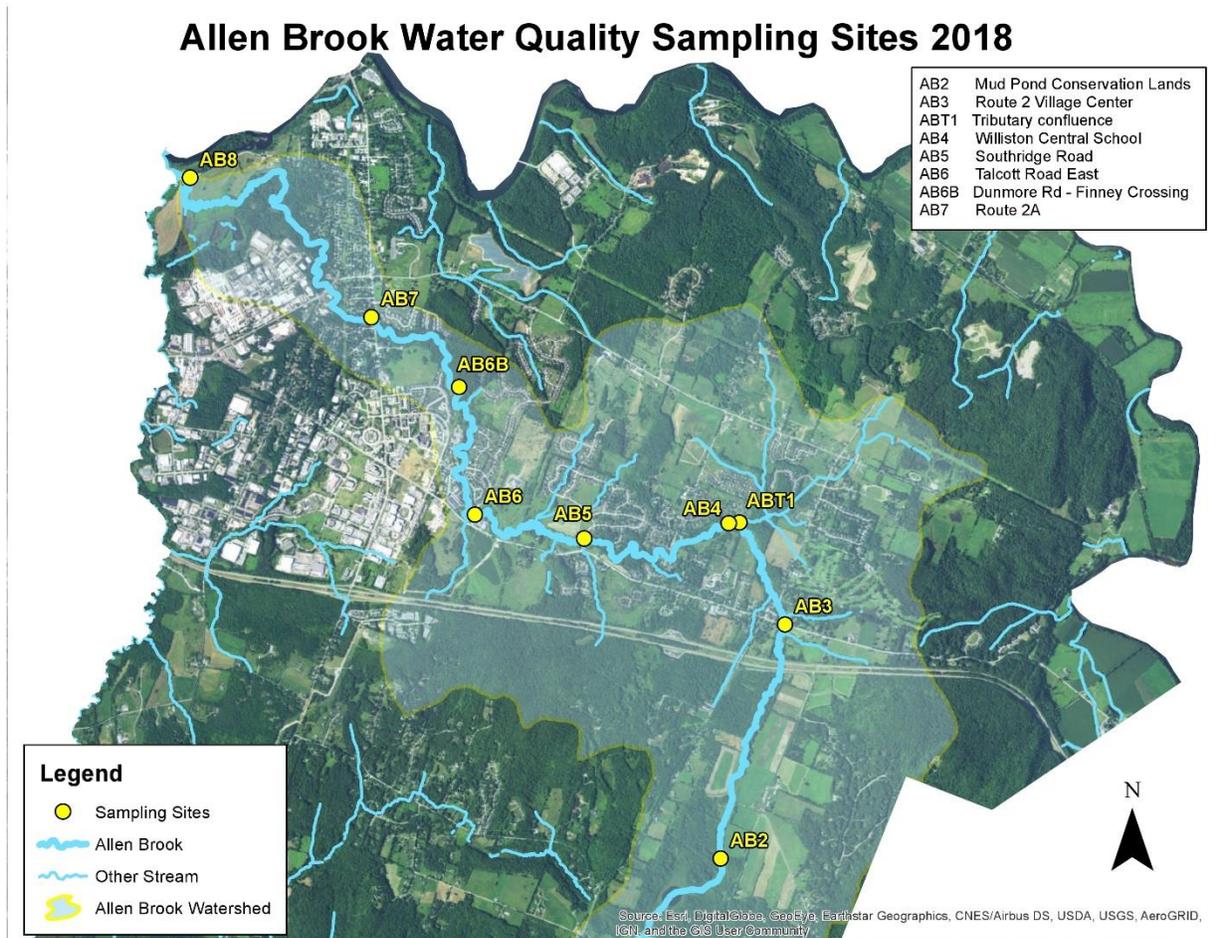


Figure 1: 2018 Allen Brook Sampling Sites

Table 1: 2018 Allen Brook Sampling Site Location Descriptions

Site	Description
AB2	Mud Pond Conservation Land, downstream of pond. Has been a sampling site for TN (2007-2013), TP (2007-Present), <i>E.coli</i> (2007-2017), Chloride (2010-2013), and Turbidity (2010-present)
AB3	Upstream of Route 2 crossing in Village Center. Has been a sampling site for TN (2007-2013), TP (2007-present), <i>E.coli</i> (2007-2017), Turbidity (2010- present)
ABT1	Major tributary north of Central School ball fields, downstream of beaver lodge. Has been a sampling site for TN (2008,2010), TP (2008-present), <i>E.coli</i> (2010), Turbidity (2010-present)
AB4	Williston Central School- behind ball fields, south of 338 Southfield Drive (access through this yard). Has been a sampling site for TN (2007- 2010, 2013), TP (2007- present), <i>E.coli</i> (2007-2017), Chloride (2010), Turbidity (2010- present)
AB5	Just upstream of Southridge Road crossing. Has been a sampling site for TN (2007-2010), TP (2007- present), <i>E.coli</i> (2007,2010), Chloride (2010), Turbidity (2007- present)

AB6	Just upstream of Talcott Road East crossing (access from Fire Station). Has been a sampling site for TN (2007-2013), TP (2007-present), <i>E. coli</i> (2007-2017), Chloride (2010- 2013), Turbidity (2010- present)
AB6B	Just northeast of Finney Crossing development (access from end of Half Moon Ln). New sampling site added in 2018.
AB7	Under Route 2A crossing (large culvert). Has been a sampling site for TN (2007- 2010), TP (2007- present), <i>E.coli</i> (2007- 2008), Chloride (2010), Turbidity (2007, present)
AB8	Just upstream of River Cove Road crossing. Has been a sampling site for TN (2007- 2013), TP (2007- present), <i>E.coli</i> (2007- 2010), Chloride (2010- 2013), Turbidity (2010- present)

Prior to the 2018 sampling season, the WCC developed a Quality Assurance Project Plan (QAPP)^{iv}, which was approved by the Vermont Department of Environmental Conservation (DEC). The QAPP specifies several objectives related to data precision, accuracy, completeness and representativeness during data collection, laboratory processing and data analysis. A detailed description of sampling methods is available in the Quality Assurance Project Plan.

The QAPP specifies that at least 80% of the anticipated number of samples will be collected, analyzed and determined to meet data quality objectives for the project to be considered successful. The Williston Conservation Commission met the objectives for the 2018 season (see Table 2). We sampled 16 out of 16 planned sampling dates. The thermometer was lost in the field on 6/13/18, and a new one not purchased until 6/27/18; therefore, not all temperature readings were obtained.

Table 2: Project Completeness

Parameter	Number of Samples Anticipated	Number of Valid Samples Collected & Analyzed	Percent Complete
Total Phosphorus	9 sites, 16 weeks = 144	7 sites, 16 weeks; 2 sites, 15 weeks = 142	99%
Turbidity	9 sites, 2 weeks = 18	9 sites, 4 weeks = 36	200%
Temperature	9 sites, 16 weeks = 144	3 sites, 15 weeks; 6 sites, 14 weeks = 129	90%

Sampling protocol requires at least one Field Duplicate and one Field Blank to be submitted for every ten samples collected. Field Duplicate serves as a check on water quality, sampling & analysis consistency. This is a replicated sample collected at the same point in time and space so as to be considered identical. A Field Duplicate is a second sample from a second sampling event, collected immediately after the first sampling. Otherwise put, these separate samples are said to represent the same population and are carried through all steps of the sampling and analytical procedures in an identical manner. They are used to assess precision of the total method, including sampling, analysis, and site heterogeneity.

The Field Blank checks for contamination (Accuracy/Bias) in the field by processing laboratory-supplied de-ionized through the sampling train. This checks for contamination introduced from the sample container(s) or from field contamination.

We obtained the required number of Duplicates/Blanks for Phosphorus and Turbidity. The Field Duplicates and Field Blanks were subsequently analyzed for consistency and samples with values outside acceptable ranges (Table 3) were identified.

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Table 3: Acceptable Range of Values for Field Duplicate and Field Blank

Parameter	Field Duplicate – Relative Percent Difference (RPD)	Field Blank
Total phosphorus	≤ 15%	≤ 5 ug/l
Turbidity	≤ 15%	≤ 0.2 NTU

The following samples returned high RPD values. Sample #181041-02 was excluded because of the unusually high RPD and since the TP value was outside the normal range. Sample #181224-05 was retained since the NTU level was extremely low, and at that level the RPD is expected to be high.

<u>Sample Number</u>	<u>Parameter</u>	<u>RPD</u>
181041-02	TP	52.8%
181224-05	NTU	22.54%

<u>Sample Number</u>	<u>Parameter</u>	<u>Blank</u>
181224-11	TP	6.55
181657-11	TP	19.5
181819-11	TP	362.5
181737-11	TP	366

A few blanks came back with unacceptably high values; however, it has been determined that there was a bottle contamination issue at the lab, where the TSS bottle was not properly cleaned prior to filling with distilled water. Therefore, these samples were retained. Complete monitoring data are provided in Appendix A. Original field data sheets are attached as Appendix B.

Results

Relationship to Stream Discharge/Flow

Flow (discharge magnitude) can dramatically affect certain water quality parameters, thus it is important to record flow observations during data collection. Streamflow was documented during each sampling day using both qualitative (descriptive) and quantitative methods. A quantitative discharge measurement in a gaged stream is the most precise method. In the fall of 2016 a new gaging station was installed on Allen Brook at the Route 2A crossing, replacing the former USGS stream gage. Discharge was calculated from field measurements of the staff gage at the gaging station collected during sampling events (See Table 4) and a USGS rating table (see Appendix C).

Table 4: Measured Height at Allen Brook USGS Stream Gage and Estimated Daily Mean Discharge

Date	Staff Gage Reading	Discharge (cfs)
6/6/2018	1.12	2.92
6/13/2018	0.90	0.77
6/20/2018	1.37	7.85
6/27/2018	0.97	1.26
7/3/2018	0.95	1.12
7/11/2018	0.96	1.21
7/18/2018	0.76	0.20
7/25/2018	0.72	0.13
8/1/2018	0.76	0.21
8/8/2018	0.87	0.60

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8/15/2018	0.71	0.11
8/22/2018	0.76	0.22
8/29/2018	0.76	0.21
9/5/2018	0.71	0.10
9/12/2018	0.94	1.07
9/19/2018	0.73	0.14

Figure 2 below shows June – September 2018 daily mean precipitation plotted with Allen Brook mean stream stage. Daily precipitation and stream stage records were obtained from a real-time flow monitoring website, maintained and made available through a partnership between the Town of Williston, the State of Vermont Department of Environmental Conservation (DEC), Stone Environmental and Fitzgerald Environmental Associates LLC.^v

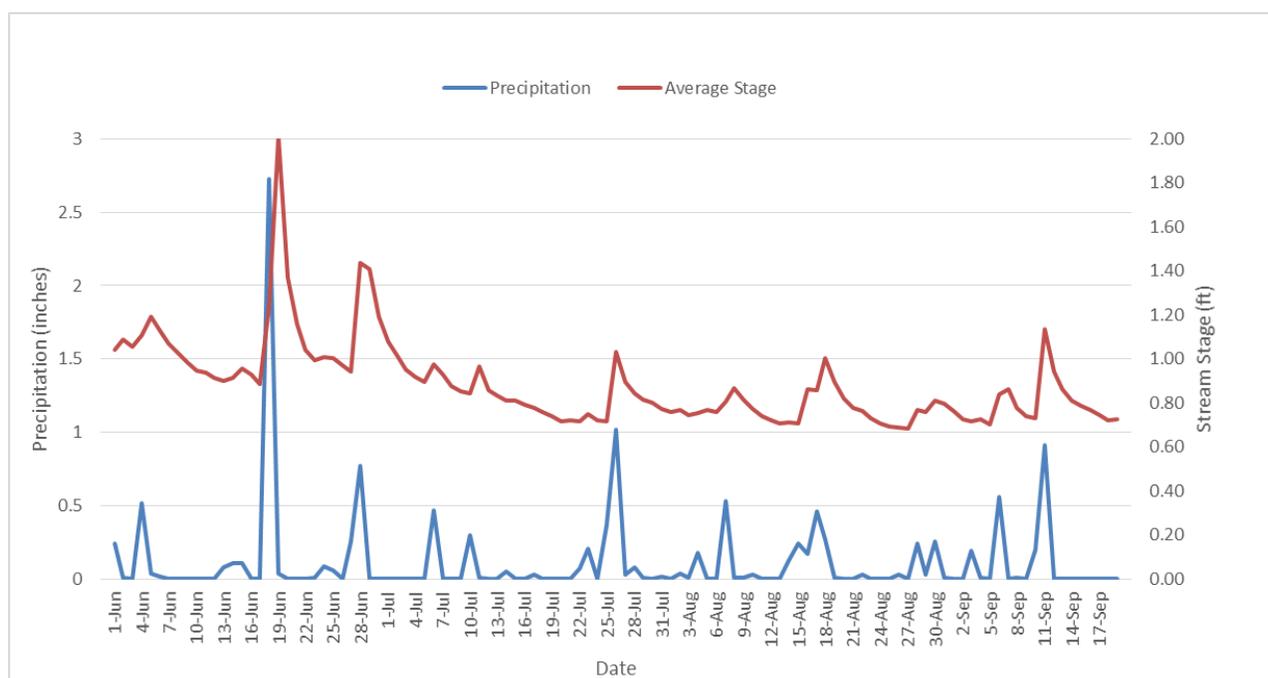


Figure 2: 2018 Daily Precipitation and Allen Brook Stream Stage

The 2018 sampling season was very dry, with just over 12 inches of precipitation from June 1 – September 19. All sampling occurred during base flows. There was one large storm event on June 18 (2.7 inches), but on the sampling date of June 20, stream discharge had already decreased to just above base flow. While there were a few notable precipitation events, the resulting higher flows did not coincide with a sampling date. Thus we categorized all samples as base flow.

Allen Brook is a “flashy” stream, characterized by very high flows immediately following heavy rain events, followed by rapid subsidence of stream flow to base levels. The highest stage (2ft) occurred on June 19, following a 2 inch rain event on June 18. By June 20, the stage was recorded as 1.37. There were a handful of moderate rain events (>.5 inch) throughout the sampling season; however, these resulted in only minor peaks in the recorded stream stage.

Figures 3-4 show the relationship of the water quality parameters collected to measured stream flow.

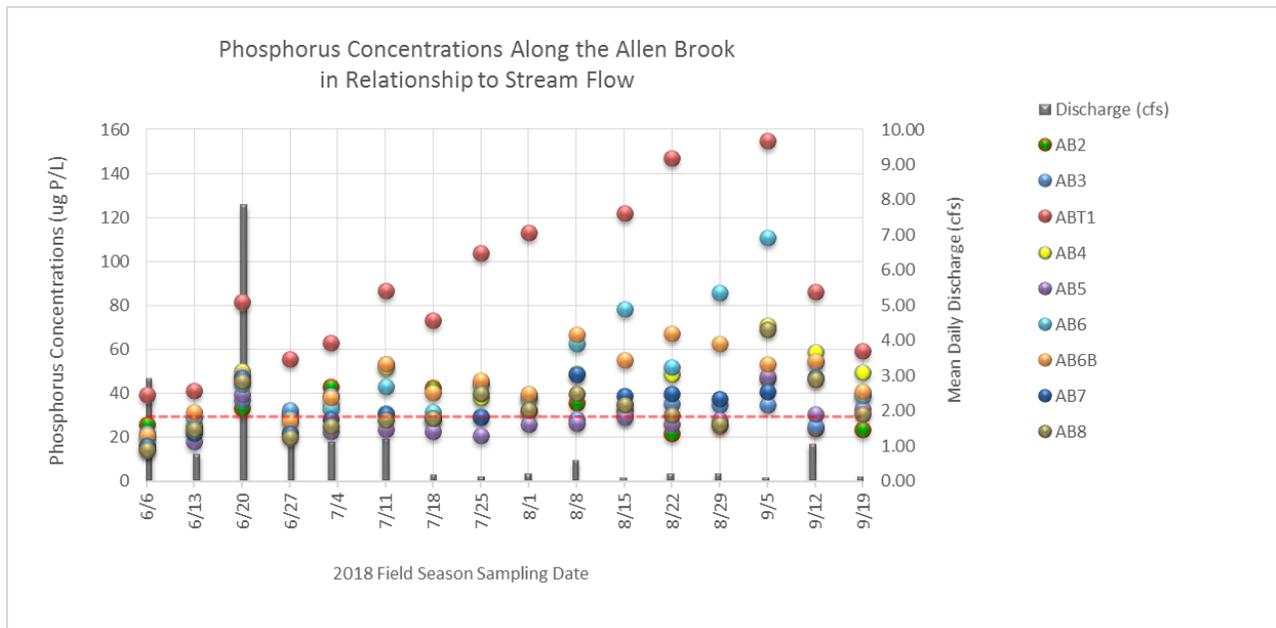


Figure 3: Phosphorus concentrations along the Allen Brook in relation to stream flow.

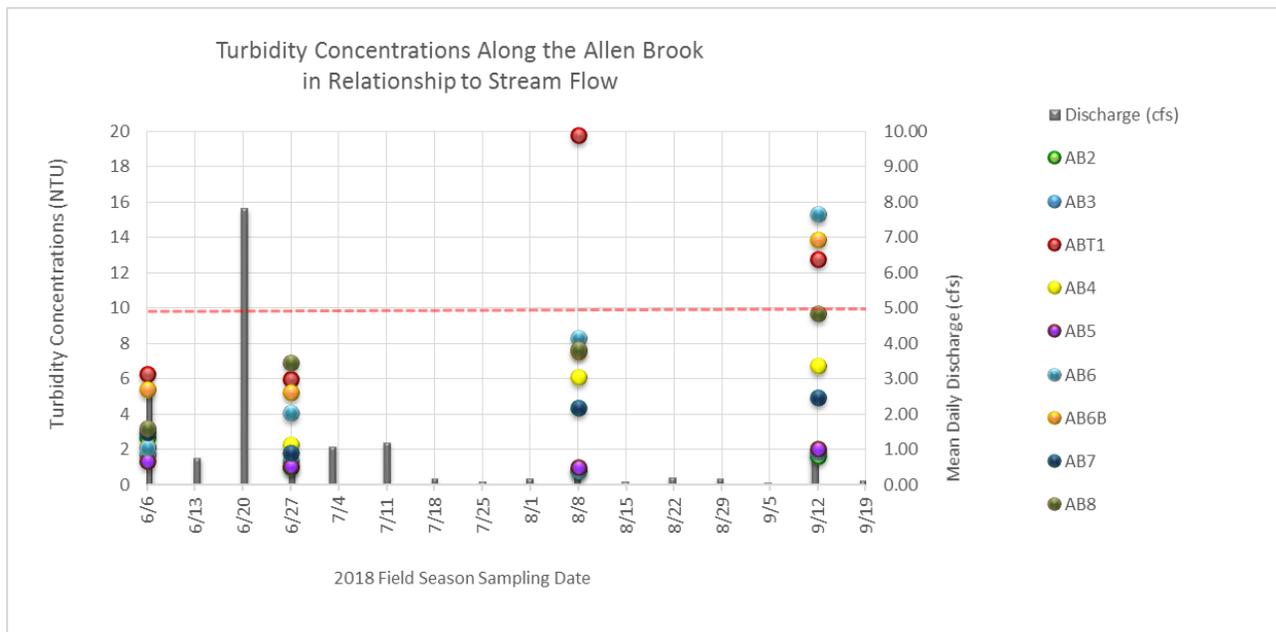


Figure 4: Turbidity levels along the Allen Brook in relation to stream flow.

Neither total phosphorus nor turbidity demonstrates any relationship to stream flow. However, a clear relationship was difficult to capture because of the lack of opportunities to sample during high flow. Notably, total phosphorus appears to increase over the course of the season for several sites, most notably for site ABT1. Turbidity also appears to increase over time, especially for sites ABT1, AB6 and AB6B. Both phosphorus and turbidity are consistently low at site AB2, which is in the upper watershed. This likely reflects the water storage and buffering capacity of the generally forested land cover in the upper watershed, as compared to the greater urbanization and impervious cover in the lower watershed.

Attainment of State Water Quality Standards

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Allen Brook is classified as a Class B Cold Water Fish Habitat stream. The water quality criteria established by the State of Vermont Water Quality Rules^{vi} are as follows:

- Turbidity: Not to exceed 10 NTU (nephelometric turbidity units) as an annual average under dry weather base-flow conditions.
- Total Phosphorus: Not to exceed 27 µg/L at low median monthly flow during June through October in a section of the stream representative of well-mixed flow.

Phosphorus

Phosphorus was sampled at each site once per week from June 6 – September 19. The geometric mean for each site was calculated for sampling events over the entire 4-month 2018 season (Figure 7). We were not able to capture any high flow samples; therefore, all samples are treated as base flow.

Table 5: 2018 Allen Brook sites phosphorus data (ug/L) sampled at low median monthly flow. Blue bar graphs are superimposed to show each sample's value relative to all other samples.

2018 TP Concentration (ug P/L)										
Date	Sampling Site									
	AB2	AB3	ABT1	AB4	AB5	AB6	AB6B	AB7	AB8	
6/6/2018	25.7	21.6	39.2	19.3	14.8	16.2	20.5	16	14.1	
6/13/2018	25.5	24	41.3	24.8	17.9	28.8	31.6	21.5	23.4	
6/20/2018	33.4	37.1	81.4	50	39.4	44.1	48	47	45.1	
6/27/2018	31.1	32.1	55.5	27.2	22.1	28.1	27.4	21.8	19.7	
7/3/2018	43.1	39	63.1	34.8	22.5	32.9	37.7	28.2	25.1	
7/11/2018	53.1	31	86.6	51.7	23.3	42.9	53.1	30.4	27.7	
7/18/2018	42.5	28.5	73.1	28.2	22.7	31.4	40.1	28.8	28.6	
7/25/2018	44.2	29.6	104	37.9	20.9	44.1	45.6	28.9	39.9	
8/1/2018	31.9	38.2	113	37.2	25.9	38.8	39.7	32.1	32.3	
8/8/2018	35.4	28.3	179	49	26.3	62.7	66.8	48.5	39.6	
8/15/2018	32.1	29.8	122	35	29	78.1	54.9	39	34.4	
8/22/2018	21.6	34.9	147	48.4	25.8	51.8	67	39.6	30.1	
8/29/2018	25.2	34.6	85.6	excluded	27.5	85.8	62.7	37.2	25.6	
9/5/2018	46.8	34.8	155	70.9	47.8	111	53.3	40.5	69.2	
9/12/2018	23.8	25	86.1	58.7	30.4	54.3	54.7	47.2	46.3	
9/19/2018	23.6	39.3	59.2	49.7	32.7	38.6	40.8	excluded	30.4	
GEOMEAN (n = 15)	32.5	31.3	85.0	39.2	25.8	44.3	44.4	32.3	31.1	
CONFIDENCE	4.3	2.4	18.1	6.2	3.6	10.9	6.0	4.4	5.7	

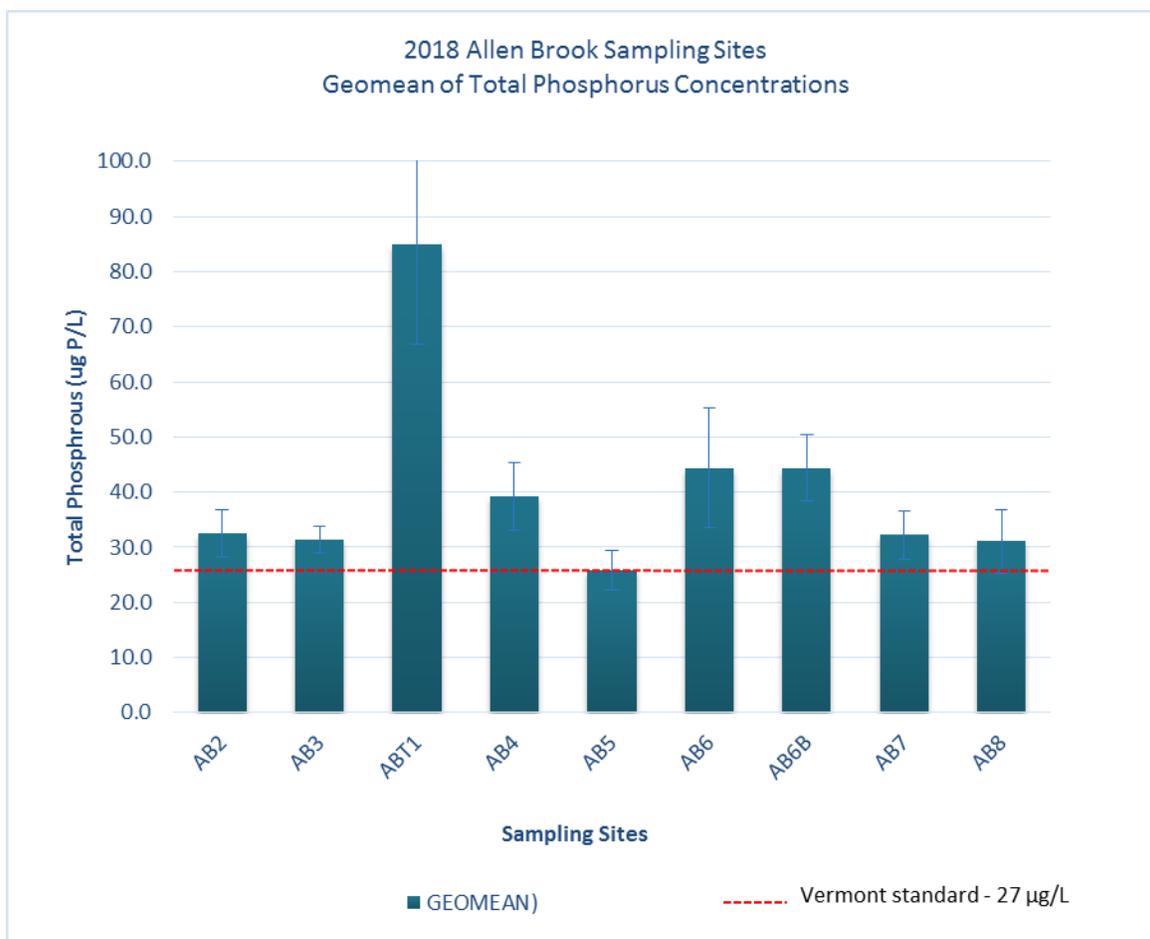


Figure 5: 2018 Allen Brook sampling sites phosphorus concentrations (ug/L) geometric mean and 90% confidence interval for base flow (n=16).

During the 4-month period, 113 out of 142 sampling events (79.5%) yielded phosphorus concentrations exceeding Vermont water quality standards (> 27 ug/L) (Table 5). In 2018 the geometric mean of all sites were above the Vermont water quality standard of 27 ug/L at base flow conditions (Figure 5). We characterize AB5 as being above the threshold because the geomean plus upper confidence limit exceeds 27 ug/L. This is in contrast to 2017, when all but two sites were below the Vermont standard.

Turbidity

Turbidity was sampled at each site four times during the 2018 season (6/6, 6/27, 8/8, 9/12). Results are shown in Table 6 below. The geometric mean for each site was calculated for sampling events during base flow conditions over all sampling events (Figure 6). During the 4-month period, all sites except ABT1 met the Vermont water quality standards for 10 NTU at base flow conditions. Site ABT1 geomean plus upper confidence limit exceeds 10 NTU. The lower watershed sites of ABT1, AB6, AB6B, and AB8 had relatively high mean turbidity, which tended to increase later on in the season. Sites AB2, AB3 and AB5 consistently had the lowest NTU concentrations.

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Table 6: 2018 Allen Brook sites turbidity data (NTU) sampled at low median monthly flow. Blue bar graphs are superimposed to show each sample's value relative to all other samples.

2018 Turbidity Data (NTU)									
Sampling Site									
Date	AB2	AB3	ABT1	AB4	AB5	AB6	AB6B	AB7	AB8
6/6/2017	2.68	1.68	6.3	2.14	1.35	2.12	5.42	2.97	3.22
6/27/2019	1	1.36	5.97	2.26	1.03	4.06	5.23	1.83	6.9
8/8/2019	0.79	0.82	19.8	6.1	1	8.3	7.55	4.35	7.65
9/12/2019	1.63	1.89	12.8	6.72	2.01	15.3	13.9	4.96	9.67
Mean Turbidity	1.3	1.2	9.1	3.1	1.1	4.1	6.0	2.9	5.5
CONFIDENCE	0.4	0.2	2.9	0.8	0.1	1.2	0.5	0.5	0.9
SD	0.8	0.4	6.4	1.8	0.2	2.6	1.1	1.0	1.9



Figure 6: 2017 Allen Brook sampling sites turbidity concentrations (NTU) geometric mean and 90% confidence interval for base flow (n=15) and high flow (n=2).

Data Trends over Time

To characterize and compare the sampling data gathered from 2007-2018 (no samples were taken in 2009), the median concentration of each parameter was calculated for each monitoring site for each year. Below is a summary of the findings for each parameter.

Phosphorus: Over the eleven year sampling span, 75% of the samples are above the Vermont Standard (27 ug-P/L).^{vii} From 2012 to 2014, phosphorus concentrations appear to decrease across all sites, followed by a sharp rise in 2015. Since 2015, there has been a downward trend in TP at AB3, AB4, AB5 and AB8, while TP at ABT1 has increased. Since 2011, site AB2 has had consistently low total phosphorus concentrations.



Figure 7: 2010 to 2017 Median Turbidity Concentrations (NTU)

Figure 8: 2007 to 2018 Median Total Phosphorus Concentrations (ug/L). No sampling occurred in 2009.

The decrease in phosphorus concentrations at this site may be related to the implementation of agricultural BMPs, which reduce the amount of sediment and phosphorus entering the Allen Brook.

From 2011 to 2014, the Town implemented several riparian buffer plantings in the lower watershed near sites AB3, AB4, ABT1, AB5 and AB6. 26 residential, commercial, and school system permitted stormwater systems are undergoing substantial improvements in conformance with the Allen Brook Flow Restoration Plan. Of these, eleven systems have been constructed and we anticipate four more systems to be upgraded in 2019. We anticipate future decreases in phosphorus concentrations over time, although it might be several years before these management practices yield improvements.

Turbidity: Turbidity was consistently below the State water quality threshold of 10 NTU for a cold water stream. Looking at the median values for every site over the 9 year period shows that only site AB8 has a median over 10 NTU. Over the nine year sampling span, only 11% of the samples exceeded the Vermont cold water fish habitat standard of 10 NTU.

Sites AB2, AB3, and AB5 had the lowest turbidity, while sites AB8 and ABT1 had the highest turbidity. Notably, AB8 is downstream from an area of industrial development which may be responsible for some illicit discharge or stream buffer encroachment. Also, the Allen Brook travels through an area of severely eroded farmland along River Cove Road immediately upstream from site AB8. This site, the Griswold Farm, was the site of a 4 acre streambank restoration project in 2012-2013 which is being managed by Friends of the Winooski River. From 2012 - 2014 stream buffer restoration projects were implemented along other stretches of the Allen Brook in the vicinity of sampling points AB3, AB4, AB5 and AB6 with the intention of reducing stream bank erosion. It may take additional time for stabilization to occur along this corridor and to be reflected in the sampling results.

Conclusion/Lessons Learned

Eleven years of data collection and analysis are revealing some trends, while other parameters remain variable across sites and over time. Nutrient and *E. coli* concentrations appear to have weak correlations to stream discharge, with higher pollutant concentrations following peak stream flows. However, these correlations are not consistent. Pollutant concentrations at downstream sites are highly sensitive to changes in stream flow, which is likely due to the increased development density in the downstream portion of the Allen brook watershed. The newly established flow monitoring station at AB7 will help to ensure continuous accurate flow measurements on the Allen Brook, including base flow.

Since 2007 annual median phosphorous concentrations have trended upward and downward. It is unclear what is causing these changes in trends; however, we would expect to begin to see a steady downward trend as water quality issues are addressed at both the local and state level. Changes in agricultural practices can have marked effects on water quality and may be influencing the water quality trends at site AB3. The riparian buffer restoration projects completed from 2008-2014 likely had at least an initial positive impact on water quality; however, the increasing density of residential development near AB4, ABT1, AB5 and AB6 is a confounding factor. On the positive side, 22 residential subdivisions are substantially upgrading their stormwater infrastructure over the next several years, which is expected to result in water quality improvements. Continuing to track phosphorus over time along a gradient of land uses will help determine the effectiveness of these management practices.

With the exception of AB8, median values for turbidity at all other monitoring sites are well below the Vermont cold water fish habitat standard of 10 NTU. Over the eight year sampling span, only 11% of the samples exceeded this standard. The industrial complex in the vicinity of AB8 should be checked to ensure that there is no illicit discharge contributing to turbidity concentrations at AB8. Continuing to test turbidity levels will help determine if BMP implementation projects designed to reduce peak flows and stream bank erosion positively impact the stream. However, in successive field seasons it should be sufficient to sample turbidity less often, perhaps only for one base flow and one high flow event.

It is a primary objective of the WCC to ensure that the Allen Brook provides high-quality habitat for aquatic and riparian organisms, as well as opportunities for safe public recreation, including swimming, wading, and fishing. Meeting these objectives will involve addressing the *E. coli* and nutrient problems which have placed the brook on the State's 303(d) list of impaired waters. Continued water quality monitoring is an important step in this process and will complement the State's efforts to implement a TMDL for Allen Brook.

As a clearer picture of bacteria and nutrient contamination in Allen Brook emerges, the Town and WCC are developing strategies for improvement of water quality. Watershed-wide strategies include stringent

and thorough review of development projects to ensure they meet current State stormwater standards, working with property owners to bring old stormwater infrastructure up to current standards, maintaining the Town’s existing riparian buffer restoration projects, supporting efforts to implement additional buffer planting projects, and working to conserve and protect floodplains and upland forests.

References

- ⁱ Dolan, K., L. Barg, C. Hession, C. Cianfrani, B. Kort and C. Cook. 2001. Progress Report: Allen Brook Water Quality Improvement Plan and TMDL. Prepared for VT Agency of Natural Resources.
- ⁱⁱ Vermont Department of Environmental Conservation, September 2008. *A Total Maximum Daily Load (TMDL) to Address Biological Impairment in the Allen Brook*. Prepared for the U.S. Environmental Protection Agency-Region 1.
- ⁱⁱⁱ Town of Williston, 2017. *2016-2024 Town of Williston Comprehensive Plan*.
- ^{iv} Williston Conservation Commission, 2018. *Vermont General Quality Assurance Project Plan for Volunteer, Educational and Local Community Monitoring and Reporting*. Prepared for the Vermont Department of Environmental Conservation.
- ^v Vermont Department of Environmental Conservation, Stone Environmental, and Fitzgerald Environmental Associates, 2018. *Streamflow and Precipitation Monitoring for Vermont MS4s*. Accessed January 10, 2019 at <http://vt-ms4-flow.stone-env.com/FlowDev/index.html>.
- ^{vi} State of Vermont Agency of Natural Resources Department of Environmental Conservation, 2016. *Vermont Water Quality Standards Environmental Protection Rule Chapter 29(a)*. Accessed February 16, 2018 at http://dec.vermont.gov/sites/dec/files/documents/wsmd_water_quality_standards_2016.pdf.
- ^{vii} State of Vermont Agency of Natural Resources Department of Environmental Conservation, 2016. *Vermont Water Quality Standards Environmental Protection Rule Chapter 29(a)*. Accessed February 16, 2018 at http://dec.vermont.gov/sites/dec/files/documents/wsmd_water_quality_standards_2016.pdf.

Appendix A: 2018 Allen Brook Water Quality Monitoring Data

Sample Number	Location	Date	TP (ug P/L)	RPD TP Dupe (%)	Turbidity (NTU)	RPD Turbidity Dupe (%)
180920-01	AB2	6/6/2018	25.7	1.16%	2.68	8.97%
180920-02	AB3	6/6/2018	21.6		1.68	
180920-03	ABT1	6/6/2018	39.2		6.3	
180920-04	AB4	6/6/2018	19.3		2.14	
180920-05	AB5	6/6/2018	14.8		1.35	
180920-06	AB6	6/6/2018	16.2		2.12	
180920-07	AB6B	6/6/2018	20.5		5.42	
180920-08	AB7	6/6/2018	16		2.97	
180920-09	AB8	6/6/2018	14.1		3.22	
180920-10	AB2 Blank	6/6/2018	< 5		0.27	
180920-11	AB2 Dup	6/6/2018	26		2.45	
181041-01	AB2	6/13/2018	25.5			
181041-02	AB3	6/13/2018	24	3.28%		
181041-03	ABT1	6/13/2018	41.3			
181041-04	AB4	6/13/2018	24.8			
181041-05	AB5	6/13/2018	17.9			
181041-06	AB6	6/13/2018	28.8			
181041-07	AB6B	6/13/2018	31.6			
181041-08	AB7	6/13/2018	21.5			
181041-09	AB8	6/13/2018	23.4			
181041-10	AB3 Dup	6/13/2018	24.8			
181041-11	AB3 Blank	6/13/2018	< 5			
181098-01	AB2	6/20/2018	33.4			
181098-02	AB3	6/20/2018	37.1			
181098-03	ABT1	6/20/2018	81.4	3.14%		
181098-04	AB4	6/20/2018	50			
181098-05	AB5	6/20/2018	39.4			
181098-06	AB6	6/20/2018	44.1			
181098-07	AB6B	6/20/2018	48			
181098-08	AB7	6/20/2018	47			
181098-09	AB8	6/20/2018	45.1			
181098-10	ABT1 Dup	6/20/2018	84			
181098-11	ABT1 Blank	6/20/2018	< 5			
181174-01	AB2	6/27/2018	31.1		1	
181174-02	AB3	6/27/2018	32.1		1.36	
181174-03	ABT1	6/27/2018	55.5		5.97	
181174-04	AB4	6/27/2018	27.2	0.73%	2.26	7.66%
181174-05	AB5	6/27/2018	22.1		1.03	
181174-06	AB6	6/27/2018	28.1		4.06	
181174-07	AB6B	6/27/2018	27.4		5.23	
181174-08	AB7	6/27/2018	21.8		1.83	
181174-09	AB8	6/27/2018	19.7		6.9	
181174-10	AB4 Dup	6/27/2018	27.4		2.44	
181174-11	AB4 Blank	6/27/2018	< 5		< 0.2	
181224-01	AB2	7/3/2018	43.1			

Sample Number	Location	Date	TP (ug P/L)	RPD TP Dupe (%)	Turbidity (NTU)	RPD Turbidity Dupe (%)
181224-02	AB3	7/3/2018	39			
181224-03	ABT1	7/3/2018	63.1			
181224-04	AB4	7/3/2018	34.8			
181224-05	AB5	7/3/2018	22.5	6.45%		
181224-06	AB6	7/3/2018	32.9			
181224-07	AB6B	7/3/2018	37.7			
181224-08	AB7	7/3/2018	28.2			
181224-09	AB8	7/3/2018	25.1			
181224-10	AB5 Dup	7/3/2018	24			
181224-11	AB5 Blank	7/3/2018	6.55			
181296-01	AB2	7/11/2018	53.1			
181296-02	AB3	7/11/2018	31			
181296-03	ABT1	7/11/2018	86.6			
181296-04	AB4	7/11/2018	51.7			
181296-05	AB5	7/11/2018	23.3			
181296-06	AB6	7/11/2018	42.9	0.00%		
181296-07	AB6B	7/11/2018	53.1			
181296-08	AB7	7/11/2018	30.4			
181296-09	AB8	7/11/2018	27.7			
181296-10	AB6 Dup	7/11/2018	42.9			
181296-11	AB6 Blank	7/11/2018	< 5			
181345-01	AB2	7/18/2018	42.5			
181345-02	AB3	7/18/2018	28.5			
181345-03	ABT1	7/18/2018	73.1			
181345-04	AB4	7/18/2018	28.2			
181345-05	AB5	7/18/2018	22.7			
181345-06	AB6	7/18/2018	31.4			
181345-07	AB6B	7/18/2018	40.1	9.95%		
181345-08	AB7	7/18/2018	28.8			
181345-09	AB8	7/18/2018	28.6			
181345-10	AB6B Dup	7/18/2018	44.3			
181345-11	AB6B Blank	7/18/2018	< 5			
181402-01	AB2	7/25/2018	44.2			
181402-02	AB3	7/25/2018	29.6			
181402-03	ABT1	7/25/2018	104			
181402-04	AB4	7/25/2018	37.9			
181402-05	AB5	7/25/2018	20.9			
181402-06	AB6	7/25/2018	44.1			
181402-07	AB6B	7/25/2018	45.6			
181402-08	AB7	7/25/2018	28.9	3.88%		
181402-09	AB8	7/25/2018	39.9			
181402-10	AB7 Dup	7/25/2018	27.8			
181402-11	AB7 Blank	7/25/2018	< 5			
181478-01	AB2	8/1/2018	31.9			
181478-02	AB3	8/1/2018	38.2			
181478-03	ABT1	8/1/2018	113			

Sample Number	Location	Date	TP (ug P/L)	RPD TP Dupe (%)	Turbidity (NTU)	RPD Turbidity Dupe (%)
181478-04	AB4	8/1/2018	37.2			
181478-05	AB5	8/1/2018	25.9			
181478-06	AB6	8/1/2018	38.8			
181478-07	AB6B	8/1/2018	39.7			
181478-08	AB7	8/1/2018	32.1			
181478-09	AB8	8/1/2018	32.3	5.13%		
181478-10	AB8 Dup	8/1/2018	34			
181478-11	AB8 Blank	8/1/2018	< 5			
181552-01	AB2	8/8/2018	35.4	9.16%	0.79	22.54%
181552-02	AB3	8/8/2018	28.3		0.82	
181552-03	ABT1	8/8/2018	179		19.8	
181552-04	AB4	8/8/2018	49		6.1	
181552-05	AB5	8/8/2018	26.3		1	
181552-06	AB6	8/8/2018	62.7		8.3	
181552-07	AB6B	8/8/2018	66.8		7.55	
181552-08	AB7	8/8/2018	48.5		4.35	
181552-09	AB8	8/8/2018	39.6		7.65	
181552-10	AB2 Dup	8/8/2018	32.3		0.63	
181552-11	AB2 Blank	8/8/2018	< 5		< 0.2	
181613-01	AB2	8/15/2018	32.1			
181613-02	AB3	8/15/2018	29.8	0.67%		
181613-03	ABT1	8/15/2018	122			
181613-04	AB4	8/15/2018	35			
181613-05	AB5	8/15/2018	29			
181613-06	AB6	8/15/2018	78.1			
181613-07	AB6B	8/15/2018	54.9			
181613-08	AB7	8/15/2018	39			
181613-09	AB8	8/15/2018	34.4			
181613-10	AB3 Dup	8/15/2018	30			
181657-01	AB2	8/22/2018	21.6			
181657-02	AB3	8/22/2018	34.9			
181657-03	ABT1	8/22/2018	147	3.34%		
181657-04	AB4	8/22/2018	48.4			
181657-05	AB5	8/22/2018	25.8			
181657-06	AB6	8/22/2018	51.8			
181657-07	AB6B	8/22/2018	67			
181657-08	AB7	8/22/2018	39.6			
181657-09	AB8	8/22/2018	30.1			
181657-10	ABT1 Dup	8/22/2018	152			
181657-11	ABT1 Blank	8/22/2018	19.5			
181737-01	AB2	8/29/2018	25.2			
181737-02	AB3	8/29/2018	34.6			
181737-03	ABT1	8/29/2018	85.6			
181737-04	AB4	8/29/2018	85.7	52.8%		
181737-05	AB5	8/29/2018	27.5			
181737-06	AB6	8/29/2018	85.8			

Sample Number	Location	Date	TP (ug P/L)	RPD TP Dupe (%)	Turbidity (NTU)	RPD Turbidity Dupe (%)
181737-07	AB6B	8/29/2018	62.7			
181737-08	AB7	8/29/2018	37.2			
181737-09	AB8	8/29/2018	25.6			
181737-10	AB4 Dup	8/29/2018	49.9			
181737-11	AB4 Blank	8/29/2018	362.5			
181819-01	AB2	9/5/2018	46.8			
181819-02	AB3	9/5/2018	34.8			
181819-03	ABT1	9/5/2018	155			
181819-04	AB4	9/5/2018	70.9			
181819-05	AB5	9/5/2018	47.8	9.42%		
181819-06	AB6	9/5/2018	111			
181819-07	AB6B	9/5/2018	53.3			
181819-08	AB7	9/5/2018	40.5			
181819-09	AB8	9/5/2018	69.2			
181819-10	AB5 Dup	9/5/2018	43.5			
181819-11	AB5 Blank	9/5/2018	366			
181908-01	AB2	9/12/2018	23.8		1.63	
181908-02	AB3	9/12/2018	25		1.89	
181908-03	ABT1	9/12/2018	86.1		12.8	
181908-04	AB4	9/12/2018	58.7		6.72	
181908-05	AB5	9/12/2018	30.4		2.01	
181908-06	AB6	9/12/2018	54.3	0.73%	15.3	9.59%
181908-07	AB6B	9/12/2018	54.7		13.9	
181908-08	AB7	9/12/2018	47.2		4.96	
181908-09	AB8	9/12/2018	46.3		9.67	
181908-10	AB6 Dup	9/12/2018	54.7		13.9	
181908-11	AB6 Blank	9/12/2018	345		0.4	
181957-01	AB2	9/19/2018	23.6			
181957-02	AB3	9/19/2018	39.3			
181957-03	ABT1	9/19/2018	59.2			
181957-04	AB4	9/19/2018	49.7			
181957-05	AB5	9/19/2018	32.7			
181957-06	AB6	9/19/2018	38.6			
181957-07	AB6B	9/19/2018	40.8	2.42%		
181957-08	AB7	9/19/2018	188			
181957-09	AB8	9/19/2018	30.4			
181957-10	AB6B Dup	9/19/2018	41.8			
181957-11	AB6B Blank	9/19/2018	5			
Mean RPD				7.02%		12.19%

Allen Brook Water Quality Sampling Field Data Sheet

Waterbody Name: Allen Brook Collector Name(s): Brian Burmin / Melinda Scott

Date: 6/6/18

General Weather: light rain at beginning, sunny later on

Cloud cover (circle one): no clouds partly cloudy cloudy/overcast

Wind (circle one): calm breezy windy

Precipitation (circle one): none misty/foggy drizzle/light rain rain

Date of Last Rain: 6/6/18

Last Rain Event (circle one): mild moderate severe

*Flow *Category: Base or Freshet- Rising / Receding or Hydro Rising / Receding
 *Level: H - M - L - Flood Discharge (cfs) _____

changed the morphology of the stream channel

SAMPLES COLLECTED

(fill in the following data for each sample; if no sample collected, write 'N/A')

SITE NAME	DESCRIPTION	SAMPLE TIME	TYPE D/L/FB	H2O TEMP	AIR TEMP	WATER LEVEL	TP	NTU	COMMENTS
AB2	Mud Pond	9:56	D/L/FB	59	55.5	M	X	X	
AB3	Route 2	10:16	R	57.3	66.3	M	X	X	
ABT1	Trib confluence	10:39	R	58.5	55.4	L/M	X	X	Last yrs beaver activity
AB4	WSC	10:46	R	58.2	60.1	L/M	X	X	same as above, only left
AB5	Southridge Rd.	11:01	R	57.2	56.3	M	X	X	Post sw ponds
AB6	Talcott Rd. East	11:15	R	59.2	57	M	X	X	
AB6B	Finney Crossing	11:56	R	60.5	61.7	M	X	X	New site, at end of the
AB7	Route 2A	12:19	R	61.2	59.2	M	X	X	stream gauge busted
AB8	River Cove Rd.	12:35	R	64.1	69.4	L/M	X	X	

Allen Brook Staff Gauge	
Reading Time:	<u>12:19</u>
USGS Height (on gauge)	(ft)
Height above USGS	(ft)

1.88 (old gauge)

The USGS height should be collected every visit. If the water level is above the top of the USGS gauge, please measure from the top of the gauge using a ruler/yardstick that has decimal feet units (not inches). Please include any notes about obstructions in the channel that may be influencing water levels at the staff gauge.

Allen Brook Water Quality Sampling Field Data Sheet

Waterbody Name: Allen Brook Collector Name(s): Brian Kurmin

Date: 6/13/18

General Weather: Sunny in beginning, cloudy later on

Cloud cover (circle one): no clouds partly cloudy cloudy/overcast

Wind (circle one): calm breezy windy

Precipitation (circle one): none misty/foggy drizzle/light rain rain

Date of Last Rain: 6/7/18

Last Rain Event (circle one): mild moderate severe

*Flow *Category: Base or Freshet- Rising / Receding or Hydro Rising / Receding

*Level: H - M - L - Flood Discharge (cfs) _____

SAMPLES COLLECTED

(fill in the following data for each sample; if no sample collected, write 'N/A')

SITE NAME	DESCRIPTION	SAMPLE TIME	TYPE D/L/FB	H2O TEMP	AIR TEMP	WATER LEVEL	TP	NTU	COMMENTS
AB2	Mud Pond	8:56 AM	L	64.3	73.4	M	✓		
AB3	Route 2	9:20	D	61.5	71.3	M	✓		
ABT1	Trib confluence	9:48	R	71.3	76.5	M	✓		
AB4	WSC	10:30	R		86.3	M	✓		lost thermometer
AB5	Southridge Rd.	10:52	R			L/M	✓		
AB6	Talcott Rd. East	11:02	R			M	✓		
AB6B	Finney Crossing	11:12	R			L/M	✓		
AB7	Route 2A	11:43	R			L/M	✓		
AB8	River Cove Rd.	11:53	R			L/M	✓		

↳ Very susceptible to sun vs. shade

Allen Brook Staff Gauge	
Reading Time:	<u>11:43</u>
USGS Height (on gauge)	(ft) <u>1.64</u>
Height above USGS	(ft)

The USGS height should be collected every visit. If the water level is above the top of the USGS gauge, please measure from the top of the gauge using a ruler/yardstick that has decimal feet units (not inches). Please include any notes about obstructions in the channel that may be influencing water levels at the staff gauge.

Allen Brook Water Quality Sampling Field Data Sheet

Waterbody Name: Allen Brook Collector Name(s): Brian Kurmin

Date: 6/20/18

General Weather: Mostly sunny, slightly breezy

Cloud cover (circle one): no clouds partly cloudy cloudy/overcast

Wind (circle one) calm breezy windy

Precipitation (circle one): none misty/foggy drizzle/light rain rain

Date of Last Rain: 6/18/18

Last Rain Event (circle one): mild moderate severe

*Flow *Category: Base or Freshet Rising / Receding or Hydro Rising / Receding

*Level: H - M - L - Flood Discharge (cfs) _____

SAMPLES COLLECTED

(fill in the following data for each sample; if no sample collected, write 'N/A')

SITE NAME	DESCRIPTION	SAMPLE TIME	TYPE D/L/FB	H2O TEMP	AIR TEMP	WATER LEVEL	TP	NTU	COMMENTS
AB2	Mud Pond	9:32	R/L			M	✓		No thermometer
AB3	Route 2	9:42	R			M	✓		Looks pretty turbid
ABT1	Trib confluence	10:05	M/D/PB			M	✓		
AB4	WSC	10:10	R			M	✓		
AB5	Southridge Rd.	10:18	R			M	✓		
AB6	Talcott Rd. East	10:37	R			M	✓		
AB6B	Finney Crossing	11:17	R			M	✓		
AB7	Route 2A	11:25	R			M/H	✓		
AB8	River Cove Rd.	11:39	R			M	✓		

Allen Brook Staff Gauge	
Reading Time:	<u>11:25</u>
USGS Height (on gauge)	<u>2.13</u> (ft)
Height above USGS	<u>-</u> (ft)

The USGS height should be collected every visit. If the water level is above the top of the USGS gauge, please measure from the top of the gauge using a ruler/yardstick that has decimal feet units (not inches). Please include any notes about obstructions in the channel that may be influencing water levels at the staff gauge.

Allen Brook Water Quality Sampling Field Data Sheet

Waterbody Name: Allen Brook Collector Name(s): Brian Kurmin

Date: 6/27/2018

General Weather: Cloudy, warm, windy

Cloud cover (circle one): no clouds partly cloudy cloudy/overcast

Wind (circle one): calm breezy windy

Precipitation (circle one): none misty/foggy drizzle/light rain rain

Date of Last Rain: 6/25/18

Last Rain Event (circle one): mild moderate severe

*Flow *Category: Base or Freshet- Rising / Receding or Hydro Rising / Receding

*Level: H - M - L - Flood Discharge (cfs) _____

SAMPLES COLLECTED

(fill in the following data for each sample; if no sample collected, write 'N/A')

SITE NAME	DESCRIPTION	SAMPLE TIME	TYPE D/L/FB	H2O TEMP	AIR TEMP	WATER LEVEL	TP	NTU	COMMENTS
AB2	Mud Pond	10:22	R/L	68.7	71.1	M	✓	✓	
AB3	Route 2	10:39	R/L	63.2	72.9	m	✓	✓	
ABT1	Trib confluence	11:01	R/M/D/FB	71.0	78.2	M	✓	✓	Sun peaked through clouds
AB4	WSC	11:07	R/D/FB	67.6	78.1	m	✓	✓	"
AB5	Southridge Rd.	11:26	R	66.0	75.2	M/L	✓	✓	
AB6	Talcott Rd. East	11:44	R	70.7	73.5	m	✓	✓	New
AB6B	Finney Crossing	12:09	R	69.4	73.7	m	✓	✓	USGS gauge fixed
AB7	Route 2A	12:25	R	68.1	76.7	M/L	✓	✓	
AB8	River Cove Rd.	12:47	R	69.5	79.9	M/L	✓	✓	

Allen Brook Staff Gauge	
Reading Time:	<u>12:25</u>
USGS Height (on gauge)	<u>0.94 (ft)</u>
Height above USGS	<u>— (ft)</u>

used new gauge
 ↳ 1.67 on old gauge → don't match up

The USGS height should be collected every visit. If the water level is above the top of the USGS gauge, please measure from the top of the gauge using a ruler/yardstick that has decimal feet units (not inches). Please include any notes about obstructions in the channel that may be influencing water levels at the staff gauge.

Allen Brook Water Quality Sampling Field Data Sheet

Waterbody Name: Allen Brook Collector Name(s): Brian Hurmin

Date: ~~7/1/18~~ 7/31/18

General Weather: Hot, humid, cloudy → partly cloudy

Cloud cover (circle one): no clouds (partly cloudy) cloudy/overcast

Wind (circle one): (calm) breezy windy

Precipitation (circle one): (none) misty/foggy drizzle/light rain rain

Date of Last Rain: 6/28/18

Last Rain Event (circle one): (mild) moderate severe

*Flow *Category: (Base) or Freshet- Rising / Receding or Hydro Rising / Receding

*Level: H - M - L - Flood Discharge (cfs) _____

SAMPLES COLLECTED

(fill in the following data for each sample; if no sample collected, write 'N/A')

SITE NAME	DESCRIPTION	SAMPLE TIME	TYPE D/L/FB	H2O TEMP	AIR TEMP	WATER LEVEL	TP	NTU	COMMENTS
AB2	Mud Pond	8:36	R/L	80.1	82.3	m	✓	M	
AB3	Route 2	8:50	R	75.1	82.3	m/L	✓		
ABT1	Trib confluence	9:02	R	79.9	87.7	m	/		Sun starts coming out
AB4	WSC	9:06	R	76.5	85.5	m	/		
AB5	Southridge Rd.	9:20	D/R	76.4	84.1	m/L	/		
AB6	Talcott Rd. East	9:31	R	81.7	83.6	m	/		
AB6B	Finney Crossing	9:45	R	81.1	82.6	m/L	/		
AB7	Route 2A	9:55	R	79.5	83.8	m/L	/		
AB8	River Cove Rd.	10:07	R	79.1	89.8	m	/		

Allen Brook Staff Gauge	
Reading Time:	<u>9:55</u>
USGS Height (on gauge)	<u>.94</u> (ft)
Height above USGS	<u>—</u> (ft)

The USGS height should be collected every visit. If the water level is above the top of the USGS gauge, please measure from the top of the gauge using a ruler/yardstick that has decimal feet units (not inches). Please include any notes about obstructions in the channel that may be influencing water levels at the staff gauge.

Allen Brook Water Quality Sampling Field Data Sheet

Waterbody Name: Allen Brook Collector Name(s): Brian Kurmin

Date: 7/11/17

General Weather: Warm, clear skies, calm, humid

Cloud cover (circle one): no clouds partly cloudy cloudy/overcast

Wind (circle one): calm breezy windy

Precipitation (circle one): none misty/foggy drizzle/light rain rain

Date of Last Rain: 7/10/17

Last Rain Event (circle one): mild moderate severe

*Flow *Category: Base or Freshet- Rising / Receding or Hydro Rising / Receding

*Level: H - M - L - Flood Discharge (cfs) _____

SAMPLES COLLECTED

(fill in the following data for each sample; if no sample collected, write 'N/A')

SITE NAME	DESCRIPTION	SAMPLE TIME	TYPE D/L/FB	H2O TEMP	AIR TEMP	WATER LEVEL	TP	NTU	COMMENTS
AB2	Mud Pond	9:06	R/D	73.6	70.2	M/L	✓		water almost stagnant
AB3	Route 2	9:27	R/D	67.0	72.1	M	✓		
ABT1	Trib confluence	9:47	R	74.4	72.3	M	✓		cloudy water
AB4	WSC	9:53	R	72.7	72.0	M	✓		
AB5	Southridge Rd.	10:11	R	69.9	71.2	M/L	✓		
AB6	Talcott Rd. East	10:28	R/D/FB	75.6	74.5	M	✓		
AB6B	Finney Crossing	11:01	R	74.0	69.7	M	✓		Some clouds rolling in
AB7	Route 2A	11:16	R	71.3	72.1	M	✓		
AB8	River Cove Rd.	11:31	R	75.7	76.4	M → M/L	✓		

Allen Brook Staff Gauge	
Reading Time:	<u>11:16</u>
USGS Height (on gauge)	<u>1.0</u> (ft)
Height above USGS	<u>—</u> (ft)

The USGS height should be collected every visit. If the water level is above the top of the USGS gauge, please measure from the top of the gauge using a ruler/yardstick that has decimal feet units (not inches). Please include any notes about obstructions in the channel that may be influencing water levels at the staff gauge.

Allen Brook Water Quality Sampling Field Data Sheet

Waterbody Name: Allen Brook Collector Name(s): Brian Kermin

Date: 7/18/2018

General Weather: Cool, partly cloudy early, warm, mostly sunny later

Cloud cover (circle one): no clouds partly cloudy cloudy/overcast

Wind (circle one): calm breezy windy

Precipitation (circle one): none misty/foggy drizzle/light rain rain

Date of Last Rain: 7/10/18

Last Rain Event (circle one): mild moderate severe

*Flow *Category: Base or Freshet- Rising / Receding or Hydro Rising / Receding

*Level: H - M - L - Flood Discharge (cfs) _____

SAMPLES COLLECTED

(fill in the following data for each sample; if no sample collected, write 'N/A')

SITE NAME	DESCRIPTION	SAMPLE TIME	TYPE D/L/FB	H2O TEMP	AIR TEMP	WATER LEVEL	TP	NTU	COMMENTS
AB2	Mud Pond	9:13	R/L	74.3	66.9	M/H	✓		Stagnant, water not moving
AB3	Route 2	9:36	R/L	67.1	69.8	L	✓		
ABT1	Trib confluence	9:59	R	72.8	71.8	M/L	✓		
AB4	WSC	10:05	R	72.3	71.0	L	✓		
AB5	Southridge Rd.	10:26	R	68.3	70.2	L	✓		
AB6	Talcott Rd. East	10:48	R	77.8	70.6	L	✓		
AB6B	Finney Crossing	11:08	R/D/FB	72.3	70.0	L	✓		
AB7	Route 2A	11:25	R	72.0	73.0	L	✓		
AB8	River Cove Rd.	11:47	R	74.3	76.7	L	✓		Algae growing

Allen Brook Staff Gauge	
Reading Time:	<u>11:26</u>
USGS Height (on gauge)	<u>0.74</u> (ft)
Height above USGS	<u>—</u> (ft)

The USGS height should be collected every visit. If the water level is above the top of the USGS gauge, please measure from the top of the gauge using a ruler/yardstick that has decimal feet units (not inches). Please include any notes about obstructions in the channel that may be influencing water levels at the staff gauge.

Allen Brook Water Quality Sampling Field Data Sheet

Waterbody Name: Allen Brook Collector Name(s): Briann Kurmin
 Date: 7/25/2018

General Weather: Hot, humid, windy, overcast
 Cloud cover (circle one): no clouds partly cloudy cloudy/overcast
 Wind (circle one): calm breezy windy
 Precipitation (circle one): none misty/foggy drizzle/light rain rain
 Date of Last Rain: 7/23/18
 Last Rain Event (circle one): mild moderate severe

*Flow *Category: Base or Freshet- Rising / Receding or Hydro Rising / Receding
 *Level: H - M - L - Flood Discharge (cfs) _____

SAMPLES COLLECTED
 (fill in the following data for each sample; if no sample collected, write 'N/A')

SITE NAME	DESCRIPTION	SAMPLE TIME	TYPE D/L/FB	H2O TEMP	AIR TEMP	WATER LEVEL	TP	NTU	COMMENTS
AB2	Mud Pond	9:12	R/L	76.5	80.7	M/L	✓		
AB3	Route 2	9:31	R	72.2	82.2	L	✓		
ABT1	Trib confluence	9:53	R	72.4	85.5	L	✓		
AB4	WSC	10:00	R	77.0	84.4	L	✓		some oil slick in stagnat area
AB5	Southridge Rd.	10:17	R	71.6	82.0	L	✓		
AB6	Talcott Rd. East	10:41	R	78.5	83.2	L	✓		
AB6B	Finney Crossing	10:58	R	71.0	84.6	v. L	✓		
AB7	Route 2A	11:20	R/B/FB	76.0	82.5	L	✓		
AB8	River Cove Rd.	11:40	R	77.4	85.2	L	✓		lots of algae

Allen Brook Staff Gauge	
Reading Time:	<u>11:20</u>
USGS Height (on gauge)	<u>0.71</u> (ft)
Height above USGS	<u>-</u> (ft)

The USGS height should be collected every visit. If the water level is above the top of the USGS gauge, please measure from the top of the gauge using a ruler/yardstick that has decimal feet units (not inches). Please include any notes about obstructions in the channel that may be influencing water levels at the staff gauge.

Allen Brook Water Quality Sampling Field Data Sheet

Waterbody Name: Allen Brook Collector Name(s): Brian Kurmin

Date: 8/1/18

General Weather: Warm, partly cloudy, wind blowing in more clouds

Cloud cover (circle one): no clouds partly cloudy cloudy/overcast

Wind (circle one): calm breezy windy

Precipitation (circle one): none misty/foggy drizzle/light rain rain

Date of Last Rain: 8/30/18

Last Rain Event (circle one): mild moderate severe

*Flow *Category: Base or Freshet- Rising / Receding or Hydro Rising / Receding

*Level: H - M - L - Flood Discharge (cfs) _____

SAMPLES COLLECTED

(fill in the following data for each sample; if no sample collected, write 'N/A')

SITE NAME	DESCRIPTION	SAMPLE TIME	TYPE D/L/FB	H2O TEMP	AIR TEMP	WATER LEVEL	TP	NTU	COMMENTS
AB2	Mud Pond	9:35	R/L	75.9	76.9	m/L	✓		mostly sunny
AB3	Route 2	10:00	R	69.5	74.2	m/L	✓		
ABT1	Trib confluence	10:19	R	74.9	82.6	m/L	✓		
AB4	WSC	10:34	R	75.0	82.8	m/L	✓		
AB5	Southridge Rd.	10:45	R	70.9	80.2	L	✓		
AB6	Talcott Rd. East	11:05	R	72.4	80.9	L	✓		
AB6B	Finney Crossing	11:31	R	75.6	83.5	L	✓		
AB7	Route 2A	11:52	R	73.8	83.3	L	✓		
AB8	River Cove Rd.	12:10	R/N/FB	72.4	80.5	m/L	✓		mostly cloudy

Allen Brook Staff Gauge	
Reading Time:	<u>11:52</u>
USGS Height (on gauge)	<u>0.75</u> (ft)
Height above USGS	<u>~</u> (ft)

The USGS height should be collected every visit. If the water level is above the top of the USGS gauge, please measure from the top of the gauge using a ruler/yardstick that has decimal feet units (not inches). Please include any notes about obstructions in the channel that may be influencing water levels at the staff gauge.

Allen Brook Water Quality Sampling Field Data Sheet

Waterbody Name: Allen Brook Collector Name(s): Brian Hermin

Date: 8/8/18

General Weather: Hot, humid, partly cloudy

Cloud cover (circle one): no clouds partly cloudy cloudy/overcast

Wind (circle one): calm breezy windy

Precipitation (circle one): none misty/foggy drizzle/light rain rain

Date of Last Rain: 8/7/18

Last Rain Event (circle one): mild moderate severe

*Flow *Category: Base or Freshet Rising / Receding or Hydro Rising / Receding

*Level: H - M - L - Flood Discharge (cfs) _____

SAMPLES COLLECTED

(fill in the following data for each sample; if no sample collected, write 'N/A')

SITE NAME	DESCRIPTION	SAMPLE TIME	TYPE D/L/FB	H2O TEMP	AIR TEMP	WATER LEVEL	TP	NTU	COMMENTS
AB2	Mud Pond	9:51	D/R/FB	76.4	76.5	M	✓	✓	
AB3	Route 2	10:11	R/L	71.2	81.1	M/L	✓	✓	
ABT1	Trib confluence	10:30	R	77.3	82.9	M	✓	✓	
AB4	WSC	10:38	R	77.7	82.8	M	✓	✓	
AB5	Southridge Rd.	11:01	R	73.9	79.6	M/L	✓	✓	
AB6	Talcott Rd. East	11:16	R	79.7	81.7	M	✓	✓	
AB6B	Finney Crossing	11:37	R	76.9	76.7	M/L	✓	✓	
AB7	Route 2A	11:54	R	76.0	80.8	M/L	✓	✓	
AB8	River Cove Rd.	12:10	R	79.7	85.6	M	✓	✓	Spotted a river otter

Allen Brook Staff Gauge	
Reading Time:	<u>11:54</u>
USGS Height (on gauge)	<u>0.83</u> (ft)
Height above USGS	<u>—</u> (ft)

The USGS height should be collected every visit. If the water level is above the top of the USGS gauge, please measure from the top of the gauge using a ruler/yardstick that has decimal feet units (not inches). Please include any notes about obstructions in the channel that may be influencing water levels at the staff gauge.

Allen Brook Water Quality Sampling Field Data Sheet

Waterbody Name: Allen Brook Collector Name(s): Brian Hurmin
 Date: 8/15/18

General Weather: More cloudy throughout the day, hot and humid

Cloud cover (circle one): no clouds partly cloudy cloudy/overcast

Wind (circle one): calm breezy windy

Precipitation (circle one): none misty/foggy drizzle/light rain rain

Date of Last Rain: 8/14/18

Last Rain Event (circle one): mild moderate severe

*Flow *Category: **Base** or **Freshet**- Rising / Receding or **Hydro** Rising / Receding
 *Level: H - M - L - Flood Discharge (cfs) _____

SAMPLES COLLECTED

(fill in the following data for each sample; if no sample collected, write 'N/A')

SITE NAME	DESCRIPTION	SAMPLE TIME	TYPE D/L/FB	H2O TEMP	AIR TEMP	WATER LEVEL	TP	NTU	COMMENTS
AB2	Mud Pond	9:51	D/R	76.0	76.2	M			grass clippings ↗
AB3	Route 2	10:10	R/L/B	70.1	80.1	L			
ABT1	Trib confluence	10:20	R	75.1	81.6	M/L			
AB4	WSC	10:25	R/D	75.5 70.3	81.6	L			Wao temp: 76.5°F
AB5	Southridge Rd.	10:40	R	70.3	80.8	L			
AB6	Talcott Rd. East	10:50	R	77.5	80.1	L			
AB6B	Finney Crossing	11:00	R	75.0	80.6	L			
AB7	Route 2A	11:14	R	75.5	81.5	L			
AB8	River Cove Rd.	11:31	R	78.1	84.7	moderately turb			manure smell, a lot of growth

Allen Brook Staff Gauge	
Reading Time:	<u>11:14</u>
USGS Height (on gauge)	<u>0.169</u> (ft)
Height above USGS	(ft)

The USGS height should be collected every visit. If the water level is above the top of the USGS gauge, please measure from the top of the gauge using a ruler/yardstick that has decimal feet units (not inches). Please include any notes about obstructions in the channel that may be influencing water levels at the staff gauge.

Allen Brook Water Quality Sampling Field Data Sheet

Waterbody Name: Allen Brook Collector Name(s): Brian Kurmin

Date: 8/22/2018

General Weather: wind blowing away morning overcast -> back to cloudy

Cloud cover (circle one): no clouds partly cloudy cloudy/overcast

Wind (circle one): calm breezy windy

Precipitation (circle one): none misty/foggy drizzle/light rain rain

Date of Last Rain: 8/18/18

Last Rain Event (circle one): mild moderate severe

*Flow *Category: Base or Freshet Rising / Receding or Hydro Rising / Receding

*Level: H - M - L - Flood Discharge (cfs) _____

SAMPLES COLLECTED

(fill in the following data for each sample; if no sample collected, write 'N/A')

SITE NAME	DESCRIPTION	SAMPLE TIME	TYPE D/L/FB	H2O TEMP	AIR TEMP	WATER LEVEL	TP	NTU	COMMENTS
AB2	Mud Pond	9:20	R/L	70.5	72.1	m	✓		overcast
AB3	Route 2	9:41	R/L	67.1	75.1	M/L	✓		clouds clearing
ABT1	Trib confluence	10:11	R/D/FB	71.3	75.8	M	✓		
AB4	WSC	10:20	R	72.0	75.3	M	✓		
AB5	Southridge Rd.	10:43	R	68.9	75.7	m/L	✓		
AB6	Talcott Rd. East	11:01	R	75.9	75.6	M/L	✓		
AB6B	Finney Crossing	11:20	R	72.7	74.5	M/L	✓		
AB7	Route 2A	11:38	R	70.9	75.0	M/L	✓		
AB8	River Cove Rd.	11:57	R	72.7	77.1	M	✓		

Allen Brook Staff Gauge	
Reading Time:	<u>11:38</u>
USGS Height (on gauge)	<u>0.77</u> (ft)
Height above USGS	<u>✓</u> (ft)

The USGS height should be collected every visit. If the water level is above the top of the USGS gauge, please measure from the top of the gauge using a ruler/yardstick that has decimal feet units (not inches). Please include any notes about obstructions in the channel that may be influencing water levels at the staff gauge.

cel

Allen Brook Water Quality Sampling Field Data Sheet

Waterbody Name: Allen Brook

Collector Name(s): Melinda Scott

Date: 8/29/18

General Weather: fair

Cloud cover (circle one): no clouds partly cloudy cloudy/overcast

Wind (circle one): calm breezy windy

Precipitation (circle one): none misty/foggy drizzle/light rain rain

Date of Last Rain: _____

Last Rain Event (circle one): mild moderate severe

*Flow *Category: Base or Freshet- Rising / Receding or Hydro Rising / Receding

*Level: H - M - L - Flood Discharge (cfs) _____

SAMPLES COLLECTED

(fill in the following data for each sample; if no sample collected, write 'N/A')

SITE NAME	DESCRIPTION	SAMPLE TIME	TYPE D/L/FB	H2O TEMP	AIR TEMP	WATER LEVEL	TP	NTU	COMMENTS
AB2	Mud Pond	10:55		74.5	83.8	L	✓		
AB3	Route 2	11:12	L	71.1	85.1	L	✓		
ABT1	Trib confluence	11:30		76.6	87.4	L	✓		
AB4	WSC	11:36	D/FB	78.8	89	L	✓		
AB5	Southridge Rd.	11:52		73.5	89.4	L	✓		
AB6	Talcott Rd. East	12:04		80.1	88.5	L	✓		
AB6B	Finney Crossing	12:44		79.7	90.1	L	✓		
AB7	Route 2A	12:59		78.8	89.3	L	✓		
AB8	River Cove Rd.	1:14		79.9	91.4	L	✓		

Allen Brook Staff Gauge	
Reading Time:	1:00 PM
USGS Height (on gauge)	.74 (ft)
Height above USGS	(ft)

The USGS height should be collected every visit. If the water level is above the top of the USGS gauge, please measure from the top of the gauge using a ruler/yardstick that has decimal feet units (not inches). Please include any notes about obstructions in the channel that may be influencing water levels at the staff gauge.

Allen Brook Water Quality Sampling Field Data Sheet

Waterbody Name: Allen Brook Collector Name(s): M. Scott

Date: 9/5/2018

General Weather: Fair

Cloud cover (circle one): no clouds partly cloudy cloudy/overcast

Wind (circle one): calm breezy windy

Precipitation (circle one): none misty/foggy drizzle/light rain rain

Date of Last Rain: _____

Last Rain Event (circle one): mild moderate severe

*Flow *Category: Base or Freshet- Rising / Receding or Hydro Rising / Receding

*Level: H - M - L - Flood Discharge (cfs) _____

68.6 76

SAMPLES COLLECTED

(fill in the following data for each sample; if no sample collected, write 'N/A')

SITE NAME	DESCRIPTION	SAMPLE TIME	TYPE D/L/FB	H2O TEMP	AIR TEMP	WATER LEVEL	TP	NTU	COMMENTS
AB2	Mud Pond	9:48	L	74.5	80.5	L	✓		stream nearly dried up
AB3	Route 2	10:06		74.5	80.5	L	✓		
ABT1	Trib confluence	10:22		77.3	87.1	L	✓		
AB4	WSC	10:26		74.6	83.8	L	✓		stream nearly dried up
AB5	Southridge Rd.	10:47	D/PB	68.7	82.0	L	✓		
AB6	Talcott Rd. East	10:54		73.5	82.6	L	✓		
AB6B	Finney Crossing	11:07		72.5	84.2	L	✓		
AB7	Route 2A	11:20		72.4	82.4	L	✓		
AB8	River Cove Rd.	11:40		74.3	85	L	✓		

83.7

Allen Brook Staff Gauge	
Reading Time:	<u>11:20</u>
USGS Height (on gauge)	<u>.71</u> (ft)
Height above USGS	(ft)

The USGS height should be collected every visit. If the water level is above the top of the USGS gauge, please measure from the top of the gauge using a ruler/yardstick that has decimal feet units (not inches). Please include any notes about obstructions in the channel that may be influencing water levels at the staff gauge.

ee ee

Allen Brook Water Quality Sampling Field Data Sheet

Waterbody Name: Allen Brook Collector Name(s): Melinda Scott
 Date: 9/12/2018

General Weather: pc

Cloud cover (circle one): no clouds partly cloudy cloudy/overcast

Wind (circle one): calm breezy windy

Precipitation (circle one): none misty/foggy drizzle/light rain rain

Date of Last Rain: 9/11/2018

Last Rain Event (circle one): mild moderate severe

*Flow *Category: Base or Freshet- Rising / Receding or Hydro Rising / Receding

*Level: H - M - (L) Flood Discharge (cfs) _____

SAMPLES COLLECTED

(fill in the following data for each sample; if no sample collected, write 'N/A')

SITE NAME	DESCRIPTION	SAMPLE TIME	TYPE D/L/FB	H2O TEMP	AIR TEMP	WATER LEVEL	TP	NTU	COMMENTS
AB2	Mud Pond	8:55	L	67.5	69.4	L	✓	✓	
AB3	Route 2	9:14		62.6	70.7	L	✓	✓	
ABT1	Trib confluence	9:32		66	73.5	L	✓	✓	
AB4	WSC	9:36		65.4	73.2	L	✓	✓	
AB5	Southridge Rd.	9:55		64.7	72	L	✓	✓	
AB6	Talcott Rd. East	10:07	D/FB	67	71.2	L	✓	✓	
AB6B	Finney Crossing	10:27		67.5	69.2	L	✓	✓	
AB7	Route 2A	10:40		66.7	71.5	L	✓	✓	
AB8	River Cove Rd.	10:58		67.5	74.1	L	✓	✓	

Allen Brook Staff Gauge	
Reading Time:	<u>10:40</u>
USGS Height (on gauge):	<u>0.94</u> (ft)
Height above USGS	(ft)

The USGS height should be collected every visit. If the water level is above the top of the USGS gauge, please measure from the top of the gauge using a ruler/yardstick that has decimal feet units (not inches). Please include any notes about obstructions in the channel that may be influencing water levels at the staff gauge.

Allen Brook Water Quality Sampling Field Data Sheet

Waterbody Name: Allen Brook Collector Name(s): Melinda Scott
 Date: 9/19/2018

General Weather: cloudy, cool

Cloud cover (circle one): no clouds partly cloudy cloudy/overcast

Wind (circle one): calm breezy windy

Precipitation (circle one): none misty/foggy drizzle/light rain rain

Date of Last Rain: _____

Last Rain Event (circle one): mild moderate severe

*Flow *Category: Base or Freshet- Rising / Receding or Hydro Rising / Receding

*Level: H - M - L - Flood Discharge (cfs) _____

SAMPLES COLLECTED

(fill in the following data for each sample; if no sample collected, write 'N/A')

SITE NAME	DESCRIPTION	SAMPLE TIME	TYPE D/L/FB	H2O TEMP	AIR TEMP	WATER LEVEL	TP	NTU	COMMENTS
AB2	Mud Pond	10:35	L	71	61.3	L	✓		
AB3	Route 2	10:48		65.1	61	L	✓		
ABT1	Trib confluence	11:04		66	65.8	L	✓		
AB4	WSC	11:08		67.2	64.1	L	✓		
AB5	Southridge Rd.	11:28		64	62.1	L=M	✓		
AB6	Talcott Rd. East	11:38		64.8	63.9	L	✓		
AB6B	Finney Crossing	11:52	D/B	67.3	63.8	L	✓		
AB7	Route 2A	12:07		66.7	61.9	L	✓		
AB8	River Cove Rd.	12:26		67.7	65.3	L	✓		

Allen Brook Staff Gauge	
Reading Time:	12:07
USGS Height (on gauge)	0.73 (ft)
Height above USGS	(ft)

The USGS height should be collected every visit. If the water level is above the top of the USGS gauge, please measure from the top of the gauge using a ruler/yardstick that has decimal feet units (not inches). Please include any notes about obstructions in the channel that may be influencing water levels at the staff gauge.

Appendix C: USGS rating table

USGS Stage Height (ft)	USGS Discharge (cf/s)	USGS Stage Height (ft)	USGS Discharge (cf/s)
0.90	0.78	1.54	13.24
0.92	0.90	1.56	14.01
0.94	1.03	1.58	14.80
0.96	1.18	1.60	15.63
0.98	1.34	1.62	16.48
1.00	1.51	1.64	17.36
1.02	1.70	1.66	18.28
1.04	1.90	1.68	19.22
1.06	2.12	1.70	20.20
1.08	2.35	1.72	21.21
1.10	2.60	1.74	22.25
1.12	2.86	1.76	23.32
1.14	3.15	1.78	24.43
1.16	3.45	1.80	25.57
1.18	3.77	1.82	26.74
1.20	4.11	1.84	27.96
1.22	4.46	1.86	29.20
1.24	4.84	1.90	31.80
1.26	5.24	1.92	33.16
1.28	5.66	1.94	34.55
1.30	6.10	1.96	35.98
1.32	6.56	1.98	37.45
1.34	7.05	2.00	38.96
1.36	7.55	2.02	40.51
1.38	8.09	2.04	42.10
1.40	8.64	2.06	43.73
1.42	9.22	2.08	45.40
1.44	9.83	2.10	47.11
1.46	10.46	2.12	48.86
1.48	11.11	2.14	50.66
1.50	11.80	2.16	52.49
1.52	12.51	2.18	54.38
		2.20	56.30