

# Allen Brook Water Quality Monitoring

## 2016 Final Report

### Background

The Williston Conservation Commission (WCC) is pleased to submit this Report to summarize the results of the 2016 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.<sup>i</sup> 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.<sup>ii</sup> 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).<sup>iii</sup> 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 E.coli and 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 E.coli and 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 2016, the WCC sampled 8 locations along the Allen Brook (Figure 1, Table 1). The parameters sampled included Total Phosphorus (TP), *E. coli*, and Turbidity (NTU).

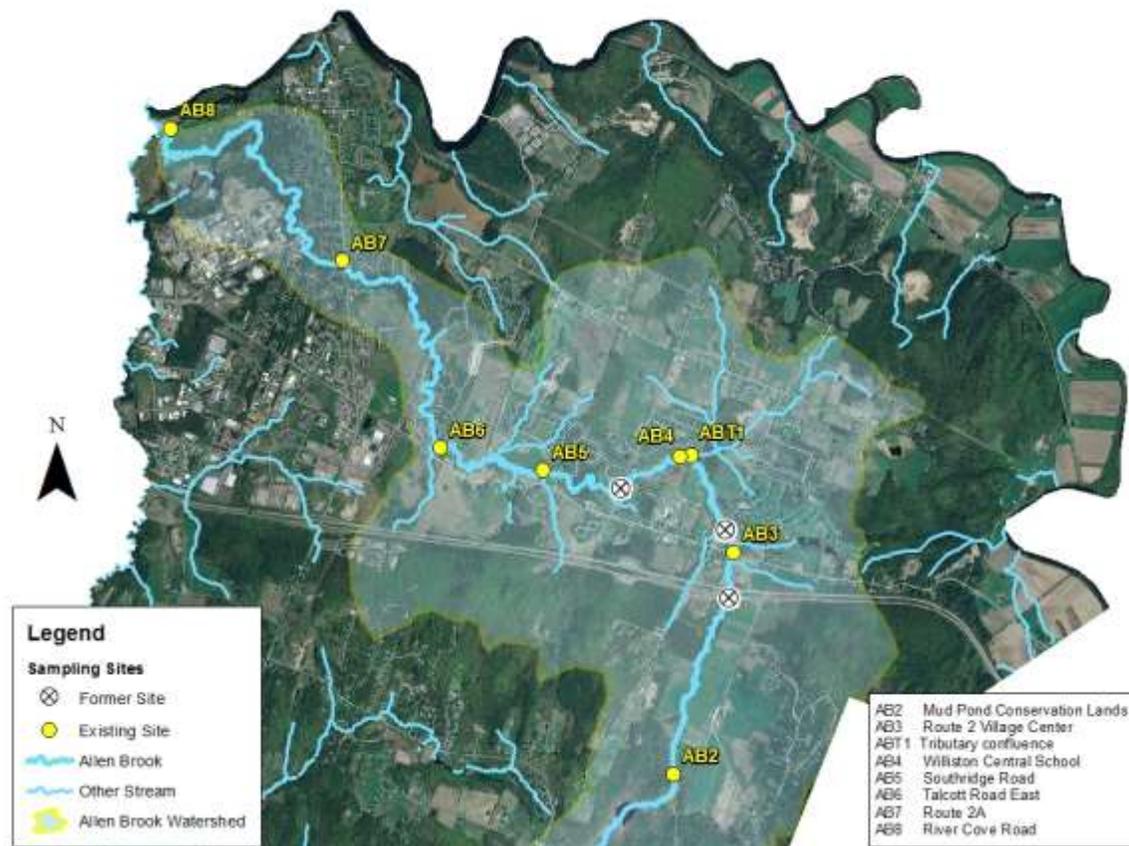


Figure 1: 2016 Allen Brook Sampling Sites

Table 1: 2016 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), E.coli (2007-Present), 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), E.coli (2007- present), 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), E.coli (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), E.coli (2007- present), Chloride (2010), Turbidity (2010- present)
AB5	Just upstream of Southridge Road crossing. Has been a sampling site for TN (2007-2010), TP (2007- present), E.coli (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- present), Chloride (2010- 2013), Turbidity (2010- present)
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 2016 sampling season, the WCC developed a Quality Assurance Project Plan (QAPP)<sup>iv</sup>, 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 2016 season (see Table 2).

Table 2: Project Completeness

Parameter	Number of Samples Anticipated	Number of Valid Samples Collected & Analyzed	Percent Complete
Total Phosphorus	8 sites, 16 weeks = 128	8 sites, 16 weeks = 128	100%
<i>E. coli</i>	4 sites, 8 weeks = 32	4 sites, 9 weeks = 36	100.13%
Turbidity	8 sites, 16 weeks = 128	8 sites, 16 weeks = 128	100%
Temperature	8 sites, 16 weeks = 128	8 sites, 16 weeks = 128	100%

At least one Field Duplicate and one Field Blank was 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.

The Field Duplicates and Field Blanks were subsequently analyzed for consistency and samples with values outside acceptable ranges (Table 3, Table 4) were identified.

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
<i>E. coli</i>	≤ 50%	≤ 1 colony/100 ml
Turbidity	≤ 15%	≤ 0.2 NTU

Complete monitoring data are provided in Appendix A. There were two samples for which a field duplicate was supposed to have been collected but was not, and one sample for which a field blank was supposed to have been collected but was not. Only two *E. coli* duplicates were taken during the season, and of these, one RPD was within the acceptable range (≤ 50%) and the other was outside this range. Three phosphorous RPDs were outside the acceptable range (≤ 15%); and six turbidity RPDs were outside the acceptable range (≤ 15%). Blank sample 161039-09 (AB8 B) fell outside the acceptable range for phosphorus (5.65). Since we have no reason to believe samples were contaminated in the field by fingers or touching sediment, and there were no sample mix ups or other unresolvable issues, all sample records were kept. 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. USGS operates a gaging station on Allen Brook at the Route 2A crossing, however, this stream gage was not being monitored by USGS during the 2016 field season. Therefore discharge was calculated from field measurements of a USGS staff gage at the gaging station collected during sampling events (See Table 5) 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	Daily Mean Discharge
<b>2-Jun</b>	1.73	1.50
<b>8-Jun</b>	2.25	13.00
<b>15-Jun</b>	1.80	2.20
<b>22-Jun</b>	1.67	0.99
<b>29-Jun</b>	1.60	0.65
<b>6-Jul</b>	1.48	0.28
<b>13-Jul</b>	1.58	0.57
<b>20-Jul</b>	1.77	1.90
<b>27-Jul</b>	1.57	0.56
<b>3-Aug</b>	1.52	0.38
<b>10-Aug</b>	1.36	0.10
<b>17-Aug</b>	2.10	8.00
<b>24-Aug</b>	1.54	0.44
<b>31-Aug</b>	1.42	0.17
<b>7-Sep</b>	1.40	0.14
<b>14-Sep</b>	1.46	0.24
<b>21-Sep</b>	1.47	0.26

Figure 2 below shows June – September 2016 daily precipitation plotted with Allen Brook observed discharge. Daily precipitation records were obtained from NOAA Online Weather Data.<sup>v</sup>

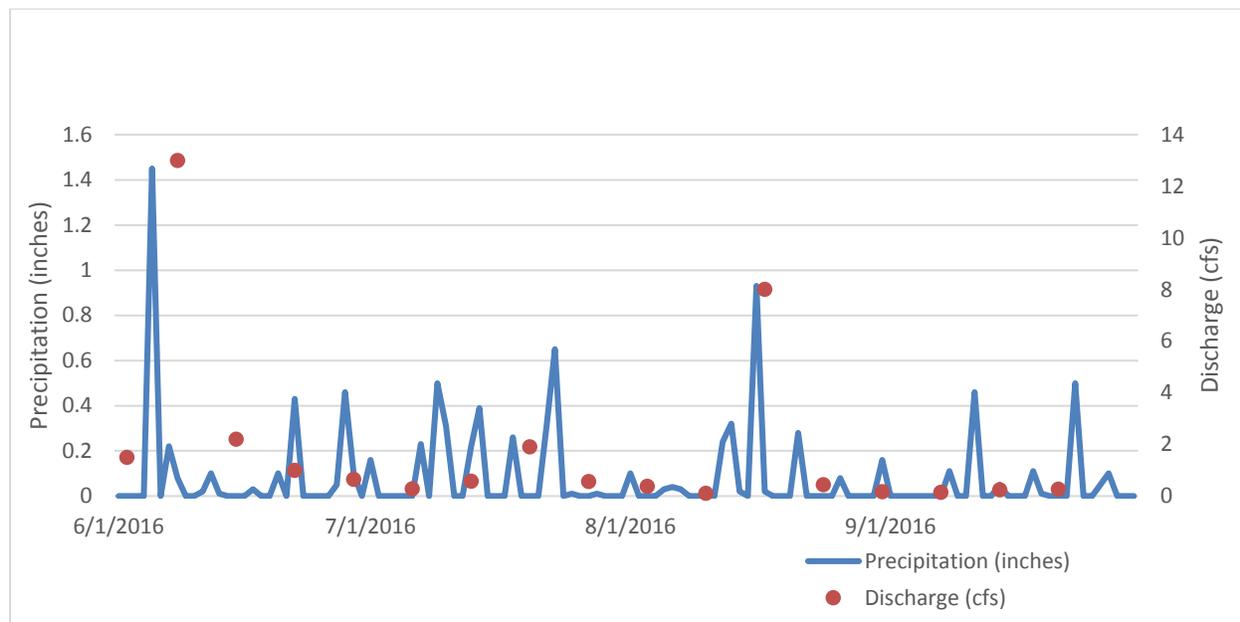


Figure 2: 2016 Daily Precipitation and Allen Brook Observed Discharge

The 2016 field season was overall moderately dry and baseflow conditions were prevalent. The highest flows (13 cfs) occurred on June 8, following a 1.45 inch rain event on June 5. On June 15, flow had receded to nearly baseflow. From June 22 to July 23, there were frequent but relatively minor rain events (half-inch or less), with corresponding low streamflows (0.28 to 1.9 cfs). From July 27 to August 10, flows continued to decrease to a season low of 0.1 cfs. Streamflow spiked at 8 cfs on August 17 following a 0.93 inch rain event on August 16. By August 23, streamflow had receded to 0.44 cfs and remained very low for the remainder of the monitoring season.

Figures 3-5 show the relationship of the water quality parameters collected to measured stream flow. Unfortunately, *E. coli* was sampled during only one high flow event. The results for that day reflect a strong positive relationship of *E. coli* concentrations with high stream flows. Notably, during the high flow event site AB2, which is in the upper watershed, had a lower concentration of *E. coli* than all other sites.

Phosphorus concentrations were not significantly elevated during the first high flow event (6/8). However, P concentrations were slightly elevated on the second high flow event (8/17). As with *E. coli*, P concentration at site AB2 was minimally affected by the high flow event. On 7/20, a beaver dam was breached just before sampling the two downstream sites ABT1 and AB4. Those sites exhibited high flow conditions and correspondingly high P concentrations. The P concentrations likely increased not only because of high flows, but also from the mud and debris released from the beaver dam.

Turbidity concentrations also were not significantly elevated during the first high flow event (6/8). NTU levels were elevated on the on the second high flow event (8/17) and exhibited a stronger positive relationship to flow than did TP. Similar to TP, NTU concentrations at ABT1 And AB4 were highly elevated on July 20 when the upstream beaver dam was breached.

The sites further downstream in the Allen Brook watershed appear to be much more sensitive to streamflow fluctuations than those further upstream in the watershed. During the high flow event of 8/17, water chemistry parameters for site AB2 remained low while at all other sites water chemistry parameter values were elevated. That water chemistry is affected by stream flow conditions to a lesser degree at site AB2 than in the sites lower down in the watershed 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. At high flows, phosphorus and turbidity concentrations were most elevated at AB6, AB7, AB8 and ABT1. It is less clear what is causing a higher sensitivity to flow conditions at these sites relative to others: soils types, amount of impervious surface, and number and types of stormwater inputs could all play a role.

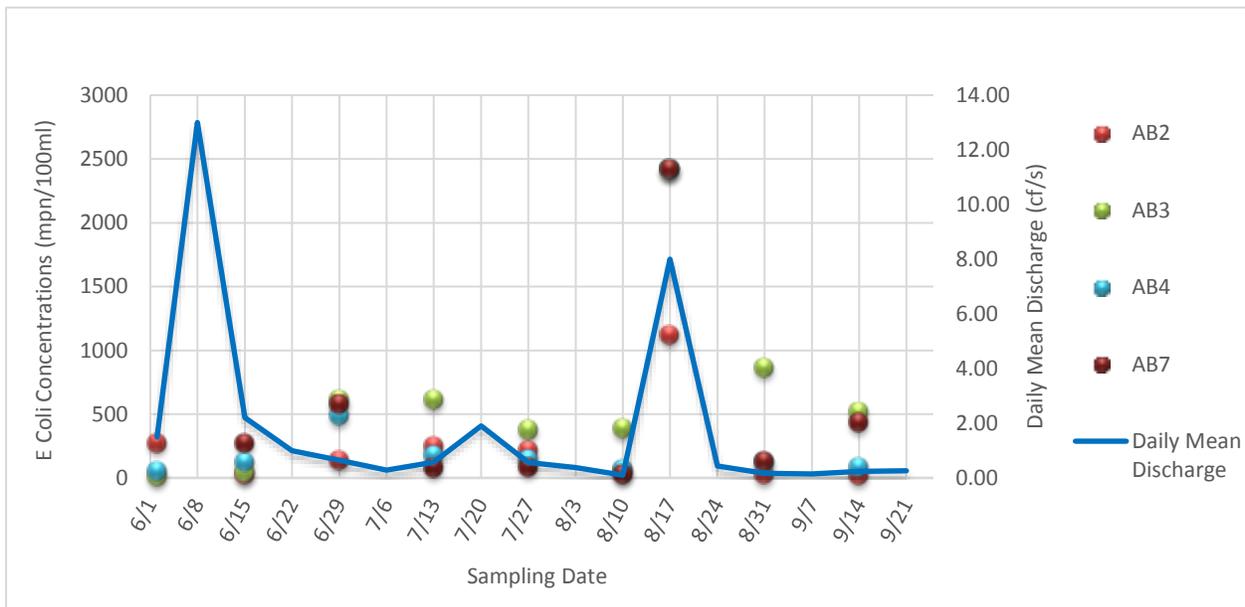


Figure 3: E. coli concentrations along the Allen Brook in relation to stream flow.

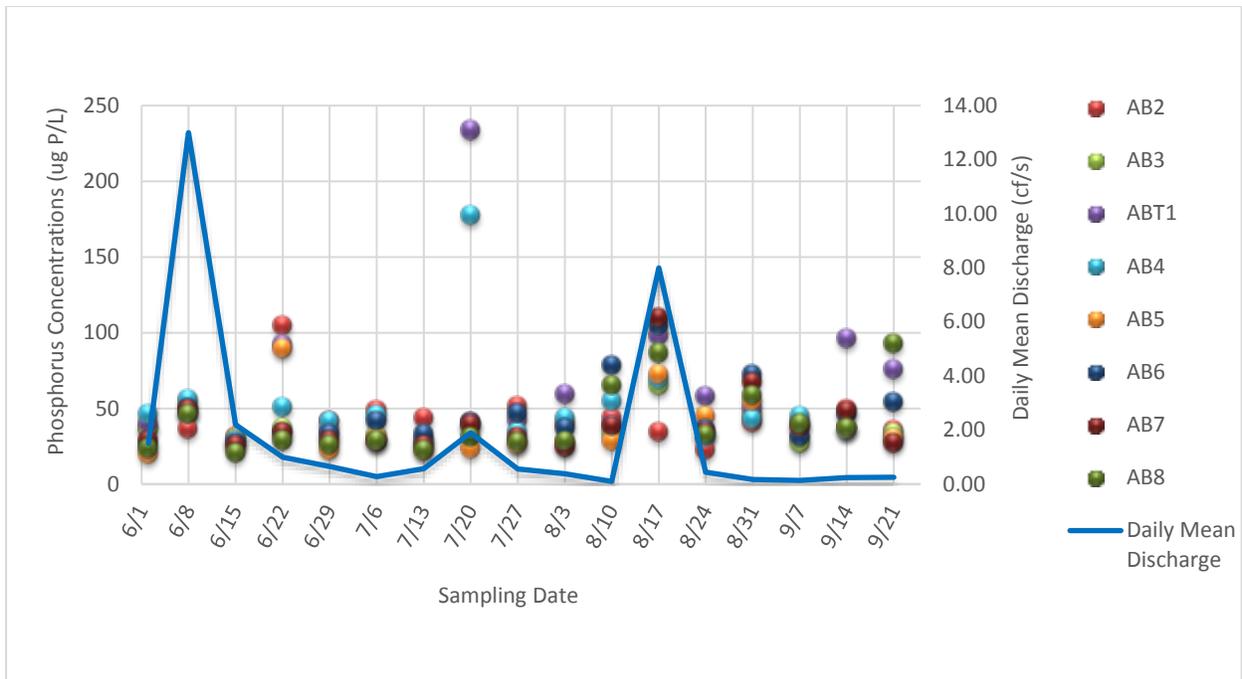


Figure 4: Phosphorus concentrations along the Allen Brook in relation to stream flow.

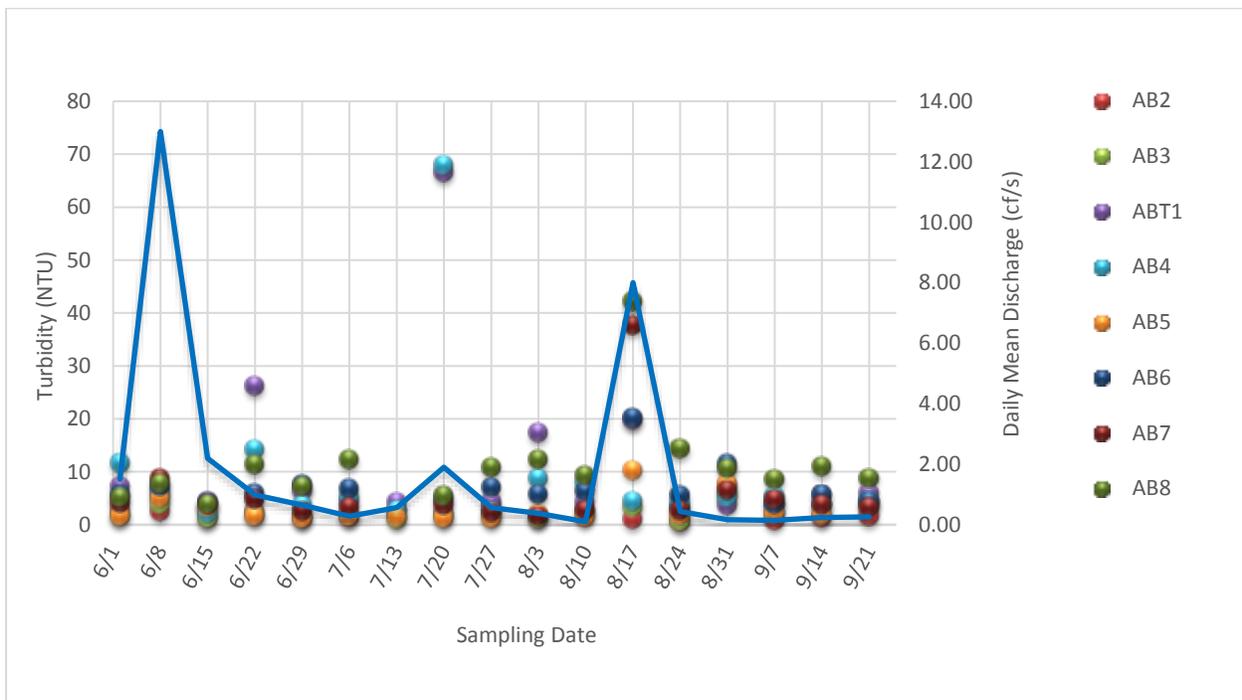


Figure 5: Turbidity levels along the Allen Brook in relation to stream flow.

**Attainment of State Water Quality Standards**

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<sup>vi</sup> are as follows:

- Turbidity: Not to exceed 10 NTU (nephelometric turbidity units) as an annual average under dry weather base-flow conditions.

- *E. coli*: Not to exceed a geometric mean of 126 organisms /100ml obtained over a representative period of 60 days, and no more than 10% of samples above 235 organisms/100 ml.
- 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.

*E. coli*

*E. coli* was sampled on nine days (approximately every other week) during the 2016 sampling season, at sites AB2, AB3, AB4 and AB7 (Table 6). At all sites, more than 10% of samples exceeded the Vermont water quality standard of 235 organisms/100 ml. Notably, site AB3 exceeded the standard on 7 out of 9 sampling events. Splitting the sampling season into two 60-day periods and excluding the one high flow sampling event of August 17, the geometric mean of each site exceeded the water quality standard of 126 organisms /100ml during the June/July period. During the July/September period, the geometric mean exceeded the standard at site AB3; all other sites were in attainment of the standard during this period.

Table 5: 2016 Allen Brook sites *E. coli* data (mpn/100ml)

Date	Sampling Site			
	AB2	AB3	AB4	AB7
6/2/2016	275	16	52	
6/15/2016	32	46	122	276
6/29/2016	140	613	488	579
7/13/2016	248	613	178	81
7/27/2016	218	378	152	88
8/10/2016	53	387	68	28
8/17/2016	1120	2420	2420	2420
8/31/2016	32	866	125	132
9/14/2016	25	517	86	436
<b>GEOMEAN (6/2 - 7/27)</b>	<b>147</b>	<b>160</b>	<b>154</b>	<b>184</b>
<b>GEOMEAN (7/13 - 9/14)</b>	75	<b>526</b>	115	103
	Above 126 mpn/100ml			
	Above 235 mpn/100ml			

The geometric mean for each site was calculated for sampling events during high (n=1) and base flow (n=8) conditions over the entire 4-month 2016 season (Figure 6). During the 4-month period, only one site AB2, meets the water quality standard. Total *E. coli* values for AB2 are relatively low and uniform as compared to the other sites. Even during the high flow sampling event, the values for AB2 are less than half that of all other sites. In contrast, at AB3 the values are high and variable.

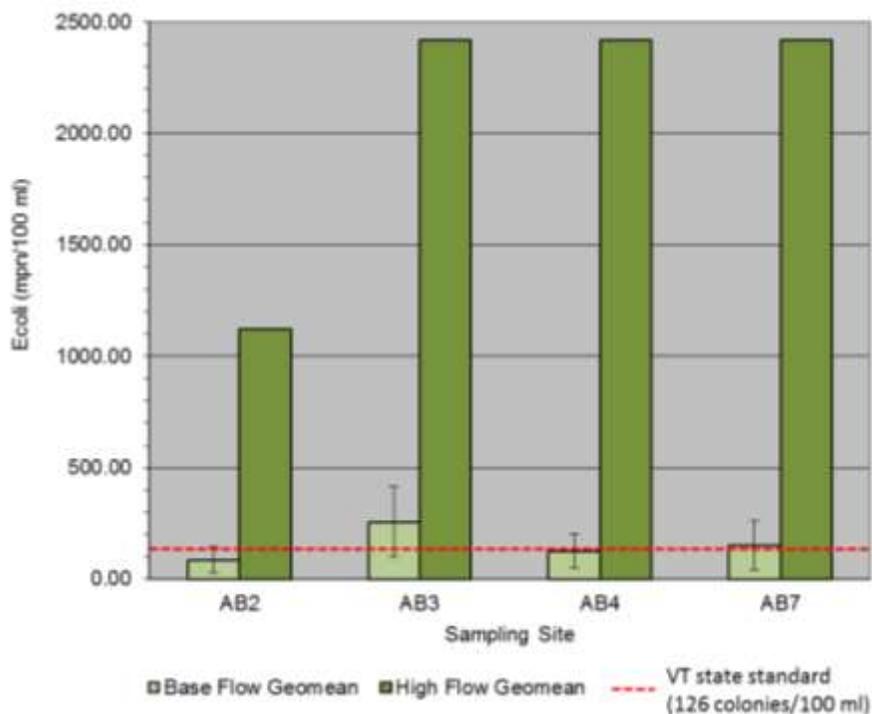


Figure 6: 2016 Allen Brook sampling sites *E. coli* concentrations (mpn/100ml) geometric mean and 90% confidence interval for base flow (n=8) and high flow (n=1).

### Phosphorus

Phosphorus was sampled at each site once per week from June 2 – September 21. The geometric mean for each site was calculated for sampling events during high (n=2) and base flow (n=15) conditions over the entire 4-month 2016 season (Figure 7). The sampling events of July 20 at sites ABT1 and AB4 were excluded from the analysis due to hydroflow conditions caused by intentional breach of an upstream beaver dam.

During the 4-month period, only 17 of 134 sampling events (5%) yielded phosphorus concentrations within the Vermont water quality standards (< 27 ug/L) (Table . All sites’ geometric means for phosphorus exceeded the Vermont water quality standard of 27 ug/L both during high flow and base flow conditions. Except for AB2, the geometric mean of phosphorus concentrations at high flows far exceeded the mean concentrations at base flows. Site ABT1 had the highest phosphorus concentrations at base flows, while AB3 and AB5 had the lowest P concentrations. At high flows sites ABT1, AB6 and AB7 all had high and variable phosphorus concentrations.

Table 6: 2016 Allen Brook sites phosphorus data (ug/L)

Date	Sampling Site							
	AB2	AB3	ABT1	AB4	AB5	AB6	AB7	AB8
6/2/2016	37.2	37.3	40.4	46.7	20.0	26.6	29.3	23.8
6/8/2016	37.0	54.3	47.1	56.3	48.5	50.5	49.6	46.7
6/15/2016	31.5	30.3	28.4	28.7	25.7	27.2	26.3	21.1
6/22/2016	105.0	37.5	92.5	51.3	90.0	33.9	34.8	29.2
6/29/2016	41.9	32.8	35.9	41.7	23.1	33.1	29.1	26.4

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7/6/2016	48.8	32.5	28.4	46.0	30.4	42.0	29.0	29.2
7/13/2016	43.8	29.2	30.2	26.0	22.6	33.6	26.4	22.8
7/20/2016	40.9	38.5	excluded	excluded	23.4	40.8	39.7	31.4
7/27/2016	51.8	27.2	42.5	34.5	27.5	47.1	31.7	28.3
8/3/2016	40.4	27.6	59.6	43.8	26.6	37.1	24.8	28.7
8/10/2016	44.1	33.3	39.0	55.1	29.0	78.7	38.6	65.5
8/17/2016	34.6	65.3	98.3	69.6	73.1	105.0	110.0	87.0
8/24/2016	23.1	33.9	58.4	31.6	45.2	37.0	34.5	33.0
8/31/2016	41.5	46.8	50.4	43.1	54.9	72.5	67.8	58.8
9/7/2016	30.7	27.3	41.2	45.1	38.8	31.7	37.8	40.2
9/14/2016	49.9	38.0	96.3	36.7	37.2	46.8	48.4	37.3
9/21/2016	35.7	34.1	75.9	30.5	30.3	54.5	27.4	93.2
<b>GEOMEAN</b>	<b>41.9</b>	<b>33.4</b>	<b>47.4</b>	<b>39.1</b>	<b>32.1</b>	<b>40.7</b>	<b>33.8</b>	<b>34.5</b>
	Above 27 ug/L							

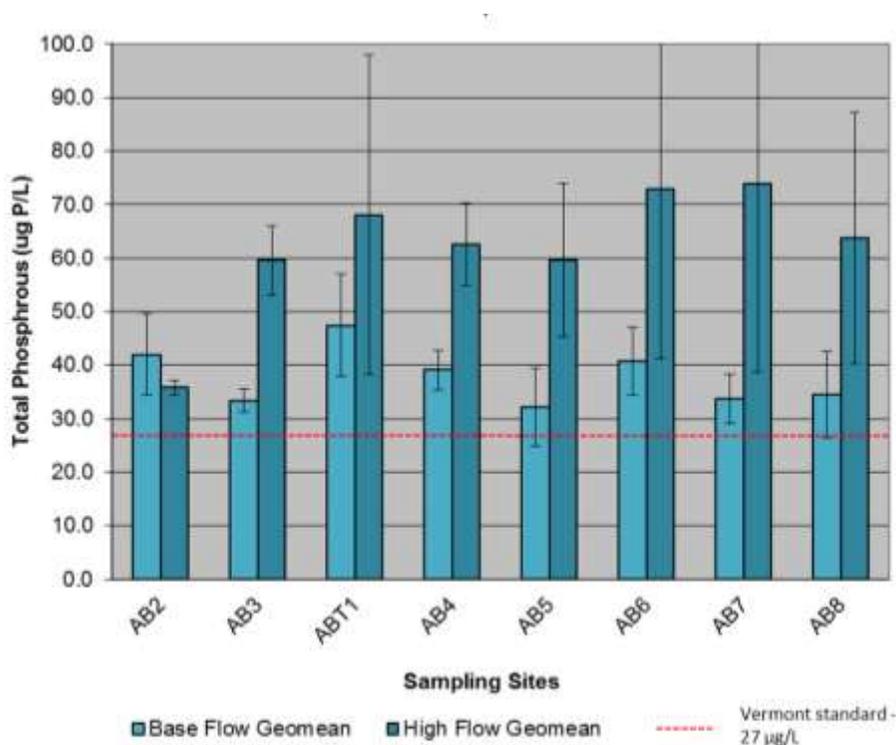


Figure 7: 2016 Allen Brook sampling sites phosphorus concentrations (ug/L) geometric mean and 90% confidence interval for base flow (n=15) and high flow (n=2) .

### Turbidity

Turbidity was sampled at each site once per week from June 2 – September 21. The geometric mean for each site was calculated for sampling events during high (n=2) and base flow (n=15) conditions over the entire 4-month 2016 season (Figure 8). The sampling events of July 20 at sites ABT1 and AB4 were excluded from the analysis due to hydro flow conditions caused by intentional breach of an upstream beaver dam. During the 4-month period, all sites met the Vermont water quality standards for 10 NTU at base flow conditions. With the exception of AB2 and AB4, mean NTU during high flow conditions was markedly

higher than at base flow conditions. Sites ABT1, AB6, AB7 and AB8 had very high and variable turbidity during elevated flows. Sites AB2, AB3 and AB4 all consistently had the lowest NTU concentrations.

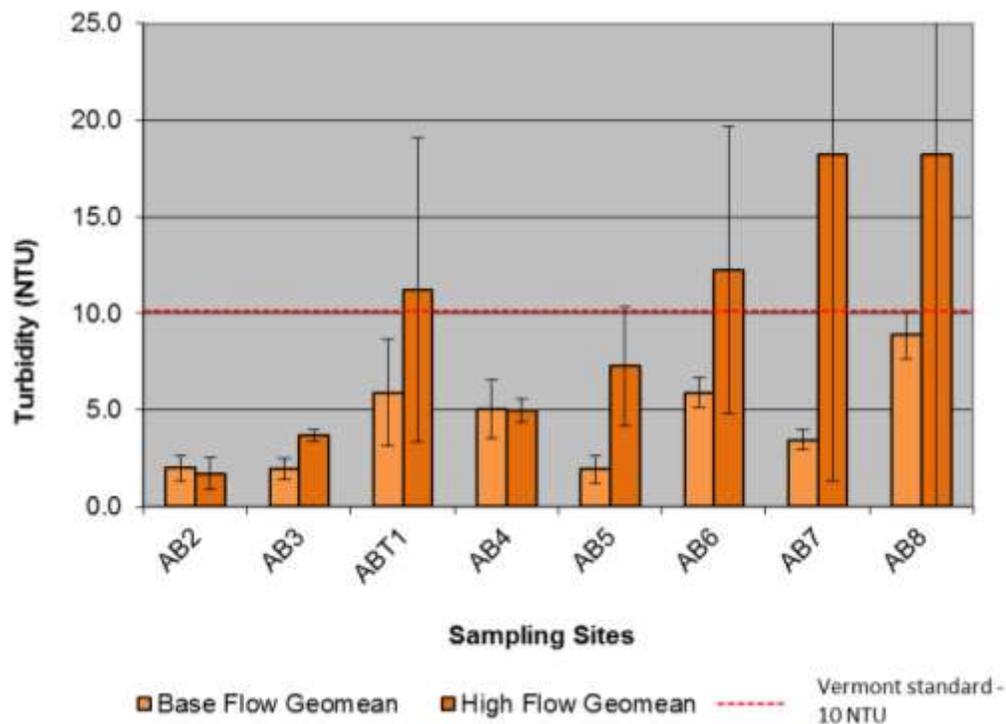


Figure 8: 2016 Allen Brook sampling sites turbidity concentrations (NTU) geometric mean and 90% confidence interval for base flow (n=15) and high flow (n=2).

### Data Trends over Time

To characterize and compare the sampling data gathered from 2007-2016 (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.

#### E. coli

Concentrations of *E. coli* are quite variable across sites and over time (Figure 9). Site AB2 is the furthest upstream site, located within a protected wetland area. Sites AB4 and AB6 are both located downstream of residential development. Site AB 3 is located downstream from agricultural uses. Site AB2 was the only sampling location to consistently remain under 126 mpn/100ml (VT state contact standard), except for 2012. This trend makes sense as AB2 is situated in a conservation area where the only inputs would be wildlife related. Over the 8 year sampling period, site AB4, located behind the Allen Brook elementary school, averaged the highest *E. coli* concentrations. The high *E. coli* concentrations could be due to pet waste, as the site is near a popular dog-walking route; it could also be due to upstream beaver activity, which is common. On 7/7/2011 the sample at AB4 showed a very large spike in *E. coli*. When cross referencing this date with the flow data there was an increase in flow from 3.1 cf/s on June 30<sup>th</sup> to 23cf/s on July 7<sup>th</sup>.

The high *E. coli* concentrations in 2011 are also likely reflective of the high flow events associated with Tropical Storm Irene in August of that year and other significant runoff events that occurred in June. Notably, in 2016 site AB3 had unusually high *E. coli* concentrations, the reason for which is unclear and needs further exploration. It may be due to a change in agricultural practices at the dairy farm just upstream of the site.

Source sampling (DNA testing) at sites AB3, AB4 and AB6 could be valuable for determining the origin (human, bovine, etc.) of these *E. coli* concentrations, and the Conservation Commission is looking into sources of funding for this effort. If the *E. coli* at AB3 was determined to be bovine in origin, the farmland bordering the Allen Brook between sites AB2 and AB3 should be checked to ensure that there is an appropriate sized buffer

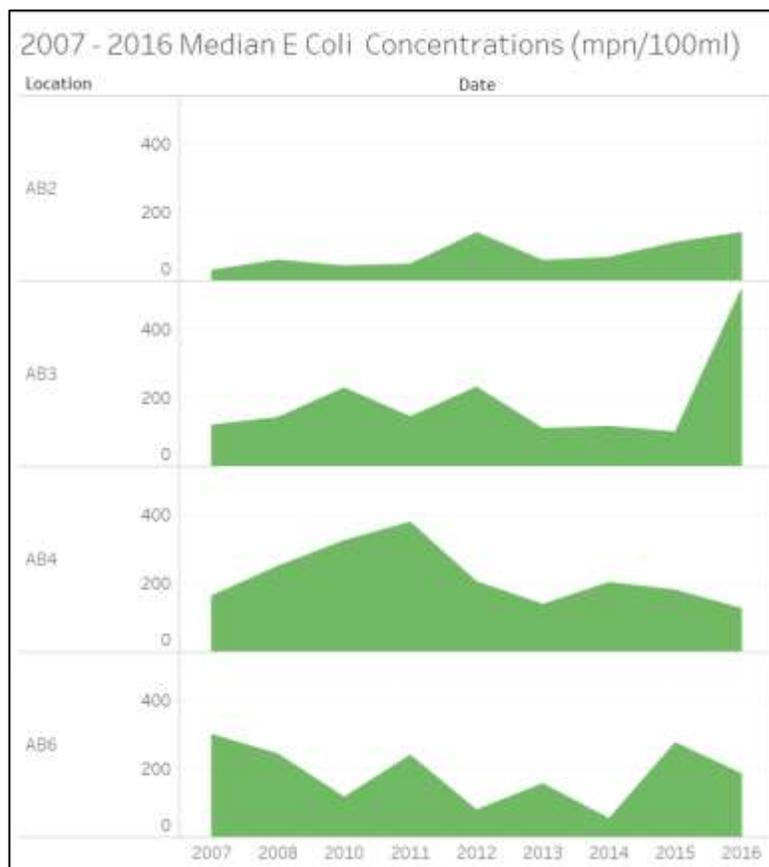


Figure 9: 2007 to 2016 Median *E. coli* Concentrations (mpn/100ml)

between the fields and the stream. Also, it might be worthwhile to try and raise awareness amongst the farmers to try and not spread manure during or before significant rain events. This phenomenon may improve with the new proposed Required Agricultural Practices that prohibit manure spreading when field conditions are conducive to runoff or if runoff events are anticipated.

**Phosphorus:** Over the nine year sampling span, 77% of the samples are above the Vermont Standard (27 ug-P/L).<sup>vii</sup> Total Phosphorous (TP) concentrations tend to be slightly higher at upstream sampling sites (AB2, AB3, AB4 and ABT1), and are the lowest at AB8. We would expect to see these results because agricultural land is concentrated in the upstream reach. AB8 was the only site at which TP concentrations were consistently below the Vermont water quality standard of 27 ug-P/L for a warm water, median gradient stream. From 2011 to 2014, phosphorus concentrations appear to decrease across all sites, followed by a slight rise in 2015 and 2016. The decrease is most noticeable at AB2, which is in the upper watershed. The decrease in phosphorus concentrations 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. In addition, 22 developments (mostly residential) will be implementing substantial improvements to their stormwater treatment systems in order to comply with current State standards over the next few years. We anticipate future decreases in phosphorus concentrations over time, although it might be several years before these management practices yield improvements.

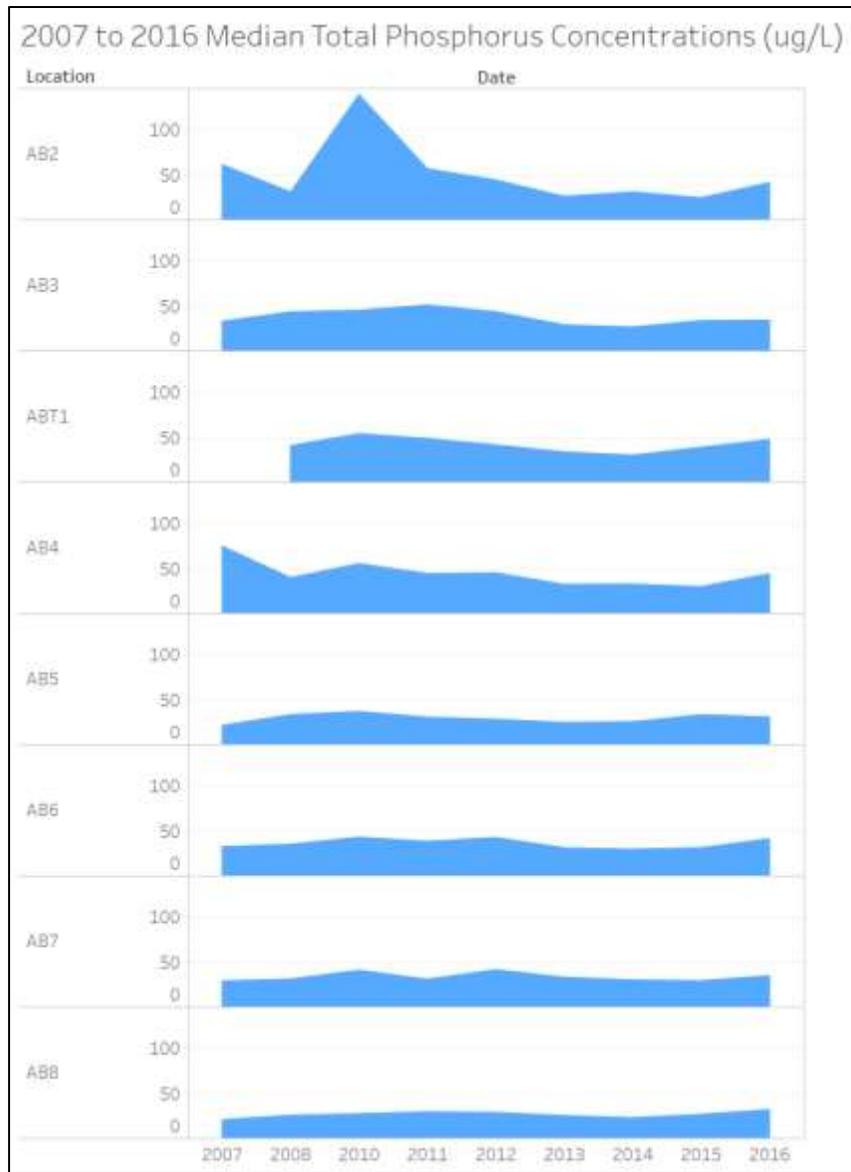


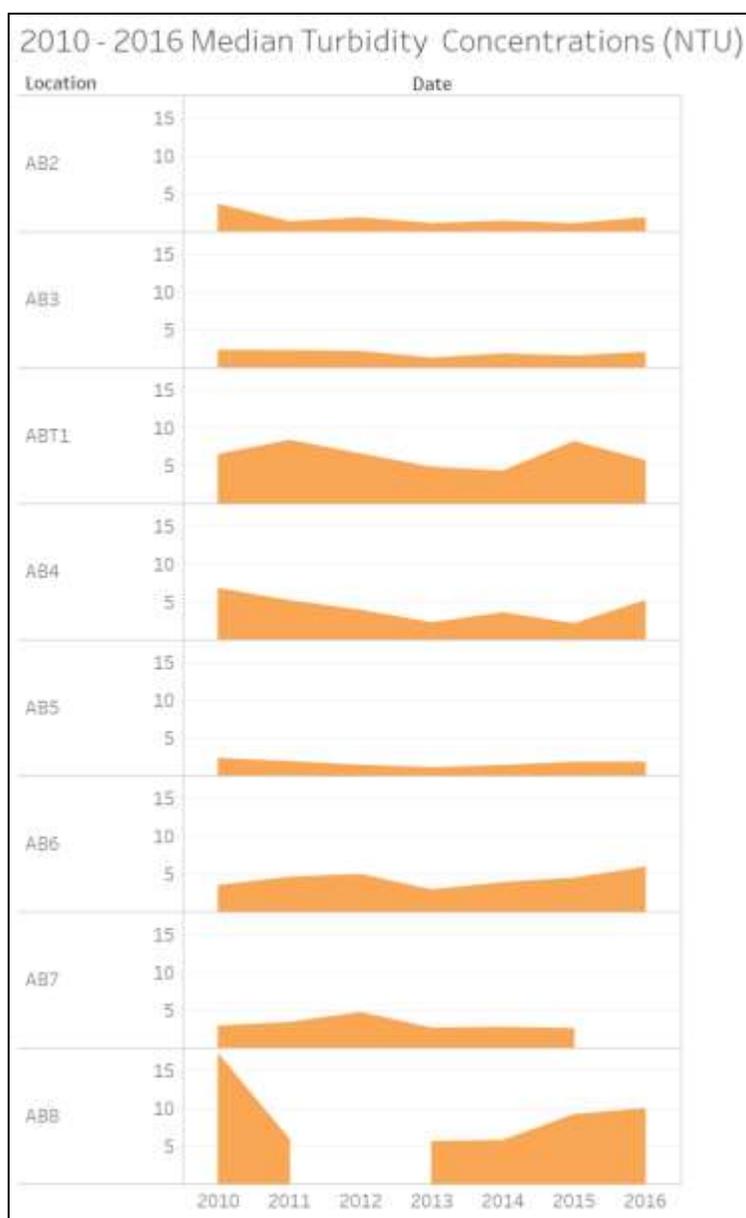
Figure 10: 2007 to 2016 Median Total Phosphorus Concentrations (ug/L)

*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 8 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, AB5 and AB7 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

Nine 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 streamflows. 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.

From 2011 to 2014, at sites AB2, AB3, ABT1 and AB4, mean annual median phosphorous concentrations decreased, and then increased in 2015-2016. It is unclear what is causing these changes in trends. 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.

Concentrations of *E. coli* are quite variable across sites and over time. Site AB2, the furthest upstream site and located within a protected wetland area, was the only sampling location to consistently remain below 126 mpn/100ml (VT state contact standard). The evidence to date suggests that overland stormwater runoff is a major factor in Allen Brook's bacteria and nutrient impairment, although other contributory sources may also exist. Sites where *E. coli* concentrations were most elevated are located along a section of Allen Brook that flows through medium density suburban developments. The cause of the increase in *E. coli* at Site AB3 over the last few years needs to be investigated further. The biological source (human vs. other animal) of *E. coli* contamination should be identified so that remediation efforts can be planned for and implemented.

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.

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 develop and implement a sediment 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

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- <sup>i</sup> 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.
- <sup>ii</sup> 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.
- <sup>iii</sup> Town of Williston, 2006. *2006-2011 Town of Williston Comprehensive Plan*.
- <sup>iv</sup> Williston Conservation Commission, 2015. *Vermont General Quality Assurance Project Plan for Volunteer, Educational and Local Community Monitoring and Reporting*. Prepared for the Vermont Department of Environmental Conservation.
- <sup>v</sup> NOAA Online Weather Data, accessed at <http://w2.weather.gov/climate/xmacis.php?wfo=btv>
- <sup>vi</sup> Vermont Water Quality Standards, Environmental Protection Rule Chapter 29(a), accessed at [http://dec.vermont.gov/sites/dec/files/documents/WSMD\\_WaterQualityStandards\\_2014.pdf](http://dec.vermont.gov/sites/dec/files/documents/WSMD_WaterQualityStandards_2014.pdf).
- <sup>vii</sup> State of Vermont Agency of Natural Resources Department of Environmental Conservation, 2014. *Vermont Water Quality Standards Environmental Protection Rule Chapter 29(a)*. Accessed February 24, 2016 at <http://www.anr.state.vt.us/dec/rulesum.htm>.

Appendix A: 2016 Allen Brook Water Quality Monitoring Data

Sample Number	Location	Date	Water Temp	E. Coli (mpn/100 ml)	RPD Ecoli Dupe (%)	TP (ug P/L)	RPD TP Dupe (%)	Turbidity (NTU)	RPD Turbidity Dupe (%)
160689-01	AB2	6/2/2016	68.72	275.51	no duplicate	37.2	-6.25%	2.68	-1.50%
160689-10	AB2 D	6/2/2016				39.6		2.64	
160689-09	AB2 B	6/2/2016		< 1		< 5		< 0.2	
160689-02	AB3	6/2/2016	67.28	15.96		37.3		1.89	
160689-03	ABT1	6/2/2016	70.32			40.4		7.3	
160689-04	AB4	6/2/2016	70.7	52.84		46.7		11.7	
160689-05	AB5	6/2/2016	67.64			20		1.66	
160689-06	AB6	6/2/2016	70.52	184.18		26.6		5.72	
160689-07	AB7	6/2/2016	69.26			29.3		4.21	
160689-08	AB8	6/2/2016	70.88			23.8		5.16	
160690-01	AB2	6/8/2016	63.7			37		2.55	
160690-02	AB3	6/8/2016	62.9			54.3	-1.64%	3.94	-22.12%
160690-10	AB3 D	6/8/2016				55.2		4.92	
160690-09	AB3 B	6/8/2016				< 5		< 0.2	
160690-03	ABT1	6/8/2016	65.2			47.1		6.34	
160690-04	AB4	6/8/2016	64			56.3		5.52	
160690-05	AB5	6/8/2016	63.1			48.5		5.07	
160690-06	AB6	6/8/2016	64.1			50.5		7.4	
160690-07	AB7	6/8/2016	64.1			49.6		8.76	
160690-08	AB8	6/8/2016	66.5			46.7		7.84	
160781-01	AB2	6/15/2016	60.3	32.67		31.5		1.48	
160781-02	AB3	6/15/2016	60.1	45.85		30.3		1.31	
160781-03	ABT1	6/15/2016	57.9			28.4	-3.80%	4.41	-17.01%
160781-10	ABT1 D	6/15/2016				29.5		5.23	
160781-09	ABT1 B	6/15/2016				< 5		< 0.2	
160781-04	AB4	6/15/2016	58.9	122.29		28.7		2.25	
160781-05	AB5	6/15/2016	59.8			25.7		3.43	
160781-06	AB6	6/15/2016	61.3			27.2		4.23	
160781-07	AB7	6/15/2016	60.3	275.51		26.3		3.93	
160781-08	AB8	6/15/2016	61.5			21.1		3.96	
160760-01	AB2	6/22/2016	63.8			105		2.48	
160760-02	AB3	6/22/2016	60.8			37.5		1.98	
160760-03	ABT1	6/22/2016	64.1			92.5		26.3	
160760-04	AB4	6/22/2016	64.5			51.3	2.77%	14.2	0.71%
160760-10	AB4 D	6/22/2016				49.9		14.1	
160760-09	AB4 B	6/22/2016				< 5		< 0.2	
160760-05	AB5	6/22/2016	61.4			90		1.72	
160760-06	AB6	6/22/2016	64.3			33.9		5.97	
160760-07	AB7	6/22/2016	63.3			34.8		4.84	

160760-08	AB8	6/22/2016	62.3			29.2		11.4	
160816-01	AB2	6/29/2016	72.1	140		41.9		1.38	
160816-02	AB3	6/29/2016	68	613		32.8		1.67	
160816-03	ABT1	6/29/2016	70.9			35.9		6.55	
160816-04	AB4	6/29/2016	71.6	488		41.7		3.65	
160816-05	AB5	6/29/2016	68.5			23.1	5.79%	1.25	-2.37%
160816-10	AB5 D	6/29/2016				21.8		1.28	
160816-09	AB5 B	6/29/2016				< 5		< 0.2	
160816-06	AB6	6/29/2016	73.9			33.1		7.69	
160816-07	AB7	6/29/2016	70.5	579		29.1		2.64	
160816-08	AB8	6/29/2016	73.5			26.4		7.33	
160959-01	AB2	7/6/2016	73.1			48.8		1.68	
160959-02	AB3	7/6/2016	67.5			32.5		2.03	
160959-03	ABT1	7/6/2016	70.4			28.4		4.52	
160959-04	AB4	7/6/2016	74.5			46		5.15	
160959-05	AB5	7/6/2016	67.5			30.4		1.75	
160959-06	AB6	7/6/2016	79.5			42	-13.33%	6.82	3.13%
160959-10	AB6 D	7/6/2016				48		6.61	
160959-09	AB6 B	7/6/2016				< 5		< 0.2	
160959-07	AB7	7/6/2016	70.6			29		3.29	
160959-08	AB8	7/6/2016	75.6			29.2		12.3	
160978-01	AB2	7/13/2016	72	248.9		43.8		2.54	
160978-02	AB3	7/13/2016	66.5	613.14		29.2		1.18	
160978-03	ABT1	7/13/2016	69.8			30.2		4.23	
160978-04	AB4	7/13/2016	71.3	178.53		26		2.75	
160978-05	AB5	7/13/2016	67.7			22.6		1.5	
160978-06	AB6	7/13/2016	76.9			33.6			
160978-07	AB7	7/13/2016	70	80.88	63.39%	26.4	-1.88%		
160978-10	AB7 D	7/13/2016		41.95		26.9			
160978-09	AB7 B	7/13/2016		< 1		< 5			
160978-08	AB8	7/13/2016				22.8			
161039-01	AB2	7/20/2016	67.8			40.9		2.2	
161039-02	AB3	7/20/2016	64.4			38.5		1.78	
161039-03	ABT1	7/20/2016	71.4			234		66.6	
161039-04	AB4	7/20/2016	71			178		68	
161039-05	AB5	7/20/2016	66.6			23.4		1.32	
161039-06	AB6	7/20/2016	71.5			40.8		4.83	
161039-07	AB7	7/20/2016	68.5			39.7		3.81	
161039-08	AB8	7/20/2016	72.4			31.4	13.97%	5.49	6.78%
161039-10	AB8 D	7/20/2016				27.3		5.13	
161039-09	AB8 B	7/20/2016				5.65		< 0.2	
161068-01	AB2	7/27/2016	69.3	218.72	40.56%	51.8	-15.49%	3.8	-53.28%
161068-10	AB2 D	7/27/2016		144.97		60.5		6.56	
161068-09	AB2 B	7/27/2016		< 1		< 5		< 0.2	
161068-02	AB3	7/27/2016	66.5	378.44		27.2		1.97	
161068-03	ABT1	7/27/2016	70.1			42.5		4.41	
161068-04	AB4	7/27/2016	71.6	151.52		34.5		2.65	

161068-05	AB5	7/27/2016	68.9			27.5		1.23	
161068-06	AB6	7/27/2016	77.3			47.1		7.14	
161068-07	AB7	7/27/2016	69.8	88.03		31.7		2.36	
161068-08	AB8	7/27/2016	74.3			28.3		10.9	
161128-01	AB2	8/3/2016	72.7			40.4		1.78	
161128-02	AB3	8/3/2016	67.8			27.6	-11.93%	1.24	-84.92%
161128-10	AB3 D	8/3/2016				31.1		3.07	
161128-09	AB3 B	8/3/2016				< 5		< 0.2	
161128-03	ABT1	8/3/2016	71.6			59.6		17.5	
161128-04	AB4	8/3/2016	76.3			43.8		8.9	
161128-05	AB5	8/3/2016	68.2			26.6		1.96	
161128-06	AB6	8/3/2016	79.2			37.1		5.79	
161128-07	AB7	8/3/2016	71.9			24.8		1.72	
161128-08	AB8	8/3/2016	74.5			28.7		12.3	
161159-01	AB2	8/10/2016	70.3	53.81		44.1		2.74	
161159-02	AB3	8/10/2016	68.5	387.32		33.3		2.19	
161159-03	ABT1	8/10/2016	70			39	-11.14%	4.31	-6.51%
161159-10	ABT1 D	8/10/2016				43.6		4.6	
161159-09	ABT1 B	8/10/2016				< 5		< 0.2	
161159-04	AB4	8/10/2016	72.8	68.28		55.1		7.95	
161159-05	AB5	8/10/2016	66.9			29		1.52	
161159-06	AB6	8/10/2016	72.5			78.7		6.28	
161159-07	AB7	8/10/2016	71.3	27.51		38.6		2.77	
161159-08	AB8	8/10/2016	73			65.5		9.3	
161204-01	AB2	8/17/2016	68.4	1119.87		34.6		1.15	
161204-02	AB3	8/17/2016	67.3	2419.57		65.3		3.43	
161204-03	ABT1	8/17/2016	70.3			98.3		19.9	
161204-04	AB4	8/17/2016	67.6	> 2419.6		69.6	-1.14%	4.45	-13.61%
161204-10	AB4 D	8/17/2016		no duplicate		70.4		5.1	
161204-09	AB4 B	8/17/2016		no blank		< 5		< 0.2	
161204-05	AB5	8/17/2016	68.7			73.1		10.4	
161204-06	AB6	8/17/2016	64.5			105		20.2	
161204-07	AB7	8/17/2016	69.8	> 2419.6		110		37.8	
161204-08	AB8	8/17/2016	69.5			87		42.2	
161227-01	AB2	8/24/2016	73.4			23.1		0.76	
161227-02	AB3	8/24/2016	72.1			33.9		0.67	
161227-03	ABT1	8/24/2016	74.1			58.4		3.36	
161227-04	AB4	8/24/2016	72			31.6		4.09	
161227-05	AB5	8/24/2016	75.7			45.2	33.59%	1.77	-17.53%
161227-10	AB5 D	8/24/2016				32.2		2.11	
161227-09	AB5 B	8/24/2016				< 5		< 0.2	
161227-06	AB6	8/24/2016	78			37		5.58	
161227-07	AB7	8/24/2016	73.5			34.5		2.85	
161227-08	AB8	8/24/2016	74.6			33		14.4	
161314-01	AB2	8/31/2016	69.6	32.25		41.5		7.25	
161314-02	AB3	8/31/2016	66.2	866.44		46.8		5.77	

161314-03	ABT1	8/31/2016	66.5			50.4		3.83	
161314-04	AB4	8/31/2016	68.8	124.98		43.1		5.14	
161314-05	AB5	8/31/2016	65.6			54.9		7.87	
161314-06	AB6	8/31/2016	69			72.5	12.14%	11.5	-4.26%
161314-10	AB6 D	8/31/2016				64.2		12	
161314-09	AB6 B	8/31/2016				< 5		< 0.2	
161314-07	AB7	8/31/2016	68.6	131.69		67.8		6.48	
161314-08	AB8	8/31/2016	69.9			58.8		10.6	
161315-01	AB2	9/7/2016	68.3			30.7		0.97	
161315-02	AB3	9/7/2016	65.5			27.3		2.24	
161315-03	ABT1	9/7/2016	65.7			41.2		3.93	
161315-04	AB4	9/7/2016	68.7			45.1		5.41	
161315-05	AB5	9/7/2016	64.9			38.8		2.15	
161315-06	AB6	9/7/2016	68.8			31.7		3.97	
161315-07	AB7	9/7/2016	69			37.8	2.95%	4.87	13.60%
161315-10	AB7 D	9/7/2016				36.7		4.25	
161315-09	AB7 B	9/7/2016				< 5		< 0.2	
161315-08	AB8	9/7/2016	73.7			40.2		8.56	
161316-01	AB2	9/14/2016	66.6	24.62		49.9		1.57	
161316-02	AB3	9/14/2016	63.7	517.21		38		3.9	
161316-03	ABT1	9/14/2016	62.9			96.3		5.67	
161316-04	AB4	9/14/2016	65.2	85.74		36.7		3.69	
161316-05	AB5	9/14/2016	64.5			37.2		1.87	
161316-06	AB6	9/14/2016	67.1			46.8		5.7	
161316-07	AB7	9/14/2016	65	435.17		48.4		3.83	
161316-08	AB8	9/14/2016	67.1			37.3	-2.38%	11	-4.44%
161316-10	AB8 D	9/14/2016				38.2		11.5	
161316-09	AB8 B	9/14/2016				< 5		< 0.2	
161317-01	AB2	9/21/2016	66.8			35.7	-19.24%	1.61	-74.22%
161317-10	AB2 D	9/21/2016				43.3		3.51	
161317-09	AB2 B	9/21/2016				< 5		< 0.2	
161317-02	AB3	9/21/2016	62.5			34.1		4.1	
161317-03	ABT1	9/21/2016	59.2			75.9		5.93	
161317-04	AB4	9/21/2016	64.2			30.5		4.48	
161317-05	AB5	9/21/2016	62.3			30.3		no turbidity	
161317-06	AB6	9/21/2016	63.1			54.5		4.45	
161317-07	AB7	9/21/2016	64.2			27.4		3.3	
161317-08	AB8	9/21/2016	68.9			93.2		8.89	

**Average  
RPD**

**51.97%**

**9.38%**

**20.37%**

Appendix B: Field Data Sheets

Allen Brook Water Quality Sampling Field Data Sheet

Waterbody Name: Allen Brook

Collector Name(s): Dan Kelly

Date: 6/2/16

General Weather: p/c, warm

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: 5/29/16

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

(write TIME sample is collected in each blank; if no sample collected, write 'N/A')

SITE NAME	DESCRIPTION	TIME SAMPLED	D/L/FB	H2O TEMP
AB2	MP Road	9:40	<u>✓D/B</u>	20.4 C
AB3	Route 2	10:00		19.6 C
ABT1	Trib confluence	10:28		21.3 C
AB4	WSC	10:40		21.5 C
AB5	Southridge Rd.	11:00		19.8 C
AB6	Talcott Rd. East	11:19		21.4 C
AB7	Route 2A	11:40		20.7 C
AB8	River Cove Rd.	11:55		21.6 C

68.72  
67.28  
70.34  
70.34  
70.64  
67.64  
70.52  
69.26  
70.88

Notes/Comments: Please refer to each sample in the following manner: Site Name-Parameter-type of sample. If you make a comment about a lab duplicate, Total Phosphorus sample at site AB7, the sample would be: AB7-TP-L.

Phosphory bottle, dipped twice - AB 2  
ABT1 very low water level  
AB5 Phosphorus done twice

Allen Brook Staff Gauge	
Reading Time:	<u>11:40 AM</u>
USGS Height (on gauge)	<u>1.73</u> (ft)
Height above USGS	(ft)
Height down from screw	(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). If you are collecting samples when the water is very high, you can measure down from the top of the head on the stainless steel lag screw that is near the FEA staff gauge. Please include any notes about obstructions in the channel that may be influencing water levels at the staff gauge.

Appendix B: Field Data Sheets

Allen Brook Water Quality Sampling Field Data Sheet

Waterbody Name: Allen Brook

Collector Name(s): Melinda Scott + Dan Kelly  
 Date: 6/8/16

General Weather: Cloudy and 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: 6/7/16

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

(write TIME sample is collected in each blank; if no sample collected, write 'N/A')

SITE NAME	DESCRIPTION	TIME SAMPLED	D/L/FB	H2O TEMP
AB2	MP Road	10:20	✓✓	63.7 F
AB3	Route 2	10:47		62.9 F
ABT1	Trib confluence	11:14		65.2 F
AB4	WSC	11:05		64 F
AB5	Southridge Rd.	11:43		63.1 F
AB6	Talcott Rd. East	12:01		64.1 F
AB7	Route 2A	12:14		64.1
AB8	River Cove Rd.	12:32		66.5

Notes/Comments: Please refer to each sample in the following manner: Site Name-Parameter-type of sample. If you make a comment about a lab duplicate Total Phosphorus sample at site AB7, the sample would be: AB7-TP-L.

AB7 replaced lab dup/ 6 min

Allen Brook Staff Gauge	
Reading Time:	<u>12:14</u>
USGS Height (on gauge)	<u>2.25</u> (ft)
Height above USGS	(ft)
Height down from screw	(ft)

- just above gage (estimated)

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). If you are collecting samples when the water is very high, you can measure down from the top of the head on the stainless steel lag screw that is near the FEA staff gauge. Please include any notes about obstructions in the channel that may be influencing water levels at the staff gauge.

Appendix B: Field Data Sheets

Allen Brook Water Quality Sampling Field Data Sheet

Waterbody Name: Allen Brook

Collector Name(s): Daniel Kelly

Date: 6/15/16

General Weather: SUNNY, 60's

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

(write TIME sample is collected in each blank; if no sample collected, write 'N/A')

SITE NAME	DESCRIPTION	TIME SAMPLED	D/L/FB	H2O TEMP
AB2	MP Road	7:14	L	60.3°F
AB3	Route 2	7:30		60.1°F
ABT1	Trib confluence	7:55	D/FB	57.9°F
AB4	WSC	7:50		58.9°F
AB5	Southridge Rd.	8:19		59.8°F
AB6	Talcott Rd. East	8:31		61.3°F
AB7	Route 2A	8:46		60.3°F
AB8	River Cove Rd.	9:01		61.5°F

Notes/Comments: Please refer to each sample in the following manner: Site Name-Parameter-type of sample. If you make a comment about a lab duplicate Total Phosphorus sample at site AB7, the sample would be: AB7-TP-L.

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Allen Brook Staff Gauge	
Reading Time:	<u>8:46</u>
USGS Height (on gauge)	<u>1.8</u> (ft)
Height above USGS	(ft)
Height down from screw	(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). If you are collecting samples when the water is very high, you can measure down from the top of the head on the stainless steel lag screw that is near the FEA staff gauge. Please include any notes about obstructions in the channel that may be influencing water levels at the staff gauge.

Appendix B: Field Data Sheets

Allen Brook Water Quality Sampling Field Data Sheet

Waterbody Name: Allen Brook

Collector Name(s): Melinda Scott

Date: 6/22/16

General Weather: rain, 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: 6/20/16

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

(write TIME sample is collected in each blank; if no sample collected, write 'N/A')

SITE NAME	DESCRIPTION	TIME SAMPLED	D/L/FB	H2O TEMP
AB2	MP Road	9:30	L	63.9
AB3	Route 2	9:50		60.9
ABT1	Trib confluence	12:15		64.1
AB4	WSC	12:05	D/FB	64.5
AB5	Southridge Rd.	10:22		61.4
AB6	Talcott Rd. East	10:45		64.3
AB7	Route 2A	11:40		63.3
AB8	River Cove Rd.	11:30		62.3

Notes/Comments: Please refer to each sample in the following manner: Site Name-Parameter-type of sample. If you make a comment about a lab duplicate Total Phosphorus sample at site AB7, the sample would be: AB7-TP-L.

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Allen Brook Staff Gauge	
Reading Time:	<u>11:40</u>
USGS Height (on gauge)	<u>7.67</u> (ft)
Height above USGS	(ft)
Height down from screw	(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). If you are collecting samples when the water is very high, you can measure down from the top of the head on the stainless steel lag screw that is near the FEA staff gauge. Please include any notes about obstructions in the channel that may be influencing water levels at the staff gauge.

Appendix B: Field Data Sheets

Allen Brook Water Quality Sampling Field Data Sheet

Waterbody Name: Allen Brook Collector Name(s): Melinda Scott / Dan Kelly  
 Date: 6/29/16

General Weather: P/C, warm

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: 6/28/16

Last Rain Event (circle one): mild moderate severe

→ site by site  
basins

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

SAMPLES COLLECTED

(write TIME sample is collected in each blank; if no sample collected, write 'N/A')

SITE NAME	DESCRIPTION	TIME SAMPLED	D/L/FB	H2O TEMP
AB2	MP Road	9:42	L	72.1
AB3	Route 2	10:32		68.6
ABT1	Trib confluence	11:02		71.6
AB4	WSC	10:30		70.4
AB5	Southridge Rd.	11:25		68.5
AB6	Talcott Rd. East	11:42		73.9
AB7	Route 2A	11:58		70.5
AB8	River Cove Rd.	12:15		73.5

← flip temps  
← sample upstream from confluence

Notes/Comments: Please refer to each sample in the following manner: Site Name-Parameter-type of sample. If you make a comment about a lab duplicate Total Phosphorus sample at site AB7, the sample would be: AB7-TP-L.

630 @ 20.2 - Conductivity @ ABT1

334.2 @ 21.6 - cond @ AB4

AB5 = iron leaching from both sides of stream = 545 @ 19.8 conduct

Allen Brook Staff Gauge	
Reading Time:	11:59
USGS Height (on gauge)	1.6 (ft)
Height above USGS	(ft)
Height down from screw	(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). If you are collecting samples when the water is very high, you can measure down from the top of the head on the stainless steel lag screw that is near the FEA staff gauge. Please include any notes about obstructions in the channel that may be influencing water levels at the staff gauge.

Appendix B: Field Data Sheets

Allen Brook Water Quality Sampling Field Data Sheet

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

Date: 7/6/2016  
 General Weather: sunny, hot, light breeze

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: 7/1/2016

Last Rain Event (circle one): mild moderate severe

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

SAMPLES COLLECTED

(write TIME sample is collected in each blank; if no sample collected, write 'N/A')

SITE NAME	DESCRIPTION	TIME SAMPLED	D/L/FB	H2O TEMP
AB2	MP Road	9:30		73.1
AB3	Route 2	9:41		67.5
ABT1	Trib confluence	9:52		70.9
AB4	WSC	9:58		74.5
AB5	Southridge Rd.	10:08		67.5
AB6	Talcott Rd. East	10:17		74.5
AB7	Route 2A	10:35		70.6
AB8	River Cove Rd.	10:47		75.6

Notes/Comments: Please refer to each sample in the following manner: Site Name-Parameter-type of sample. If you make a comment about a lab duplicate Total Phosphorus sample at site AB7, the sample would be: AB7-TP-L.

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Allen Brook Staff Gauge	
Reading Time:	_____
USGS Height (on gauge)	<u>1.98</u> (ft)
Height above USGS	(ft)
Height down from screw	(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). If you are collecting samples when the water is very high, you can measure down from the top of the head on the stainless steel lag screw that is near the FEA staff gauge. Please include any notes about obstructions in the channel that may be influencing water levels at the staff gauge.

Appendix B: Field Data Sheets

Allen Brook Water Quality Sampling Field Data Sheet

Waterbody Name: Allen Brook Collector Name(s): D Kelly  
 Date: 7/13/16

General Weather: Fair, hot

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: 7/10/16

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

(write TIME sample is collected in each blank; if no sample collected, write 'N/A')

SITE NAME	DESCRIPTION	TIME SAMPLED	D/L/FB	H2O TEMP
AB2	MP Road	9:24	L	77
AB3	Route 2	9:30		66.5
ABT1	Trib confluence	9:53		69.8
AB4	WSC	9:59		71.3
AB5	Southridge Rd.	10:43		67.7
AB6	Talcott Rd. East	10:20		70.9
AB7	Route 2A	10:32	D/FB	70.0
AB8	River Cove Rd.	10:45		

- level a little higher - rising?  
 } Turbidity not sampled due to lack of bottles

Notes/Comments: Please refer to each sample in the following manner: Site Name-Parameter-type of sample. If you make a comment about a lab duplicate Total Phosphorus sample at site AB7, the sample would be: AB7-TP-L.

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Allen Brook Staff Gauge	
Reading Time:	<u>10:32</u>
USGS Height (on gauge)	<u>1.58</u> (ft)
Height above USGS	(ft)
Height down from screw	(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). If you are collecting samples when the water is very high, you can measure down from the top of the head on the stainless steel lag screw that is near the FEA staff gauge. Please include any notes about obstructions in the channel that may be influencing water levels at the staff gauge.

Appendix B: Field Data Sheets

Allen Brook Water Quality Sampling Field Data Sheet

Waterbody Name: Allen Brook

Collector Name(s): M Scott

General Weather: fair, light breeze

Date: 7/20/2016

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: 7/18/16

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

(write TIME sample is collected in each blank; if no sample collected, write 'N/A')

SITE NAME	DESCRIPTION	TIME SAMPLED	D/L/FB	H2O TEMP
AB2	MP Road	10:33	L	67.8
AB3	Route 2	10:49		67.4
ABT1	Trib confluence	11:10		71.4
AB4	WSC	11:06		71.0
AB5	Southridge Rd.	11:30		66.6
AB6	Talcott Rd. East	11:40		71.5
AB7	Route 2A	11:45		68.3
AB8	River Cove Rd.	12:17		72.4

" Flowing fast Both sides  
Flow higher - rising? look for beaver"

Notes/Comments: Please refer to each sample in the following manner: Site Name-Parameter-type of sample. If you make a comment about a lab duplicate Total Phosphorus sample at site AB7, the sample would be: AB7-TP-L

- A little water in bottom of cooler, bottle lids not tight
- Beaver weffle being installed upstream of AB 4 & ABT 1
- Flows at AB 4 & ABT 1 high & fast
- 2 large mammal carcasses at AB 8 dam breached at 9:30

Allen Brook Staff Gauge	
Reading Time:	
USGS Height (on gauge)	1.77 (ft)
Height above USGS	(ft)
Height down from screw	(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). If you are collecting samples when the water is very high, you can measure down from the top of the head on the stainless steel lag screw that is near the FEA staff gauge. Please include any notes about obstructions in the channel that may be influencing water levels at the staff gauge.

Appendix B: Field Data Sheets

Allen Brook Water Quality Sampling Field Data Sheet

Waterbody Name: Allen Brook

Collector Name(s): Melinda Scott

Date: 7/12/16

General Weather: Clear Hot

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: 7/12/16

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**

(write TIME sample is collected in each blank; if no sample collected, write 'N/A')

SITE NAME	DESCRIPTION	TIME SAMPLED	D/L/FB	H2O TEMP
AB2	MP Road	9:52		69.3
AB3	Route 2	10:06		66.3
ABT1	Trib confluence	10:20		70.1
AB4	WSC	10:20		71.6
AB5	Southridge Rd.	10:35		68.9
AB6	Talcott Rd. East	10:45		77.3
AB7	Route 2A	11:00		69.6
AB8	River Cove Rd.	11:12		74.5

Notes/Comments: Please refer to each sample in the following manner: Site Name-Parameter-type of sample. If you make a comment about a lab duplicate Total Phosphorus sample at site AB7, the sample would be: AB7-TP-L.

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Allen Brook Staff Gauge	
Reading Time:	_____
USGS Height (on gauge)	1.57 (ft)
Height above USGS	(ft)
Height down from screw	(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). If you are collecting samples when the water is very high, you can measure down from the top of the head on the stainless steel lag screw that is near the FEA staff gauge. Please include any notes about obstructions in the channel that may be influencing water levels at the staff gauge.

Appendix B: Field Data Sheets

Allen Brook Water Quality Sampling Field Data Sheet

Waterbody Name: Allen Brook

Collector Name(s): D Kelly  
 Date: 8/3/2016

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: 8/1/2016

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**

(write TIME sample is collected in each blank; if no sample collected, write 'N/A')

SITE NAME	DESCRIPTION	TIME SAMPLED	D/L/FB	H2O TEMP
AB2	MP Road	11:01	L	72.7
AB3	Route 2	11:17	D/B	67.8
ABT1	Trib confluence	11:45		71.6
AB4	WSC	11:48		70.3
AB5	Southridge Rd.	11:59		68.2
AB6	Talcott Rd. East	12:07		79.2
AB7	Route 2A	12:19		71.9
AB8	River Cove Rd.	12:29		78.5

Notes/Comments: Please refer to each sample in the following manner: Site Name-Parameter-type of sample. If you make a comment about a lab duplicate Total Phosphorus sample at site AB7, the sample would be: AB7-TP-L.

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Allen Brook Staff Gauge	
Reading Time:	<u>12:19</u>
USGS Height (on gauge)	<u>1.52</u> (ft)
Height above USGS	(ft)
Height down from screw	(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). If you are collecting samples when the water is very high, you can measure down from the top of the head on the stainless steel lag screw that is near the FEA staff gauge. Please include any notes about obstructions in the channel that may be influencing water levels at the staff gauge.

Appendix B: Field Data Sheets

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Allen Brook Water Quality Sampling Field Data Sheet

Waterbody Name: Allen Brook

Collector Name(s): M Scott

Date: Aug 10, 2016

General Weather: 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: \_\_\_\_\_

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

(write TIME sample is collected in each blank; if no sample collected, write 'N/A')

SITE NAME	DESCRIPTION	TIME SAMPLED	D/L/FB	H2O TEMP
AB2	MP Road	10:10	L	70.3
AB3	Route 2	10:23		68.5
ABT1	Trib confluence	10:38	D/B	70.0
AB4	WSC	10:40		72.8
AB5	Southridge Rd.	10:53		66.9
AB6	Talcott Rd. East	11:02		72.5
AB7	Route 2A	11:17		71.3
AB8	River Cove Rd.	11:27		73.0

Notes/Comments: Please refer to each sample in the following manner: Site Name-Parameter-type of sample. If you make a comment about a lab duplicate Total Phosphorus sample at site AB7, the sample would be: AB7-TP-L.

ABT1 - not flowing in to Allen Brook - water levels too low

AB6 - same as above

Allen Brook Staff Gauge	
Reading Time:	<u>11:17</u>
USGS Height (on gauge)	<u>63.6</u> (ft)
Height above USGS	(ft)
Height down from screw	(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). If you are collecting samples when the water is very high, you can measure down from the top of the head on the stainless steel lag screw that is near the FEA staff gauge. Please include any notes about obstructions in the channel that may be influencing water levels at the staff gauge.

Appendix B: Field Data Sheets

Allen Brook Water Quality Sampling Field Data Sheet

Waterbody Name: Allen Brook Collector Name(s): D. Kelly

Date: 8/17/16

General Weather: Rain / drizzle, 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: 8/17/16

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

(write TIME sample is collected in each blank; if no sample collected, write 'N/A')

SITE NAME	DESCRIPTION	TIME SAMPLED	D/L/FB	H2O TEMP
AB2	MP Road	8:57		68.4
AB3	Route 2	9:12		67.3
ABT1	Trib confluence	9:25		70.3
AB4	WSC	9:30	D/B	67.6
AB5	Southridge Rd.	9:45		68.7
AB6	Talcott Rd. East	9:55		64.5
AB7	Route 2A	10:08		69.8
AB8	River Cove Rd.	10:17		64.5

Notes/Comments: Please refer to each sample in the following manner: Site Name-Parameter-type of sample. If you make a comment about a lab duplicate Total Phosphorus sample at site AB7, the sample would be: AB7-TP-L.

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Allen Brook Staff Gauge	
Reading Time:	<u>10:16</u>
USGS Height (on gauge)	<u>2.10</u> (ft)
Height above USGS	(ft)
Height down from screw	(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). If you are collecting samples when the water is very high, you can measure down from the top of the head on the stainless steel lag screw that is near the FEA staff gauge. Please include any notes about obstructions in the channel that may be influencing water levels at the staff gauge.

Appendix B: Field Data Sheets

Allen Brook Water Quality Sampling Field Data Sheet

Waterbody Name: Allen Brook

Collector Name(s): P. Kelly

Date: 8/24/16

General Weather: ??

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**

(write TIME sample is collected in each blank; if no sample collected, write 'N/A')

SITE NAME	DESCRIPTION	TIME SAMPLED	D/L/FB	H2O TEMP
AB2	MP Road			73.4
AB3	Route 2			72.1
ABT1	Trib confluence			74.1
AB4	WSC			72
AB5	Southridge Rd.		D/B	75.7
AB6	Talcott Rd. East			78
AB7	Route 2A			73.5
AB8	River Cove Rd.			74.6

Notes/Comments: Please refer to each sample in the following manner: Site Name-Parameter-type of sample. If you make a comment about a lab duplicate Total Phosphorus sample at site AB7, the sample would be: AB7-TP-L.

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Allen Brook Staff Gauge	
Reading Time:	_____
USGS Height (on gauge)	1.54 (ft)
Height above USGS	(ft)
Height down from screw	(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). If you are collecting samples when the water is very high, you can measure down from the top of the head on the stainless steel lag screw that is near the FEA staff gauge. Please include any notes about obstructions in the channel that may be influencing water levels at the staff gauge.

Appendix B: Field Data Sheets

Allen Brook Water Quality Sampling Field Data Sheet

Waterbody Name: Allen Brook

Collector Name(s): M Scott

Date: 8/31/16

General Weather: cloudy, showers

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: 8/31/16

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**

(write TIME sample is collected in each blank; if no sample collected, write 'N/A')

SITE NAME	DESCRIPTION	TIME SAMPLED	D/L/FB	H2O TEMP
AB2	MP Road	9:30	L	69.6
AB3	Route 2	9:57		66.2
ABT1	Trib confluence	10:08		66.5
AB4	WSC	10:15		68.7
AB5	Southridge Rd.	10:45		65.6
AB6	Talcott Rd. East	10:58	D/FB	69.8
AB7	Route 2A	11:23		69.6
AB8	River Cove Rd.	11:35		69.9

Notes/Comments: Please refer to each sample in the following manner: Site Name-Parameter-type of sample. If you make a comment about a lab duplicate Total Phosphorus sample at site AB7, the sample would be: AB7-TP-L.

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Allen Brook Staff Gauge	
Reading Time:	
USGS Height (on gauge)	1.42 (ft)
Height above USGS	(ft)
Height down from screw	(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). If you are collecting samples when the water is very high, you can measure down from the top of the head on the stainless steel lag screw that is near the FEA staff gauge. Please include any notes about obstructions in the channel that may be influencing water levels at the staff gauge.

Appendix B: Field Data Sheets

Allen Brook Water Quality Sampling Field Data Sheet

Waterbody Name: Allen Brook

Collector Name(s): M. Scott

Date: Sept 7

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: 8/31/16

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**

(write TIME sample is collected in each blank; if no sample collected, write 'N/A')

SITE NAME	DESCRIPTION	TIME SAMPLED	D/L/FB	H2O TEMP
AB2	MP Road	10:05	L	68.3
AB3	Route 2	10:20		69.9
ABT1	Trib confluence	10:35		69.7
AB4	WSC	10:40		69.7
AB5	Southridge Rd.	10:55		69.9
AB6	Talcott Rd. East	11:05		69.8
AB7	Route 2A	11:20	D/B	69.0
AB8	River Cove Rd.	11:40		73.7

Notes/Comments: Please refer to each sample in the following manner: Site Name-Parameter-type of sample. If you make a comment about a lab duplicate Total Phosphorus sample at site AB7, the sample would be: AB7-TP-L.

AB3 - Stream bed is almost completely dried up - sampled in remaining pool

Allen Brook Staff Gauge	
Reading Time:	<u>11:25</u>
USGS Height (on gauge)	<u>1.4</u> (ft)
Height above USGS	(ft)
Height down from screw	(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). If you are collecting samples when the water is very high, you can measure down from the top of the head on the stainless steel lag screw that is near the FEA staff gauge. Please include any notes about obstructions in the channel that may be influencing water levels at the staff gauge.

Appendix B: Field Data Sheets

Allen Brook Water Quality Sampling Field Data Sheet

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

Date: Sept 14

General Weather: cloudy, rain

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: weekend

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**

(write TIME sample is collected in each blank; if no sample collected, write 'N/A')

SITE NAME	DESCRIPTION	TIME SAMPLED	D/L/FB	H2O TEMP
AB2	MP Road	9:54	L	66.6
AB3	Route 2	10:14		65.7
ABT1	Trib confluence	10:26		62.9
AB4	WSC	10:30		65.2
AB5	Southridge Rd.	10:45		64.5
AB6	Talcott Rd. East	10:55		65.1
AB7	Route 2A	11:10		67.0
AB8	River Cove Rd.	11:25	D/FB	67.1

Notes/Comments: Please refer to each sample in the following manner: Site Name-Parameter-type of sample. If you make a comment about a lab duplicate Total Phosphorus sample at site AB7, the sample would be: AB7-TP-L.

After(s) Scot seen on bank at ABT1

Allen Brook Staff Gauge	
Reading Time:	<u>11:10</u>
USGS Height (on gauge)	<u>1.46</u> (ft)
Height above USGS	(ft)
Height down from screw	(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). If you are collecting samples when the water is very high, you can measure down from the top of the head on the stainless steel lag screw that is near the FEA staff gauge. Please include any notes about obstructions in the channel that may be influencing water levels at the staff gauge.

Appendix B: Field Data Sheets

Allen Brook Water Quality Sampling Field Data Sheet

Waterbody Name: Allen Brook Collector Name(s): M Scott  
 Date: 9/21/16

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: Sunday  
 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

(write TIME sample is collected in each blank; if no sample collected, write 'N/A')

SITE NAME	DESCRIPTION	TIME SAMPLED	D/L/FB	H2O TEMP
AB2	MP Road	10:10	D/L/FB	66.8
AB3	Route 2	10:32		62.5
ABT1	Trib confluence	10:45		59.2
AB4	WSC	10:50		61.2
AB5	Southridge Rd.	10:05		62.3
AB6	Talcott Rd. East	11:11		63.1
AB7	Route 2A	11:25		64.2
AB8	River Cove Rd.	11:45		68.9

Notes/Comments: Please refer to each sample in the following manner: Site Name-Parameter-type of sample. If you make a comment about a lab duplicate Total Phosphorus sample at site AB7, the sample would be: AB7-TP-L.

AB 5 - No turbidity, bottle broke while sampling

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Allen Brook Staff Gauge	
Reading Time:	<u>11:25</u>
USGS Height (on gauge)	<u>1.47</u> (ft)
Height above USGS	(ft)
Height down from screw	(ft)

New gauge: 0.74

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). If you are collecting samples when the water is very high you can measure down from the top of the head on the stainless steel lag screw that is near the FFA staff gauge. Please include any notes about obstructions in the channel that may be influencing water levels at the staff gauge.

Appendix C: USGS rating table with corresponding FEA staff gage height (Note that FEA data is estimated for discharges above 40cfs)

USGS Stage Height (ft)	FEA Stage Height (ft)	USGS Discharge (cfs)
1.34	0.48	0.08
1.36	0.49	0.10
1.38	0.50	0.12
1.40	0.52	0.14
1.42	0.53	0.17
1.44	0.55	0.20
1.46	0.56	0.24
1.48	0.58	0.28
1.50	0.59	0.33
1.52	0.61	0.38
1.54	0.62	0.44
1.56	0.64	0.50
1.58	0.65	0.57
1.60	0.67	0.65
1.62	0.69	0.75
1.64	0.70	0.85
1.66	0.72	0.97
1.68	0.74	1.1
1.70	0.75	1.2
1.72	0.77	1.4
1.74	0.79	1.6
1.76	0.81	1.8
1.78	0.82	2.0
1.80	0.84	2.2
1.82	0.86	2.4
1.84	0.88	2.7
1.86	0.90	3.0
1.88	0.91	3.3
1.90	0.93	3.6
1.92	0.95	3.9
1.94	0.97	4.3
1.96	0.99	4.7
1.98	1.01	5.1
2.00	1.03	5.6
2.02	1.05	6.0
2.04	1.07	6.5
2.06	1.09	6.9
2.08	1.11	7.4
2.10	1.13	8.0
2.12	1.15	8.5

USGS Stage Height (ft)	FEA Stage Height (ft)	USGS Discharge (cfs)
2.14	1.17	9.1
2.16	1.20	9.7
2.18	1.22	10
2.20	1.24	11
2.22	1.26	12
2.24	1.28	13
2.26	1.30	13
2.28	1.33	14
2.30	1.35	15
2.32	1.37	16
2.34	1.40	17
2.36	1.42	19
2.38	1.44	20
2.40	1.46	21
2.42	1.49	22
2.44	1.51	23
2.46	1.54	24
2.48	1.56	25
2.5	1.59	27
2.6	1.71	34
2.7	1.84	42
2.8	1.97	52
2.9	2.11	64
3.0	2.25	77
3.1	2.40	91
3.2	2.55	108
3.3	2.71	127
3.4	2.87	147
3.5	3.03	170
3.6	3.20	195
3.7	3.38	222
3.8	3.56	252
3.9	3.74	285
4.0	3.93	320
4.5	4.93	498
5.0	6.04	704
5.5	7.26	935
6.0	8.59	1190
6.5	10.02	1470
7.0	11.56	1760