Analysis of Spatial Patterns in Water Quality in the Second Branch of the White River watershed – Baseline monitoring of project implementation sites

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Prepared by:

Daniel Ruddell, Monitoring & Education Coordinator
White River Partnership
Royalton, VT

Volunteer Water Quality Monitoring
LaRosa Analytical Services Organizational Support Grant for 2017
Vermont Department of Environmental Conservation
Watershed Management Division
Monitoring, Assessment and Planning Program

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Acknowledgements

This document is based on one of five templates or guidance documents generated by the VT Department of Environmental Conservation (VTDEC) to support watershed groups engaged in ambient water quality monitoring under the LaRosa Partnership Program. These templates provide examples of data reduction and visualization, as well as statistical analysis, that enable more effective communication of the data – to constituents of Partnership groups; to local, state and federal partners in project implementation; and to the VT Agency of Natural Resources for meeting a variety of needs (e.g., listing / delisting of waters, basin planning, prioritization of resources to groups for project implementation). The template was prepared by South Mountain Research & Consulting of Bristol, VT, under contract to VTDEC.

This document relies on water quality data from the White River watershed, where sampling is carried out by staff and a network of trained volunteers operating under the White River Partnership, with logistical and technical support provided by the VTDEC Monitoring, Assessment and Planning Program and Beck Pond, LLC. Analytical services are provided by the Vermont Agricultural & Environmental Laboratory (http://agriculture.vermont.gov/vael) in Burlington, VT, through an analytical services partnership grant.

For the 2017 data reported here, two sites on the Second Branch were established under a LaRosa Partnership Organizational Support Grant to collect baseline monitoring data regarding implementation of a CREP (Conservation Reserve Enhancement Program) project. Four additional sites on the Second Branch and six sites on the First Branch were part of the LaRosa 2017 Volunteer Water Quality Monitoring Analytical Services Partnerships, and data from the two sites reported here will be included with further analysis of those sites under separate cover.

Executive Summary

Spatial trend analysis has been undertaken for twelve stations in the White River watershed, six each on the First and Second Branches, relying on water quality data collected during four discrete events in the summer of 2017.

Two of the sites on the Second Branch, which are the primary focus of the reporting here, were established under a LaRosa Partnership Organizational Support Grant to collect baseline monitoring data regarding implementation of a CREP (Conservation Reserve Enhancement Program) project. That project included implementation of two practices: 1) installation of livestock exclusion fencing and 2) establishment of a 50-foot riparian buffer.

Analysis of the ten additional sites on the First and Second Branches, in conjunction with the two sites reported here, will be included under separate cover after data has cleared QC review and received additional flow level Remarks.

Objectives of this monitoring effort were to: (1) collect baseline monitoring data regarding implementation of a CREP (Conservation Reserve Enhancement Program) project on the Second Branch; (2) better define the extent and magnitude of sediment, nutrient and bacteria concentrations in the watershed; and (3) share monitoring results with the public and with partner agencies engaged in the design of restoration and conservation practices that improve water quality.

1.0 Introduction

The White River Partnership (WRP) launched a Water Quality Monitoring (WQM) Program in 2001 in an effort to identify and better understand potential threats to water quality in our watershed. Since 2001 the WRP has been monitoring water quality at locations throughout the watershed over the summer months with the help of a dedicated group of volunteers. These volunteers measure conductivity, turbidity, and sample for the presence of *E. coli*. Results are distributed to town offices and interested citizens via email, WRP website, and Facebook as they become available and are also summarized in an annual report. Due in part to enhanced public engagement, our routine WQM program (effectively establishing a network of sentinel sites distributed widely through the overall White River basin) has focused on recreational sites.

Over the years our routine WQM program has highlighted sites with chronically-elevated levels of *E. coli*. Bacteria levels at sites along the First, Second and Third Branches of the White River have regularly exceeded the seasonal standard for *E. coli*, and in 2016 these three 'Branches' were added to the 303(d) list of impaired streams due to consistently elevated bacteria levels (VT DEC Water Quality Division, 2016c). Our long term monitoring site at Dugout Rd., on the Second Branch in South Randolph, has been at the top of the list for *E. coli* readings.

In addition to our routine (sentinel) monitoring, the WRP has been engaged in an adaptive WQM program in an attempt to better understand and address high bacteria numbers and their relationship to sediment and nutrient levels. In 2017 our more intensive adaptive monitoring was focused in eastern portions of the watershed, on the First and Second Branches (based on previous results from our adaptive monitoring program). Additional stations were established to: (1) collect baseline monitoring data regarding implementation of a CREP (Conservation Reserve Enhancement Program) project on the Second Branch; (2) better define the extent and magnitude of sediment, nutrient and bacteria concentrations in the watershed; and (3) share monitoring results with the public and with partner agencies engaged in the design of restoration and conservation practices that improve water quality.

Reporting included here examines 2017 water quality at two stations sampled monthly from June through September. Four additional sites on the Second Branch and six sites on the First Branch were part of the LaRosa 2017 Volunteer Water Quality Monitoring Analytical Services Partnerships, and data from the two sites reported here will be included with further analysis of those sites under separate cover.

2.0 Background

2.1 Description of Watershed

The White River watershed is a 710 square mile basin in east central Vermont encompassing portions of 30 towns in 5 counties. Originating on the Green Mountain National Forest in the town of Ripton, the 56-mile main stem of the White River eventually joins the Connecticut River

at White River Junction, VT. It has 5 major tributaries: the First Branch, the Second Branch, the Third Branch, the West Branch, and the Tweed River. The mainstem White River is significant for being one of the last free-flowing rivers in the State of Vermont, and is the longest un-dammed tributary to the Connecticut River. The First and Second Branches, however, have multiple dams still in place - both intact and breached.

The Second Branch of the White drains roughly 74 square miles, and the mainstem flows roughly 20 miles from the Brookfield-Williamstown Gulf, primarily along Rte. 14, and joins the White mainstem in Royalton near the junction of Rtes. 14 and 107. The White River is thought to be the highest pH watershed in the Connecticut River watershed with its calcareous setting (Waits River formation; VTDEC 2016).

The Second Branch is located in the Vermont Piedmont physiographic region, which comprises eastern portions of the overall White River basin (Lower White mainstem and First, Second and half Third Branches) (Stewart and MacClintock 1969; Thompson and Sorenson 2000). Conductivity readings taken by White River Partnership water quality monitoring volunteers over the years show values commonly ranging from 70-90 uS/cm2 in western portions of the watershed to 350-400 uS/cm along the First and Second Branches.

Calcium carbonate is a significant contributor to the higher conductivity readings in eastern portions of the White River basin. The bedrock underlying eastern portions of the White River basin tend toward calcareous, carbonate-rich formations relatively easily weathered to fertile soils (Thompson and Sorenson 2000). The significant presence of calcareous bedrock in eastern portions of the White River basin has much to do with an intensive agricultural and forestry history and “few large areas of wild nature” (Thompson and Sorenson 2000). The Second Branch is heavily dominated by agricultural land use along the river corridor.

The surficial sediments and soils present in the White River basin reflect a complex glacial and post-glacial history. Factors particularly affecting the Second Branch are related to the presence and subsequent draining of glacial Lake Hitchcock. Lake Hitchcock formed as an impoundment behind large volumes of glacial deposits in central Connecticut that dammed the Connecticut River valley. At its maximum extent, the lake body stretched from Rocky Hill, CT for 200 miles northward to the mouth of the Nulhegan River in Bloomfield, VT, and as far west as the Upper White mainstem in Pittsfield/Rochester and the Third Branch in Braintree. Sediments in and along the edges of the glacial Lake tend to be dominated by the stratification of fine silts, sands and gravels that settled out differentially in the still waters of the Lake as glacial streams fed into it (Attachment 1).

The finest silt loams and silty-clay components required quiet waters in the stillest portions of the Lake to settle out, and are prominent along the Second Branch as far north as the village of East Randolph. Generally, these soils have low to very low infiltration rates, leading to ponding

of water on flat surfaces and generating runoff on steeper slopes. Sandier soils of greater permeability tend to be associated with localized deposits of glaciofluvial and alluvial origin, and are concentrated along the margins of the former glacial Lake Hitchcock including upstream portions of the Second Branch (Stewart, 1973; Stewart & MacClintock, 1969; USDA 2013, 2011).

2.2 Water Quality Monitoring Sites

Reporting here focuses on two WQM sites monitored by the White River Partnership in 2017 under a LaRosa Partnership Organizational Support Grant. Our long-term sentinel station at Dugout Road (DR), in South Randolph on the Second Branch, brackets the upstream end of a 2017 project implementation at Green Acres Farm (Figure 1; Table 1). An additional monitoring station was established in 2017 at the downstream end of the project area, labelled as Green Acres Downstream (GAD).

These two stations are located just upstream of a 9.8 mile portion of the Second Branch newly listed in 2016 as impaired for contact recreation use (Figure 1) due to consistently elevated *E.coli* readings, currently with a Low priority for development of a needed EPA-approved Total Maximum Daily Load for Bacteria (303(d) list, Part A, VTDEC, 2016a).

Twenty-one sentinel stations have been established throughout the White River basin to track long-term variations in water quality resulting from naturally fluctuating weather and vegetation, as well as human-influenced factors such as shifting land use or changes in management practices. In 2017, five new adaptive water quality monitoring stations were established on each of the First and Second Branches to complement additional nutrient testing on existing sentinel stations (one sentinel station each on the First and Second Branches), and data from the two sites reported here will be included with further analysis of those sites under separate cover.

All twelve 2017 stations on the First and Second Branches are located on river segments classified as Class B(2) cold-water fisheries (VWMD, 2016, App. A, F). All six stations on the Second Branch, however, are on reaches classed as Warm-water, Medium Gradient for application of Combined Nutrient Criteria for Aquatic Biota and Wildlife in Rivers and Streams (VWMD, 2016, Table 2, p. 27; pers. comm. Jim Kellogg et al., VT DEC staff, January 2017). First Branch stations are understood to be on Medium High-gradient reaches.

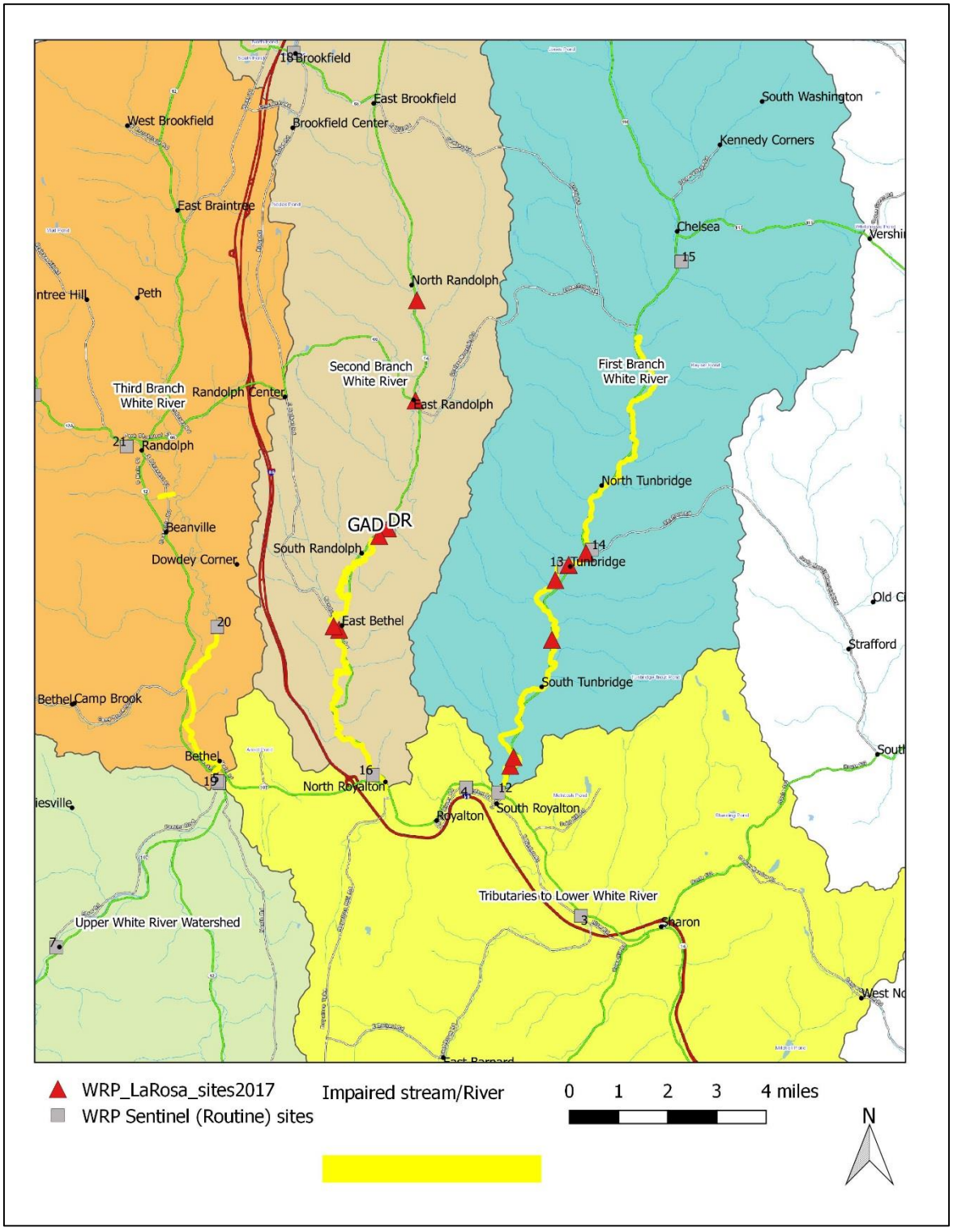


Figure 1. Location of sentinel and 2017 adaptive (WRP_LaRosa) stations in the White River watershed, along with river segments considered impaired as described in the text. DR and GAD are the Second Branch sites discussed in this report. Flow in these watersheds is north to south or west to east.

Table 1. List of Sentinel and Adaptive water quality monitoring stations sampled under LaRosa partnerships in the First and Second Branch White River watersheds in 2017. Gray highlighted stations are the Second Branch sites discussed in this report.

Stream	Site	Type	Location	Town
Second Branch	FRU	A	Upstream of Ferris Rd jct with Rte 14	North Randolph
Second Branch	GRD	A	Downstream of Gulf Rd Dam under Rte 14, base Rte 66	East Randolph
Second Branch	DR	S	Dugout Rd, upstream of bridge	East Randolph
Second Branch	GAD	A	Green Acres farm, downstream end of farm upstream of lagoon ditch	East Randolph
Second Branch	HMU	A	upstream Hyde Mill dam, ~400 ft US of Factory Hill Rd	East Bethel
Second Branch	HMD	A	downstream Hyde Mill dam, access granted at Mill Art Garden	East Bethel
First Branch	FBU	A	upstream of breached Farnham Bros. dam, at Rec Field	Tunbridge
First Branch	HND	A	downstream of Hayward Noble Dam and Mill Bridge	Tunbridge
First Branch	TFD	S	point bar by south gate to Tunbridge Fairgrounds racetrack	Tunbridge
First Branch	HLD	A	downstream Howe Ln-Rte 110 jct (Chapman Farm swimming hole)	Tunbridge
First Branch	C2M	A	path by rugby field beyond Log Landing Ln	Royalton
First Branch	EDS	A	downstream of intact Lower Eaton Dam, river right	Royalton

S= Sentinel; A=Adaptive

Sites listed upstream to downstream

2.3 Discharge Measurement

The nearest continuous monitoring United States Geological Survey (USGS) streamflow gaging station is on Ayers Brook in Randolph, roughly six to seven miles west of the stations sampled in 2017 in the Second Branch basin. Station # 01142500 is at the VT Route 66 crossing near Randolph Union High School just upstream of the Montague Golf Course, and measures flow from an approximate drainage area of 30.5 square miles. This station has daily flow records dating back to 1939.

Figure 2 presents thresholds from a flow duration curve computed on daily mean flows recorded for water years 1939 through 2015. The "water year" is a standard measure of time in hydrology which begins October 1st of the previous calendar year and extends through September 30th of the indicated year. Thresholds have been categorized following VTDEC *Guidance on Streamflow Observations at time of Water Quality Sampling of Rivers and Streams*. High flows are defined as those flow conditions which are equaled or exceeded only 25% of the time, and low flow levels are those equaled or exceeded more than 75% of the time, while those flows occurring between 25 and 75% of the time are classified as medium. Flood flows are those equaled or exceeded less than 5% of the time.

Flow (VTDEC)	Statistic Name	Value	Units
High to Flood	1_Percent_Duration	346	cubic feet per second
	10_Percent_Duration	116	cubic feet per second
Moderate	25_Percent_Duration	59	cubic feet per second
	75_Percent_Duration	15	cubic feet per second
Low	90_Percent_Duration	7.5	cubic feet per second
	99_Percent_Duration	2.6	cubic feet per second

*Figure 2. Flow Duration statistics for Ayers Brook at Randolph, VT (USGS Stn #*01142500*). Based on approved daily mean flow record for water years: 1939 – 2015.*

3.0 Methods

Water quality sampling in the White River watershed is carried out by a network of trained volunteers operating under a VTDEC- and EPA-approved Quality Assurance Project Plan (QAPP).

3.1 Meteorological Conditions

To characterize meteorological conditions during sampling, WRP relies on a network of weather stations and data reported by the National Oceanic and Atmospheric Administration (NOAA). Additionally, weather conditions on the sample date, and two previous days, are recorded on field sampling data sheets to capture current and antecedent weather conditions for each sample date, local to the sampling stations.

3.2 Sample Collection and Analysis

Monthly samples were collected on four pre-determined dates in the summer of 2017 (June 7, July 5, August 2, and September 13). Samples were collected as grab samples from wadeable stream reaches at a depth approximately half way between the water surface and bed of the stream. Samples were analyzed by VAEL for phosphorus (digested), total nitrogen (persulfate), nitrate-nitrite (water), and turbidity (turbidity for the two Second Branch sites reported in this document only; additional sites on the First and Second Branches were tested for turbidity by WRP, using a turbidity tube). *E.coli* , turbidity (tube), and conductivity were analyzed by WRP. Bottles were stored on ice packs in a cooler until delivery to the Vermont Agricultural & Environmental Laboratory in Burlington, VT.

3.3 Quality Assurance / Quality Control

In accordance with the QAPP, field duplicates and field blanks were collected at a 10% frequency during each monthly event by WRP. The location of the field duplicate was rotated from month to month. To prepare field blanks, bottles for each scheduled analyte were filled with lab-supplied deionized water and accompanied the regular sample bottles during transport in the field and to the lab. Results of regular and field duplicate pairs from selected

stations were evaluated and the average of the Relative Percent Difference (RPD) in results for each constituent was compared to a data quality goal, specified in the QAPP.

4.0 Results and Discussion

4.1 Meteorological and Hydrological Conditions

Following a moderate drought in the region during 2016, water levels recovered in spring into early summer 2017 (Figure 3).

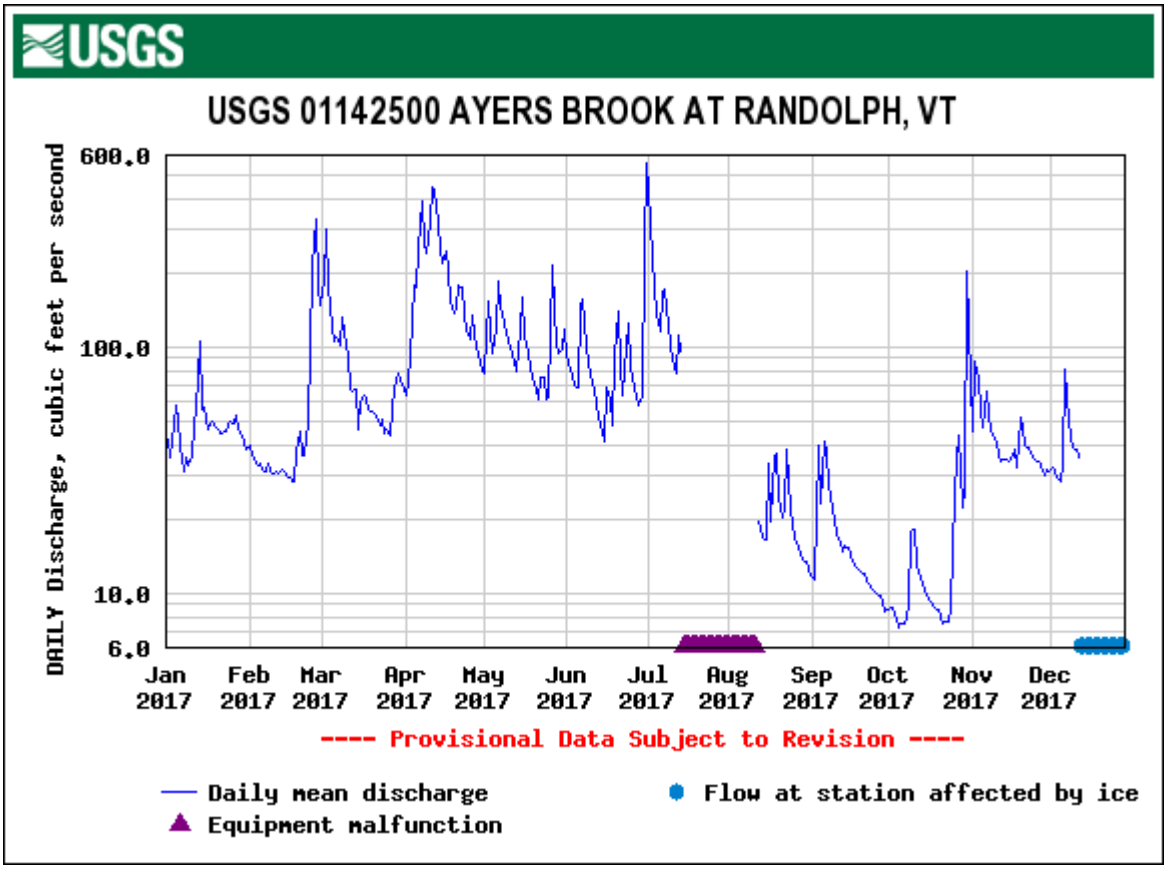


Figure 3. Daily mean discharge recorded for Ayers Brook (USGS Stn #01142500) during 2017.

Although sampling in June 2017 was conducted at some of the lower flows of the period, the rainy weather left us with High water levels for our June sampling (Table 2). The July sampling date followed four days of dry weather following flash flooding in the region on July 1, 2017, but was still clearly affected by the high water levels from that event (Table 2).

	6/7/2017	7/5/2017	8/2/2017	9/13/2017
Weather within the past 24 hrs*	Rain	Sunny	Sunny	Sunny
Ayers Brook USGS gauge at 3pm (CFS)**	138	91	17	15
Ayers Brook USGS gauge daily mean value (CFS)**	45	35	18	15
Rain Accumulation (in) in the last 24 hrs in Randolph***	0.68	0.00	0.00	0.00
Rain Accumulation (in) in the last 48 hrs in Randolph***	1.56	0.00	0.00	0.00
Conditions (wet or dry)*****	*Wet*	*Dry*	*Dry*	*Dry*
Flow (VTDEC classification)	***High - Freshet***	***High - Freshet***	***Moderate - Base***	***Moderate - Base***

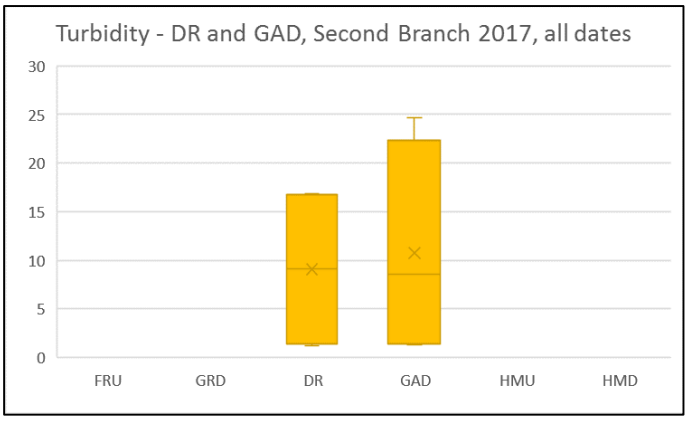
* Weather in the past 24 hrs - Based on last 24 hrs-
Descriptors include- Mostly Sunny (<49% cloud cover), Partly Sunny (50-99% cloud cover),
Overcast (100% cloud cover, no rain), Scattered Rain (measurable rain <.1 but >.05 inches), Rain (>.1 inches)
**River gauge data found at: http://waterdata.usgs.gov/usa/nwis/uv?01142500
***Precip Data measured at Ayer's Brook in Randolph, found at: http://waterdata.usgs.gov/vt/nwis/uv?site_no=01142500, 3pm-3pm
**** Wet - More than .1 inches in the last 24 hrs or more than .25 inches in the last 48

Table 2. Flows recorded at Ayers Brook USGS gage on Sample Dates in 2017, Second Branch White River basin

4.2 Water Quality Results

White River First and Second Branch sample results for 2017 are listed in Attachment 2. All charts on following pages display sites in order from upstream to downstream.

4.2.1 Turbidity



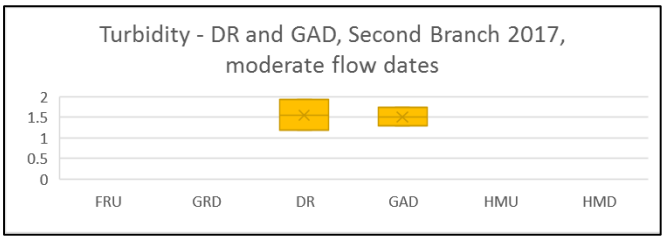


Figure 4. VAEL Turbidity readings, recorded only at LaRosa Organization Support Grant sites on Second Branch, 2017. Units are Nepholometric Turbidity Units (NTUs).

VT Water Quality Standards (effective January 15, 2017):

- **Turbidity** (Cold Water Fish Habitat) = Turbidity levels not to exceed **10 NTU**s as an annual average under dry weather base-flow conditions.

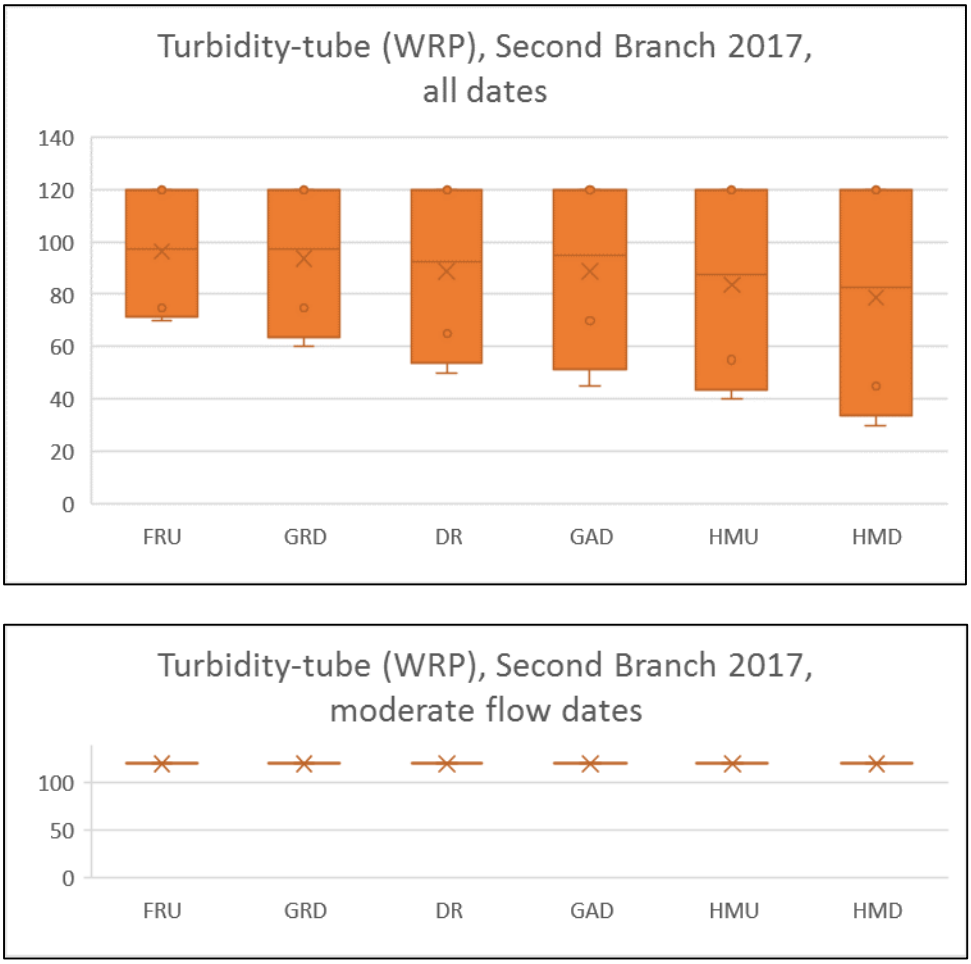


Figure 5. WRP Turbidity readings on Second Branch, 2017. Units are cm of visibility in a turbidity tube; higher values equal lower turbidity. No thresholds in the VT Water quality standards.

4.2.2 E.coli

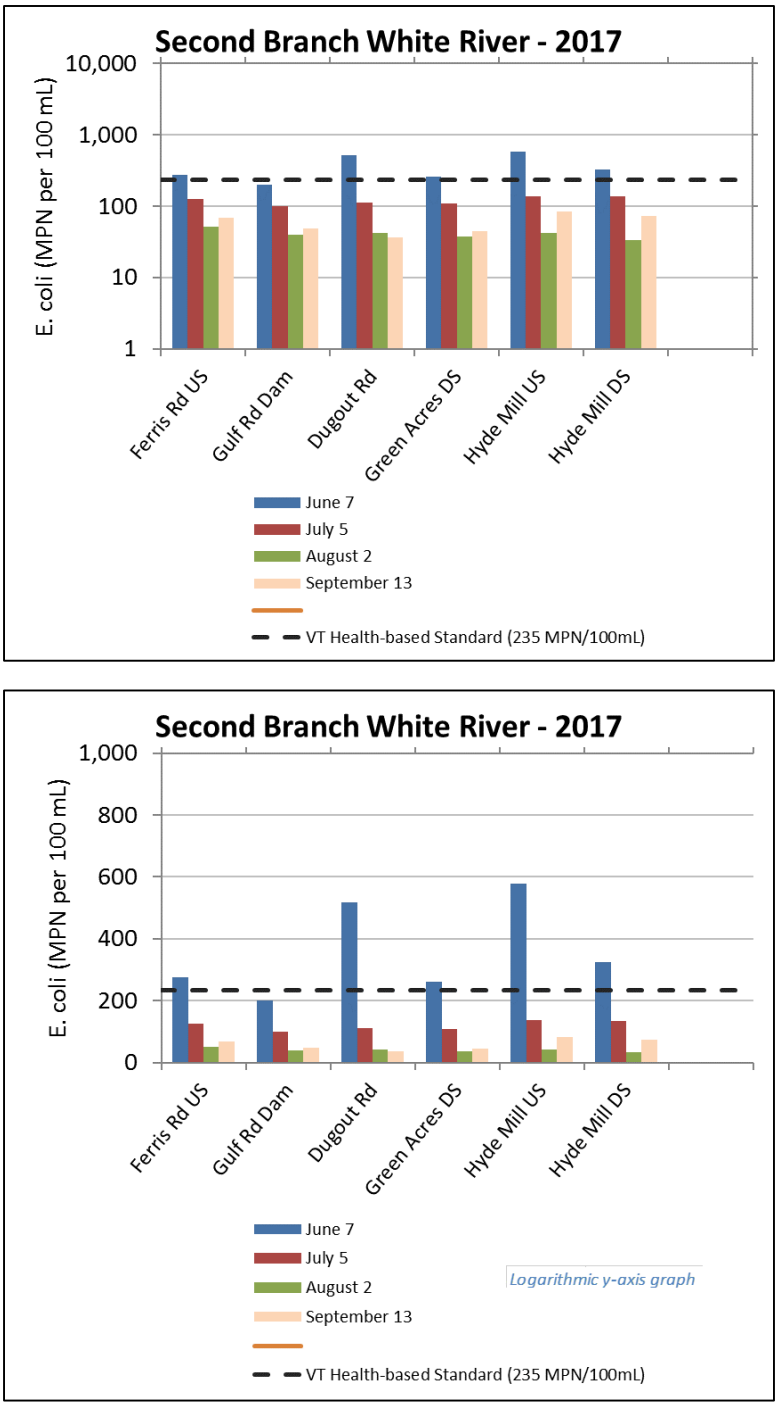
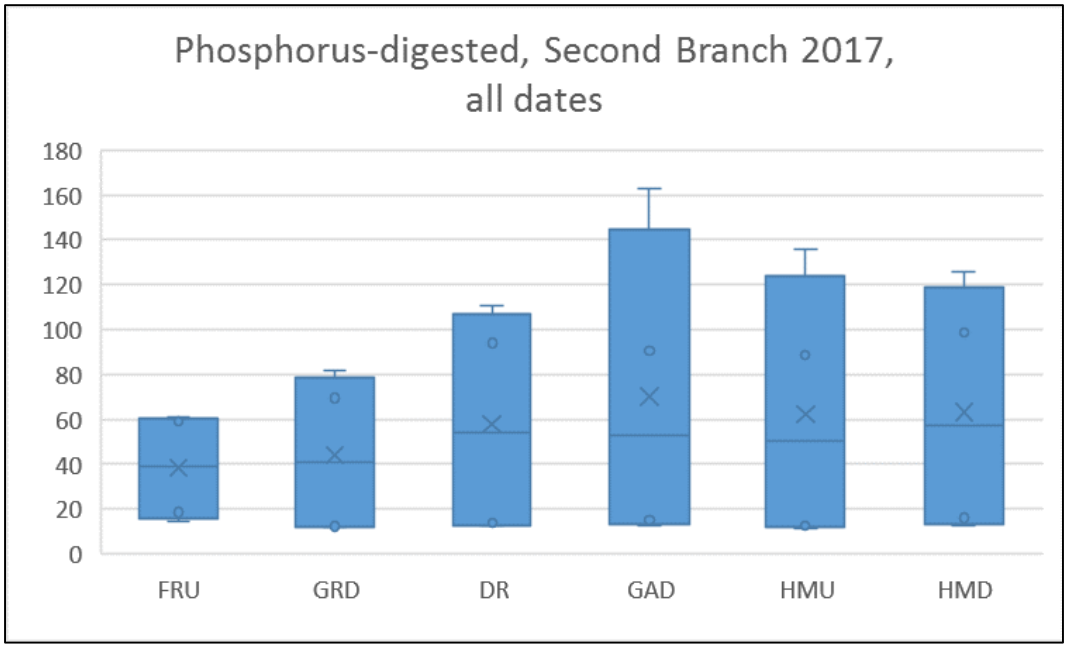


Figure 5. WRP E. coli readings on Second Branch, 2017.

VT Water Quality Standards (effective January 15, 2017):

- **E. coli** (Class B): 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**. In waters receiving combined sewer overflows, the representative period shall be 30 days.

4.2.3 Phosphorus



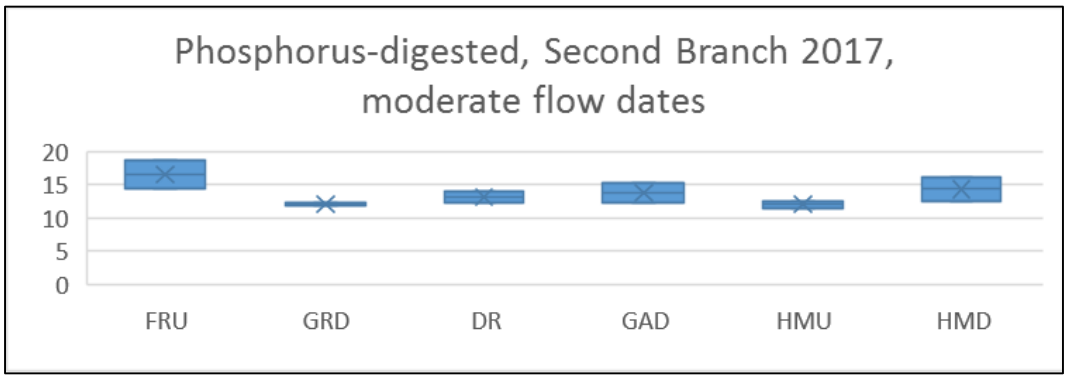


Figure 6. VAEL Phosphorus readings on Second Branch, 2017. Units are ug P/L.

VT Water Quality Standards (effective January 15, 2017):

- **Phosphorus** (Class B(2), Warm-water Medium Gradient): Not to exceed **27 ug/L** at low median monthly flow during June through October in a section of the stream representative of well-mixed flow. Second Branch reaches are considered Warm-Water, Medium Gradient for Combined Nutrient Criteria for Aquatic Biota and Wildlife in Rivers and Streams even though they are consider Cold Water Fish Habitat (pers. comm., Jim Kellogg et al., VT DEC, Jan. 2017)

4.2.4 Nitrogen

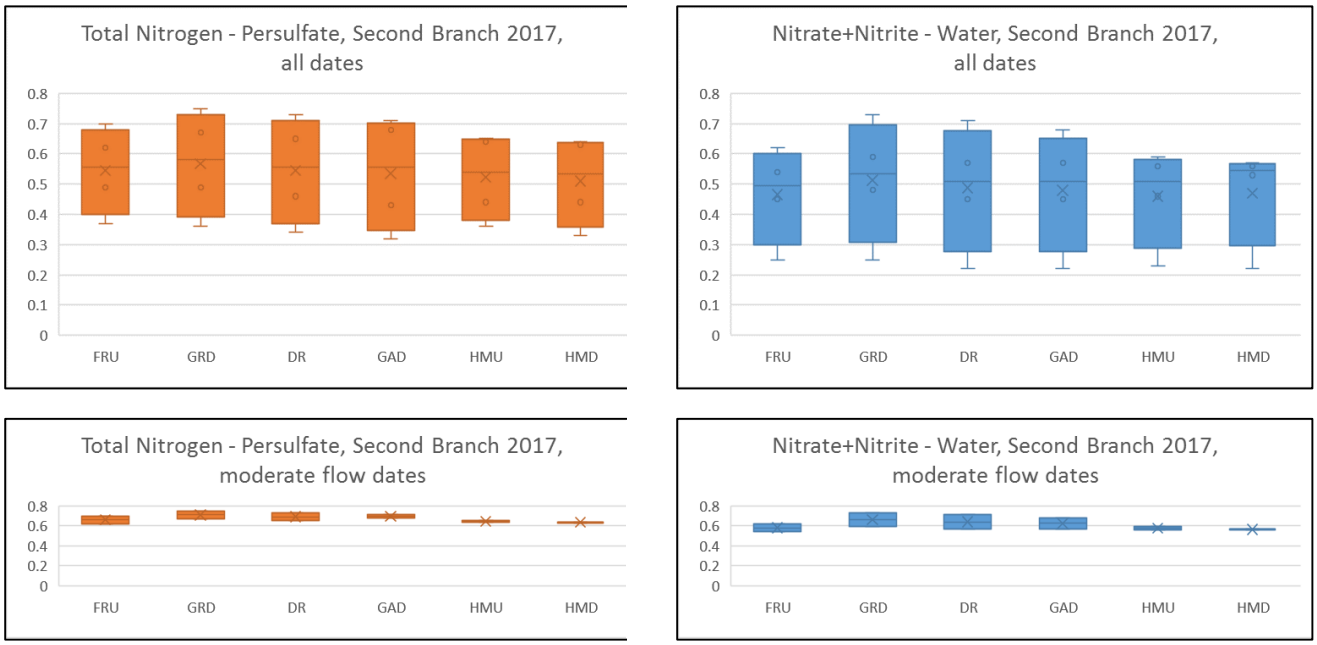


Figure 7. VAEL nitrogen readings (Total Nitrogen at left, Nitrate+Nitrate at right) on Second Branch, 2017. Units are mg-N/l for both analytes.

5.0 Conclusion

Spatial trend analysis has been undertaken for six stations in the Second Branch White River watershed, relying on water quality data collected during four discrete events in the summer of 2017. Data for the two sites monitored under a LaRosa Organizational Support Grant are highlighted here. These data will be further analyzed under separate cover in conjunction with data from four additional sites on the Second Branch and six sites on the First Branch, collected as part of the LaRosa 2017 Volunteer Water Quality Monitoring Analytical Services Partnerships.

6.0 References

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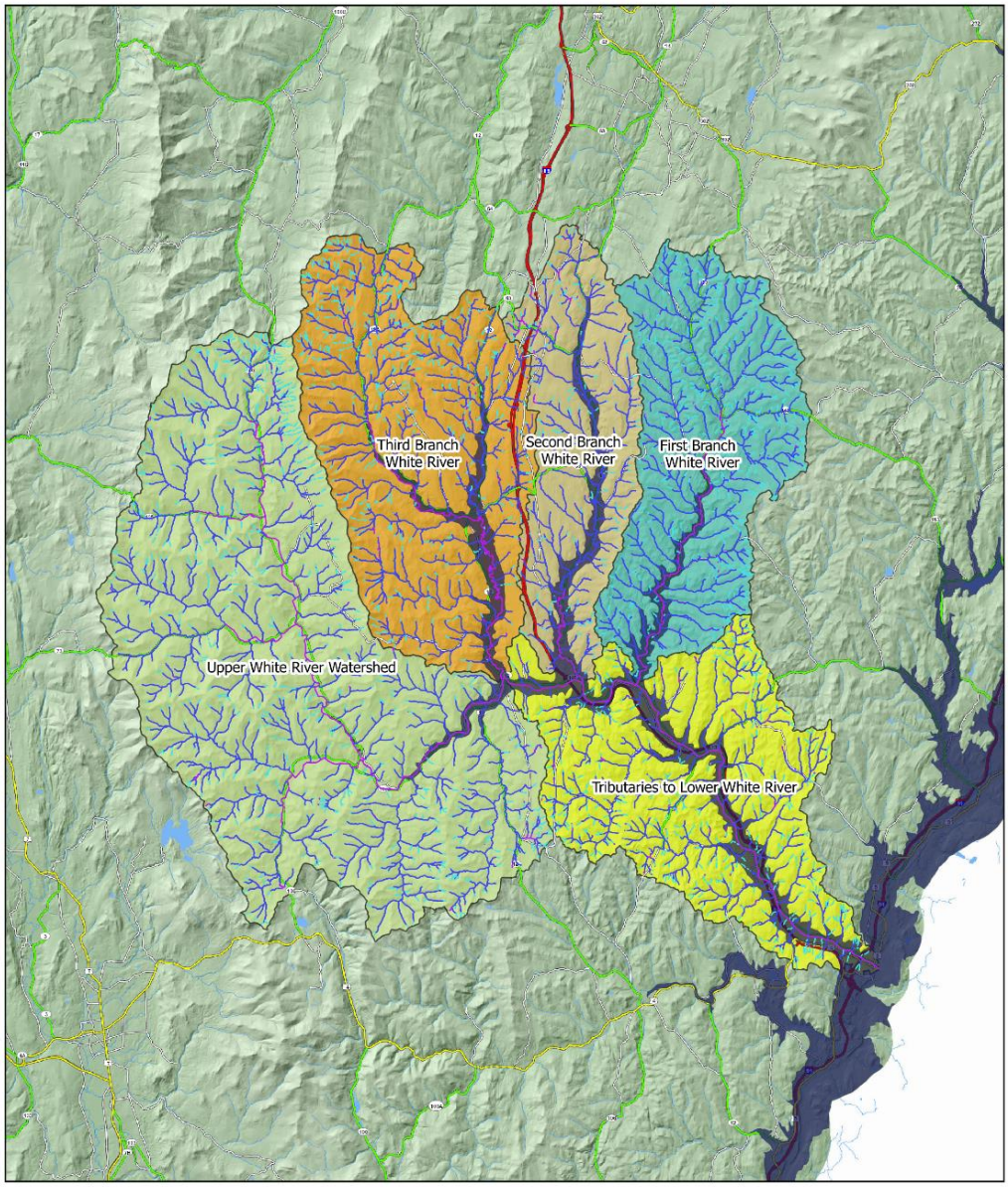
Attachment 1

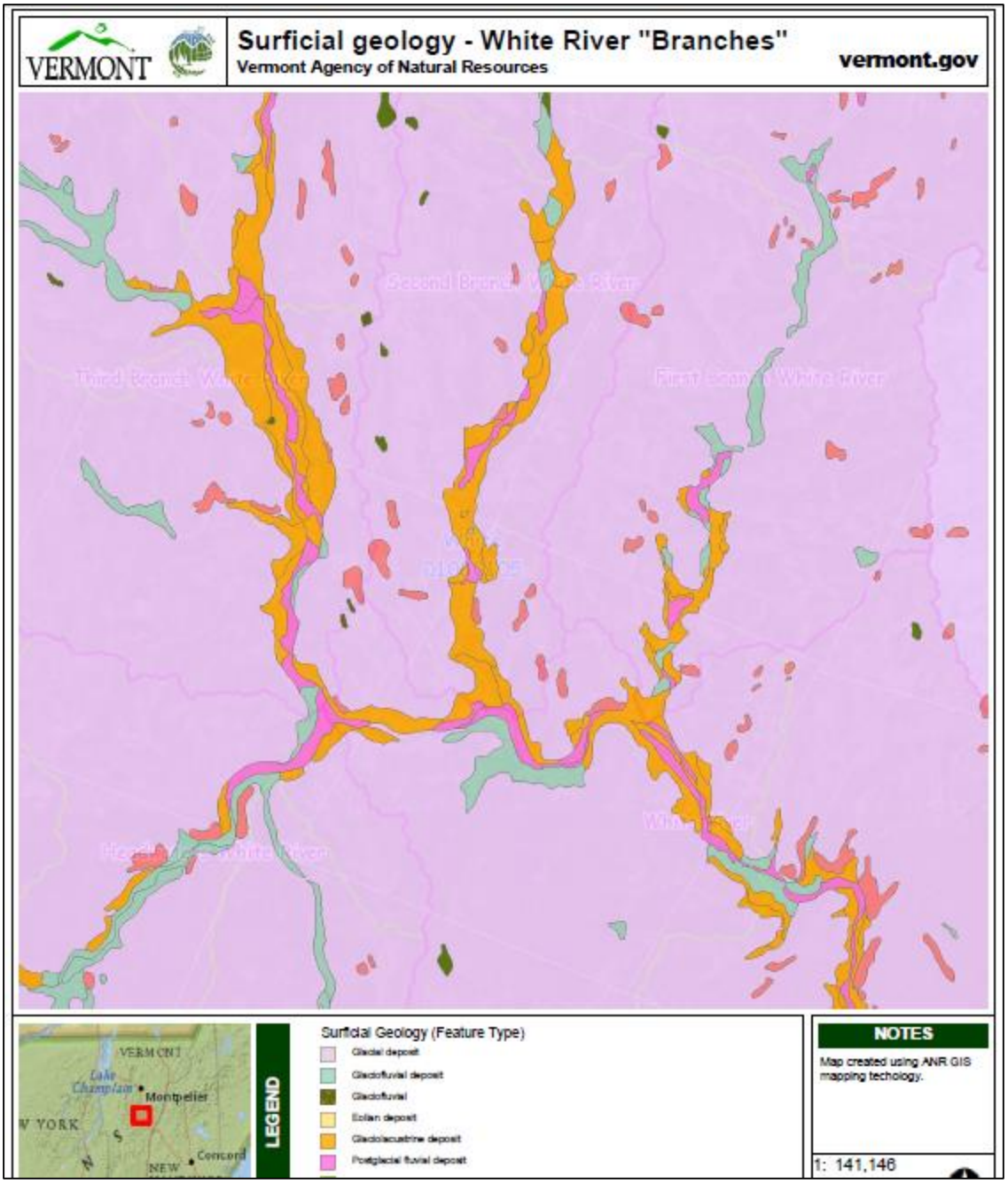
Approximate Extent of Glacial Lake Hitchcock

in the White River Basin

and Resulting Surficial Geologic Features



Approximate extent of glacial Lake Hitchcock (dark blue) in the White River basin



Surficial geology of the White River 'Branches' indicating preponderance of glaciolacustrine soils (silt, silty clay, clay) along significant portions of the Second and Third Branches and downstream portions of the First Branch

Attachment 2

Water Quality Results – LaRosa-White River Partnership

Abbreviations:

mg/L = milligrams per liter
ug/ L = micrograms per liter
NTU = Nephelometric Turbidity Units
MPN/100 mL = organisms per 100 milliliters
uS = microSiemens

White River - Second Branch 2017 (grey highlights indicate sites reported in this document)

Site	Date	Nitrate + Nitrite - Water	Nitrogen, Total - Persulfate	Phosphorus - Digested	Turbidity	Turbidity-Tube (WRP)	E. coli (WRP)	Conductivity (WRP)
		mg-N/l	mg/L	ug P/L	NTU	cm	MPN/L	uS
FRU	6/7/2017	0.25	0.37	59.3		75	275.5	250
GRD	6/7/2017	0.25	0.36	69.6		75	201.4	220
DR	6/7/2017	0.22	0.34	94	16.4	65	517.2	220
GAD	6/7/2017	0.22	0.32	90.5	15.4	70	260.3	220
HMU	6/7/2017	0.23	0.36	88.5		55	579.4	220
HMD	6/7/2017	0.22	0.33	98.6		45	325.5	220
FRU	7/5/2017	0.45	0.49	60.8		70	125.9	260
GRD	7/5/2017	0.48	0.49	82		60	98.8	240
DR	7/5/2017	0.45	0.46	111	16.9	50	110.6	230
GAD	7/5/2017	0.45	0.43	163	24.7	45	107.6	230
HMU	7/5/2017	0.46	0.44	136		40	137.4	240
HMD	7/5/2017	0.53	0.44	126		30	135.4	240
FRU	8/2/2017	0.54	0.62	18.6		120	52.1	290
GRD	8/2/2017	0.59	0.67	12.3		120	39.9	280
DR	8/2/2017	0.57	0.65	14	1.92	120	42.2	280
GAD	8/2/2017	0.57	0.68	15.2	1.73	120	37.3	290
HMU	8/2/2017	0.56	0.65	12.6		120	42.2	290
HMD	8/2/2017	0.56	0.64	16.1		120	33.6	300
FRU	9/13/2017	0.62	0.7	14.5		120	67.7	320
GRD	9/13/2017	0.73	0.75	11.8		120	47.9	310
DR	9/13/2017	0.71	0.73	12.4	1.18	120	36.4	320
GAD	9/13/2017	0.68	0.71	12.4	1.29	120	44.8	320
HMU	9/13/2017	0.59	0.64	11.5		120	83.3	330
HMD	9/13/2017	0.57	0.63	12.6		120	72.7	330

VT Water Quality Standards (effective January 15, 2017):

- **Nitrate** (Class B): Not to exceed 5.0 mg/l as NO3-N at flows exceeding low median monthly flows, in Class B(1) and B(2)waters.
- **Phosphorus** (Class B(2), Warm-water Medium Gradient): Not to exceed **27 ug/L** at low median monthly flow during June through October in a section of the stream representative of well-mixed flow. Second Branch reaches are considered Warm-Water, Medium Gradient for Combined Nutrient Criteria for Aquatic Biota and Wildlife in Rivers and Streams even though they are consider Cold Water Fish Habitat (pers. comm., Jim Kellogg et al., VT DEC, Jan. 2017)
- **Turbidity** (Cold Water Fish Habitat) = Turbidity levels not to exceed **10 NTU**s as an annual average under dry weather base-flow conditions.
- **E. coli** (Class B): 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**. In waters receiving combined sewer overflows, the representative period shall be 30 days.

WRP results and flow data - White River - Second Branch 2017 (grey highlights indicate sites reported in this document)

WRP-LaRosa 2017 Water Quality Monitoring																							
						6/7/2017				7/5/2017				8/2/2017				9/13/2017					
			Weather within the past 24 hrs*			Rain				Sunny				Sunny				Sunny					
			Ayers Brook USGS gauge at 3pm (CFS)**			138				91				17				15					
			Ayers Brook USGS gauge daily mean value (CFS)**			45				35				18				15					
			Rain Accumulation (in) in the last 24 hrs in Randolph***			0.68				0.00				0.00				0.00					
			Rain Accumulation (in) in the last 48 hrs in Randolph***			1.56				0.00				0.00				0.00					
			*Conditions (wet or dry)****			*Wet*				*Dry*				*Dry*				*Dry*					
						E-coli				E-coli				E-coli				E-coli					
Tributary	Lat	Lon	Site Number	Town	Site Name	lg/ small	MPN	Turbidity	Conduct-ivity	lg/ small	MPN	Turbidity	Conduct-ivity	lg/ small	MPN	Turbidity	Conduct-ivity	lg/ small	MPN	Turbidity	Conduct-ivity	Seasonal Mean	*wet*	*dry*
Second Branch	43.96833	-72.55415	FRU	North Randolph	Ferris Rd US	49/16	275.5	75	250	44/10	125.9	70	260	32/2	52.1	120	290	36/4	67.7	120	320	105.2	275.5	76.3
Second Branch	43.93985	-72.55434	GRD	East Randolph	Gulf Rd Dam	48/13	201.4	75	220	42/6	98.8	60	240	26/3	39.9	120	280	31/1	47.9	120	310	78.5	201.4	57.4
Second Branch	43.90196	-72.56607	DR	East Randolph	Dugout Rd	49/27	517.2	65	220	42/10	110.6	50	230	25/6	42.2	120	280	25/2	36.4	120	320	96.8	517.2	55.4
Second Branch	43.89929	-72.56898	GAD	East Randolph	Green Acres DS	48/19	260.3	70	220	42/9	107.6	45	230	24/4	37.3	120	290	29/2	44.8	120	320	82.7	260.3	56.4
Second Branch	43.87327	-72.58763	HMU	East Bethel	Hyde Mill US	49/29	579.4	55	220	44/13	137.4	40	240	25/6	42.2	120	290	40/4	83.3	120	330	129.3	579.4	78.5
Second Branch	43.8723	-72.58598	HMD	East Bethel	Hyde Mill DS	49/19	325.5	45	220	45/10	135.4	30	240	25/0	33.6	120	300	38/3	72.7	120	330	101.9	325.5	69.2
First Branch	43.89567	-72.48478	FBU	Tunbridge	Farnham Bros Dam US	49/12	224.7	120	250	42/8	104.6	120	290	32/8	62.7	120	330	26/6	44.3	120	340	89.9	224.7	66.2
First Branch	43.89139	-72.49188	HND	Tunbridge	Hayward Noble Dam	39/7	86.0	105	210	40/5	85.7	120	240	33/7	63.8	120	310	35/8	72.3	120	340	76.4	86.0	73.4
First Branch	43.88689	-72.49732	TFD	Tunbridge	Tunbridge Fairgrounds DS	39/7	86.0	110	210	39/11	95.9	120	250	38/4	74.9	120	310	28/1	41.0	120	330	70.9	86.0	66.5
First Branch	43.86931	-72.4987	HLD	Tunbridge	Howe Ln DS (Chapman Farm)	46/12	156.5	105	210	37/14	93.4	115	240	39/4	78.9	120	310	42/8	104.6	120	320	104.8	156.5	91.7
First Branch	43.84076	-72.51957	C2M	Royalton	Log Landing Ln	49/20	344.8	110	210	38/8	83.9	90	250	31/5	54.6	120	300	39/7	86.0	120	340	108.0	344.8	73.3
First Branch	43.83207	-72.51564	EDS	Royalton	Eaton Dams DS	49/17	290.9	73	210	28/4	45.7	110	250	42/7	101.7	120	300	42/5	96.0	120	340	106.7	290.9	76.4

exceeds EPA standard (235 colonies/100mL sample)

* Weather in the past 24 hrs - Based on last 24 hrs- Descriptors include- Mostly Sunny (<49% cloud cover), Partly Sunny (50-99% cloud cover), Overcast (100% cloud cover, no rain), Scattered Rain (measurable rain <.1 but >.05 inches), Rain (>.1 inches)

**River gauge data found at: http://waterdata.usgs.gov/usa/nwis/uv?01142500

***Precip Data measured at Ayer's Brook in Randolph, found at: http://waterdata.usgs.gov/vt/nwis/uv?site_no=01142500, 3pm-3pm

**** Wet - More than .1 inches in the last 24 hrs or more than .25 inches in the last 48