



## 2010 LaRosa Partnership Final Report

### Program Overview

In 2001, the White River Partnership (WRP) launched a Water Quality Monitoring Program (WQM Program) to better understand potential threats to water quality and public health. For 9 weeks from June thru September, WRP staff and volunteers keep tabs at over 20 sites throughout the watershed, including popular swimming holes and locations that have the potential to become contaminated. Every other Wednesday morning, volunteers measure turbidity (water clarity) and electrical conductivity, and collect water samples that are tested for *E. coli* bacteria.

Starting in 2006, the WRP formed a new partnership with the State of Vermont's LaRosa Water Quality Laboratory to conduct additional water quality testing at some of the WQM Program sites. In 2010, we tested 6 of our WQM sites for total suspended solids (TSS), total phosphorus (TP), and total nitrogen (TN). Additionally, we bracketed Adams Brook and Dugout Road, two problem WQM sites, to conduct adaptive monitoring. Our Adams Brook site has consistently high conductivity readings. It is located directly downstream of I-89, a VTrans garage, and a new porous concrete park and ride. We tested 4 sites upstream of our WQM site as well as our WQM site for Alkalinity and Chloride. The Dugout Road site has consistently high *E. coli* and turbidity numbers. We tested for TP and TSS at 3 sites, one downstream and 2 upstream of Dugout Road.

WQM Program volunteers collected samples for the LaRosa Partnership four times during the summer of 2010: on June 30, July 28, August 25, and September 29. WRP staff transported the samples to the LaRosa Lab in Waterbury for processing; results were available online within 3 weeks.

**Table 1: 2010 LaRosa Partnership Sampling Sites**

SITE	TOWN
Adams Brook bracketing (5 sites)	Randolph
Dugout Road bracketing (3 sites)	South Randolph
Watson Park	Hartford
Mill Brook Mouth	Pomfret
White Brook Road	Sharon
Vermont Law School (VLS)	South Royalton
Locust Creek Mouth	Bethel
Tweed River at South Hill Road	Stockbridge

## Test Descriptions

### Nitrogen & Phosphorus

Nitrogen and phosphorus are both major nutrients that affect the productivity of fresh water systems. Deficient amounts of these nutrients can decrease the biological productivity of a system, while excess amounts can cause unwanted blooms of algae and other plants. Excessive plant growth can reduce the attractiveness of a water body for activities such as boating and swimming, and when large amounts of vegetation die in a water body the decomposing organisms can greatly reduce the concentration of oxygen in the water. Common sources of nitrogen and phosphorus “pollution” are agricultural runoff, sewage and leaking septic systems, as well as many other human activities.

The Vermont Water Resources Panel has established water quality standards for nitrogen and phosphorus levels in state waters. For nitrogen, Vermont rivers should not exceed 2.0 – 5.0 mg/L.<sup>1</sup> For phosphorus, 90% of Vermont rivers should measure <46 micrograms/L.<sup>2</sup>

### Total Suspended Solids

Total suspended solids (TSS) concentrations indicate the amount of solids suspended in the water. The TSS test measures an actual weight of material per volume of water. TSS can also be used to calculate the total amount of material being moved by a stream. High concentrations of suspended particles can cause increased sedimentation in a stream, which can destroy important habitat areas for fish and other aquatic life. Suspended particles also provide attachment places for other pollutants, such as metals and bacteria. Additionally, high concentrations of suspended particles can impair the vision of predator species, such as trout, and can also attach to the gills of fish.

The Vermont Water Resources Panel has described the water quality standard for total suspended solids as “none in such concentrations or combinations that would prevent the full support of uses.” The general water quality range for Vermont rivers is 1 – 10 NTU; cold water fisheries like the White River should not exceed 10 NTU.<sup>3</sup>

### Alkalinity

Alkalinity is a measure of the buffering capacity of water. Alkalinity is usually reported as total alkalinity. Most of the total alkalinity found in rivers and streams tend to be carbonate alkalinity, which is dissolution of carbonate rocks. Alkalinity comes from rocks and soils, salts, and certain industrial wastewater discharges (detergents and soap-based products are alkaline). If an area’s geology contains large quantities of calcium carbonate (CaCO<sub>3</sub>, limestone), water bodies tend to be more alkaline. Alkalinity is measured per liter (mg/l), and samples are gathered in 250 ml plastic square bottles. The general water quality range for alkalinity in Vermont rivers is “no

---

<sup>1</sup> Vermont’s *Volunteer Surface Water Monitoring Guide*, p. 31, [http://www.vtwaterquality.org/lakes/docs/monitoringguide/lp\\_vmg-sec4.pdf](http://www.vtwaterquality.org/lakes/docs/monitoringguide/lp_vmg-sec4.pdf).

<sup>2</sup> Id.

<sup>3</sup> Id.

change from reference conditions that would prevent the full support of the aquatic biota, wildlife, and aquatic habitat uses.”<sup>4</sup>

Chloride

Chloride is an ion that is released into surface waters through the breakdown of salt compounds. Although salt is a naturally occurring mineral, elevated levels in rivers and streams may be attributed to road salt storage and use. In addition to negatively impacting water quality, chloride in large concentrations can be corrosive; cause damage to vegetation; and enter the drinking water supply, causing discoloration, foul taste and odor. Chloride samples are taken in the field with 50 ml polycarbonate centrifuge tubes. Chloride is reported in milligrams per liter (mg/L).<sup>5</sup>

**LaRosa Partnership Sampling Results**

The sampling done as part of the LaRosa Partnership provides a snapshot of the alkalinity, chloride, nitrogen, phosphorus, and TSS levels at the sampling sites. The WRP plans to continue monitoring these sites next year. The results from the 2010 sampling dates are displayed below in Tables 2, 3, 4, and 5.

**Table 2: Results from LaRosa Partnership Sampling on 6/30/10**

<b>June 30, 2010</b>					
<b>Sample Site</b>	<b>Alkalinity (mgCaCO3/L)</b>	<b>Chloride (mg/L)</b>	<b>Total Nitrogen (mg/L)</b>	<b>Total Phosphorus (µg/L)</b>	<b>Total Suspended Solids (mg/L)</b>
Adams Brook-1 (AB1)	203	190			
Adams Brook-2 (AB2)	178	45.3			
Adams Brook-3 (AB3)	167	19			
Adams Brook-4 (AB4)	143	132			
Adams Brook-5 (AB5)	224	45.3			
Dugout Road-1 (DG1)				32.3	15.4
Dugout Road-2 (DG2)				17.4	4.71
Dugout Road-3(DG3)				17.4	8.82
Watson Park (WAT)			0.2	20.9	11.2
Mill Brook Mouth(MIL)			0.22	9.87	1.24
White Brook Road (WBK)			0.17	13.4	5
Vermont Law School (VLS)			0.2	12.9	4.13
Locust Creek Mouth (LOC)			0.19	5.14	<1
Tweed River at S. Hill Rd. (TWD)			0.2	6.67	<1

<sup>4</sup> Vermont’s *Volunteer Surface Water Monitoring Guide*, p. 31, [http://www.vtwaterquality.org/lakes/docs/monitoringguide/lp\\_vmg-sec4.pdf](http://www.vtwaterquality.org/lakes/docs/monitoringguide/lp_vmg-sec4.pdf)

<sup>5</sup> Ibid p. 21

**Table 3: Results from LaRosa Partnership Sampling on 7/28/10**

<b>July 28, 2010</b>					
<b>Sample Site</b>	<b>Alkalinity (mgCaCO3/L)</b>	<b>Chloride (mg/L)</b>	<b>Total Nitrogen (mg/L)</b>	<b>Total Phosphorus (µg/L)</b>	<b>Total Suspended Solids (mg/L)</b>
Adams Brook-1 (AB1)	231	214			
Adams Brook-2 (AB2)	202	96.6			
Adams Brook-3 (AB3)	193	37			
Adams Brook-4 (AB4)	156	135			
Adams Brook-5 (AB5)	240	49.4			
Dugout Road-1 (DG1)				27	8.82
Dugout Road-2 (DG2)				19.8	3.52
Dugout Road-3(DG3)				18.1	4.77
Watson Park (WAT)			0.19	10.1	1.51
Mill Brook Mouth (MIL)			0.21	8.04	1.19
White Brook Road (WBK)			0.22	12.8	2
Vermont Law School (VLS)			0.26	9.43	1.83
Locust Creek Mouth (LOC)			0.17	6.35	<1
Tweed River at S. Hill Rd. (TWD)			0.26	<5	<1

**Table 4: Results from LaRosa Partnership Sampling on 8/25/10**

<b>August 25, 2010</b>					
<b>Sample Site</b>	<b>Alkalinity (mgCaCO3/L)</b>	<b>Chloride (mg/L)</b>	<b>Total Nitrogen (mg/L)</b>	<b>Total Phosphorus (µg/L)</b>	<b>Total Suspended Solids (mg/L)</b>
Adams Brook-1 (AB1)	218	189			
Adams Brook-2 (AB2)	187	-			
Adams Brook-3 (AB3)	184	43.6			
Adams Brook-4 (AB4)	132	108			
Adams Brook-5 (AB5)	229	44.4			
Dugout Road-1 (DG1)				13.9	1.59
Dugout Road-2 (DG2)				11	1.18
Dugout Road-3(DG3)				13.1	1.11
Watson Park (WAT)			0.2	12.5	2.02
Mill Brook Mouth (MIL)			0.2	7.49	<1
White Brook Road (WBK)			0.17	9.34	<1
Vermont Law School (VLS)			0.21	8.39	<1
Locust Creek Mouth (LOC)			0.11	5.96	<1
Tweed River at S. Hill Rd. (TWD)			0.17	5.98	<1

**Table 5: Results from LaRosa Partnership Sampling on 9/29/10**

<b>September 29, 2010</b>					
<b>Sample Site</b>	<b>Alkalinity (mgCaCO3/L)</b>	<b>Chloride (mg/L)</b>	<b>Total Nitrogen (mg/L)</b>	<b>Total Phosphorus (µg/L)</b>	<b>Total Suspended Solids (mg/L)</b>
Adams Brook-1 (AB1)	207	217			
Adams Brook-2 (AB2)	185	111			
Adams Brook-3 (AB3)	176	63.4			
Adams Brook-4 (AB4)	123	87.2			
Adams Brook-5 (AB5)	231	53.8			
Dugout Road-1 (DG1)				15.8	1.53
Dugout Road-2 (DG2)				14.1	1.18
Dugout Road-3(DG3)				14.1	<1
Watson Park (WAT)			0.21	11	2.1
Mill Brook Mouth (MIL)			0.1	11.6	<1
White Brook Road (WBK)			0.25	14	2.13
Vermont Law School (VLS)			0.17	9.61	<1
Locust Creek Mouth (LOC)			<0.1	7.97	<1
Tweed River at S. Hill Rd. (TWD)			0.1	7.85	<1

**Quality Assurance Results**

For quality assurance, we wanted to collect a field duplicate and field blank for every 10 samples. We therefore collected 12 duplicate samples and 12 blank samples. The duplicate and blank samples provide a way to assess the precision of the sampling and analysis in total. The quality of the data collected can be calculated in two ways: average blank concentration, by parameter (should be close to Reporting Limit for each parameter); and the Mean Relative Percent Difference (should be  $\leq$  Estimated Precision for each parameter). The results are listed below.

**Table 5: Average Blank Concentration by Parameter**

<b>Parameter</b>	<b>Blank Sample</b>			<b>Average Blank</b>	<b>Parameter Reporting Limit</b>
Alkalinity	AB1-<1	AB2-1		$\leq 1$ mg/L	1 mg/L
Chloride	AB1-<2	AB2-<2		$\leq 2$ mg/L	2 mg/L
Total Nitrogen (TN)	MIL-<0.1	TWD-<0.1		$\leq 0.1$ mg/L	0.1 mg/L
Total Phosphorus (TP)	DR1- <5	MIL- <5	TWD- <5	$\leq 5$ µg/L	5 µg/L
Total Suspended Solids (TSS)	DR1- <1	MIL- <1	TWD- <1	$\leq 1$ mg/L	1 mg/L

**Table 6: Mean Relative Percent Difference (RFD) for Field Duplicates**

<b>SITE</b>	<b>PARAMETER</b>	<b>Sample Result</b>	<b>Duplicate Result</b>	<b>Absolute Value</b>	<b>Average</b>	<b>RFD</b>
AB1	Alkalinity	203	202	1	202.5	0.004938
AB1	Chloride	190	188	2	189	0.010582
DR1	TP	32.3	32.7	0.4	32.5	0.012308
DR1	TSS	15.4	15.6	0.2	15.5	0.012903
AB2	Alkalinity	202	202	0	202	0
AB2	Chloride	96.6	96.1	0.5	96.35	0.005189
MIL	TN	.2	0.19	0.01	0.195	0.051282
MIL	TP	7.49	8.07	0.58	7.78	0.07455
MIL	TSS	<1	<1	0	1	0
TWD	TN	0.1	<0.1	0	0.1	0
TWD	TP	7.85	7.52	0.33	7.685	0.042941
TWD	TSS	<1	<1	0	1	0

**Table 7: Mean Relative Percent Difference (RFD) by Parameter**

<b>Parameter</b>	<b>Mean RFD</b>	<b>Estimated Precision</b>
Alkalinity	0.002469	≤5%
Chloride	0.007886	≤5%
TN	0.025641	≤20%
TP	0.043266	≤30%
TSS	0.004301	≤15%

**Conclusions**

The LaRosa Partnership provides an excellent opportunity for the WRP to enhance the WQM Program and to gain a better understanding of the health of the White River watershed. The WRP plans to continue the partnership in future years and to follow up by continuing to gather more data at these sites. The WRP would also like to expand the sampling into the spring as well. Many thanks to the WRP’s volunteer monitors who have helped make this partnership possible: Jim Martin, Ron Rhodes, Max Merrill, Sheryl Dickey, Karen Waterworth, Falko Schilling, and Mary Russ!