

2014 Water Quality Monitoring Report December 14, 2014

FRENCH RIVER CONNECTION P.O. BOX 45, WEBSTER MA 01570 http://www.frenchriverconnection.org contact@frenchriverconnection.org

Introduction

This report summarizes the findings of the French River Connection resulting from our 2014 water quality monitoring campaign utilizing the TROLL 9500 and E. Coli sampling. Our goal continues to be to assess and improve the water quality of the French River. Methods to calibrate and to maintain quality control are contained in Program Plans published by The Last Green Valley, who owns the equipment and provided the necessary calibration materials.

Problems with the TROLL 9500 and very low flow or no flow resulted in some data gaps this year. We were very fortunate that the Last Green Valley's sampling program was flexible enough to allow us to use the TROLL that they normally use. The Troll unit has been sent out for repair so hopefully there should not be problems next year.

This year we expanded the sampling program by adding another sampling site on the French River. The site is called Site 16, Route 56 and is located at the intersection of the French River and Route 56 in North Oxford.

With the support of the Town of Webster, we continued monitoring for E. Coli. The work schedule at the Webster lab cannot accommodate analysis of samples taken on the normal Saturday sample schedule so E. Coli samples have been taken on a convenient date close to the scheduled Saturday date or the Saturday schedule has been modified if volunteers were available. The date sample of E. Coli testing is indicated in the E. Coli column of each site report if different than the normal sample date. The sampling program was modified this year to include additional sampling and analysis if an elevated reading was observed. The additional dates and analysis are indicated in the E. Coli column.

We must mention the volunteers who make our water quality work possible, and we thank them all for doing such a wonderful job. Getting to spend a few hours with these people is the best part of our program. They are:

Devon Avery Wiktor Tomkiewicz

Jean Hixson Ed Bazinet
Ziggy Waraszkiewcz Carolyn Josti
Jack Josti Jean Pillo

Ziggy Waraszkiewcz, an experienced TROLL operator and calibrator, joined our team this year and took over the sampling of four sites. (Old Mill Brook, Lowe's Brook, Dudley Road, and Hardwood Street).

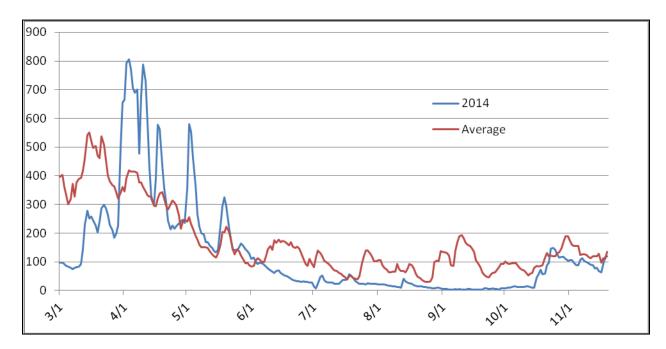
Ken Parker assisted with preparation of this report.

A special thanks to Timothy Loftus, Chief Chemist at the Webster Wastewater Treatment Plant and his assistant Pam for their help and understanding.

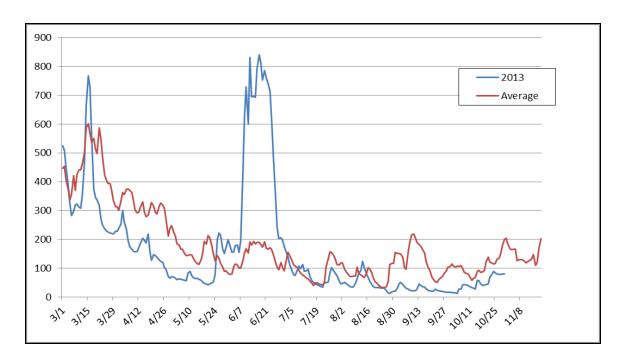
Over the last ten years, more than 63 volunteers have spent a day or more on the river supporting our program.

French River Flow

One of the major differences in the river year to year is the flow level, that is, discharge, measured in cubic feet /second. Since 2007, until last year, we have been copying the daily average flow at the Webster USGS gage station, which was available online, to show the difference in flow each year, during the monitoring season. This daily data is no longer available to the public on-line, but has been provided to us by the USGS Massachusetts Water Science Center. The graph compares the average of the last seven years (including 2014) of data with this year . The same comparison to the average of previous years is also shown for 2013. We find that 2014 with the exception of the period 4/1 to 5/1 was a year of below average flow comparable to 2007. 2012 was also a year of low summertime flow. USGS has discharge data going back to 1948, but to use it, one would need to know the effect of withdrawals and discharges over that period, and the effect of the operation of dams.



2014 Flow

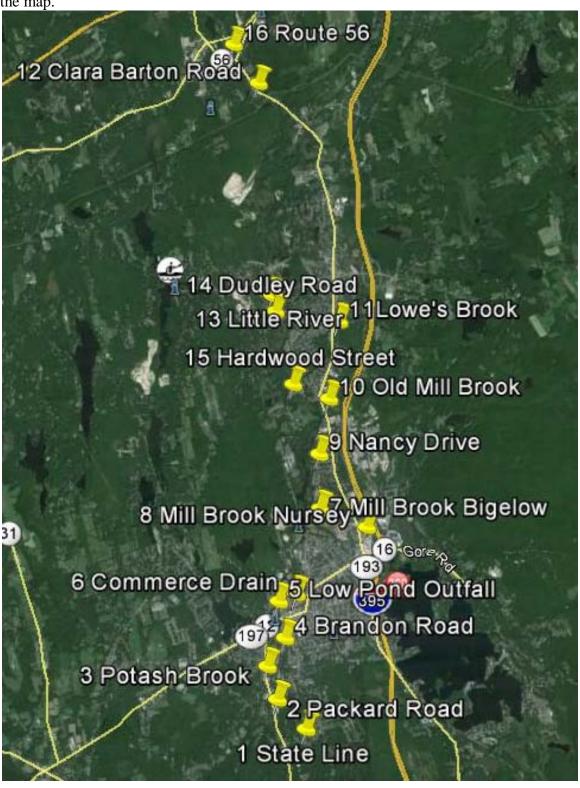


2013 Flow

One of the observations we make is a judgment about flow at each station, characterized from very low to very high. It's easy for an experienced volunteer who has seen each location many times to make this characterization, but not so for a relative newcomer. Flow velocity, depth of water, bank exposure, and observations such as depth of water over the step dam at the State line are used to characterize the flow rate.

Site reports

The following pages contain a brief report for each of the sixteen sites we monitor, as shown on



In these reports, we take note of pH values below 6.5 and DO below 5 mg/l which are the state standards, conductivity above 300 uSm/cm, above 5 for turbidity, and above 235 for E. Coli. At bathing beaches as defined by the Massachusetts Department of Public Health in 105 CMR 445.031: where E. Coli is the chosen indicator the geometric mean of the five most recent samples taken during the same bathing season shall not exceed 126 colonies per 100 ml and no single sample shall exceed 235 colonies per 100 ml. E. Coli samples were tested according to Hach method 10029 (m-Coli Blue) or Standard Methods, 22^{nd} ed., method 9213D (modified m-TEC).

State Line, Webster N 42°02'27.5" W 71°53'02"

Stateline (boundary): this is a measure of water quality, below the Webster WWTP, as the main stem leaves the state. This site is chosen because it is on the state line. It is reached by parking where the P&W active rail line crosses Perryville Road in Webster and walking diagonally downstream until the river is reached.



Date	Water Temp	pН	Conductivity	Turbidity	DO	E. Coli
Date	C	pii	uSm/cm	NTUs	mg/l	Col/100ml
4/27/2014	11.16	7.16	228.9	1.4	11.1	NT
5/19/2014	18.00	7.05	199.0	0.5	9.09	5/19 75
7/7/2014	22.80	7.23	254.6	1.1	8.11	60
7/22/2014	22.62	7.24	275.0	1.3	8.13	7/15 177
8/26/2014	21.86	7.32	<mark>389.3</mark>	2.3	8.54	3
9/24/2014	15.58	7.22	<mark>390.3</mark>	1.6	9.57	60
10/27/2014	11.72	7.01	203.8	1.3	10.56	40

Water at this site is clear and odorless. Elevated conductivity has been observed in previous years, and was also the case this year. In other years it has been as high as 514 uSm/cm and lasted for more than one observation.

Packard Pond Outflow, Dudley N 42°01'1.0" W 71°53'25.5"

Packard Pond (impact): carries a significant volume of water and drains Ardlock Acres conservation area and an area behind the Dudley transfer station, which may be a source of pollution. Park at the junction of Carpenter Road and Route 12 in Dudley, and monitor on the east side of the culvert.



	Water					
Date	Temp	pН	Conductivity	Turbidity	DO	E. Coli
						Col/100
	C		uSm/cm	NTUs	mg/l	ml
4/27/2014	11.88	7.12	180.9	2.8	10.23	NT
5/21/2014	17.78	7.02	182.7	0.7	8.81	NT
7/7/2014	21.51	6.62	186.4	3.1	5.19	NT
7/22/2014	20.28	6.57	200.4	11.32	<mark>3.96</mark>	NT
8/26/2014	19.71	6.5	241.2	<mark>11.0</mark>	3.71	0
9/24/2014	No	Flow				
10/27/2014	Flow	Too	Low	То	Sample	

Water at this site is normally clear and odorless. There are small articles of trash scattered about, and plants along the sides of the channel.. The flow rate was very low on 7/22 and 8/26 and this may have contributed to the low DO and high Turbidity. The no flow condition is the first recorded for this site. The site was only tested once for E. Coli this year because of low readings in past years. One test will be conducted next year.

Potash Brook, Dudley N 42°02'13.5" W 71°53'33.3"

Potash Brook (impact): carries a significant volume of water and drains an area west of Merino Pond which is partly residential and partly agricultural and may be a source of nutrient runoff. Turn off Route 12 onto New Boston Road and then right into the Dudley Pumping Station, and monitor on the south side of the bridge.



Date	Water Temp	pН	Conductivity	Turbidity	DO	E. Coli
	C		uSm/cm	NTUs	mg/l	col/100 ml
4/27/2014	9.52	7.18	208.8	3.7	11.17	NT
5/21/2014	11.88	7.07	252.4	0.8	10.28	5/19 118
7/7/2014	20.33	7.30	238.8	1.1	8.27	6/23 <mark>760</mark>
7/22/2014	19.26	7.31	275.7	2.6	7.31	7/15 <mark>740</mark>
8/26/2014	18.10	7.23	<mark>306.6</mark>	1.0	8.31	<mark>500</mark>
9/24/2014	11.12	7.11	289.7	0.4	10.39	<mark>350</mark>
10/27/2014	10.97	6.87	<mark>312.9</mark>	0.5	9.99	20

Water here is clear and odorless. Unlike 2007, 2008 and 2010, the brook did not dry up. Water temperatures here are generally the lowest we observe. The elevated E. Coli seems to be a continuing problem at this site. Up stream sampling for E. Coli will be conducted next year.

Brandon Road, Dudley N 42°02'30.2" W 71°53'14.8"

Brandon Road (reference): At this location we can take data upstream of the Webster Wastewater Treatment Plant. Drive into the Ethan Allen Mill Complex north of the office and proceed directly to the river, just downstream from the Hill Street bridge



Date	Water Temp C	pН	Conductivity uSm/cm	Turbidity NTUs	DO mg/l	E. Coli Col/100ml
4/27/2014	11.37	7.22	212.5	1.2	11.0	NT
5/21/2014	18.23	6.97	187.1	0.0	8.69	5/19 72
7/7/2014	22.72	7.09	212.3	1.3	7.80	53
7/21/2014	22.76	7.21	226.6	1.4	8.07	7/15 107
8/26//2014	21.30	7.27	255.7	0.4	8.04	116
9/24/2014	15.23	7.10	287.3	1.2	8.91	90
10/27/2014	11.49	6.91	184.2	0.9	10.61	50

Water here is clear and odorless. Conductivity was slightly higher this year and may be attributed to low flow.

Low Pond Outflow, Dudley N 42°02'59.8" W 71°53'16.3"

Low Pond outflow (impact): carries a significant volume of water and drains a string of ponds including Low Pond and Merino Pond, around which there are significant residential developments which may be a source of runoff. Park on the north side of Stevens Linen in Dudley in the large parking lot and proceed to the right to the tailrace. Monitor where it emerges from under the building.



Date	Water Temp	pН	Conductivity	Turbidity	DO	E. Coli
	C		uSm/cm	NTUs	mg/l	Col/100ml
4/27/2014	12.02	7.33	105.7	2.1	10.91	NT
5/21/2014	17.99	7.07	118.5	0.6	9.24	NT
7/7/2014	22.0	7.14	111.9	3.3	7.83	NT
7/22/2014	21.63	7.11	126.1	2.3	7.77	NT
8/12/2014	Too	Shallow	То	Sample		
9/24/2014	15.69	7.03	136.4	<mark>8.8</mark>	9.30	NT
10/27/2014	11.24	6.55	186.0	3.3	9.77	NT

Water here is generally clear and odorless. There is some trash in the channel. The higher levels of pH and low conductivity are characteristic of this site. The site was not tested for E. Coli this year because of low readings in past years. One test will be conducted next year.

Commerce Parking Lot Storm Drain, Webster N 42°03'01.4" W 71°53'00.6"

Commerce parking lot storm drain (impact): This continually running storm drain in downtown Webster has exuded an odor detectable at times and nearby rocks have exhibited an orange deposit. High E. Coli counts were found at this site. This is a possible point source of pollution. Enter the public parking lot at Tracy Court and go to the southwest corner. Monitor the storm drain outflow.



Date	Water Temp	pН	Conductivity	Turbidity	DO	E. Coli
Dute	С	PII	uSm/cm	NTUs	mg/l	Col/100ml
4/27/2014	NT	NT	NT	NT	NT	NT
5/21/2014	12.80	6.92	<mark>396.7</mark>	0.7	9.56	5/19 108
6/23/2014	17.23	6.98	<mark>718.4</mark>	<mark>11.8</mark>	8.62	73
						7/7 12 7/15 <mark>320</mark>
7/22/2014	18.49	7.83	<mark>371.8</mark>	1.7	9.18	110
8/26/2014	17.89	7.89	<mark>573.8</mark>	3.9	NT	223
9/24/2014	14.87	7.41	531.8	<mark>7.1</mark>	8.71	200
						<mark>8600</mark>
10/27/2014	13.44	7.26	<mark>363.7</mark>	14.7	9.89	10/3 <mark>1820</mark>

There is some trash scattered about. Consistently higher levels of conductivity and pH characterize this site. The high E. Coli values occurred during dry weather and may be associated with illicit connections. Additional sampling is scheduled for next year. The odors and deposits that were observed at the site in earlier years have disappeared.

Mill Brook at Bigelow Road, Webster N 42°04'00.8" W 71°52'31.9"

Mill Brook at Bigelow Road (impact): As the outflow from Webster Lake, carries a significant volume of water. This station is downstream from a former stump grinding operation, which operated on raw material of unknown origin and character, and added chemicals to its product, and may have affected the chemistry of Mill Brook. Park near the bridge over Mill Brook on Bigelow Road, and monitor on the east side of the bridge.



Date	Water Temp	pН	Conductivity	Turbidity	DO	E. Coli
	C		uSm/cm	NTUs	mg/l	Col/100ml
4/27/2014	NT	NT	NT	NT	NT	NT
5/21/2014	16.19	7.41	269.3	0.7	10.26	5/19 20
6/23/2014	18.61	6.71	<mark>376.0</mark>	1.2	6.46	106
7/22/2014	19.49	6.68	<mark>542.6</mark>	1.5	6.60	7/15 <mark>540</mark>
8/12/2014	21.17	6.59	<mark>583.9</mark>	1.1	<mark>4.01</mark>	8/26 47
9/24/2014	13.85	6.5	<mark>452.7</mark>	1.2	<mark>3.01</mark>	40
10/27/2014	10.7	<mark>6.44</mark>	544.8	0.9	5.01	<10

Water here is very clear and odorless. There is considerable trash scattered about, and plants seen throughout the season include milfoil, algae, water lilies, cattails, and many others. Flow here is affected by operation of a dam controlling the level of Webster Lake. Frequent high levels of conductivity correspond to very low flows. There was one occasion where the state standard for pH is not met. This is typical of other years. pH is virtually always lower here than upstream at Webster Nursery, observed over the last ten years. There are two occasions where the state standard for DO is not met and the 3.01 reading is the lowest on record for this site. DO has failed to meet state standards on occasion in other years. The elevated E. Coli reading may be related to beavers. A beaver dam is being constructed at the Bigelow Road bridge.

Mill Brook at Webster Nursery, Webster N 42°03'45.0" W 71°51'50.3"

Mill Brook at Webster Nursery (reference): measures the quality of water leaving Webster Lake, and serves as a reference point above the former stump grinding operation. Park in the Webster Nursery parking lot and monitor on the west side of the bridge.



Date	Water Temp	pН	Conductivity	Turbidity	DO	E. Coli
	C		uSm/cm	NTUs	mg/l	Col/100ml
4/27/2014	11.82	7.30	195.8	0.9	11.19	NT
5/21/2014	19.09	7.07	227.5	0.5	9.27	38
6/23/2014	22.50	6.8	272.8	1.3	8.73	7
7/22/2014	24.43	7.78	507.7	1.2	2.51	53
8/26/2014	21.17	7.14	<mark>564.9</mark>	1.1	7.61	0
9/24/2014	16.90	7.05	<mark>437.1</mark>	2.5	<mark>3.01</mark>	20
10/27/2014	12.40	6.98	<mark>465.4</mark>	0.7	10.05	<10

Water here is generally clear and odorless. Considerable oil had been noted late in 2010, and more was expected, but it has not been observed. There is some trash scattered about the site, and algae and small attached plants were seen on occasion. High levels of conductivity were observed four times which is consistent with that seen downstream at Bigelow Road during low flow. Elevated conductivity is common here; it occurred during the last five observations of 2010 and exceeded 900 uSm/cm on one occasion. The two low DO readings are most likely related to very low flow conditions. Runoff from the new mall does not seem to be changing the water characteristics.

Nancy Drive, Webster N 42°04'41.2" W 71°52'28.0"

Nancy Drive (impact): an unnamed stream on the east side of the river in Webster near the Oxford line, which receives water from an industrial park and a casual junkyard, possibly carrying pollutants of all types. High conductivity levels have been measured here in the past. Take Nancy Drive from Route 12 and park at the end. Walk to the left by the house to a wooden bridge, and monitor downstream.



Date	Water Temp	pН	Conductivity	Turbidity	DO	E. Coli
	C		uSm/cm	NTUs	mg/l	Col/100ml
4/27/2014	10.68	6.96	<mark>966.6</mark>	1.2	10.30	NT
5/21/2014	16.94	6.64	<mark>873.4</mark>	0.1	6.19	5/19 2
6/23/2014	17.65	6.51	<mark>939.1</mark>	3.4	<mark>4.91</mark>	80
7/22/2014	22.98	6.59	<mark>743.2</mark>	1.8	2.73	7/15 <mark>620</mark>
8/21/2014	20.40	6.60	<mark>750.7</mark>	3.0	<mark>2.36</mark>	87
9/42/2014	Too	Shallow	То	Sample		
10/27/2014	9.96	<mark>6.43</mark>	<mark>751.9</mark>	0.7	<mark>4.24</mark>	20

Water here is clear and odorless. The extreme high levels of conductivity and low levels of DO, far below state standards, are typical of this site. This is the second year that high levels of conductivity have been consistent throughout the sampling period. DO failed to meet state standards on four occasions and pH on one occasion,

Old Mill Brook, Oxford N 42°05'19.1" W 71°52'15.1"

Old Mill Brook (impact): carries a significant volume of water and flows through two industrial parks, which may be sources of pollution. Park on Route 12 under the railroad overpass and Old Mill Brook is on the west side. Monitor where it emerges from the culvert under Route 12.



Date	Water Temp	pН	Conductivity	Turbidity	DO	E. Coli
	С		uSm/cm	NTUs	Mg/l	Col/100ml
4/27/2014	10.26	7.22	<mark>353.0</mark>	0.8	11.04	NT
5/17/2014	19.14	<mark>6.38</mark>	250.9	2.7	9.03	5/19 35
6/18/2014	20.43	<mark>6.27</mark>	<mark>434.3</mark>	1.8	7.68	6/23 60
7/12/2014	17.90	6.55	381.8	2.6	5.89	7/15 <mark>360</mark>
8/26/2014	20.80	NT	NT	NT	NT	440
9/3/2014	21.14	6.53	<mark>372.4</mark>	4.0	<mark>4.06</mark>	9/24 200
10/06/2014	11.29	6.58	<mark>364.5</mark>	2.8	<mark>4.78</mark>	10/27 50

The water here is clear and odorless. It failed twice to meet state standards for DO and twice for pH. . These results are quite typical of this site, although it may be noted that a 2.21 mg/l DO was recorded in 2012. Elevated levels of conductivity were observed five times. These readings may be attributed to very low flow conditions.

Lowe's Brook, Oxford N 42°06'14.7" W 71°51'58.8"

Lowe's Brook (impact): The largest brook that we measure flowing into the French River, except for the Little River, drains Lowe Pond, above which significant commercial development is taking place, which may be resulting in runoff now from development, and in the future from operation. Park at the small convenience store on the east side where Lowe's Brook crosses Route 12. Monitor from the bridge over the small diagonally running road (State Street) behind the store.



Date	Water Temp	pН	Conductivity	Turbidity	DO	E. Coli
	C		uSm/cm	NTUs	Mg/l	Col/100ml
4/27/2014	NT	NT	NT	NT	NT	NT
5/17/2014	20.10	<mark>6.43</mark>	293.3	3.0	8.74	5/19 125
6/18/2014	25.56	<mark>6.24</mark>	<mark>309.8</mark>	1.4	7.75	6/23 <mark>220</mark>
7/12/2014	23.31	6.70	<mark>374.2</mark>	1.3	5.38	7/15 126
8/26/2014	23.60	NT	NT	NT	NT	420
9/03/2014	22.34	6.69	<mark>447.4</mark>	1.7	<mark>3.79</mark>	9/24 230
10/06/2013	11.64	7.00	<mark>486.5</mark>	1.4	7.00	10/27 40

The water here is clear and odorless. There is trash scattered around the site. Lowe's Brook failed to meet DO standards once in 2014, at a level of 3.79 mg/l. It is noteworthy that before 2010, Lowe's Brook did not come close to failing to meet DO standards. The Lowe's Brook DO graph presented in this report's Conclusions Section addresses historic DO values in greater detail. Elevated E. Coli reading may be attributed to beaver activity. High conductivity readings may be related to very low flow conditions.

Clara Barton Road, Oxford N 42°09'14.2" W 71°52'57.3"

Clara Barton Road (reference): This site is upstream of gravel pit operations in the area. Take Clara Barton Road off Route 12 in North Oxford and park at the stone bridge. Make your way down to the water upstream of the bridge and monitor from the rock outcropping.



	Water					
Date	Temp	pН	Conductivity	Turbidity	DO	E. Coli
	C		uSm/cm	NTUs	Mg/l	Col/100ml
4/27/2014	11.01	7.33	203.1	3.1	11.39	NT
5/21/2014	19.6	7.07	183.3	0.5	9.38	5/19 135
6/23/2014	19.4	7.09	226.3	1.8	8.73	33
7/22/2014	25.73	7.37	189.5	1.5	8.02	7/15 50
8/26/2014	29.48	7.15	227.0	0.9	8.06	19
9/24/2014	14.68	7.11	254.7	1.2	9.59	10
10/27/2014	10.13	6.71	146.1	1.2	10.80	40

Water here is clear and odorless. The E. Coli values are lower this year and this may support the theory that the higher E. Coli results previously seen are related to runoff. This was a dry summer with less rainfall than the previous two years.

Little River, Oxford N 42°06'34.1" W 71°53'00.3"

The Little River (impact): this site is the largest inflow of water into the French River; it is the outflow from Buffumville Lake. Between Buffumville Lake and its confluence with the French River there are several industrial areas right on the river. We are monitoring here to see if there are any adverse effects from these sites. Where Dudley Road crosses over the French River there is a public parking lot at the Leovich Landing boat launch site. Park here and walked down the old Boston & Albany railbed about ¼ mile and monitor the Little River when reached



Date	Water Temp	pН	Conductivity	Turbidity	DO	E. Coli
	C		uSm/cm	NTUs	Mg/l	Col/100ml
4/27/2014	12.90	7.33	160.7	1.1	9.70	NT
5/21/2014	18.26	7.07	164.7	0.3	9.13	5/19 28
7/7/2014	23.60	7.09	161.3	0.5	7.39	6/23 146
7/22/2014	25.71	8.76	185.2	0.9	11.0	7/15 <mark>780</mark>
8/26/2014	25.00	6.70	213.9	0.9	6.45	133
9/24/2014	12.78	6.58	<mark>335.1</mark>	2.1	6.70	150
10/27/2014	11.22	6.80	166.3	1.7	9.87	50

Water here is clear and odorless. There are grassy plants visible as early as May until October. The Little River failed to meet DO standards once in 2012, but that had not been seen before and was not repeated in the last two years. The pH and DO results of 7/22 are either in error or indicate a chemical spill up river. E. Coli results at this location continue to be high.

Dudley Road, Oxford N 42°06'25.5" W 71°52'58.4"

Dudley Road (reference): This site is above Lowe's Brook and is monitored as a baseline to see how much influence Lowe's Brook has on the French River. Park in the same location as for Little River and monitor off the bridge.



Date	Water Temp	pН	Conductivity	Turbidity	DO	E. Coli
	С	_	uSm/cm	NTUs	mg/l	Col/100ml
4/27/2014	12.01	7.13	191.0	1.3	11.15	NT
5/17/2014	19.12	6.37	189.9	0.6	9.12	5/19 95
6/18/2014	25.17	6.23	216.7	1.4	8.07	6/23 150
7/12/2014	23.56	6.65	214.1	1.1	6.65	7/15 130
8/26/2014	23.6	NT	NT	NT	NT	123
9/3/2014	23.05	6.51	266.4	1.5	<mark>4.95</mark>	9/24 180
10/6/2014	13.45	7.67	249.3	1.2	7.16	10/26 50

The water here is clear and odorless, with grasses observed at mid-season. State standards are not met once for DO and twice for pH. Although there has been a summertime dip in DO since we started observing in 2007, 2014 was the third year it failed state standards. On 7/15 an E. Coli sample was taken on the French River at Charlton Street. The value was 50. On 7/15 the E. Coli reading at Little River was 780. This would indicate that the Little River discharge may be a contributing factor to high E. Coli readings in the French River.

Harwood Street , Oxford N 42°05'28.6" W 71°52'48.7"

Harwood Street (reference): This site is below Lowe's Brook and combined with Dudley Road should give us a clear picture of any impact Lowe's has on the French. Monitoring here also gives us a good flow measurement above North Village dam to compare with flow below as measured by the USGS gauge in Webster. There is a pull off next to the bridge where Harwood Street crosses over the French River. Park here and monitor off the bridge



Date	Water Temp	pН	Conductivity	Turbidity	DO	E. Coli
	C	-	uSm/cm	NTUs	mg/l	Col/100ml
4/27/2014	12.09	7.05	198.6	1.4	10.96	NT
5/17/2014	19.52	6.58	201.9	2.2	8.40	5/19 95
6/18/2014	24.01	<mark>6.31</mark>	234.8	1.3	7.60	6/23 193
7/12/2014	23.18	6.65	222.1	1.1	5.91	7/15 110
8/26/2014	20.02	NT	NT	NT	NT	60
9/3/2014	22.22	6.67	295.0	0.8	5.96	9/24 50
10/6/2013	12.62	7.16	268.0	1.0	7.16	60

The water here is clear and odorless. Grasses were noted later in the season The E. Coli reading on 7/15 may be related to the Little River discharge. State standards were not met once for pH.

Route 56, Oxford N 42.16345° W 71.888340°

Route 56 (reference): It is the furthest upstream site that we will be monitoring and gives us a baseline for all downstream monitoring. Take Route 56 off Route 12 in North Oxford and park at the bridge. Make your way down to the water upstream of the bridge and monitor from the riprap.

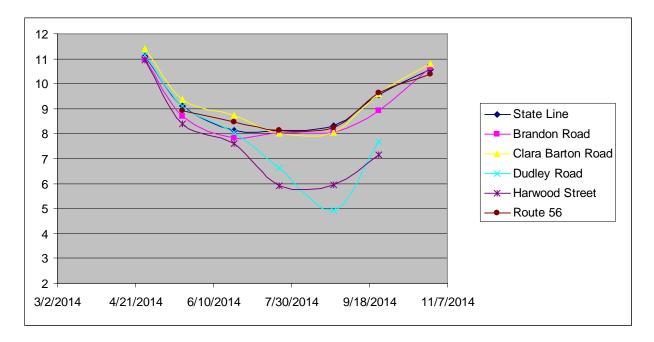
Water Conductivity **Turbidity** E. Coli **Date** Temp pН DO Col/100ml \mathbf{C} uSm/cm **NTUs** mg/l 5/19 40 8.90 5/21/2014 17.73 7.04 167.5 1.5 6/23/2014 21.3 6.85 207.2 1.9 6.85 12 7.12 7/22/2014 26.15 183.1 1.7 8.12 7/15 37 8/26/2014 7.25 37 21.44 213.9 0.5 8.25 9/24/2014 7.28 9.62 120 15.10 241.0 1.8 10/27/2014 10.19 6.87 138.6 1.8 10.37 60

This is the first year of monitoring at this site. Water here is clear and odorless.

French River Parameter Graphs

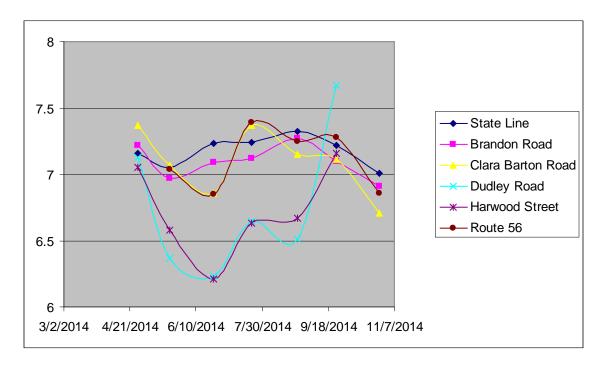
Since 2007, we have been creating plots for each parameter, showing variations over the monitoring season for each of the five mainstream locations. With the addition of the Route 56 site, we now show six sites. What we have noted is that the lines representing the locations are similar year to year, and that their relationship to each other is also similar. On the following pages are the charts for 2014. These have been compared with charts from previous years, and we find that the similarity continues. If there is a negative trend to watch, it may be that the dissolved oxygen "dip" at Dudley Road and Harwood Street is becoming deeper and/or broader. This negative trend did continue this year and will continue to be monitored.

French River Dissolved Oxygen (mg/l)



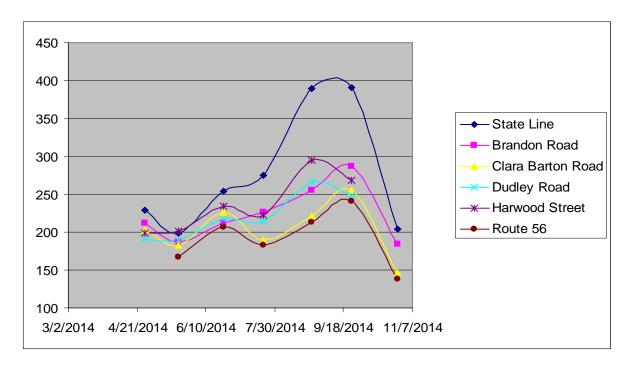
It is usual to observe Clara Barton, State Line, and Brandon Road exhibiting higher levels of dissolved oxygen throughout the season. It was also the case for Route 56. Dudley Road and Harwood Street exhibited a "dip", but not as deep as last year. The low at Dudley Road was 4.95 and at Harwood Street 5.91

French River pH



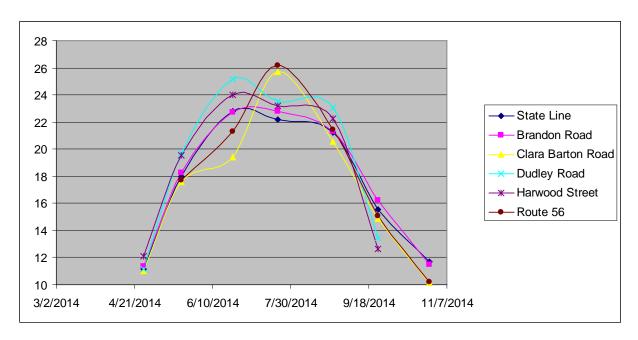
The values of pH, and the relative positions of the lines representing each station, are similiar to the previous years. We generally find Clara Barton, State Line, and Brandon Road within a 0.5 pH range. This is not true on every date, but most often it is. Route 56 was also within this range. Dudley Road and Harwood Street are almost always lower than any of the other four, with Harwood Street most often the lowest. The pH range (the difference between the high and low pH) was greater than last year for Dudley Road and Harwood Street and pH values at Dudley Road and Harwood Street are lower than last year.

French River Conductivity (uSm/cm)



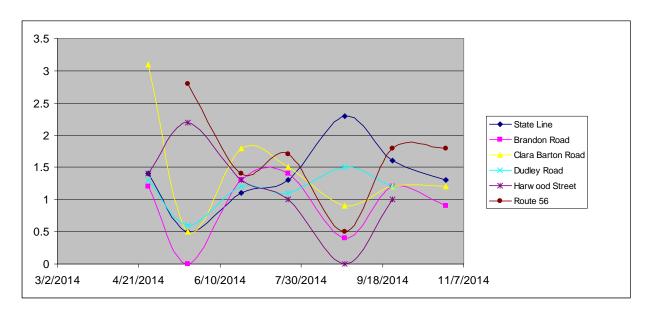
It is usual to find the highest values of conductivity at State Line, and for a significant spike in conductivity to appear at the lowest flow of the season. The spike at low flow was more significant this year. Values under similar conditions at State Line have been as high as 500 uSm/cm. In some other years there has been a smaller spike at Clara Barton but that did not happen in 2014. It is common for Brandon Road to have the second-highest conductivity, but that did not occur this year. The high measurements at all sites were higher this year. The lowest value recorded was 138.6 at Route 56.

French River Temperature ($^{\circ}$ C)



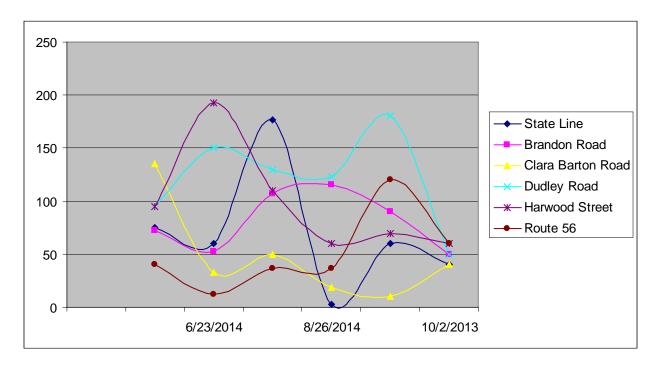
Before 2011, temperature has been recorded in Fahrenheit. Water temperature is extremely weather dependent, and always very similar over the length of the river. The higher temperatures at State Line and Clara Barton Road on 7/22 maybe related to upstream impoundments. The highest temperature was recorded at Route 56. Water temperatures are slightly lower than last year.

French River Turbidity (NTU's)



We rarely see levels of turbidity above 4 NTU's in the main stem, and since turbidity measurements at low levels are not very stable, there is no consistency from year to year in the turbidity graphs. High levels have occurred in past years due to runoff.

French River E. Coli (Col/100ml)

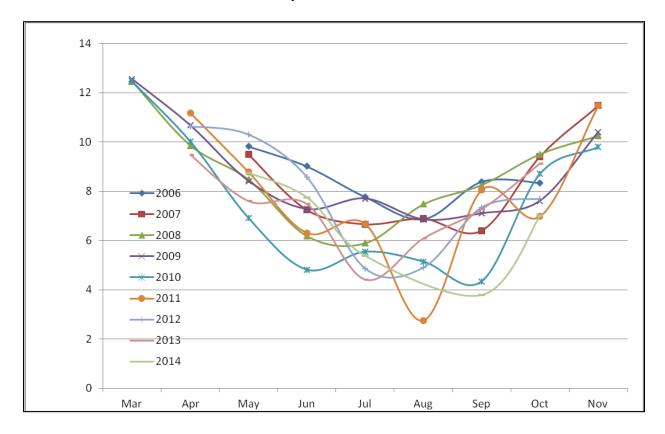


The E. Coli graph shows values taken at the six French River stations. 314 CMR 4.00, Massachusetts Surface Water Quality Standards, states that the bacteria standard, where E. Coli is the chosen indicator, for Class B Inland Waterway for waters other than beaches is, the geometric mean of all samples taken within the most recent six months shall not exceed 126 colonies per 100 ml, typically based on a minimum of five samples and no single sample taken during the bathing season shall exceed 235 colonies per ml, typically based on a minimum of five samples It can be noted that no readings exceeded 235 and that the calculated geometric mean value for the all samples at each site were below 126. The highest calculated geometric mean was 112.9 at Dudley Road. All sites meet the maximum standard of 235 and the geometric mean standard of 126

Conclusion

Although we had problems with the Troll this season, we are confident in the quality of the data and observations recorded throughout the season. We did not find great departures from data taken in previous years.

The results of this campaign and the previous four give us something to watch in the future. The dips in DO occurring during late summer at Dudley Road and Harwood Street are not as deep as previous years. The next few years should tell us if this trend is consistent. The graph below shows us the change in DO measurements at Lowe's Brook over the previous eight years. The lowest DO measured at Lowe's Brook in 2014 was 3.97. The "dip" in the French River and Lowe's Brook needs to be evaluated next year.



Lowe's Brook DO

E.Coli results indicate several areas that will require additional monitoring. The high dry weather level at the Commerce Drain site indicates the need to be monitored more often and to evaluate the need for additional upstream monitoring. The high E. Coli results at Potash Brook indicate the need for upstream sampling. No sampling was conducted during wet weather conditions this year so the impact of stormwater runoff was not addressed. Additional E. Coli sampling was conducted upstream of the Clara Barton Road site at Route 56 and it is still too early to clearly see a pattern, but under dry weather conditions there does not appear to be an upstream source. The Route 56 site has been added to the program and will continue to be monitored.