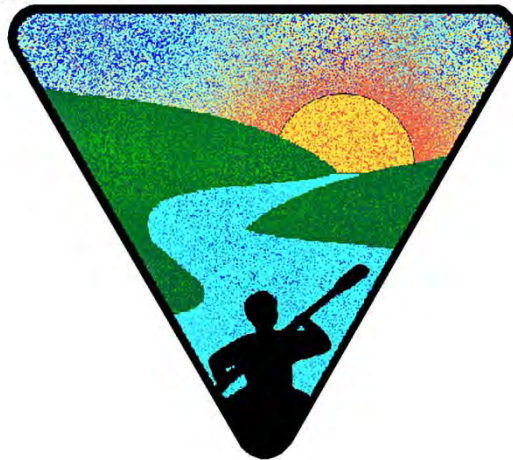


French River Connection



2017 Water Quality Monitoring Report

December 5, 2017

FRENCH RIVER CONNECTION
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Introduction

This report summarizes the findings of the French River Connection sampling from our 2017 water quality monitoring campaign utilizing the TROLL 9500. 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 and road construction resulted in significant data gaps this year. The June sampling was terminated due to problems with the Troll. No duplicate sample was taken and post calibration testing was not conducted. Data for June sampling is not qualified. We were very fortunate to be able to use the Last Green Valley's Troll. E.Coli sampling was not conducted this year because funding was not available.

This year's report includes the duplicate sample results which are indicated in appropriate site data table.

The following volunteers made our water quality work possible, and we thank them:

Devon Avery

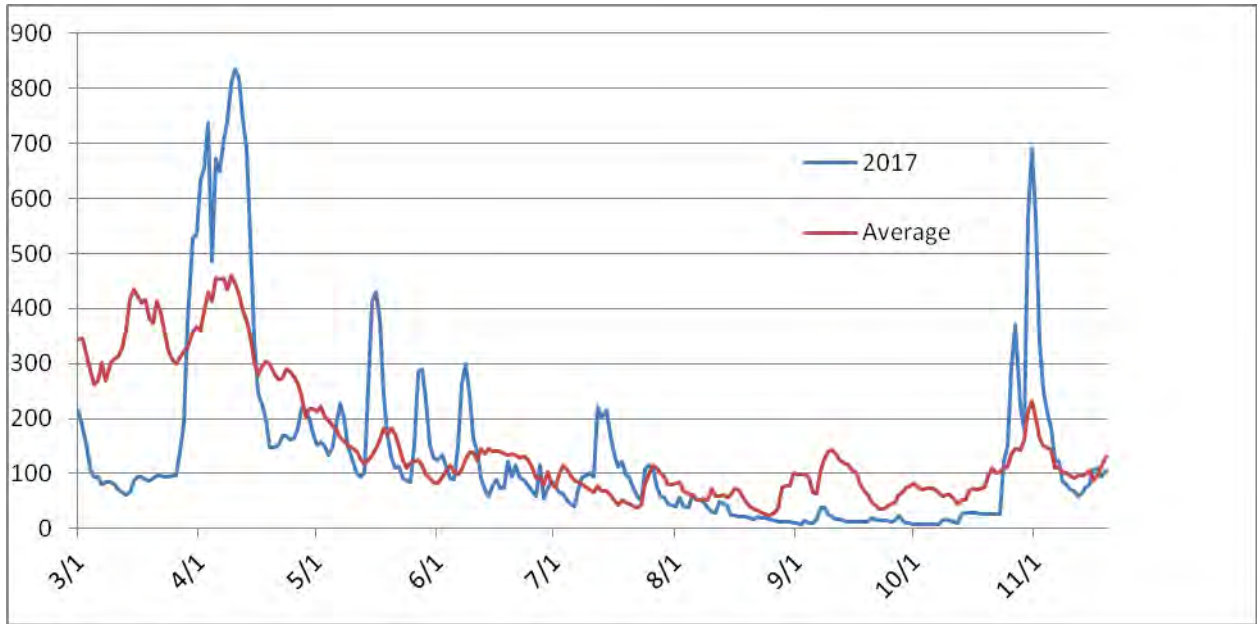
Carolyn Josti

Jack Josti

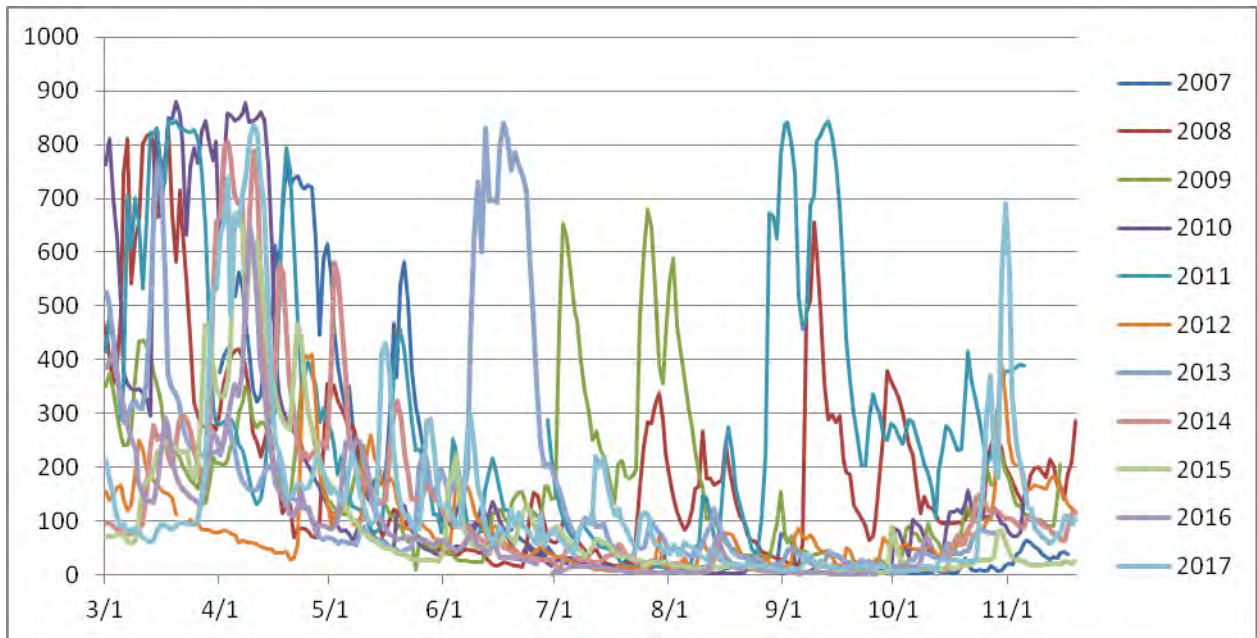
Ken Parker assisted with preparation of this report.

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. Daily flow data was provided to us by USACE as suggested by the USGS Massachusetts Water Science Center. The USACE Corps Water Management System will be the source of this data in the future. The charts compare the average of the last eleven years (including 2017) of data with this year. We found that in 2017, with the exception of a spike in mid May, summer flows were below average and comparable to 2007, 2012, 2014, and 2015. These were also years of low summertime flow.



2017 Flow

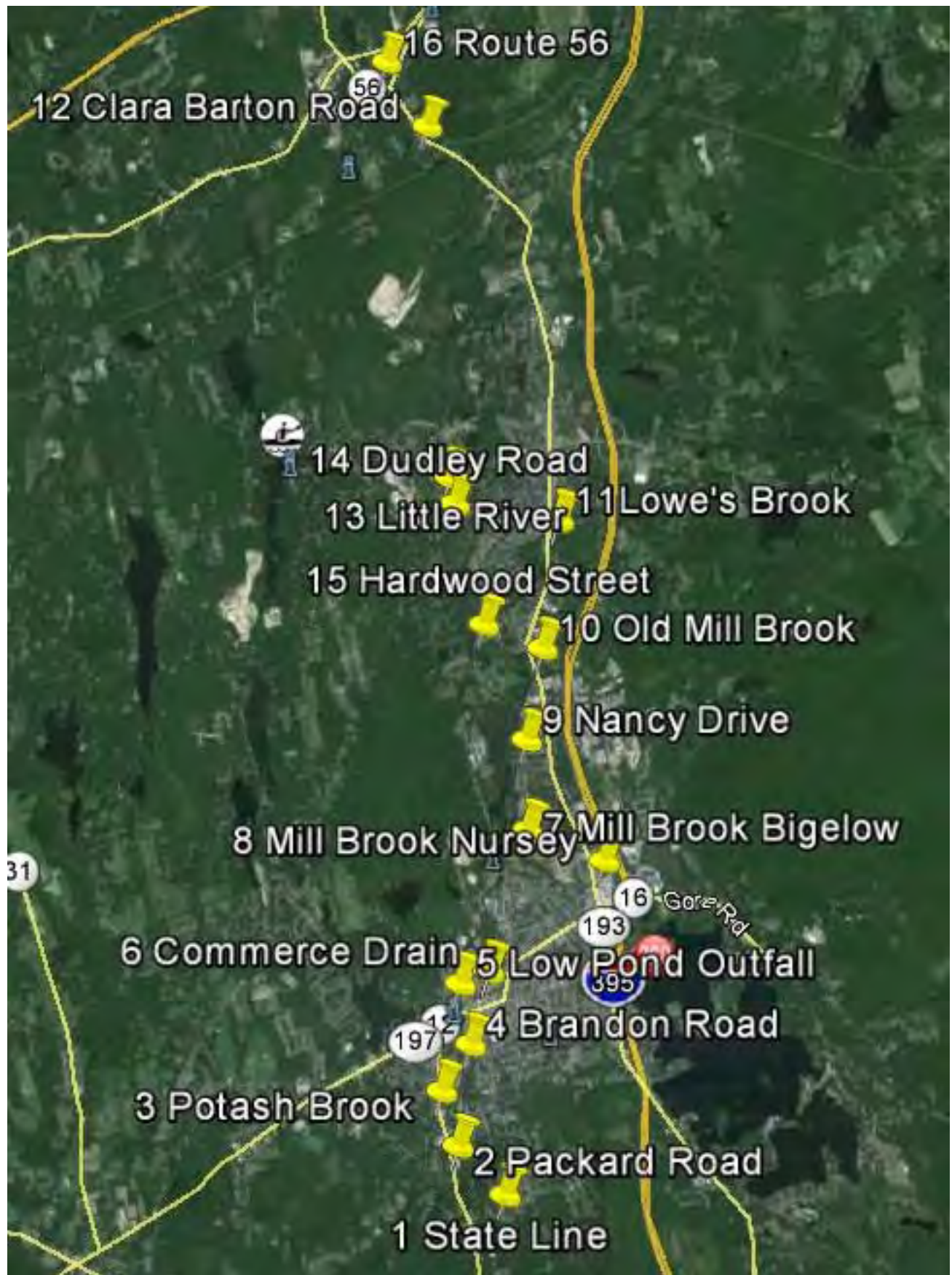


Eleven Year Flow

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 the map on the next page.



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, and over 5 for turbidity. The TROLL rugged reader utilized for August sampling was set to record turbidity in FNUS units. This has since been corrected, but data was not qualified by the sampler.

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	pH	Specific Conductivity	Turbidity	DO	E. Coli
	C		uS/cm	NTUs	mg/l	Col/100ml
*6/27/2017	21.82	7.15	291.2	1.3	8.2	NT
7/13/2017	23.23	6.93	200.4	4.9	8.11	NT
8/17/2017	22.66	6;94	366.6	-8.1 (FNUS)#	7.97	NT

- * Post calibration check not conducted do to problems with the Troll. Data not qualified
- # Data not qualified by sampler

Water at this site is clear and odorless. Elevated conductivity has been observed in previous years, it was also the case this year. The low conductivity in July is related to heavy rain on the previous day.

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 monitored on the west side of the culvert.



Date	Water Temp C	pH	Specific Conductivity uS/cm	Turbidity NTUs	DO mg/l	E. Coli Col/100 ml
*6/27/2017	20.94	6.49	217.5	2.1	6.5	NT
7/13/2017	22.25	6.26	144.0	9.8	6.26	NT
8/17/2017	220.62	6.25	192.5	-6.9 (FNUS)#	6.25	NT

* Post calibration check not conducted do to problems with the Troll. Data not qualified
.# Data not qualified by sampler.

The monitoring location was changed this year to up stream of the Route 12 culvert. 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. Three pH readings were below State standards

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

Potash Brook : 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 C	pH	Specific Conductivity uS/cm	Turbidity NTUs	DO mg/l	E. Coli col/100 ml
*6/27/2017	16.95	7.20	317.5	3.7	7.87	NT
7/13/2017	20.0	6.57	133.8	9.0	8.16	NT
8/17/2017	21.10	7.11	342.1	-7.7 (FNUS)#	8.97	NT

* Post calibration check not conducted due to problems with the Troll. Data not qualified.
Data not qualified by sampler.

Water here is clear and odorless. Water temperatures here are generally the lowest we observe.

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	pH	Specific Conductivity uS/cm	Turbidity NTUs	DO mg/l	E. Coli Col/100ml
* 6/27/2017	22.33	6.97	262.2	1.3	7.78	NT
7/13/2017	24.1	6.96	217.7	2.3	7.84	NT
8/17/2017	21.18	6.79	272.5	-8.9 (FNUS)#	7.89	NT

* Post calibration check not conducted due to problems with the Troll. Data not qualified
Data not qualified by sampler

Water here is clear and odorless. Conductivity was slightly lower this year.

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	pH	Specific Conductivity	Turbidity	DO	E. Coli
	C		uS/cm	NTUs	mg/l	Col/100ml
*6/27/2017	20.71	7.25	146.0	2.9	9.00	NT
7/13/2017	23.5	7.33	124.1	3.1	8.17	NT
8/17/2017		Site not	accessible	due to	road	construction

* Post calibration check not conducted due to problems with the Troll. Data not qualified

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

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	pH	Specific Conductivity	Turbidity	DO	E. Coli
	C		uS/cm	NTUs	mg/l	Col/100ml
* 6/9/2017	17.06	7.60	584.9	2.2	9.60	NT
7/13/2017	18.52	7.17	316.1	2.5	8.72	NT
8/17/2017	17.98	7.55	593.3	-5.8 (FNUS)#	9.13	NT

* Post calibration check not conducted due to problems with the Troll. Data not qualified

.# Data not qualified by sampler.

There is some trash scattered about. Consistently higher levels of conductivity and pH characterize this site. 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 C	pH	Specific Conductivity uS/cm	Turbidity NTUs	DO mg/l	E. Coli Col/100ml
*6/27/2017	22.57	6.54	260.0	1.8	7.4	NT
7/13/2017	24.95	6.55	233.1	1.7	6.55	NT
8/17/2017	20.08	6.37	364.7	-8.1 (FNUS)#	6.47	NT

* Post calibration check not conducted due to problems with the Troll. Data not qualified

Data not qualified by sampler.

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. This is typical of other years. pH is virtually always lower here than upstream at Webster Nursery, observed over the last eleven years. The beaver dam at the Bigelow Road Bridge has been removed and DO readings are consistent with years prior to 2016.

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	pH	Specific Conductivity	Turbidity	DO	E. Coli
	C		uS/cm	NTUs	mg/l	Col/100ml
7/13/2017	25.69	6.77	209.4	0.7	8.33	NT
8/17/2017	23.33	6.80	288.7	-8.9 (FNUS)#	6.80	NT

Data not qualified by sampler.

Water here is generally clear and odorless. There is some trash scattered about the site, and algae and small attached plants were seen on occasion. High levels of conductivity were observed once which is consistent with that seen downstream at Bigelow Road during low flow. 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 C	pH	Specific Conductivity uS/cm	Turbidity NTUs	DO mg/l	E. Coli Col/100ml
7/13/2017	21.89	6.44	387.2	5.6	1.39	NT
8/17/2017		Flow	To low	To sample		

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. DO failed to meet state standards 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	pH	Specific Conductivity	Turbidity	DO	E. Coli
	C16		uS/cm	NTUs	Mg/l	Col/100ml
7/13/2017	21.20	6.82	241.2	1.9	8.48	NT
8/16/2017	16.97	6.53	156.6	-7.8 (FNUS)#	8.74	NT

Data not qualified by sampler.

The water here is clear and odorless. Low DO values which are quite typical of this site were not observed this year. The three-year trend of elevated levels of conductivity was not observed this season.

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	pH	Specific Conductivity	Turbidity	DO	E. Coli
	C		uS/cm	NTUs	Mg/l	Col/100ml
7/13/2017	23.10	6.71	290.2	3.4	6.97	NT
8/17/2017*	20.72/20.73	6.51/6.51	271.6.2/272.3	-5.1/-8.6 (FNUS)#	6.51/6.42	NT

* Duplicate sample

Data not qualified by sampler,

The water here is clear and odorless. There is trash scattered around the site. It is noteworthy that between 2010 and 2015, Lowe's Brook had at least one occasion in which DO values were below state DO standards. Conductivity readings were lower this year

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.



Date	Water Temp C	pH	Specific Conductivity uS/cm	Turbidity NTUs	DO Mg/l	E. Coli Col/100ml
7/13/2017	22.36	7.15	236.8	3.0	8.37	NT
8/16/2017	21.88	7.15	309.9	-5.1 (FNUS)#	8.47	NT

Data not qualified by sampler.

Water here is clear and odorless. High conductivity values were observed on one occasion.

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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	pH	Specific Conductivity	Turbidity	DO	E. Coli
	C		uS/cm	NTUs	Mg/l	Col/100ml
7/13/2017	24.43	6.87	183.4	4.0	7.38	NT
8/17/2017	21.73	7.44	204.1	-8.0 (FNUS)#	6..55	NT

Data not qualified by sampler.

Water here is clear and odorless. There are grassy plants visible. 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 five years.

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	pH	Specific Conductivity	Turbidity	DO	E. Coli
	C		uS/cm	NTUs	mg/l	Col/100ml
7/13/2017	24.06	6.70	221.6	2.6	6.25	NT
8/17/2017	20.79	6.48	273.5	-8.9 (FNUS)#	5.84	NT

Data not qualified by sampler.

The water here is clear and odorless, with grasses observed at mid-season. There has been a summertime dip in DO since we started observing in 2007. The pH level did fall below State standards once this year.

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 C	pH	Specific Conductivity uS/cm	Turbidity NTUs	DO mg/l	E. Coli Col/100ml
7/13/2017	23.78	6.59	243.4	2.6	5.78	NT
8/17/2017	20.82	6.53	274.8	-8.8 (FNUS)#	6.91	NT

Data not qualified by sampler.

The water here is clear and odorless.

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.



Date	Water Temp C	pH	Specific Conductivity uS/cm	Turbidity NTUs	DO mg/l	E. Coli Col/100ml
7/13/2017 *	23.16/23.16	6.87/6.87	238.7/238.9	2.5/2.2	7.54/7.46	NT
8/17/2017	20.92	6.94	347.8	-8.6 (FNUS)#	8.57	NT

* Duplicate sample

Data not qualified by sampler.

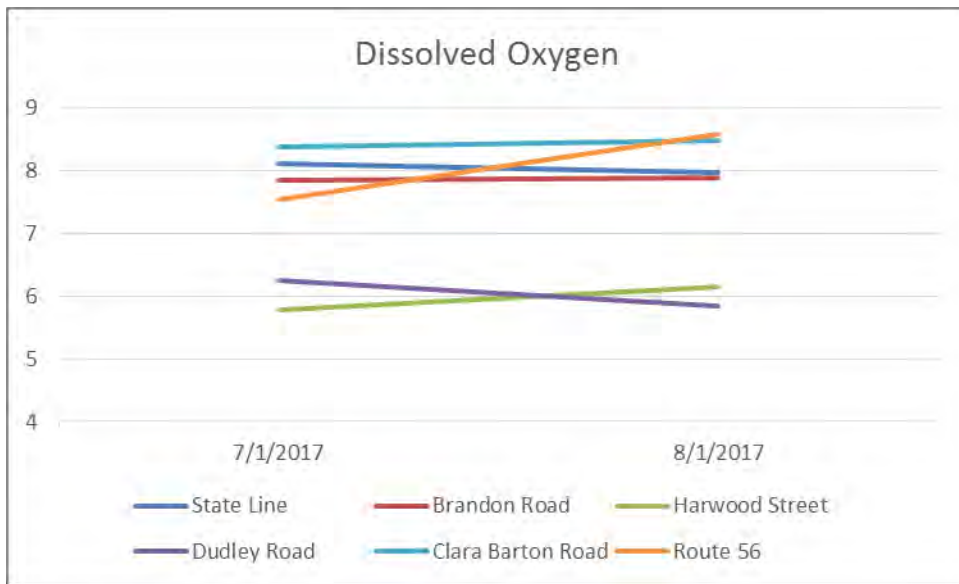
This is the fourth year of monitoring at this site. Water here is clear and odorless. High conductivity was observed on one occasion.

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 2017. Turbidity was not charted this year.

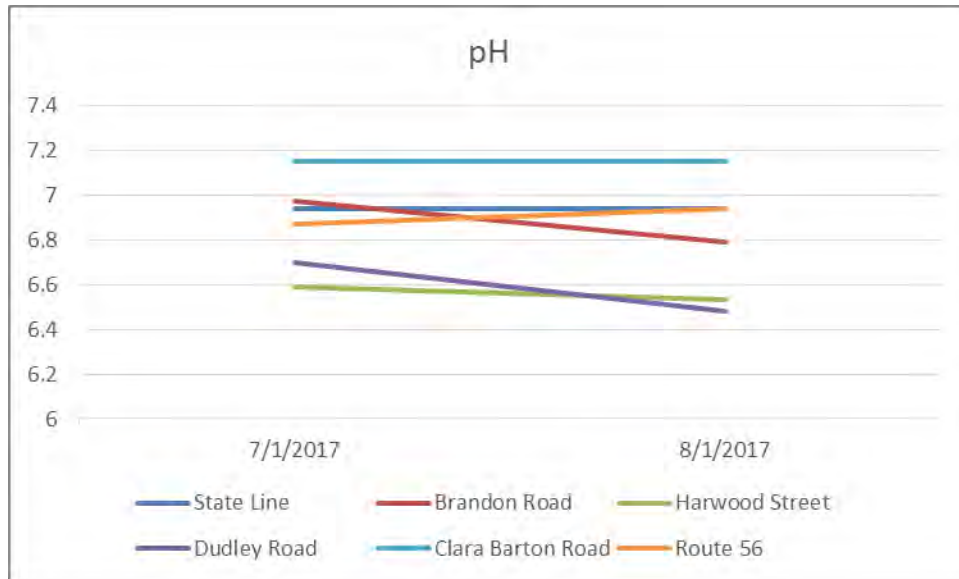
These have been compared with charts from previous years, and we find that the similarity continues. If there is a negative trend to watch, it may be that the dissolved oxygen “dip” at Dudley Road and Harwood Street is becoming deeper and/or broader. This negative trend did not continue this year but will continue to be monitored.

French River Dissolved Oxygen (mg/l)



It is usual to observe Clara Barton, State Line, Brandon Road, and Route 56 exhibiting higher levels of dissolved oxygen throughout the season. Dudley Road and Harwood Street exhibited lower levels but not as low as last year. There was not sufficient data to evaluate the “dip” shown in previous years. Dudley Road was not as low as last year.

French River pH



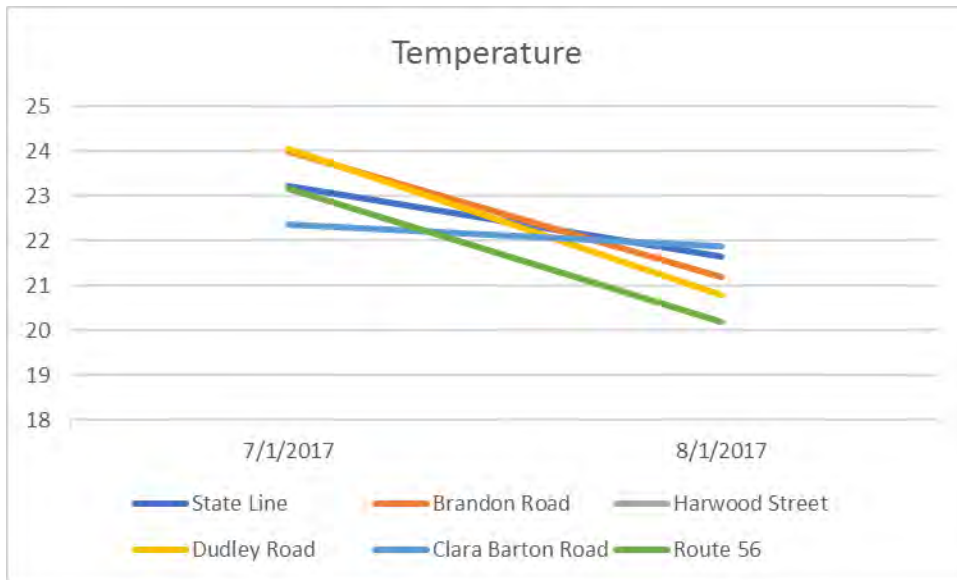
The values of pH, and the relative positions of the lines representing each station, are similar to the previous years. We generally find Clara Barton, State Line, Brandon Road and Route 56 within a 0.5 pH range. This is not true on every date, but most often it is.

French River Specific Conductivity (uSm/cm)



The heavy rain the day before 7/13 sampling resulted in a low specific conductivity for all sites.

French River Temperature (°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 7/13 maybe related to upstream impoundments. The highest temperature was recorded at Brandon Road. Water temperatures are similar to last year. The August water temperature reflects a cooler than normal August.

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 did not provide sufficient information to evaluate the DO dips at Dudley Road, Harwood Street, and Lowe's Brook sites. The "dip" in the French River and Lowe's Brook needs to be evaluated next year.