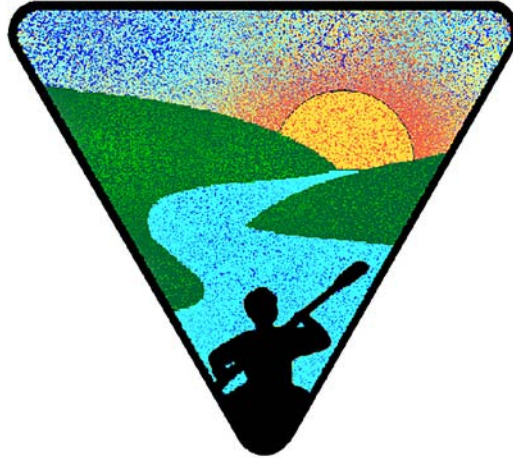


# *French River Connection*



## **2011 Water Quality Monitoring Report TROLL 9500 Data**

**December 17, 2011**

FRENCH RIVER CONNECTION  
46 BROOKSIDE AVENUE, WEBSTER MA 01570

<http://www.frenchriverconnection.org>

[frenchriver@charter.net](mailto:frenchriver@charter.net)

## **Introduction**

This report summarizes the findings of the French River Connection resulting from our 2011 water quality monitoring campaign, utilizing the TROLL 9500. Readers of previous reports will find this much abbreviated, concentrating strictly on findings without description of goals and methods which are contained in Program Plans published by The Last Green Valley, who owns the equipment and provided the necessary calibration material.

We cannot fail to 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:

Judy Nawrocki	Felicia Cierpich	Simone Arent
Amanda DeBartolomeis	Chris Markey	Tim Bell
LuAnn LaFountain	Jean Hixson	Ann Hixson
Tom Ayau	Naomi Kunkel	Pat Kunkel
Ben White	Molly Helock	Jack Josti
Stephanie St. George	Kendra Faldetta	

Over the last seven years, more than 60 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, we have been copying the daily average flow at the Webster USGS gaging station, which is available online, to show the difference in flow each year, during the monitoring season. Five years of data on a chart is becoming unreadable, so for this year we averaged the five years, and show a comparison on the next page of this year, a high flow year, to 2007, a year of very low 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. One might also ask if there are effects from climate change.

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. We can get an idea about how these subjective measures might be derived from the Webster gage by considering the following: In the last five years, we have taken recorded 1248 gage readings.

Very low: 10% are 11 cu ft/sec or below

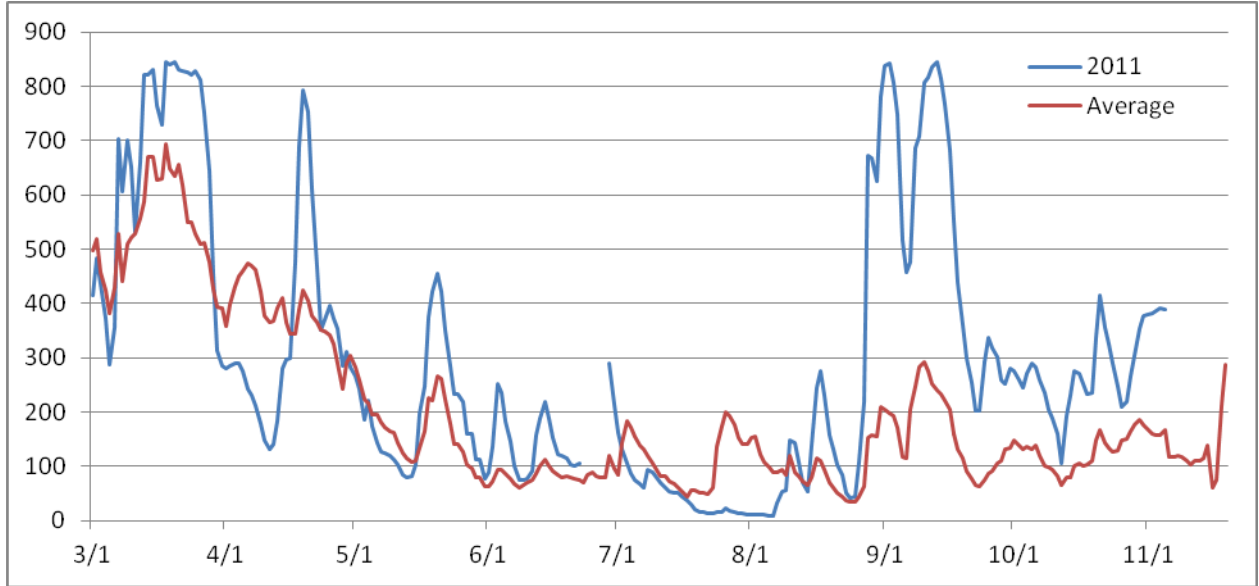
Low: 20% are between 12 and 47 cu ft/sec inclusive

Average: 40% are between 48 and 233 cu ft/sec inclusive

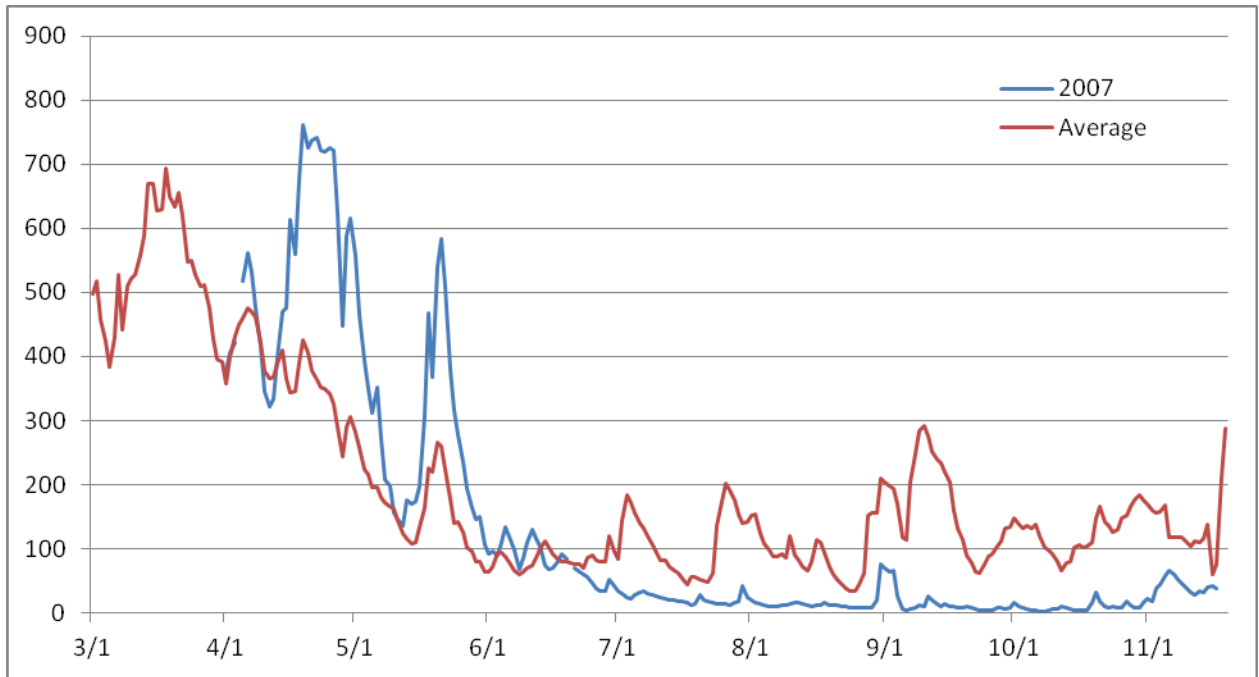
High: 20% are between 234 and 540 cu ft/sec inclusive

Very High: 10% are 541 cu ft/sec or above

Or, one might also simply separate the data into quintiles.



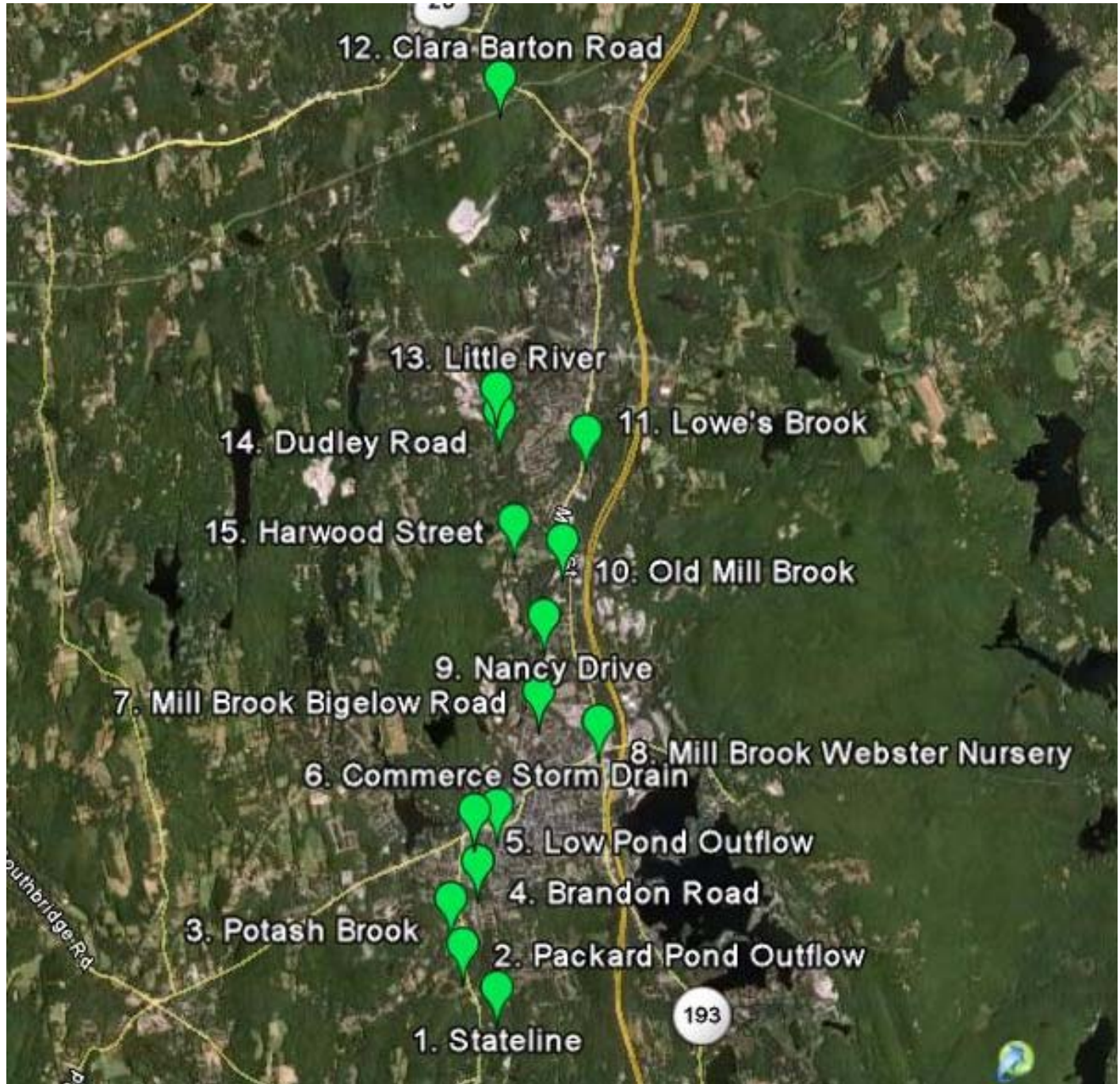
Higher than average flows (2011)



Lower than average flows (2007)

## Site reports

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



In these reports, we take note of pH values below 6.5 and DO below 5 mg/l which are the state standards, and also conductivity above 300 uSm/cm.

**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.



<b>Date</b>	<b>Water Temp</b>	<b>pH</b>	<b>Conductivity</b>	<b>Turbidity</b>	<b>DO</b>
	<b>C</b>		<b>uSm/cm</b>	<b>NTUs</b>	<b>mg/l</b>
4/2/2011	4.73	6.83	128.8	0.9	11.48
5/7/2011	14.49	7.07	167.5	1.4	9.66
6/4/2011	19.01	6.97	159.2	2.4	8.88
7/2/2011	21.85	7.14	182.2	2.2	8.40
8/3/2011	22.80	6.75	347.5	1.1	7.34
8/29/2011	19.99	6.88	118.1	4.9	8.65
10/1/2011	19.80	6.85	146.2	2.4	8.39
11/5/2011	6.07	6.85	106.5	1.6	12.18

Water at this site is clear and odorless. As is usual for this site, elevated conductivity is observed during low flow. 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.



<b>Date</b>	<b>Water Temp</b>	<b>pH</b>	<b>Conductivity</b>	<b>Turbidity</b>	<b>DO</b>
	<b>C</b>		<b>uSm/cm</b>	<b>NTUs</b>	<b>mg/l</b>
4/2/2011	5.12	6.73	98.9	1.2	11.04
5/7/2011	15.21	6.86	163.6	1.8	8.94
6/4/2011	18.59	6.63	177.7	2.2	7.08
7/2/2011	20.97	6.75	172.1	1.1	7.30
8/3/2011	20.19	6.52	190.5	3.3	6.15
8/29/2011	19.19	6.48	188.1	5.0	7.37
10/1/2011	18.60	6.44	152.3	1.7	6.99
11/5/2011	5.32	6.64	107.2	2.8	11.66

Water at this site is clear and odorless. There are small articles of trash scattered about, and plants along the sides of the channel. pH values below 6.5 do not meet state standards. This last occurred in 2008.

**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.



<b>Date</b>	<b>Water Temp</b>	<b>pH</b>	<b>Conductivity</b>	<b>Turbidity</b>	<b>DO</b>
	<b>C</b>		<b>uSm/cm</b>	<b>NTUs</b>	<b>mg/l</b>
4/2/2011	4.19	6.84	162.4	2.0	11.39
5/7/2011	12.03	6.86	200.3	2.5	9.08
6/4/2011	13.83	7.09	188.0	2.0	9.07
7/2/2011	18.08	7.13	184.0	2.6	8.38
8/3/2011	17.86	7.00	189.7	3.2	7.80
8/29/2011	17.17	6.81	113.4	3.0	8.38
10/1/2011	17.65	6.78	167.2	1.1	7.68
11/5/2011	4.86	6.86	119.6	1.9	11.97

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.

**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



<b>Date</b>	<b>Water Temp</b>	<b>pH</b>	<b>Conductivity</b>	<b>Turbidity</b>	<b>DO</b>
	<b>C</b>		<b>uSm/cm</b>	<b>NTUs</b>	<b>mg/l</b>
4/2/2011	4.75	6.77	120.2	1.2	11.78
5/7/2011	14.92	7.04	153.1	1.2	9.71
6/4/2011	19.31	6.82	151.7	1.9	8.54
7/2/2011	22.12	7.04	167.5	1.7	8.15
8/3/2011	22.50	6.96	256.1	1.1	7.04
8/29/2011	20.10	6.76	108.0	5.1	8.38
10/1/2011	19.85	6.58	135.5	2.0	7.77
11/5/2011	5.90	6.76	99.5	1.8	11.98

Water here is clear and odorless. Parameter values found are consistent with earlier years.

**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 C	pH	Conductivity uSm/cm	Turbidity NTUs	DO mg/l
4/2/2011	5.09	7.00	59.1	1.5	11.87
5/7/2011	15.52	7.26	91.3	2.3	9.64
6/4/2011	19.19	7.08	104.4	3.0	8.72
7/2/2011	22.21	7.17	105.6	4.9	8.34
8/3/2011	19.16	6.90	132.5	6.4	7.61
8/29/2011	21.79	7.44	98.8	6.1	8.70
10/1/2011	20.49	7.11	90.7	3.1	8.54
11/5/2011	7.08	7.09	69.1	2.7	12.15

Water here is generally clear and odorless. There is some trash in the channel. It is not surprising that slightly elevated turbidity levels were observed after tropical storm Irene, but the higher level on 8/3 when flow was very low is unexpected.

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. In 2005 high coliform counts were found on the only occasion measured. 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 C	pH	Conductivity uSm/cm	Turbidity NTUs	DO mg/l
4/2/2011	6.83	6.86	304.8	4.1	11.17
5/7/2011	11.96	7.27	294.2	1.0	10.13
6/4/2011	15.83	7.18	274.1	1.2	8.92
7/2/2011	18.65	7.40	255.2	4.3	8.64
8/3/2011	18.36	7.48	285.7	1.5	8.81
8/29/2011	18.32	7.05	291.5	1.9	8.58
10/1/2011	18.22	7.07	317.8	1.8	8.00
11/5/2011	10.88	6.94	293.4	2.5	11.19

Water here is clear and odorless, with the exception of a musky odor noted on 10/1. 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 closed 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	Conductivity uSm/cm	Turbidity NTUs	DO mg/l
4/2/2011	5.03	6.59	118.3	0.7	12.00
5/7/2011	13.50	6.50	399.5	1.5	6.67
6/4/2011	13.56	6.39	481.8	2.4	5.09
7/2/2011	23.12	6.50	209.8	1.2	7.51
8/3/2011	17.93	6.47	581.2	0.9	6.53
8/29/2011	21.54	6.34	166.4	1.8	7.80
10/1/2011	20.86	6.18	161.0	0.8	7.33
11/5/2011	7.74	6.50	117.6	0.7	11.42

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. Periodic high levels of conductivity correspond to very low flows. There are four occasions where the state standard for pH is not met, and it is barely met in the remainder of cases. This is typical of other years. pH is virtually always lower here than upstream at Webster Nursery, observed over the last seven years. Although meeting state standards, a low level of DO was observed 6/4. Upstream at Webster Nursery, no such low value is seen. Do has failed to meet state standards on occasion in other years; in 2010 it reached 3.76 mg/l, the lowest seen at the site.

**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  
stump grinding operation. Park in the Webster  
Nursery parking lot and monitor on the west  
side of the bridge.



<b>Date</b>	<b>Water Temp</b>	<b>pH</b>	<b>Conductivity</b>	<b>Turbidity</b>	<b>DO</b>
	<b>C</b>		<b>uSm/cm</b>	<b>NTUs</b>	<b>mg/l</b>
4/2/2011	4.85	6.80	112.0	0.9	12.38
5/7/2011	16.08	7.04	286.4	0.8	9.20
6/4/2011	17.10	7.01	529.8	1.3	8.84
7/2/2011	24.06	6.87	188.7	0.9	8.36
8/3/2011	21.89	6.88	644.4	1.2	8.03
8/29/2011	22.16	6.74	160.1	2.1	8.07
10/1/2011	21.20	6.44	149.0	0.5	8.70
11/5/2011	8.16	6.82	109.4	0.7	12.03

Water here is generally clear and odorless, with the exception of an oily appearance on 6/4. Considerable oil had been noted late in 2010, and more was expected, but with this exception, it was not observed. There is some trash scattered about the site, and algae and small attached plants were seen on occasion. pH failed to meet state standards on one occasion, which is typical, and high levels of conductivity observed twice are 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.

**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.



<b>Date</b>	<b>Water Temp</b>	<b>pH</b>	<b>Conductivity</b>	<b>Turbidity</b>	<b>DO</b>
	<b>C</b>		<b>uSm/cm</b>	<b>NTUs</b>	<b>mg/l</b>
4/2/2011	4.06	6.68	706.1	3.2	9.34
5/7/2011	14.86	6.76	707.5	1.3	5.78
6/4/2011	15.09	6.57	713.4	2.0	3.12
7/2/2011	19.10	6.67	743.7	1.7	3.29
8/3/2011	20.09	6.60	724.1	3.6	2.35
8/29/2011	19.67	6.51	255.2	4.2	2.50
10/1/2011	17.61	6.52	622.1	1.5	1.81
11/5/2011	4.03	6.69	436.7	3.4	7.34

Water here is clear and odorless. Duckweed was observed in May. The extreme high levels of conductivity and low levels of DO, far below state standards, are typical of this site.

**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 C	pH	Conductivity uSm/cm	Turbidity NTUs	DO mg/l
4/2/2011	3.76	6.87	221.5	0.9	11.87
5/7/2011	13.46	7.00	298.8	2.0	9.37
6/4/2011	13.44	6.73	337.4	1.2	8.69
7/2/2011	15.57	6.83	652.4	1.6	8.49
8/3/2011	19.34	6.17	366.4	2.8	3.62
8/29/2011	17.93	6.90	122.5	4.0	8.84
10/1/2011	17.50	6.81	215.6	1.2	8.23
11/5/2011	3.58	6.88	148.3	1.0	12.84

The water here is clear and odorless. It failed once each to meet state standards for pH and DO, at the low water mark for the year. Elevated levels of conductivity were observed three times. These results are quite typical of this site, although it may be noted 3.62 mg/l is the lowest level of DO ever recorded here.

**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 C	pH	Conductivity uSm/cm	Turbidity NTUs	DO mg/l
4/2/2011	5.89	6.82	162.0	1.7	11.18
5/7/2011	15.23	6.88	220.8	3.2	8.78
6/4/2011	18.88	6.63	267.3	3.9	6.31
7/2/2011	22.49	6.76	184.6	1.5	6.68
8/3/2011	22.41	6.46	388.1	2.8	2.76
8/29/2011	20.17	6.47	90.4	5.0	8.05
10/1/2011	19.70	6.60	196.3	10.5	6.98
11/5/2011	6.11	6.74	120.0	4.3	11.47

The water here is odorless, but was characterized as murky during the last two observations of the year, and this was borne out by the turbidity measurement 10/1. Often in the past this subjective observation has been made here without being corroborated by the measured turbidity. There is trash scattered around the site. Very low DO (well below state standards) and elevated conductivity were observed during the lowest flow on 8/3. Although Lowe's Brook failed to meet DO standards twice in 2010, the levels were above 4 mg/l. It is noteworthy that before 2010, Lowe's Brook did not come close to failing to meet DO standards. This may be because Lowe's Pond was drawn down for dam repair in 2010. pH levels were slightly below state standards twice; this is rare but not unprecedented.

Water levels were unusually high during the last three observations due to beaver activity downstream. These levels have never been observed before even at the periods of highest flow.

**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. It is the furthest upstream site that we will be monitoring and gives us a baseline for all down stream monitoring. 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.



<b>Date</b>	<b>Water Temp</b>	<b>pH</b>	<b>Conductivity</b>	<b>Turbidity</b>	<b>DO</b>
	<b>C</b>		<b>uSm/cm</b>	<b>NTUs</b>	<b>mg/l</b>
4/2/2011	3.99	7.06	115.2	2.1	12.37
5/7/2011	15.69	7.36	136.3	1.2	9.74
6/4/2011	18.34	7.13	120.9	2.3	9.28
7/2/2011	22.15	7.30	150.0	2.6	8.56
8/3/2011	23.33	7.04	187.1	1.6	7.66
8/29/2011	19.92	6.92	84.8	5.3	8.99
10/1/2011	19.13	7.14	112.5	2.1	8.79
11/5/2011	5.21	7.10	85.0	2.5	12.90

Water here is clear and odorless, with the exception of a “tea” color noted on 8/29 following tropical storm Irene. pH levels are consistently higher here than other sites. The results seen here are consistent with earlier 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



<b>Date</b>	<b>Water Temp</b>	<b>pH</b>	<b>Conductivity</b>	<b>Turbidity</b>	<b>DO</b>
	<b>C</b>		<b>uSm/cm</b>	<b>NTUs</b>	<b>mg/l</b>
4/2/2011	4.62	6.76	98.5	2.1	11.83
5/7/2011	16.08	6.96	121.6	1.5	9.40
6/4/2011	20.36	6.85	142.4	1.6	8.29
7/2/2011	22.86	7.06	147.8	1.5	7.81
8/3/2011	22.25	6.62	193.6	0.7	7.86
8/29/2011	21.07	6.89	112.6	5.4	7.99
10/1/2011	19.77	6.63	101.6	3.4	7.65
11/5/2011	6.33	7.02	86.1	1.5	11.98

Water here is clear and odorless, except for a murky observation 8/29 following tropical storm Irene. There are grassy plants visible as early as May until October. The Little River failed to meet DO standards once and pH standards three times in 2010, but that had not been seen before and was not repeated this year.

**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 C	pH	Conductivity uSm/cm	Turbidity NTUs	DO mg/l
4/2/2011	4.78	6.58	112.7	1.4	11.51
5/7/2011	16.14	7.00	139.4	2.1	9.72
6/4/2011	19.83	6.72	142.5	2.0	7.84
7/2/2011	22.62	6.89	155.8	3.4	7.70
8/3/2011	22.29	6.50	221.1	1.2	3.73
8/29/2011	21.13	6.81	117.7	3.9	7.80
10/1/2011	19.44	6.45	118.0	1.5	6.74
11/5/2011	5.93	6.74	91.6	1.6	11.70

The water here is clear and odorless, with grasses observed at mid-season. State standards are not met once each for pH and DO, the latter at the lowest flow. Although there has been a summertime dip in DO since we started observing in 2007, 2010 was the first year it failed state standards, and this year is the lowest value measured.

**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



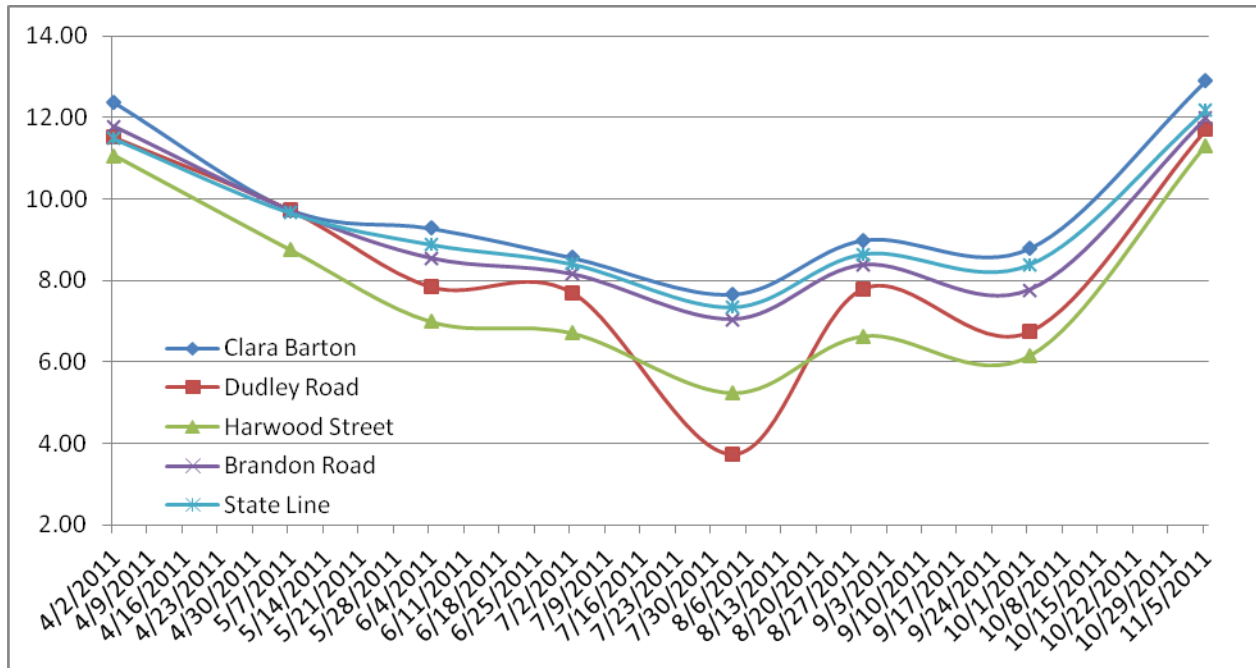
Date	Water Temp C	pH	Conductivity uSm/cm	Turbidity NTUs	DO mg/l
4/2/2011	4.67	6.61	117.2	1.4	11.06
5/7/2011	15.45	6.82	151.5	2.2	8.75
6/4/2011	18.93	6.56	145.6	2.8	6.99
7/2/2011	21.81	6.92	158.0	2.4	6.71
8/3/2011	21.55	6.65	236.1	1.2	5.25
8/29/2011	20.29	6.44	104.0	3.3	6.64
10/1/2011	19.19	6.42	130.4	3.0	6.16
11/5/2011	5.42	6.67	94.6	1.9	11.31

The water here is clear and odorless; a characterization of “murky” on 8/29 is not borne out by the turbidity measurement. Algae was observed during the lowest flow 8/3, and was not noted again. One year in the past there were widespread mats of it. Grasses were noted later in the season. State standards for pH were not met twice, and DO barely met standards on one occasion; it failed once in both 2010 and 2009, but not before that.

## **French River Parameter Graphs**

Since 2007, we have been creating plots, one per parameter, showing the variation of each over the monitoring season for each of the five main stem locations. 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 2011. 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.

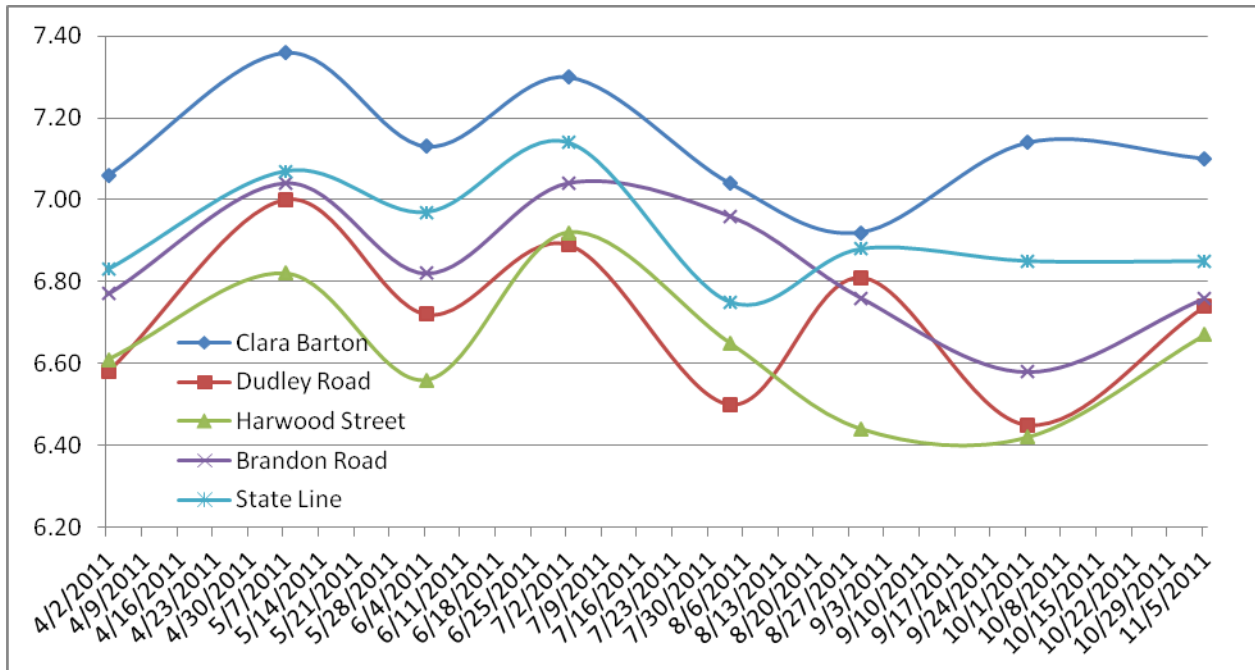
## French River Dissolved Oxygen (mg/l)



It is usual to observe Clara Barton, State Line, and Brandon Road exhibiting higher levels of dissolved oxygen throughout the season, and in that order, as they do here, and for Dudley Road and Harwood Street to exhibit a significant decrease. The low value at Dudley Road is as low as any we've seen there. In some previous years Harwood Street was the lowest; in 2010 it too was approximately 4 mg/l. In some previous years, the "dip" is broader. The possibility of that was probably cut short in 2011 by high water at the end of August.

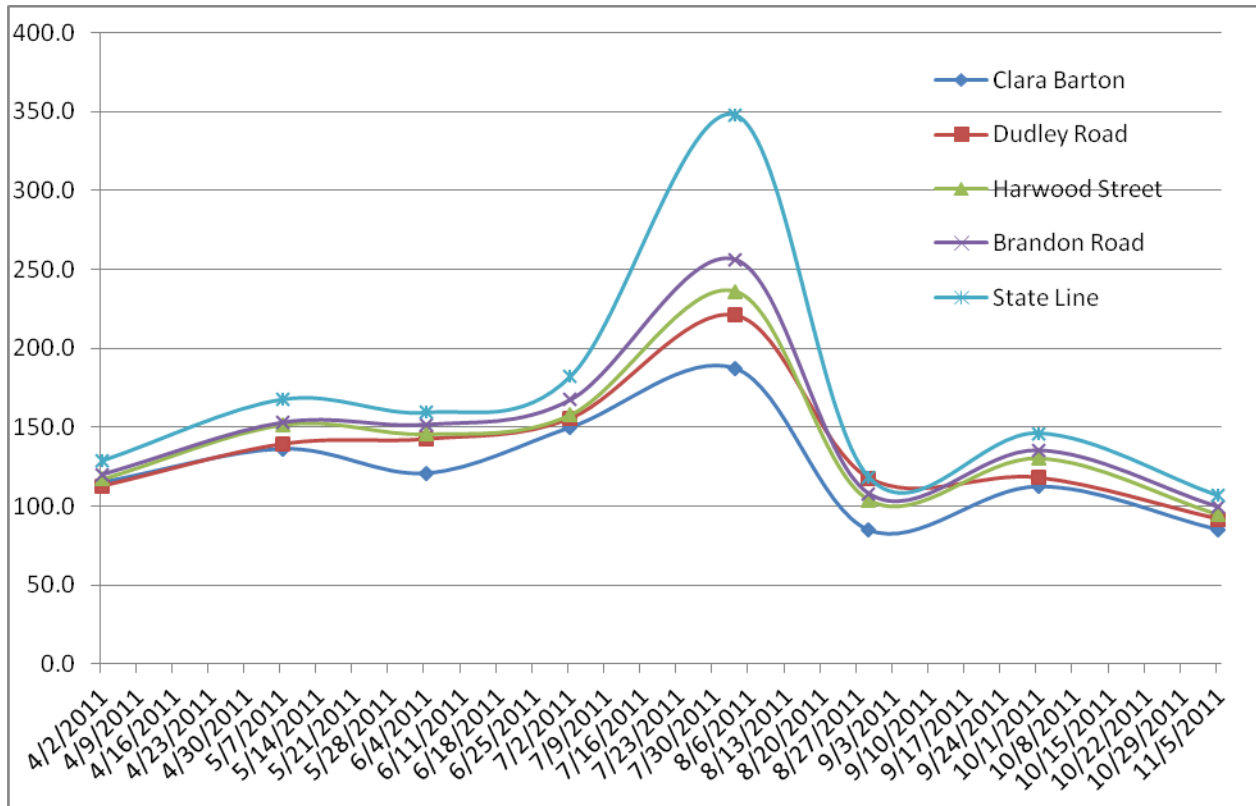
Dissolved oxygen rarely goes below 7 mg/l at three of the stations, but there is a decrease below 6, and as low as 4 mg/l which occurs at the other two, and it is possibly becoming more pronounced.

## French River pH



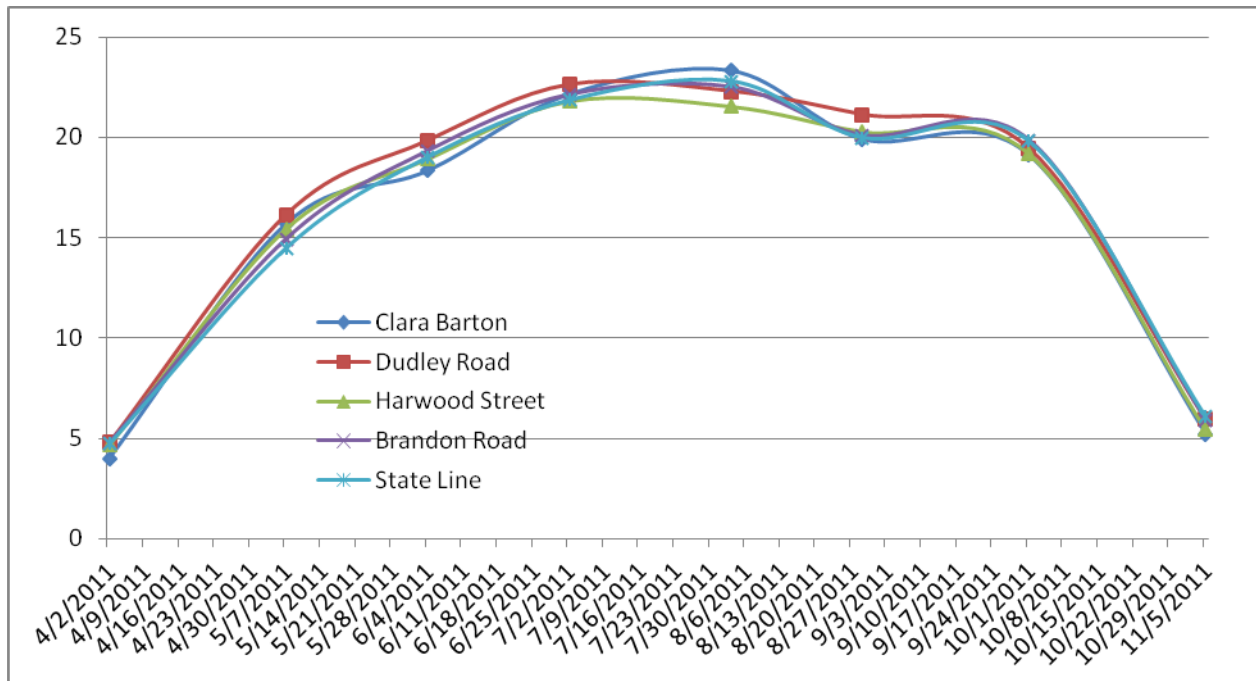
The values of pH, and the relative positions of the lines representing each station, are familiar from the previous years, where we generally find Clara Barton the highest, followed by State Line and Brandon Road. This is not true on every date, but most often it is. Dudley Road and Harwood Street are almost always lower than any of the other three, with Harwood Street most often the lowest.

## French River Conductivity (uSm/cm)



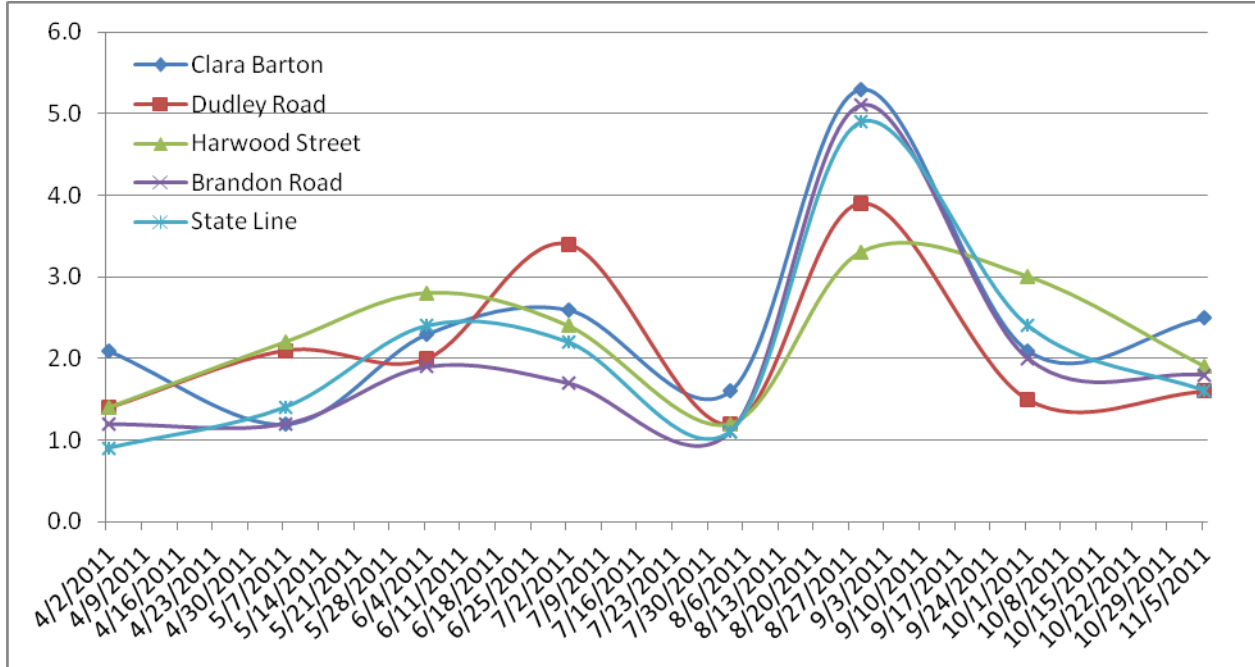
It is usual to find the highest values of conductivity at State Line, and for a significant spike in conductivity to appear at the lowest flow of the season. Often it is more than one date wide, but it did not have a chance to be repeated this year due to high flows. Values under similar conditions at 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 2011, in fact it is consistently lowest, and that is seen in some other years for most measurements, even if a spike is also exhibited. As in 2011, it is common for Brandon Road to have the second-highest conductivity.

## French River Temperature (°C)



In previous years, temperature has been recorded in Fahrenheit. Water temperature is extremely weather dependent, and always very similar over the length of the river. Here we can note that the highest of the highs occurs at Clara Barton Road. Temperature data logging in previous years confirmed this as a warm location, possibly because the river has just left a broad shallow impoundment. Finding Harwood Street to have the lowest of the highs is not unexpected from previous years, nor is it surprising to find Dudley Road to measure near the highest throughout the season.

## 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. The spike here is due to the heavy rains of tropical storm Irene. The only other example of a similar spike occurred in the spring of 2010.

## Conclusion

We are confident in the correct operation of the TROLL and the quality of the data and observations recorded throughout the season. We did not find great departures from data taken in previous years, but we do note that tropical storm Irene greatly increased late summer flow, almost to flood stage, so that our late summer findings are one date wide, not the usual two.

The results of this campaign and 2010 give us something to watch in the future. We have a hint of deeper and broader dips in DO occurring during late summer at Dudley Road and Harwood Street, and beginning to occur at Lowe's Brook. 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 last six years.

