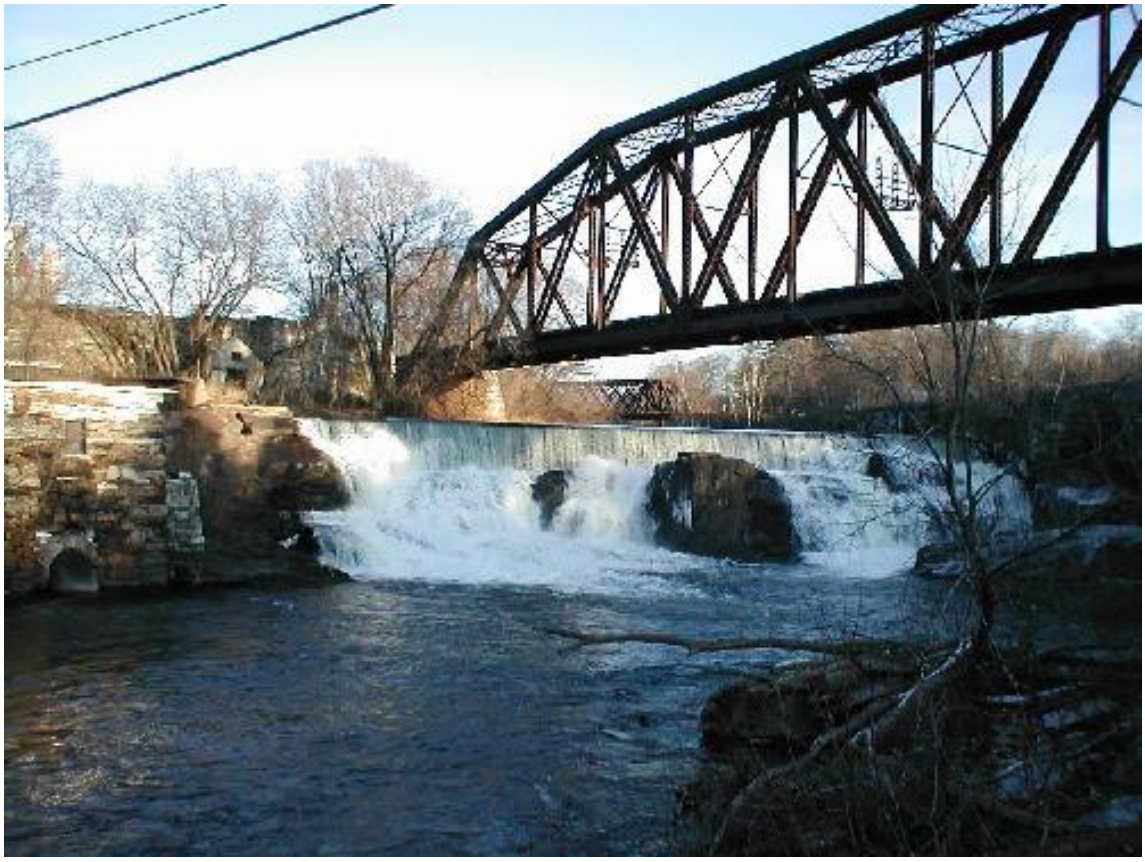
2007 UPPER OTTER CREEK WATERSHED COUNCIL
WATER QUALITY MONITORING PROGRAM



http://www.meadnewsletter.com/images/500_falls1.jpg

Submitted by
The Upper Otter Creek Watershed Council
c/o Nanci McGuire
Rutland Natural Resource Conservation District
170 South Main Street
Rutland, VT 05701
nanci.mcguire@vt.nacdnet.net

Submitted to
VT Department of Environmental Conservation
103 S. Main 10N Waterbury VT 05671-0408

Funding to create this report was provided by the Natural Resource Conservation Council, Clean and Clear Funds.

2007 Upper Otter Creek Water Quality Monitoring Results

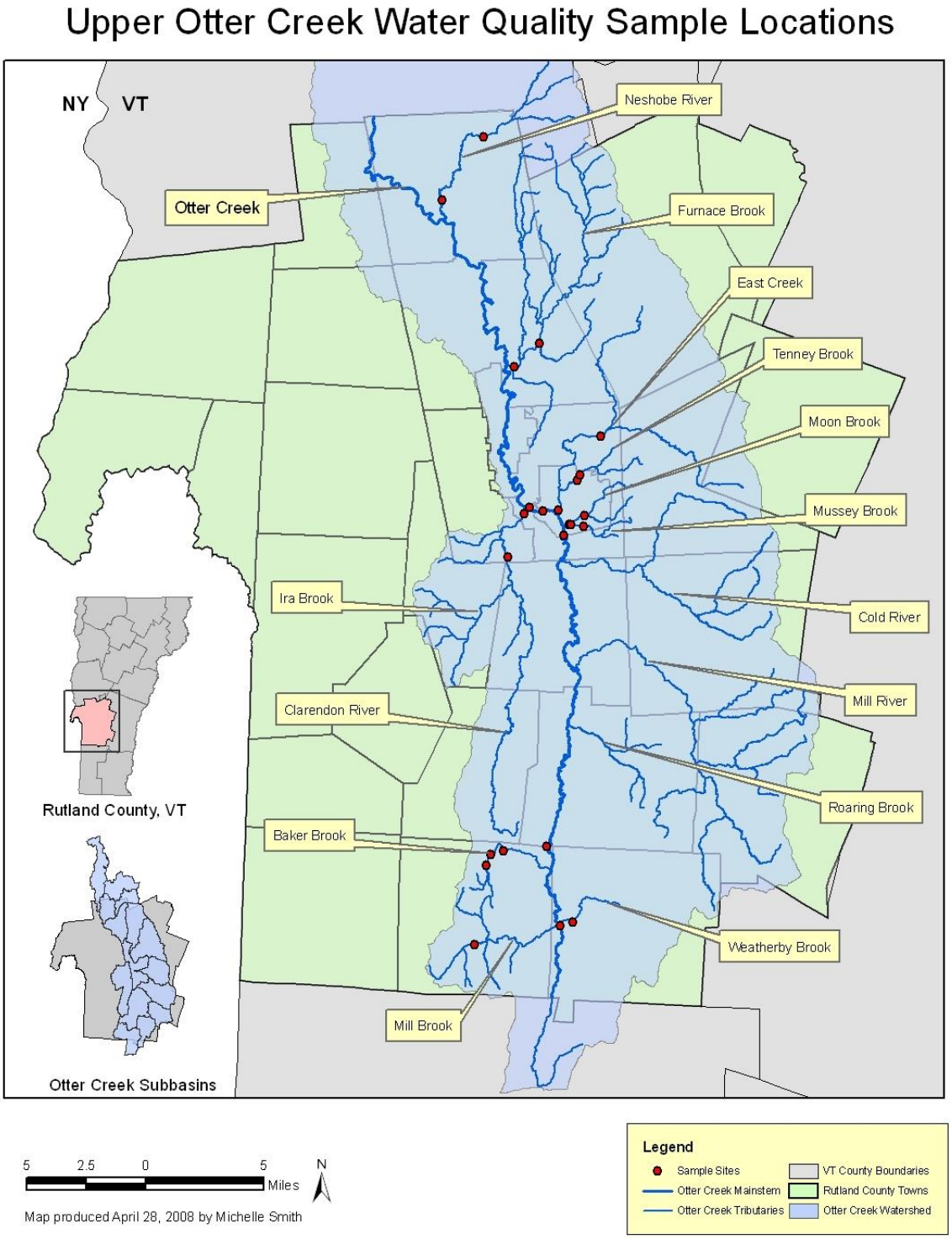
Sample Locations

All sampling sites monitored for this project were located in Rutland County on the mainstem of the Otter Creek or on significant tributaries to the Otter Creek. Many of these waters are those that have been identified in the *2004EPA 303(d) List* as waters either consistently not meeting Vermont Water Quality Standards (2000) or waters in need of further assessment. The following table lists all of the sites monitored in 2007 and their location in the watershed.

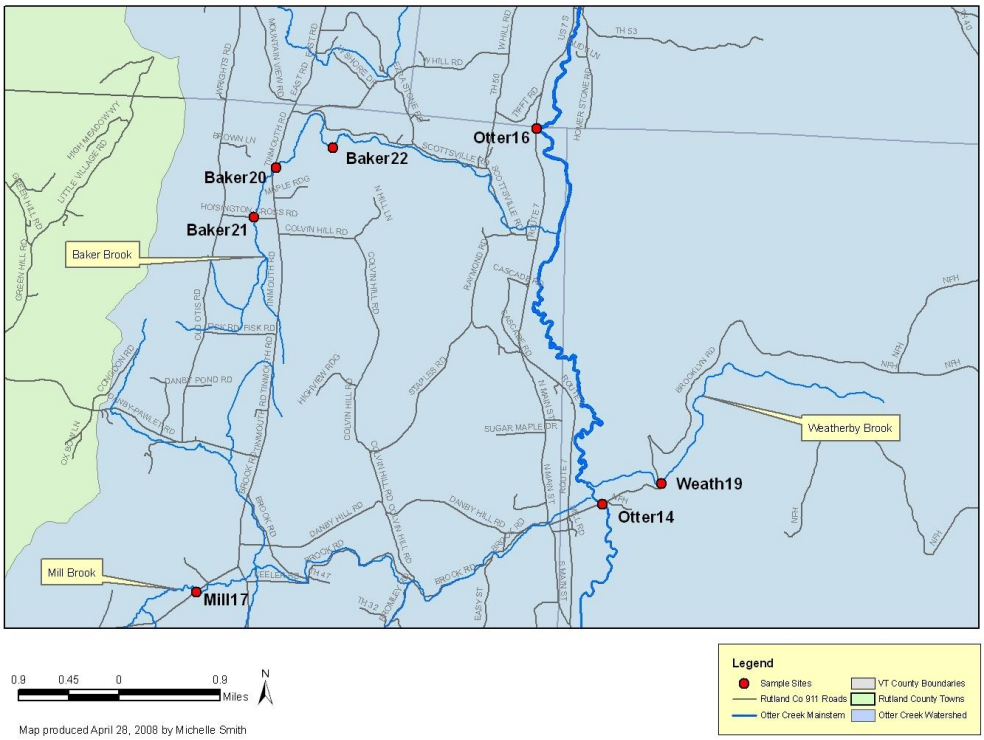
Table 1: Sample names and locations for Upper Otter Creek Watershed Council Summer 2007 water quality monitoring project.

Description of the project waters: for 2007 Sampling	
Site	**Description**
Moon02	Avenue B at recreation area (Whites Pool)
Moon03	Below Forest St. Bridge
Muss04	Upstream from Park St. Bridge
Muss05	Before entering the Rutland County Fairgrounds
East07	Meadow St. at recreation area
East10	Chittenden Road
Tenn10	Lincoln Avenue Park
Tenn12	Route 7 North – behind Sewards Restaurant
Otter14	Mount Tabor Road crossing
Otter16	Rest Area/Pull Off Rte 7
Otter17	Park Street extension
Otter18	Upstream of Ripley Bridge
Otter19	Downstream of Business Route 4 Bridge
Mill17	Bridge, just south of Keeler Road: Local swimming hole
Weath19	Smokey House Center monitoring program # WB1 minimal impact headwaters reference site
Baker20	East Road Bridge
Baker21	Hossington Crossroad in Danby
Baker22	Baker Brook Road
Furn01	Oxbow Road
Furn02	Upstream of Cooley Bridge
Clar07	West Rutland Recreation Area
Clar08	Business Route 4A crossing
Nesh01	Route 53 crossing
Nesh02	Union Street crossing

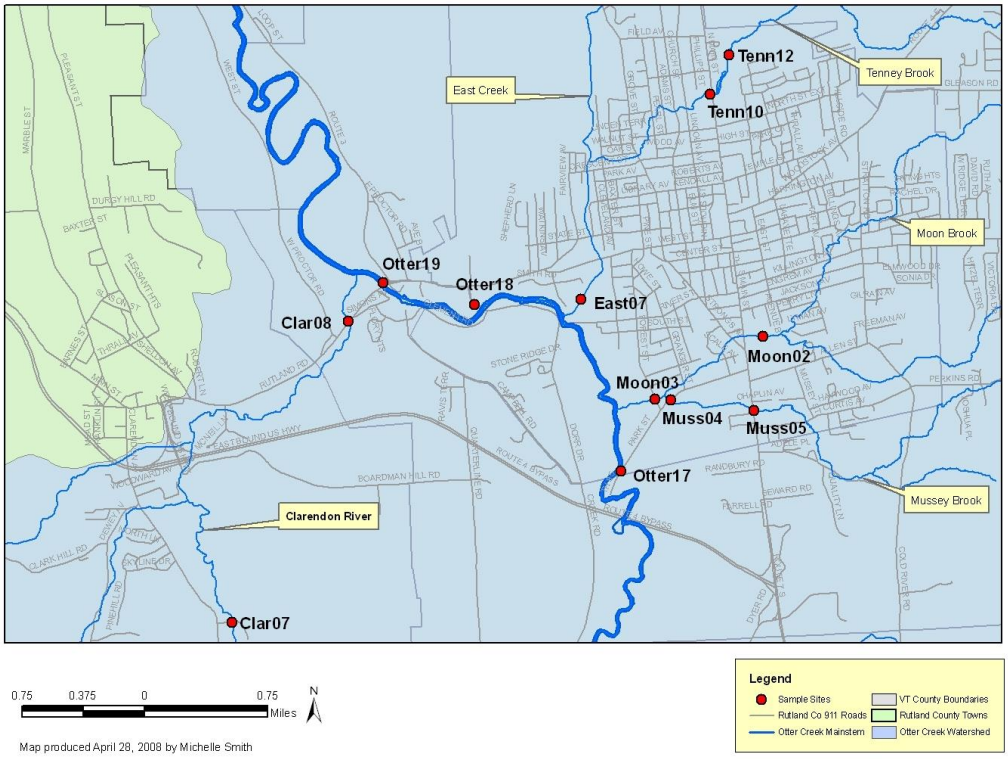
The following maps show the locations of all of the sampling sites in this study:



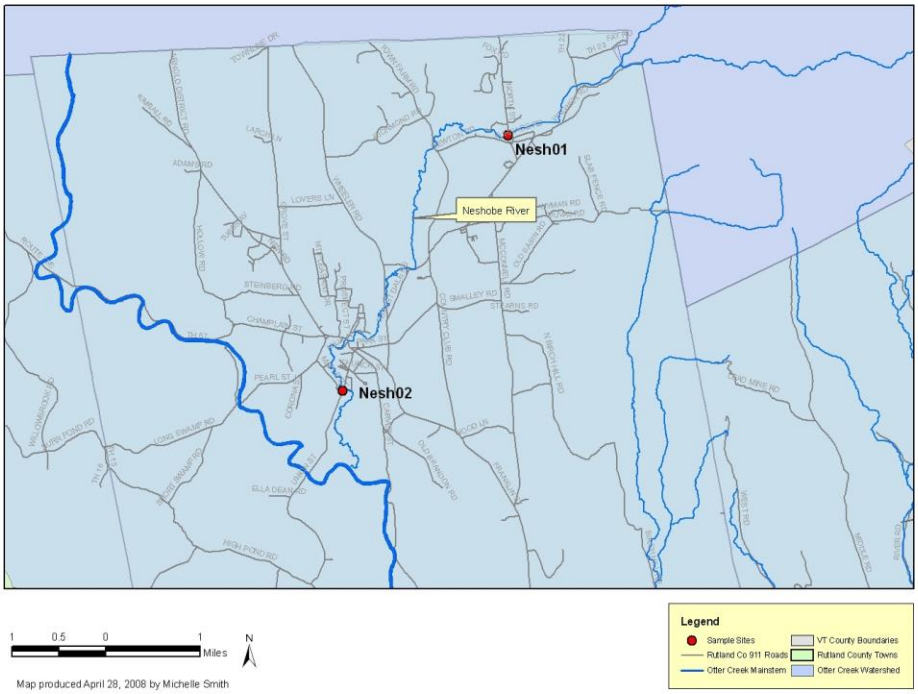
Upper Otter Creek Water Quality Sample Locations: Mount Tabor and Danby



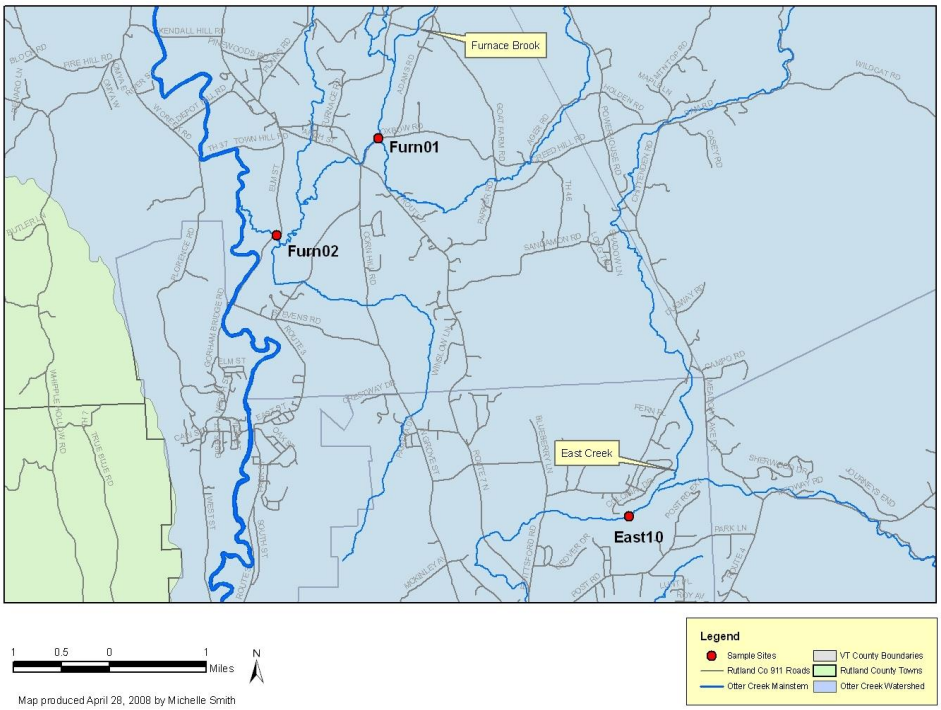
Upper Otter Creek Water Quality Sample Locations: Rutland Area



Upper Otter Creek Water Quality Sample Locations: Brandon



Upper Otter Creek Water Quality Sample Locations: Pittsford and Rutland



Methodology

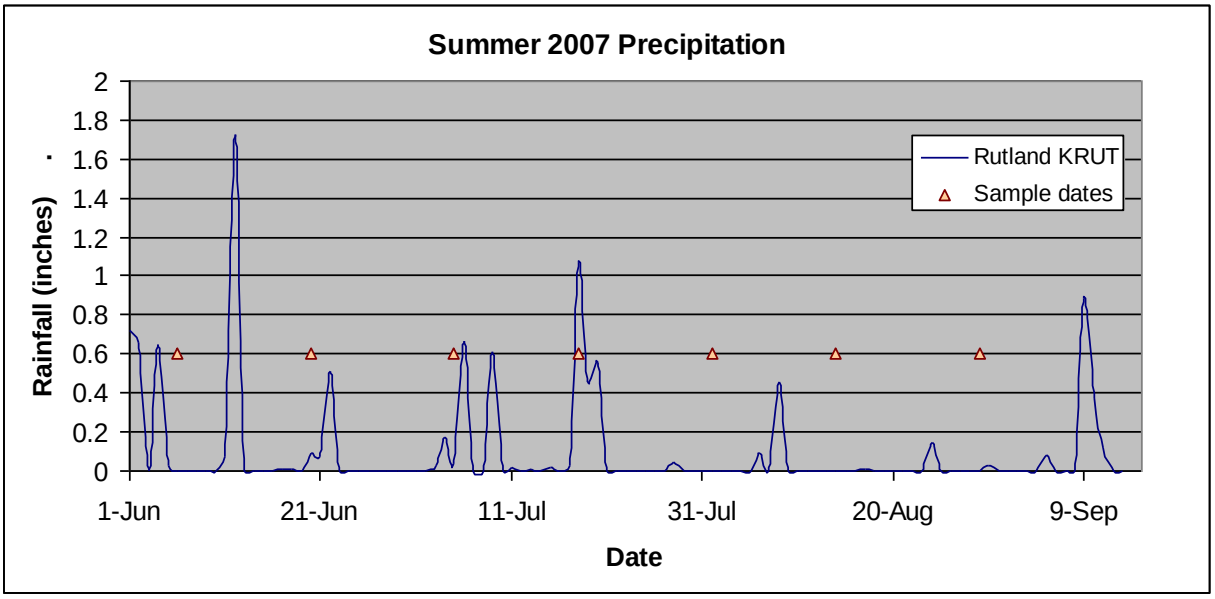
UOCWC followed all training, sample collection and sample transport protocols outlined in their June 2007 QAPP. The training schedule can be found in Appendix A.

Samples were collected at the above twenty four locations at seven dates (every other Tuesday morning between June 6 and August 29, 2007 throughout the summer). 100% of the proposed samples were collected and analyzed. Samples were reviewed for quality assurance (QA) and quality control (QC) and all sample results (field blanks, field duplicates and an extra phosphorus sample per batch for the matrix spike) were compiled and are listed in Appendix B.

Results

Streamflow Data

Chart 1: Streamflow data measured at the USGS gage station below Rutland Falls, Center Rutland.

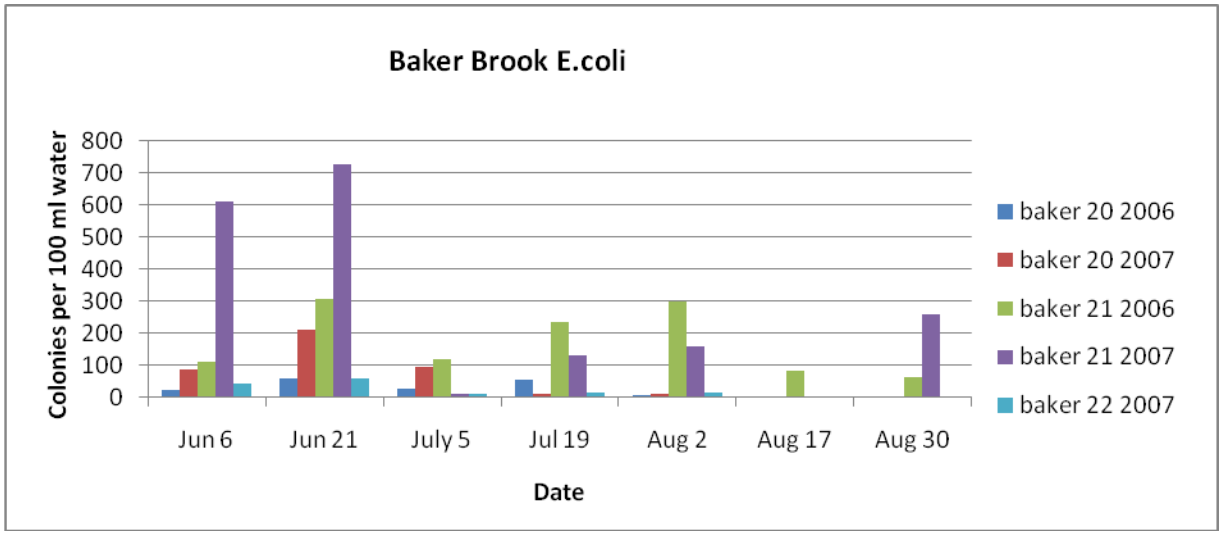


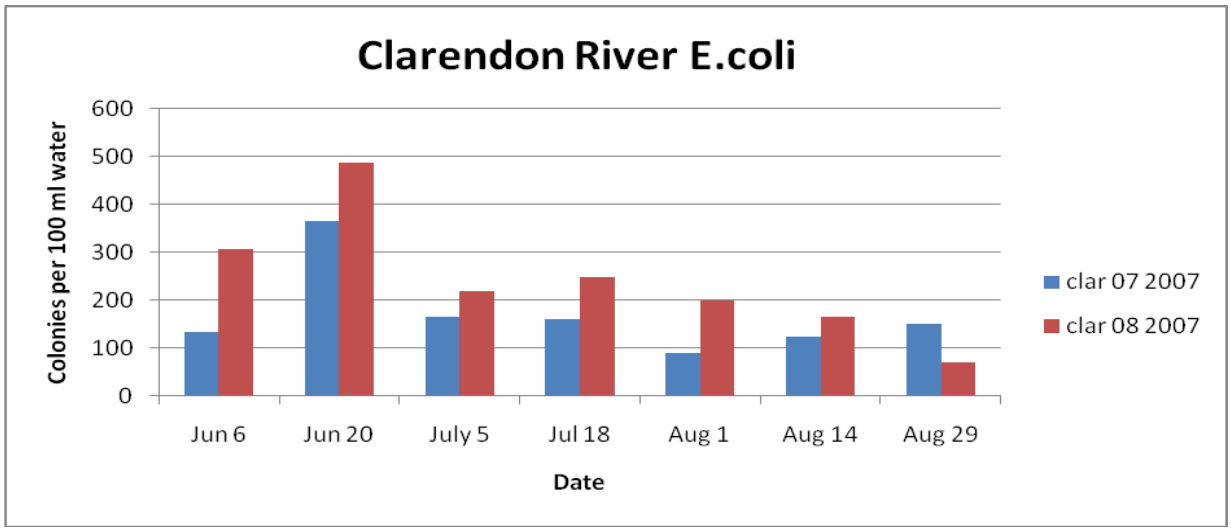
The above chart shows streamflow for the Otter Creek at Center Rutland between the dates of June 1 and September 9, 2007. The highest flow for this period occurred during the first half of the summer. The samples collected during the second sample date should reflect these high streamflow conditions

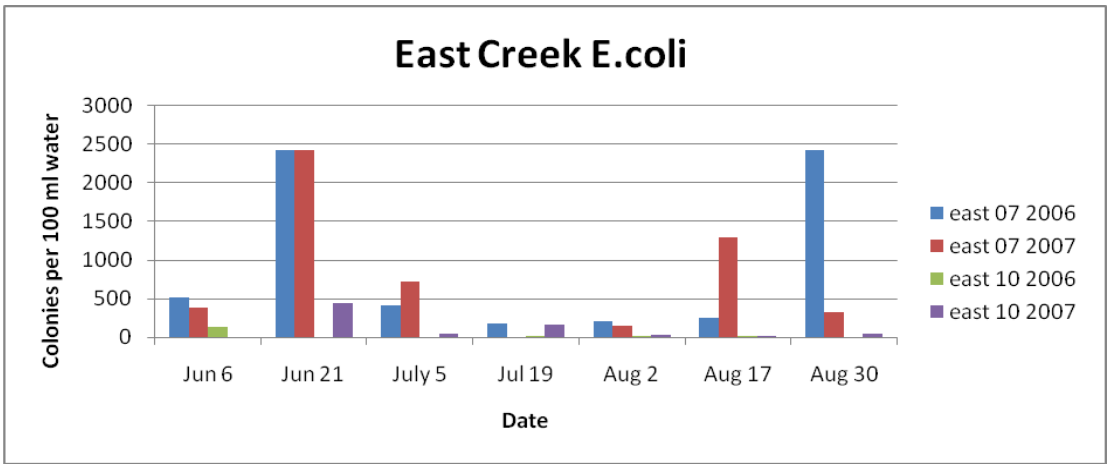
E. Coli (Escherichia coli)

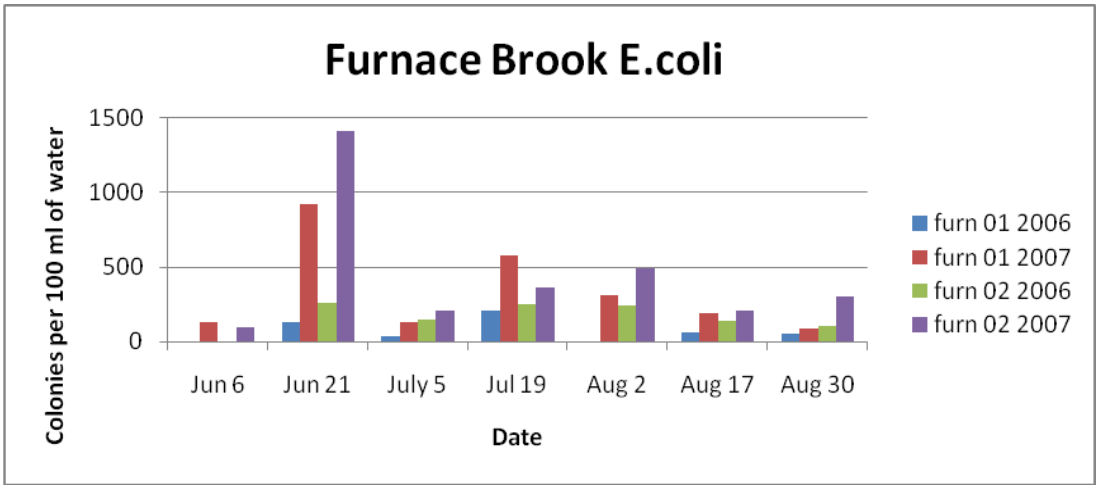
E. coli counts measure one type of fecal coliform bacteria found in the digestive tracts of human and other warm-blooded animals. High *E. coli* levels indicate that fecal waste is being carried over land or through groundwater into streams. People exposed to fecal wastes of sick individuals can develop serious diseases or other health consequences. US EPA sets its recommended limits for *E. coli* levels in waters where swimming may occur at 235 colonies per 100ml of water, while the Vermont DEC sets their recommended limit for class B waters (current classification for most of the sites monitored) at 77 colonies per 100 ml of water.

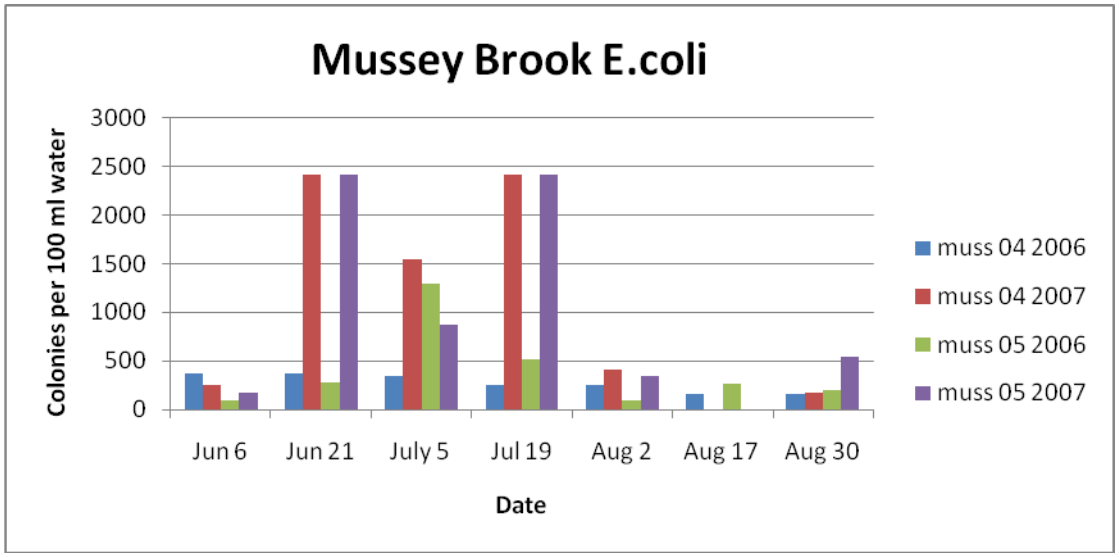
Charts 2-12: E. Coli results

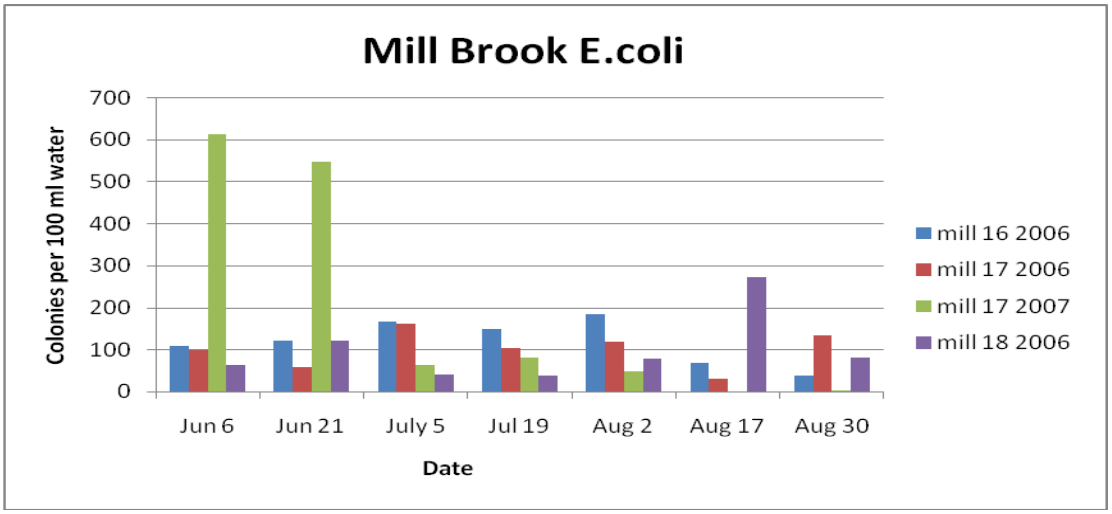


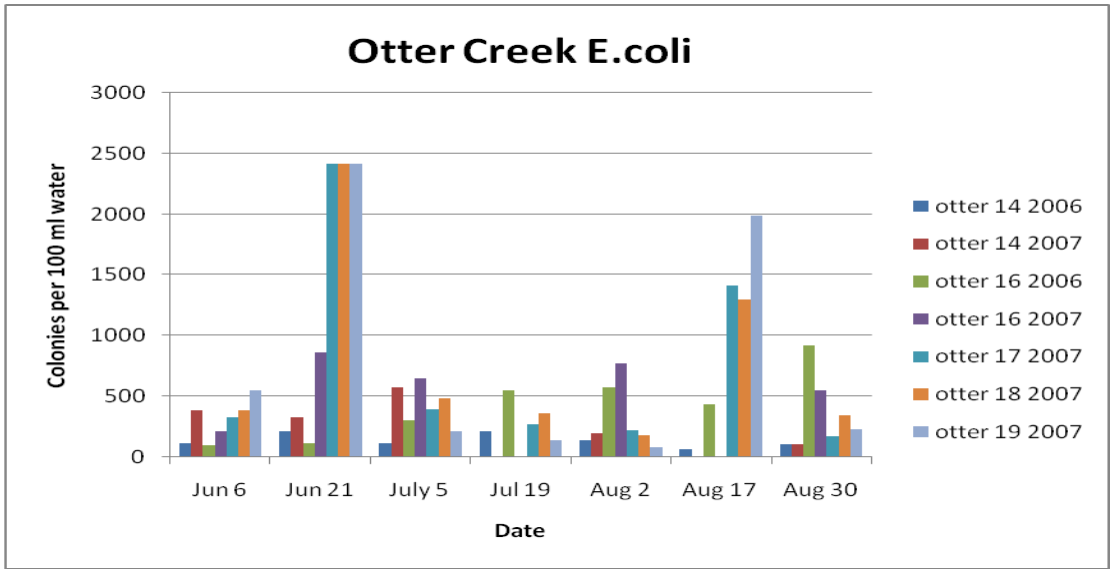


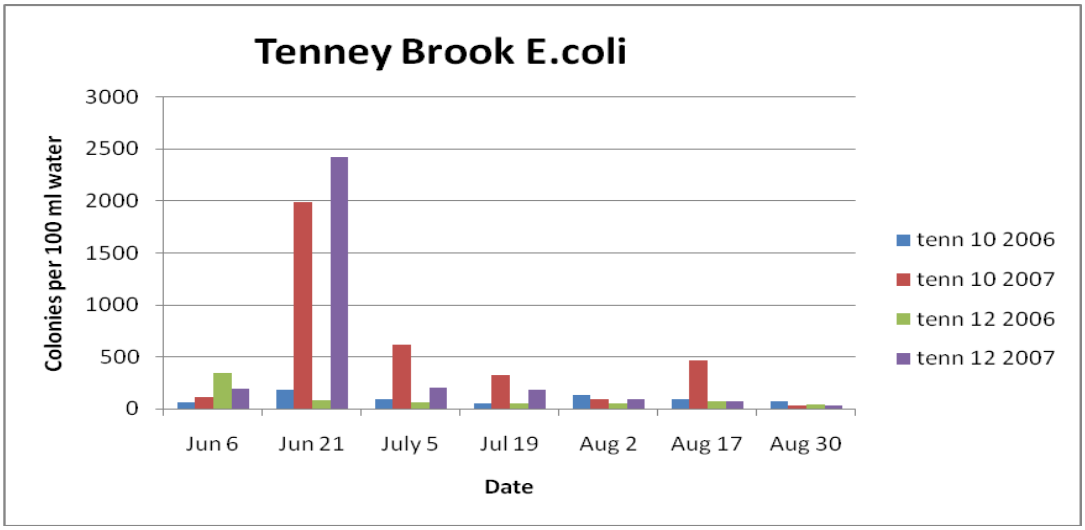

East Creek E.coli
Colonies per 100 ml water
3000
2500
2000
1500
1000
500
0
Jun 6
Jun 21
July 5
Jul 19
Aug 2
Aug 17
Aug 30
Date
east 07 2006
east 07 2007
east 10 2006
east 10 2007

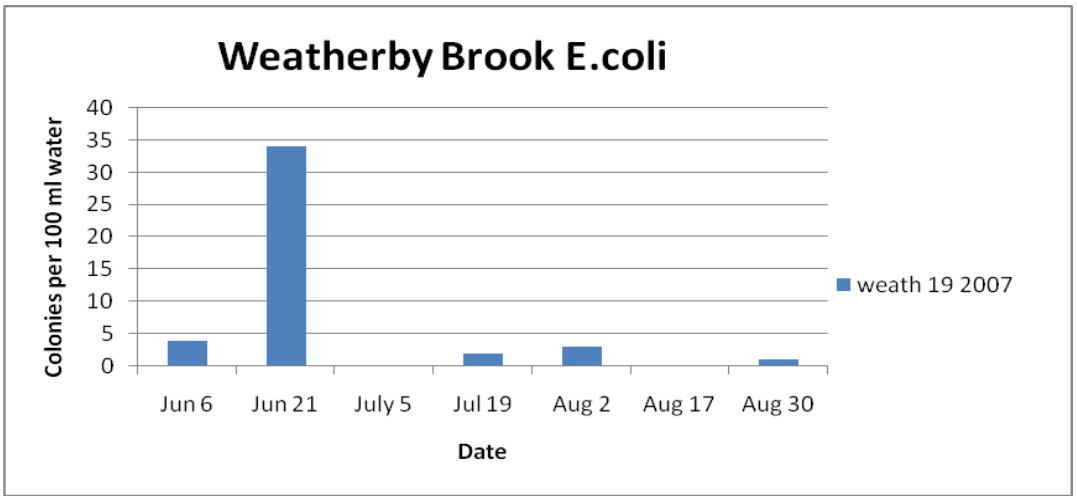

Furnace Brook E.coli
Colonies per 100 ml of water
1500
1000
500
0
Jun 6
Jun 21
July 5
Jul 19
Aug 2
Aug 17
Aug 30
Date
furn 01 2006
furn 01 2007
furn 02 2006
furn 02 2007

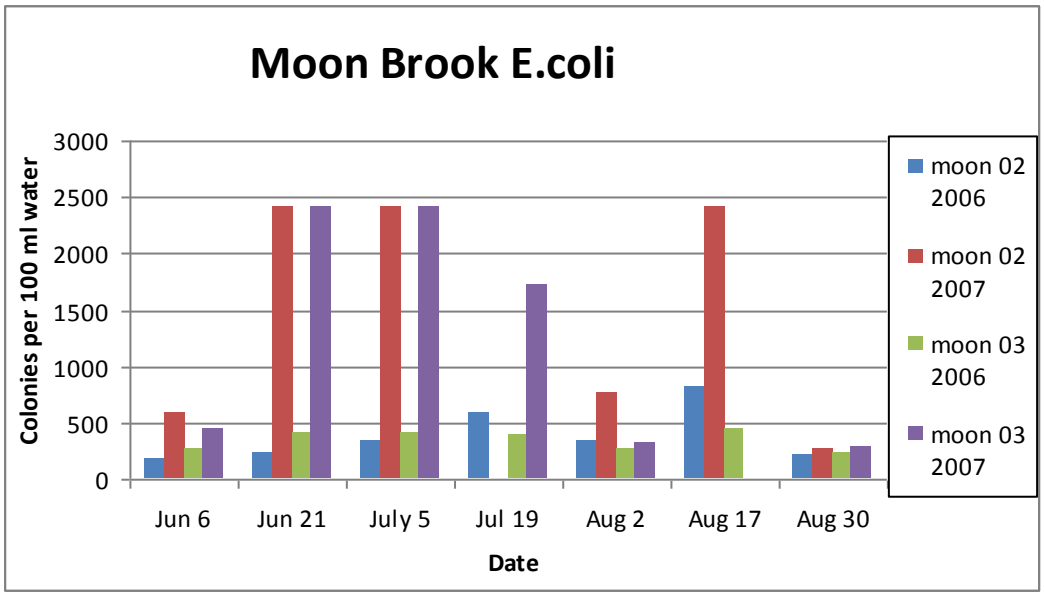

Mussey Brook E.coli
Colonies per 100 ml water
3000
2500
2000
1500
1000
500
0
Jun 6
Jun 21
July 5
Jul 19
Aug 2
Aug 17
Aug 30
Date
muss 04 2006
muss 04 2007
muss 05 2006
muss 05 2007

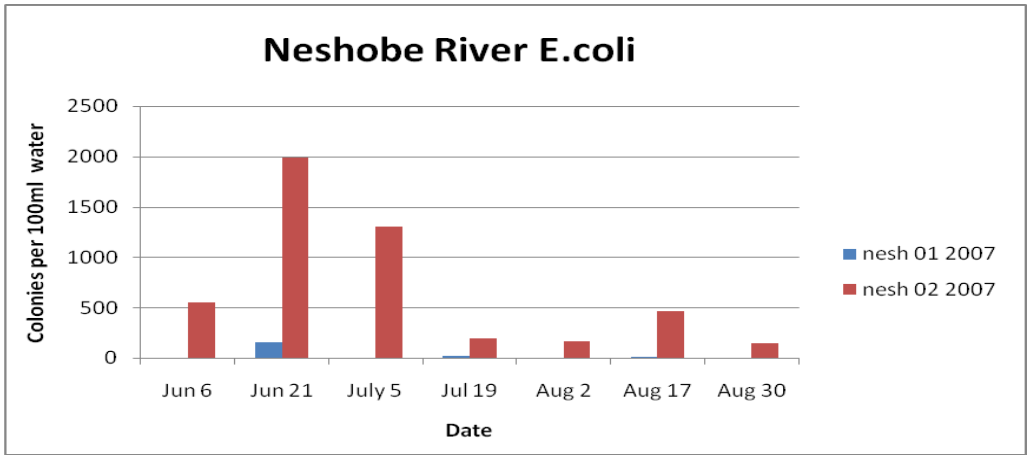

Mill Brook E.coli
Colonies per 100 ml water
700
600
500
400
300
200
100
0
Jun 6
Jun 21
July 5
Jul 19
Aug 2
Aug 17
Aug 30
Date
mill 16 2006
mill 17 2006
mill 17 2007
mill 18 2006


Otter Creek E.coli
Colonies per 100 ml water
3000
2500
2000
1500
1000
500
0
Jun 6
Jun 21
July 5
Jul 19
Aug 2
Aug 17
Aug 30
Date
otter 14 2006
otter 14 2007
otter 16 2006
otter 16 2007
otter 17 2007
otter 18 2007
otter 19 2007


Tenney Brook E.coli
Colonies per 100 ml water
3000
2500
2000
1500
1000
500
0
Jun 6
Jun 21
July 5
Jul 19
Aug 2
Aug 17
Aug 30
Date
tenn 10 2006
tenn 10 2007
tenn 12 2006
tenn 12 2007


Weatherby Brook E.coli
Colonies per 100 ml water
40
35
30
25
20
15
10
5
0
Jun 6
Jun 21
July 5
Jul 19
Aug 2
Aug 17
Aug 30
Date
weath 19 2007


Moon Brook E.coli
Colonies per 100 ml water
3000
2500
2000
1500
1000
500
0
Jun 6
Jun 21
July 5
Jul 19
Aug 2
Aug 17
Aug 30
Date
moon 02 2006
moon 02 2007
moon 03 2006
moon 03 2007


Neshobe River E.coli
Colonies per 100ml water
2500
2000
1500
1000
500
0
Jun 6
Jun 21
July 5
Jul 19
Aug 2
Aug 17
Aug 30
Date
nesh 01 2007
nesh 02 2007

Many of the creeks measured exceeded State and Federal *E. coli* standards at some point during the summer. *E. coli* results for lower Moon Brook (Moon02 and Moon03), Mussey Brook (Muss04 and Muss05) and East Creek near the Combined Sewer Overflow (CSO) (East07) were chronically high during the 2007 sampling season. In addition, Furnace Brook, Baker Brook, and the lower Neshobe River all had *E. coli* levels elevated in the absence of rain events, indicating that illicit discharges or other unidentified sources are potentially affecting these streams. Mid-June precipitation showed elevated levels of bacteria on all waters monitored, consistent with the rainfall and runoff event leading up to the June 21st monitoring date.

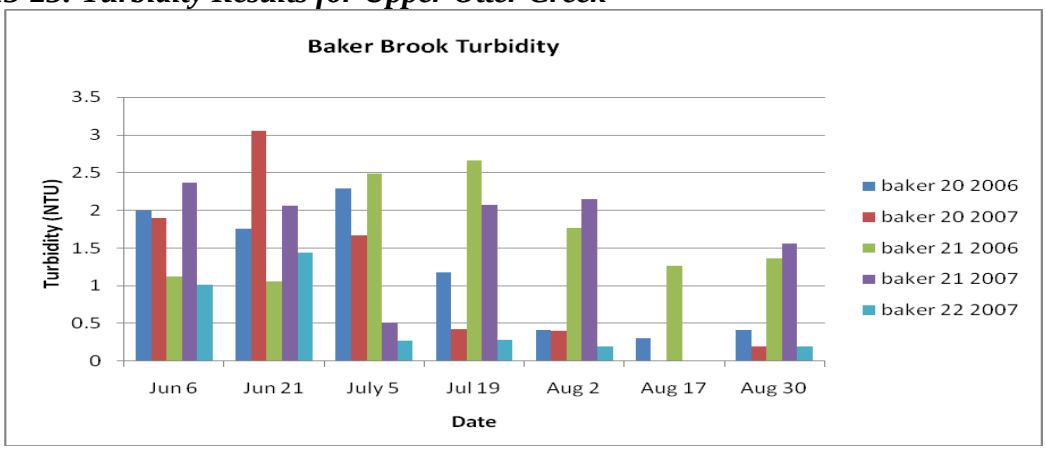
Turbidity and Suspended Solids

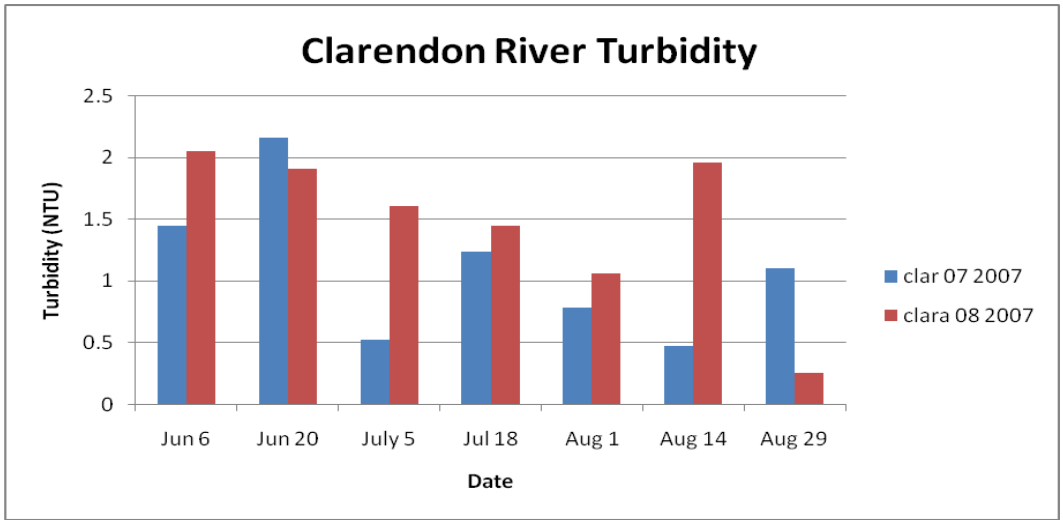
The amount of turbidity and/or total suspended solids (TSS) found in water serves to determine its relative clarity. Suspended solids in the water create turbid (murky) conditions and reduce the transmission of light. Suspended solids are varied, ranging from clay, silt and plankton, to industrial wastes and sewage.

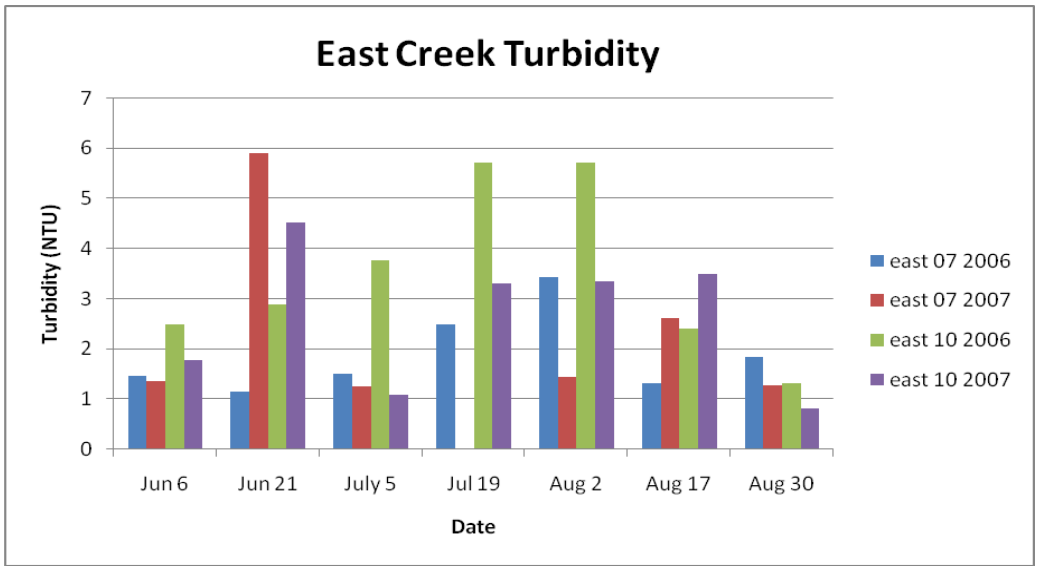
Water containing high levels of sediment, loses its ability to support a diversity of aquatic organisms, becoming warmer as suspended particles absorb heat from the sunlight and cause depleted dissolved oxygen concentrations. Photosynthesis decreases because less light penetrates the water, resulting in even further drops in oxygen levels. The combination of warmer water, less light and oxygen depletion may make it impossible for some forms of aquatic life to survive.

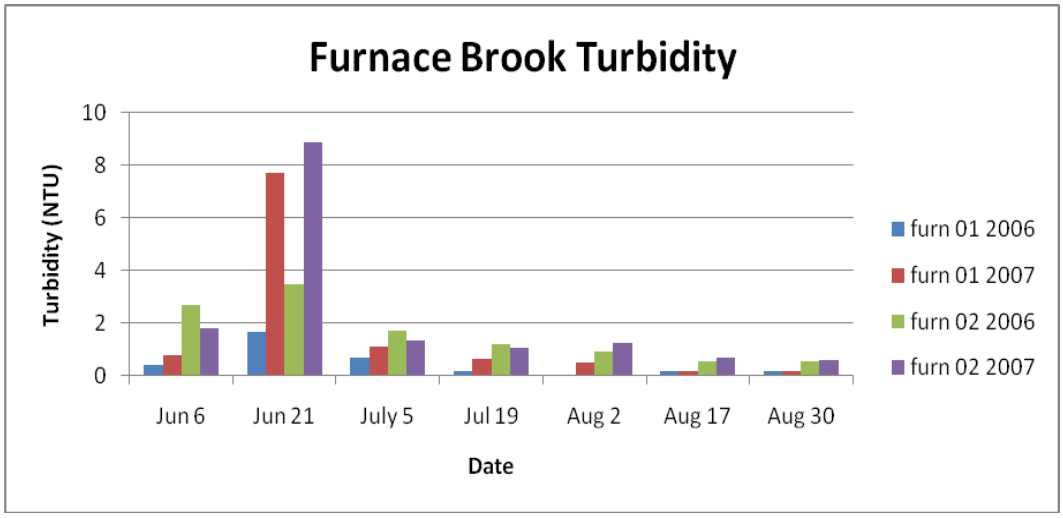
Suspended solids affect aquatic life in other ways as well. Suspended solids can clog fish gills, reduce growth rates, decrease resistance to disease and prevent egg and larval development. Particles of silt, clay and organic materials settle to the bottom, especially in areas of a river or stream that are slow moving. These settled particles could smother the eggs of fish and aquatic insects, as well as suffocate newly hatched insect larvae. Material that settles into the spaces between rocks makes these microhabitats unsuitable for mayfly and stonefly nymphs, caddisfly larvae and other aquatic insects living there (Above information from Richards, West River Report, 2004).

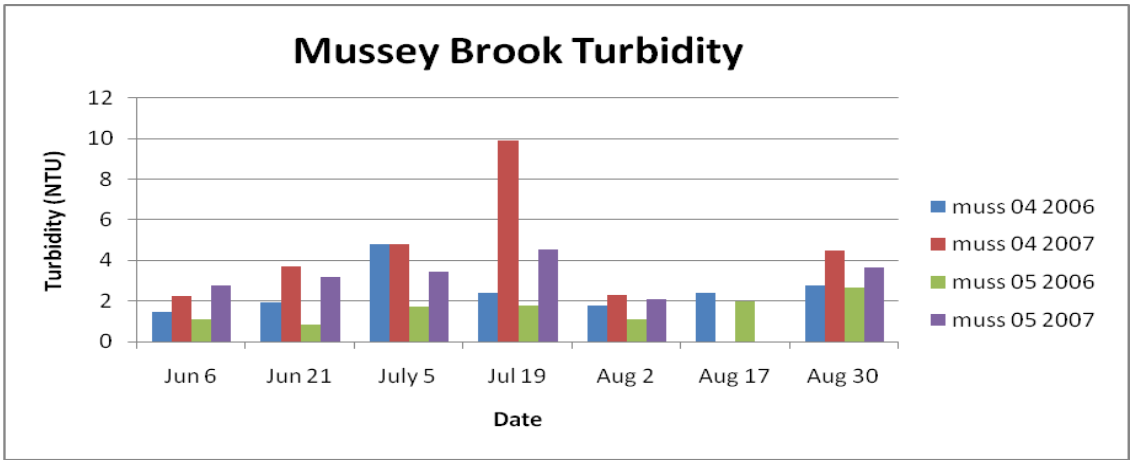
Charts 13-23: Turbidity Results for Upper Otter Creek

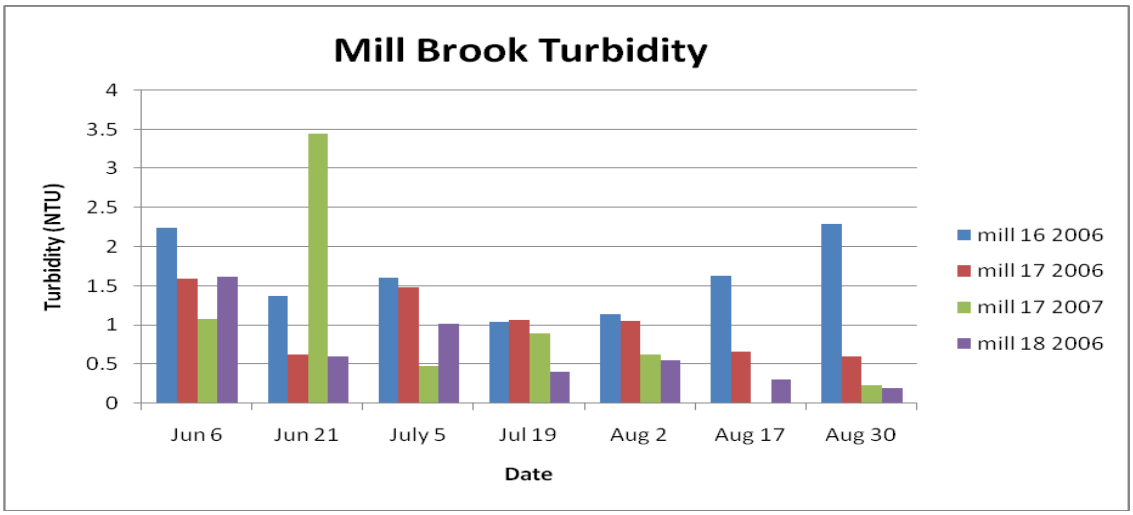


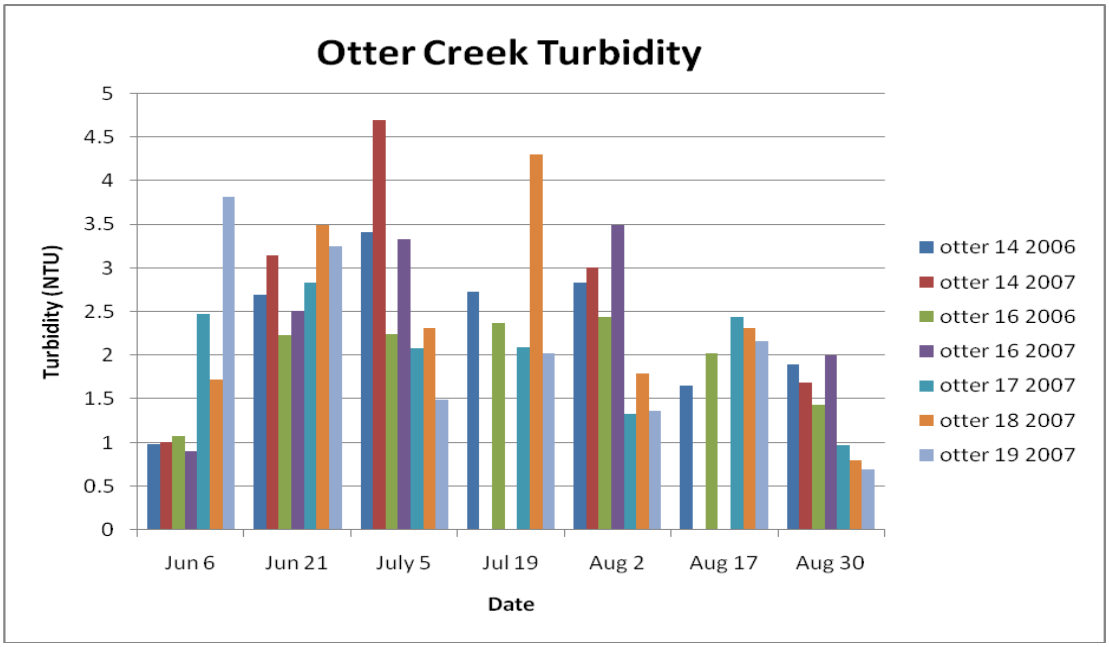

Clarendon River Turbidity
Turbidity (NTU)
2.5
2
1.5
1
0.5
0
Jun 6
Jun 20
July 5
Jul 18
Aug 1
Aug 14
Aug 29
Date
clar 07 2007
clara 08 2007

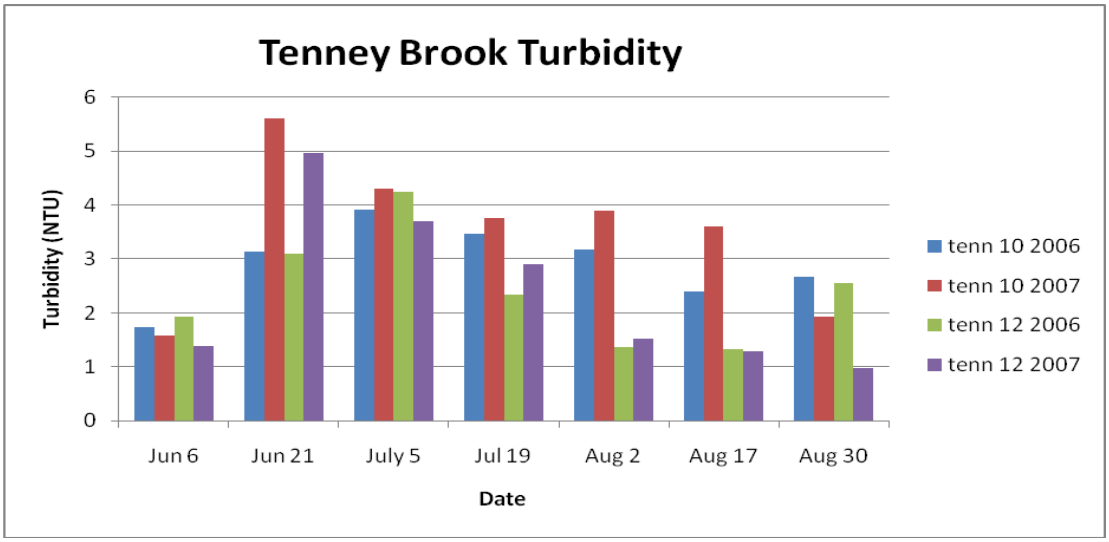

East Creek Turbidity
Turbidity (NTU)
7
6
5
4
3
2
1
0
Jun 6
Jun 21
July 5
Jul 19
Aug 2
Aug 17
Aug 30
Date
east 07 2006
east 07 2007
east 10 2006
east 10 2007

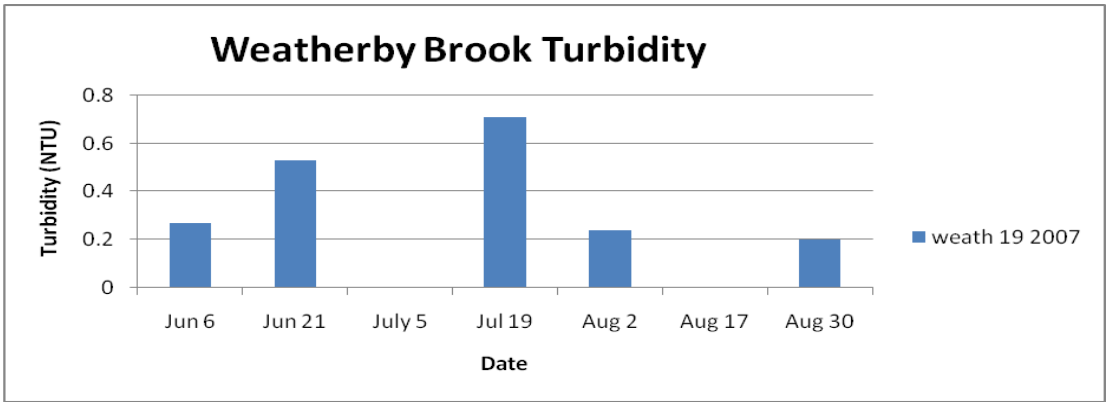

Furnace Brook Turbidity
Turbidity (NTU)
10
8
6
4
2
0
Jun 6
Jun 21
July 5
Jul 19
Aug 2
Aug 17
Aug 30
Date
furn 01 2006
furn 01 2007
furn 02 2006
furn 02 2007

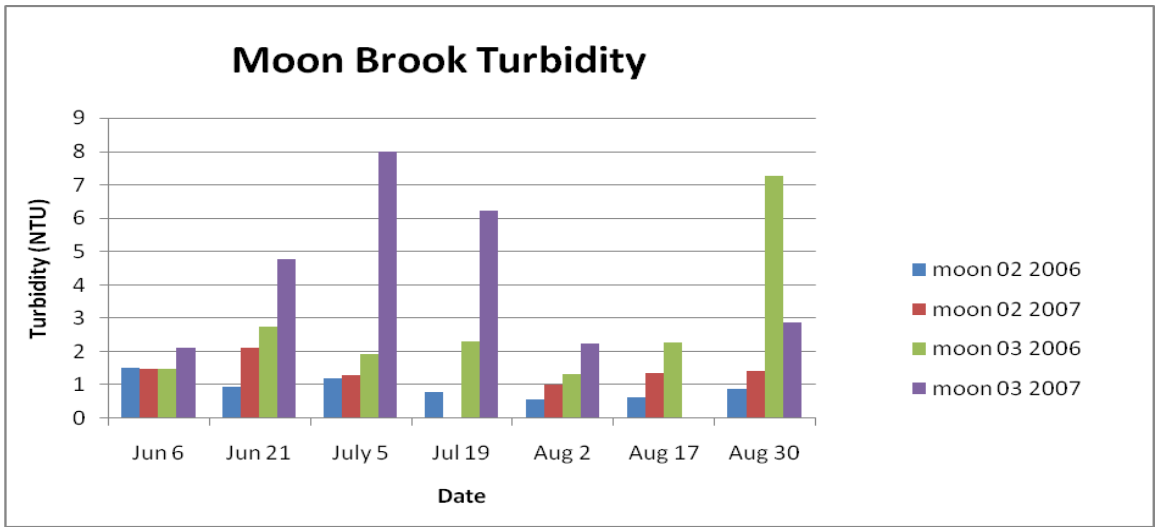

Mussey Brook Turbidity
Turbidity (NTU)
12
10
8
6
4
2
0
Jun 6
Jun 21
July 5
Jul 19
Aug 2
Aug 17
Aug 30
Date
muss 04 2006
muss 04 2007
muss 05 2006
muss 05 2007

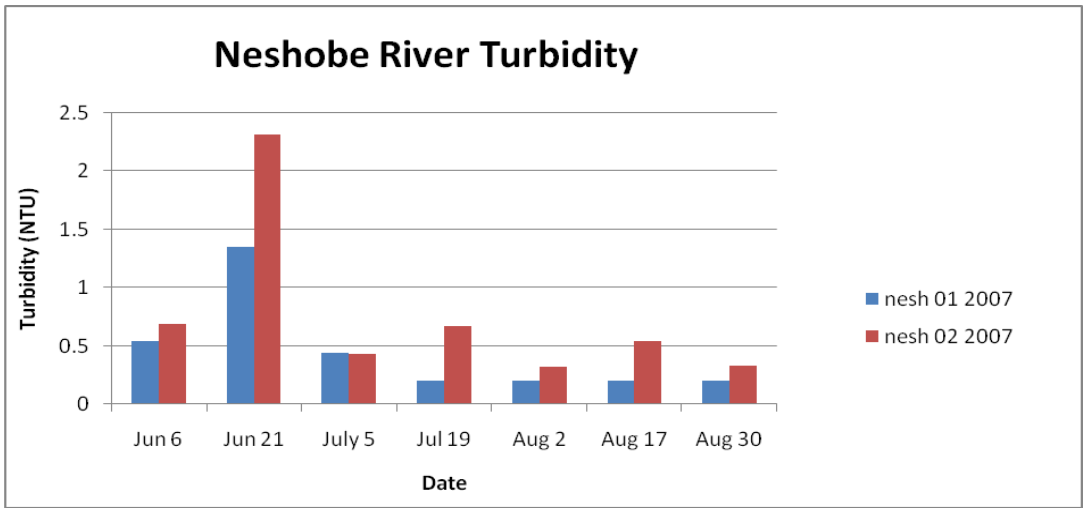

Mill Brook Turbidity
Turbidity (NTU)
4
3.5
3
2.5
2
1.5
1
0.5
0
Jun 6
Jun 21
July 5
Jul 19
Aug 2
Aug 17
Aug 30
Date
mill 16 2006
mill 17 2006
mill 17 2007
mill 18 2006


Otter Creek Turbidity
Turbidity (NTU)
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
Jun 6
Jun 21
July 5
Jul 19
Aug 2
Aug 17
Aug 30
Date
otter 14 2006
otter 14 2007
otter 16 2006
otter 16 2007
otter 17 2007
otter 18 2007
otter 19 2007


Tenney Brook Turbidity
Turbidity (NTU)
0
1
2
3
4
5
6
Jun 6
Jun 21
July 5
Jul 19
Aug 2
Aug 17
Aug 30
Date
tenn 10 2006
tenn 10 2007
tenn 12 2006
tenn 12 2007


Weatherby Brook Turbidity
Turbidity (NTU)
0
0.2
0.4
0.6
0.8
Jun 6
Jun 21
July 5
Jul 19
Aug 2
Aug 17
Aug 30
Date
weath 19 2007


Moon Brook Turbidity
Turbidity (NTU)
0
1
2
3
4
5
6
7
8
9
Jun 6
Jun 21
July 5
Jul 19
Aug 2
Aug 17
Aug 30
Date
moon 02 2006
moon 02 2007
moon 03 2006
moon 03 2007



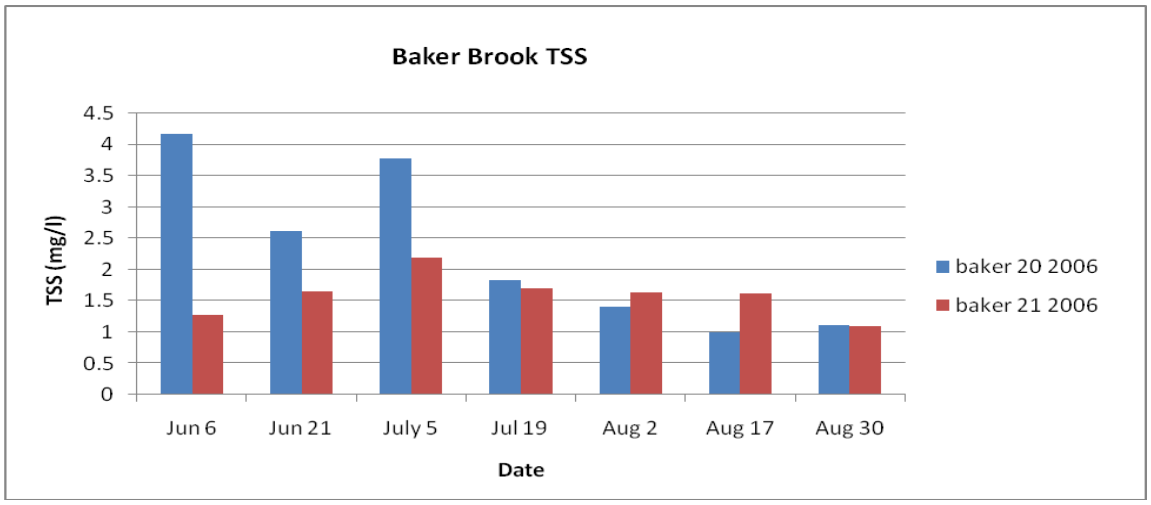
Turbidity is a measure of sediment levels in the water. High turbidity is often associated with sediments carried in stormwater runoff, though anthropogenic sources such as water from car washing, cleaning of sidewalks or buildings and leaking septic systems can cause increases in turbidity when runoff is low.

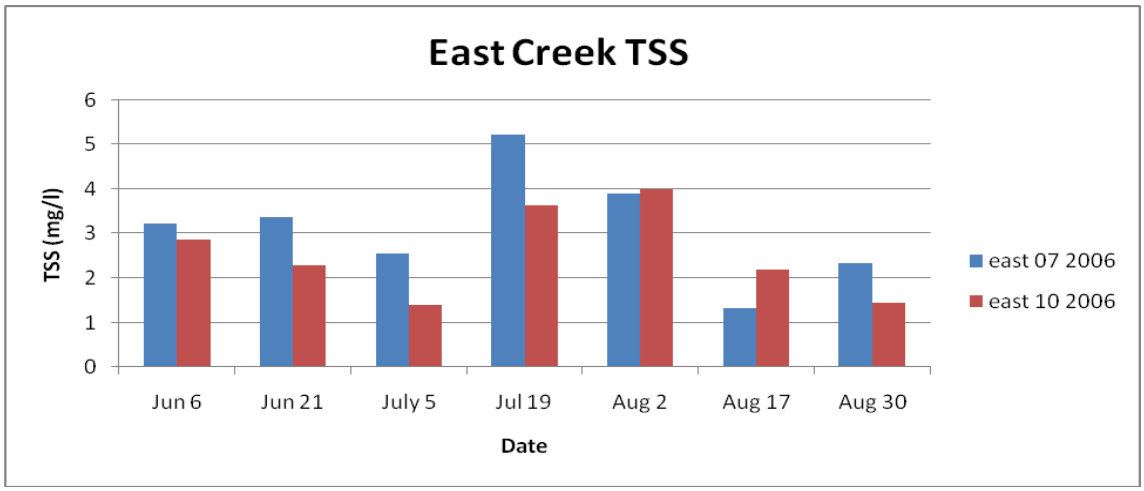
State standards for turbidity are 10 NTU for cold water fish habitat and 25 NTU for warm water fish habitat.

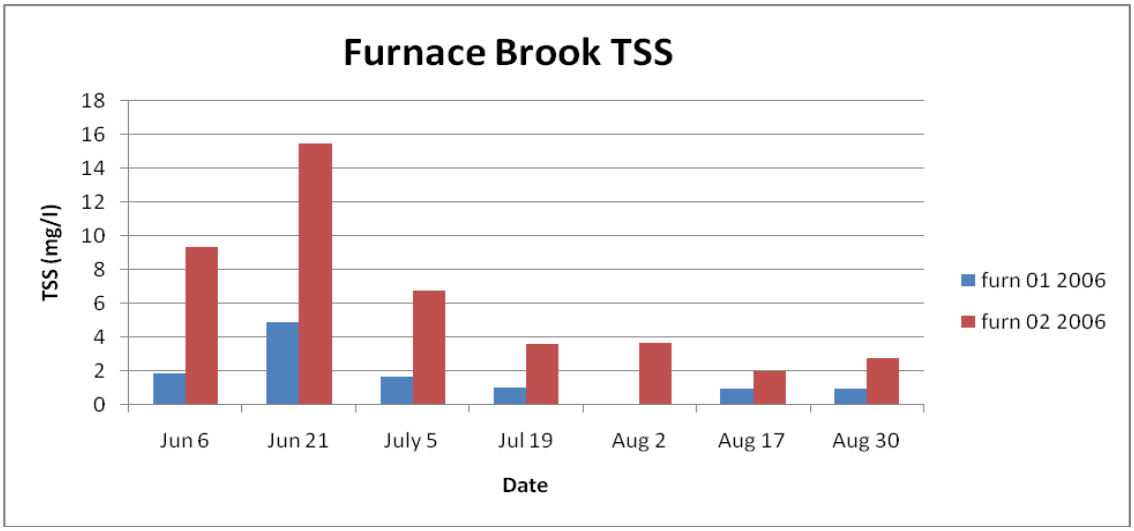
None of the waters monitored in 2007 exceeded the 10 NTU threshold for cold water fish habitat as per the Vermont Water Quality Standards.

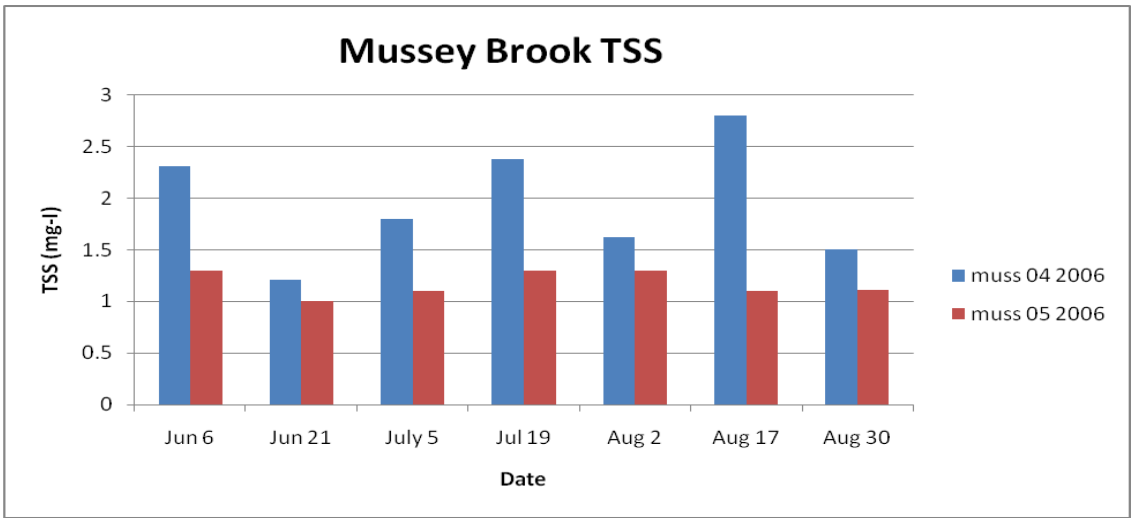
Total Suspended Solids

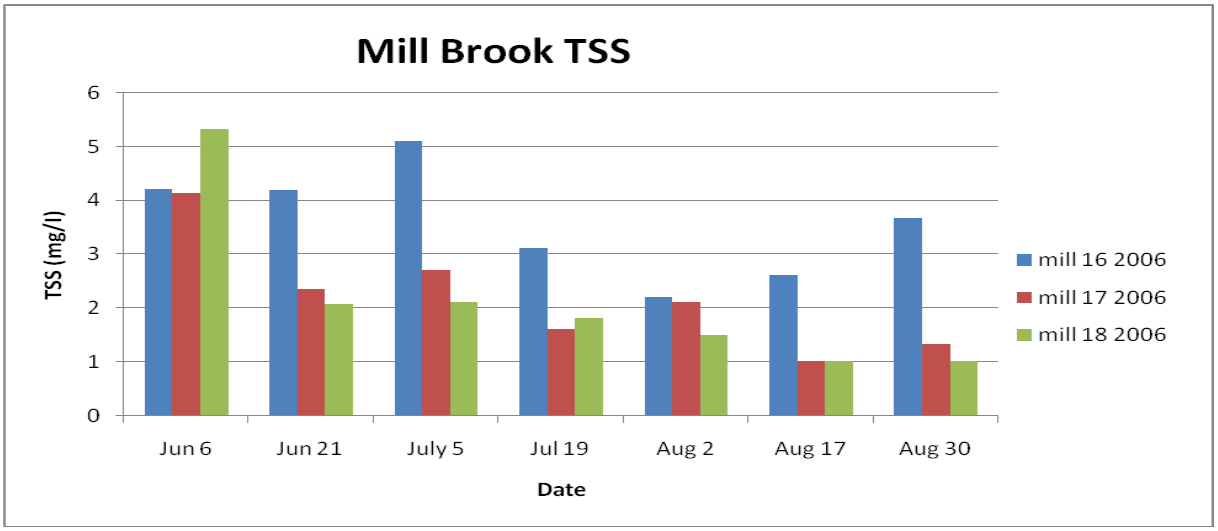
Charts: 24-31: Total Suspended Solids,(TSS) results for Upper Otter Creek

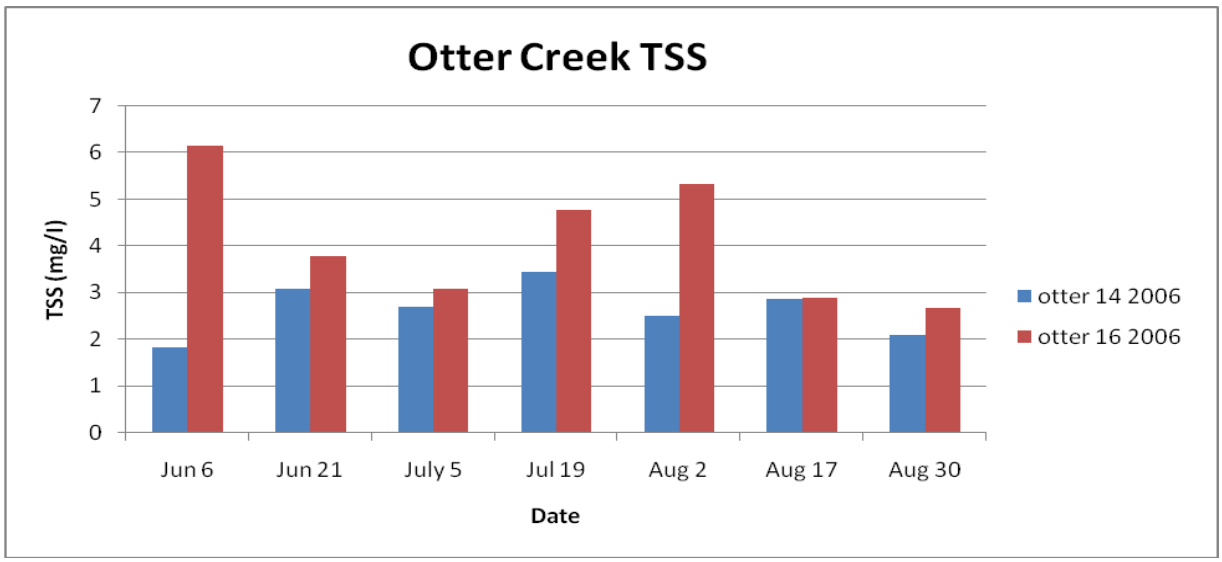


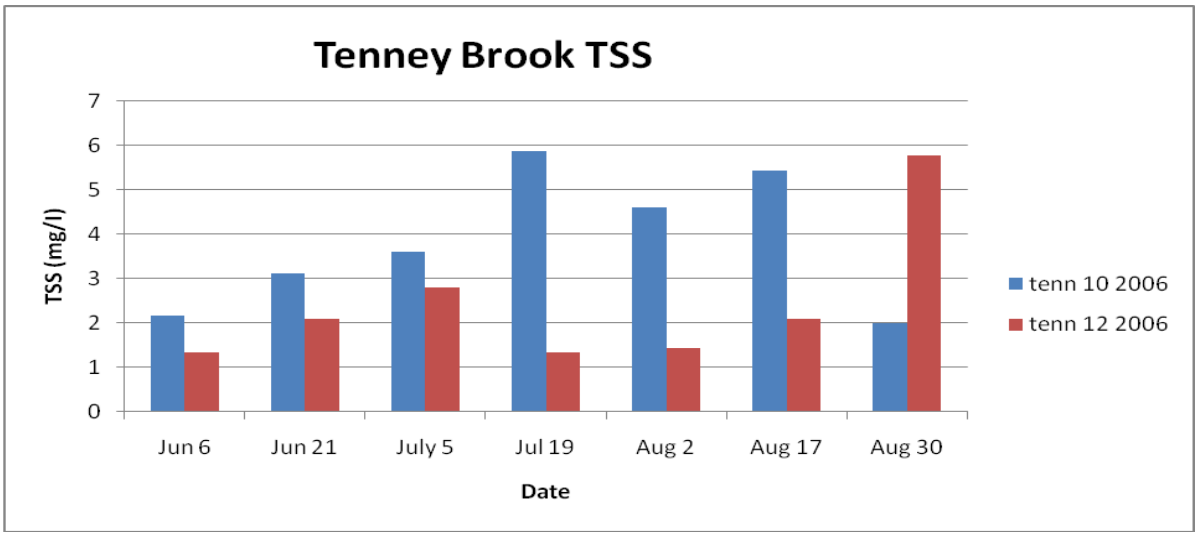

East Creek TSS
TSS (mg/l)
6
5
4
3
2
1
0
Jun 6
Jun 21
July 5
Jul 19
Aug 2
Aug 17
Aug 30
Date
east 07 2006
east 10 2006

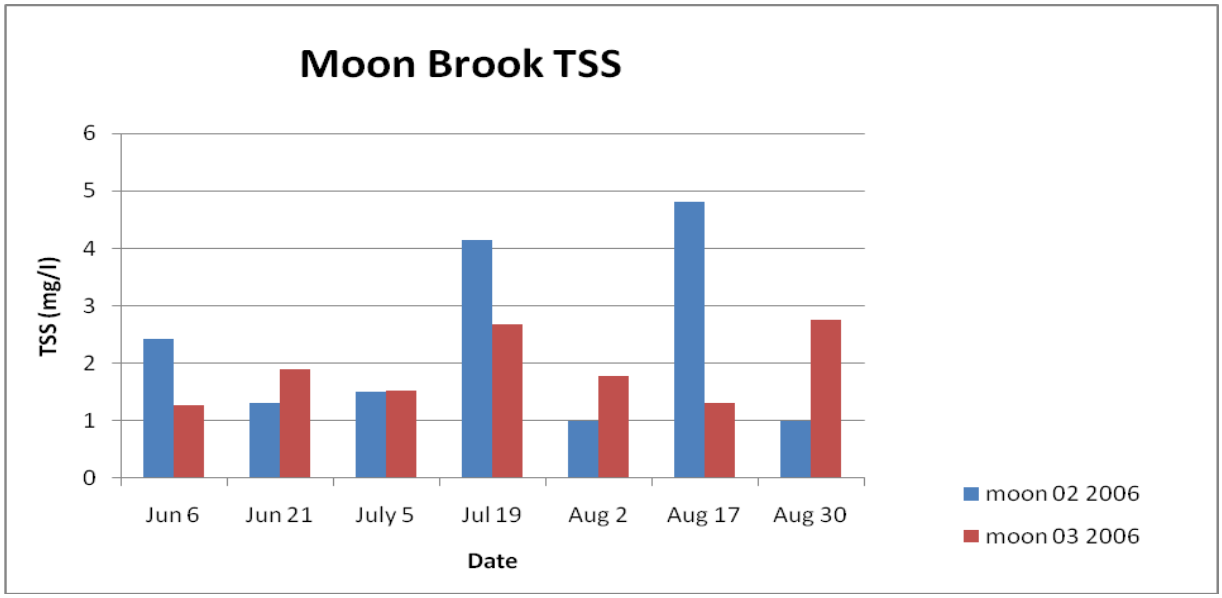

Furnace Brook TSS
TSS (mg/l)
18
16
14
12
10
8
6
4
2
0
Jun 6
Jun 21
July 5
Jul 19
Aug 2
Aug 17
Aug 30
Date
furn 01 2006
furn 02 2006


Mussey Brook TSS
TSS (mg-l)
3
2.5
2
1.5
1
0.5
0
Jun 6
Jun 21
July 5
Jul 19
Aug 2
Aug 17
Aug 30
Date
muss 04 2006
muss 05 2006


Mill Brook TSS
TSS (mg/l)
0
1
2
3
4
5
6
Jun 6
Jun 21
July 5
Jul 19
Aug 2
Aug 17
Aug 30
Date
mill 16 2006
mill 17 2006
mill 18 2006


Otter Creek TSS
TSS (mg/l)
0
1
2
3
4
5
6
7
Jun 6
Jun 21
July 5
Jul 19
Aug 2
Aug 17
Aug 30
Date
otter 14 2006
otter 16 2006


Tenney Brook TSS
TSS (mg/l)
0
1
2
3
4
5
6
7
Jun 6
Jun 21
July 5
Jul 19
Aug 2
Aug 17
Aug 30
Date
tenn 10 2006
tenn 12 2006

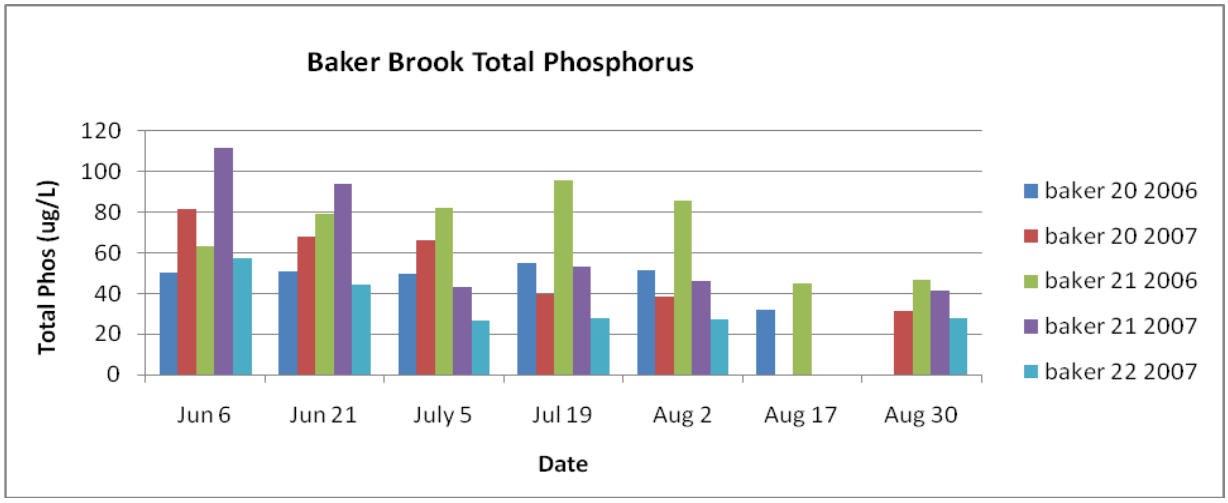


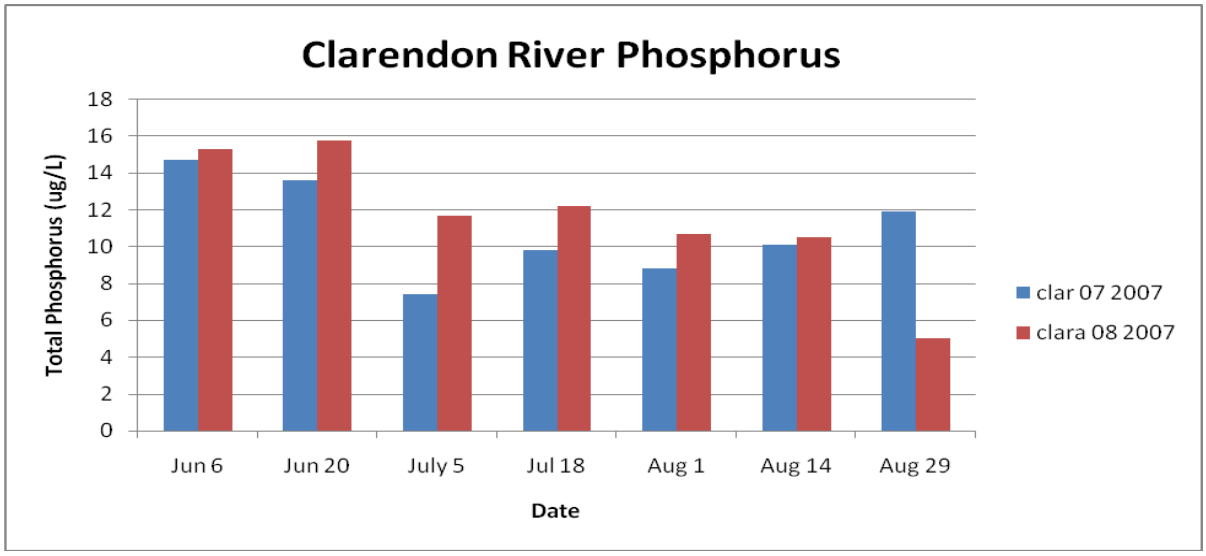
The total suspended solids (TSS) results for Otter Creek monitoring locations clearly demonstrated a link between high levels of sediment in the water and the occurrence of storm-related, overland runoff. The lowest Furnace Brook site (Furn02) showed the highest TSS levels of all sites monitored this season that appeared to correlate to precipitation events. Moon Brook (Moon02) and Tenney Brook showed the highest levels of TSS in the latter half of the summer, indicating that other factors may be responsible for TSS levels in the absence of precipitation events.

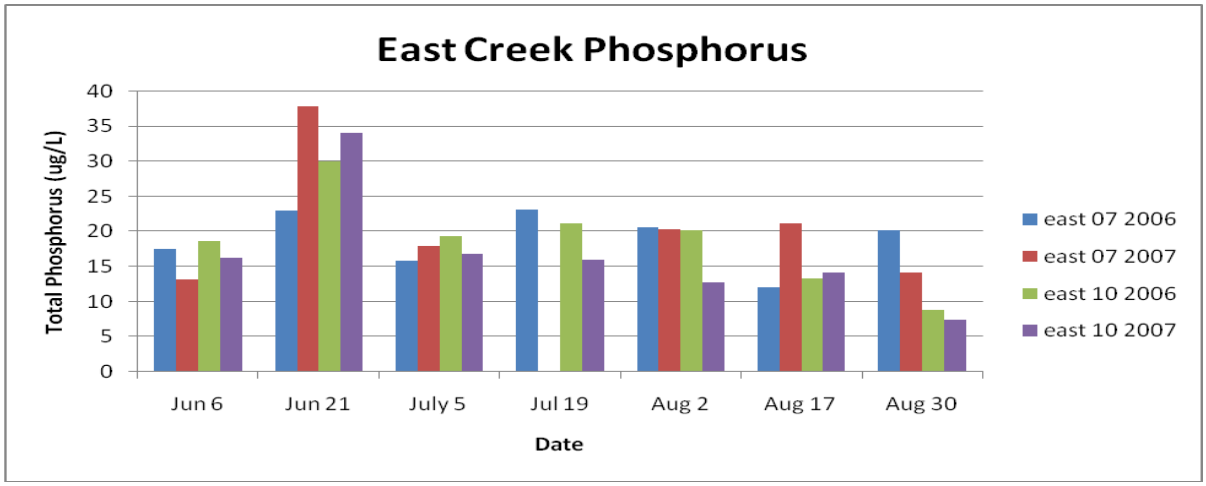
Total Phosphorus

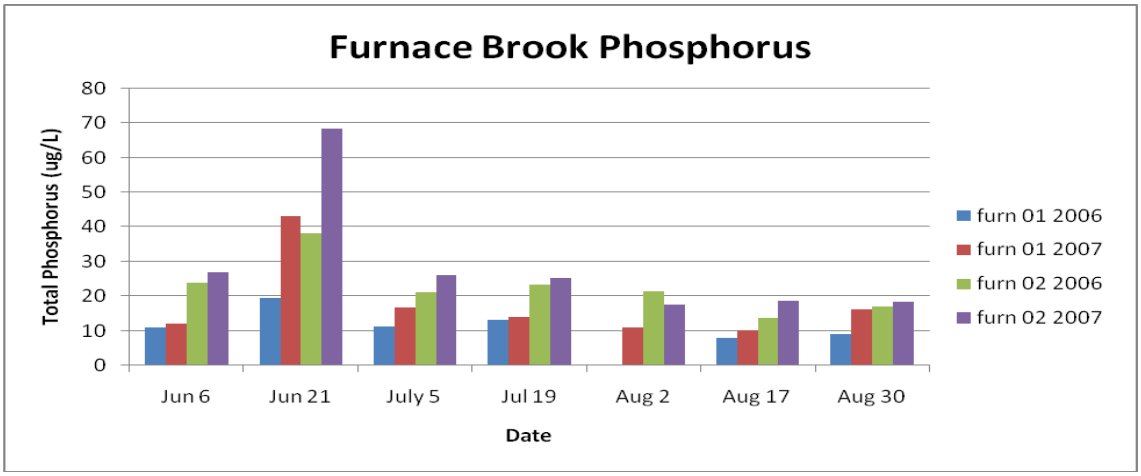
Nitrogen and phosphorus are nutrients that, when above their natural levels in the environment can change the local ecologic balance. Phosphorus is often the nutrient that limits the amount of aquatic plant growth in our waterbodies. Excess phosphorus in water, thus, often contributes to the growth of algae and other plants. This accelerated plant growth may eventually damage stream ecosystems by changing the balance of plants growing, causing algal blooms and by draining the oxygen levels in the water when the plants decompose. Phosphorus is often introduced into the environment through human activities such as improper waste management, over-application of fertilizers, certain industrial wastes and human disturbance of the land and its vegetation. Phosphorus binds with soil and is often carried into streams during storms when TSS levels are high. Under certain conditions, phosphorus may disassociate from the soil and dissolve in the water column, where it may become biologically available for many seasons.

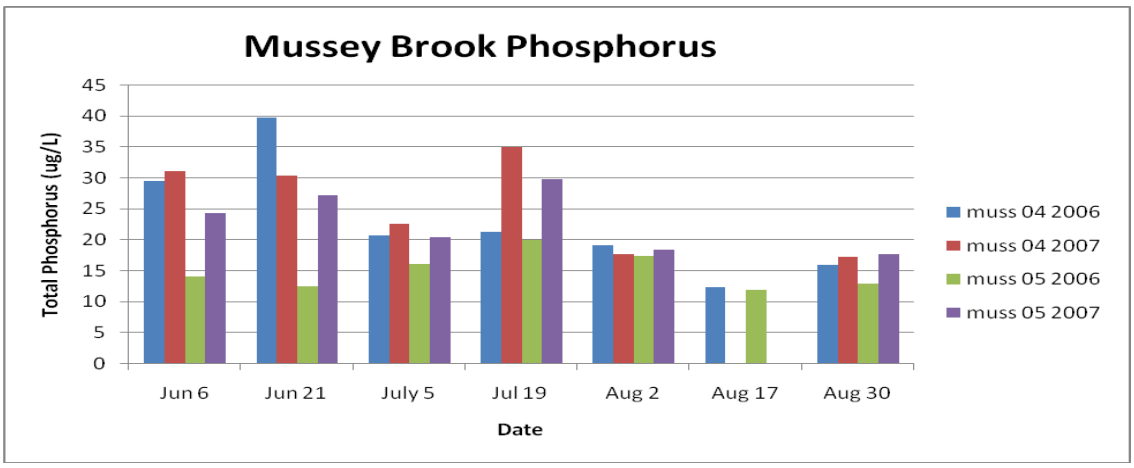
Charts: 32-42: Total phosphorus results for Upper Otter Creek

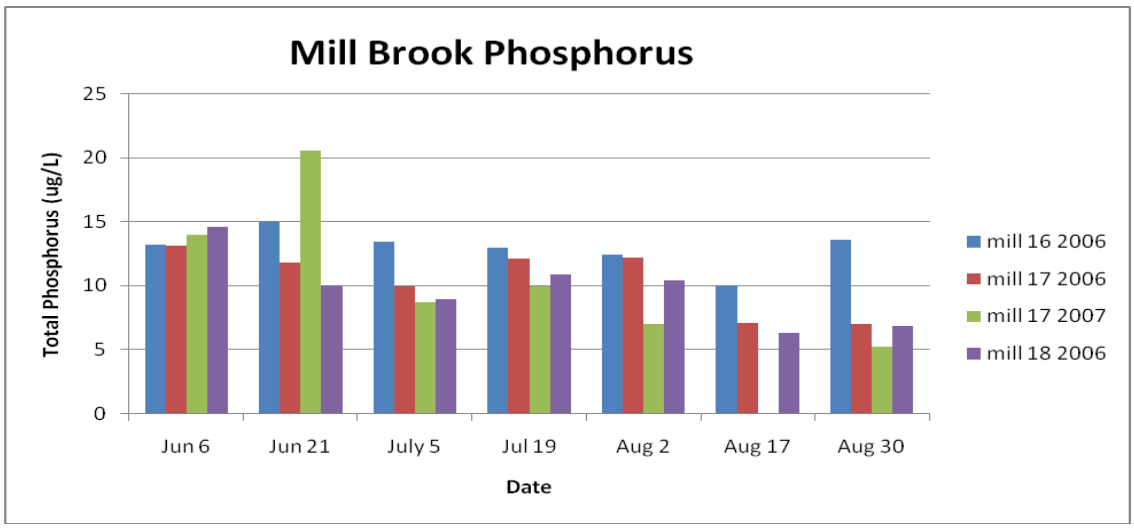


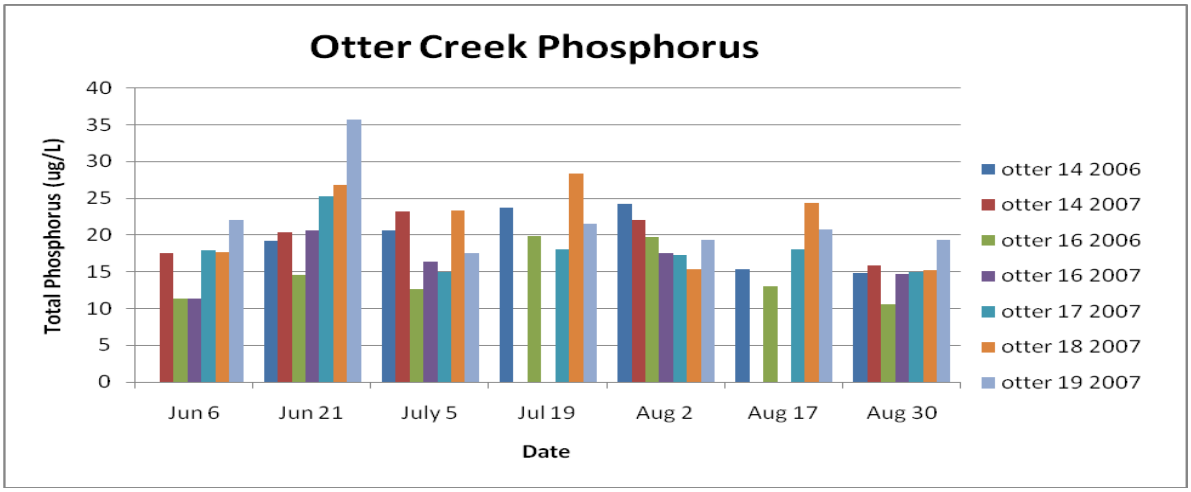


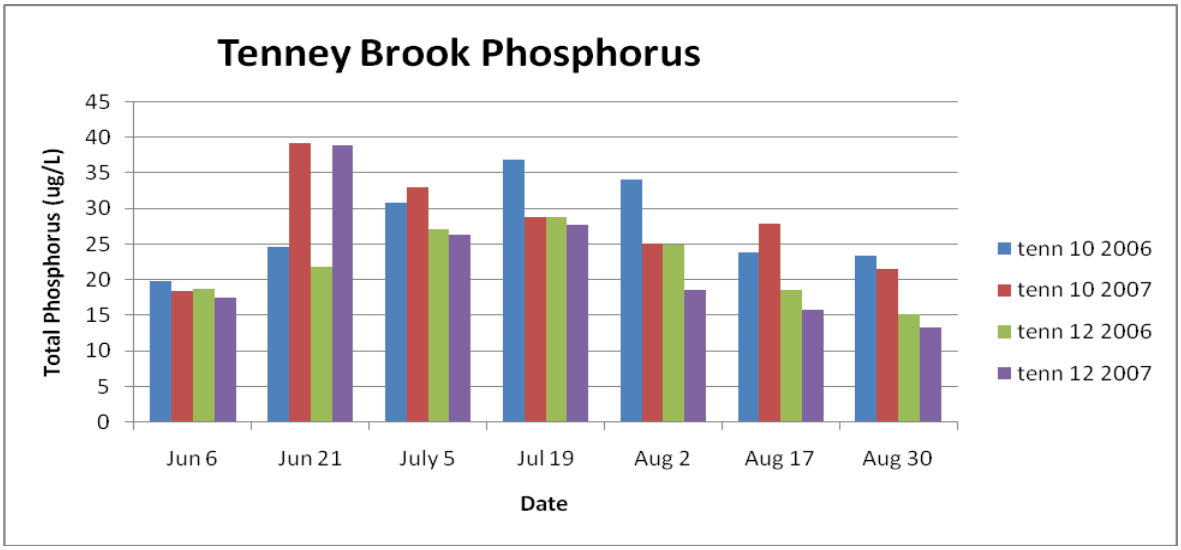


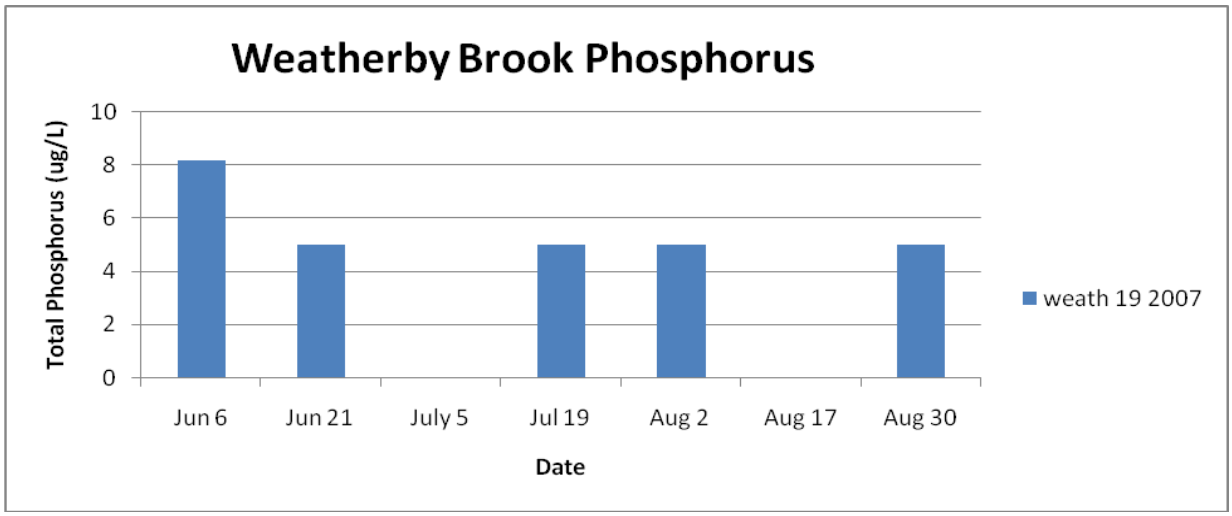

Furnace Brook Phosphorus
Total Phosphorus (ug/L)
80
70
60
50
40
30
20
10
0
Jun 6
Jun 21
July 5
Jul 19
Aug 2
Aug 17
Aug 30
Date
furn 01 2006
furn 01 2007
furn 02 2006
furn 02 2007

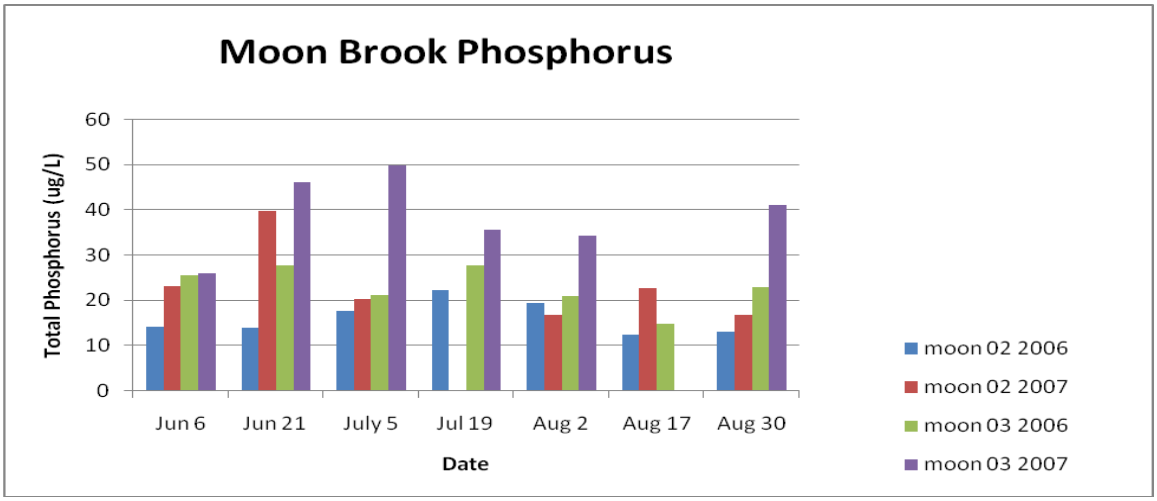

Mussey Brook Phosphorus
Total Phosphorus (ug/L)
45
40
35
30
25
20
15
10
5
0
Jun 6
Jun 21
July 5
Jul 19
Aug 2
Aug 17
Aug 30
Date
muss 04 2006
muss 04 2007
muss 05 2006
muss 05 2007

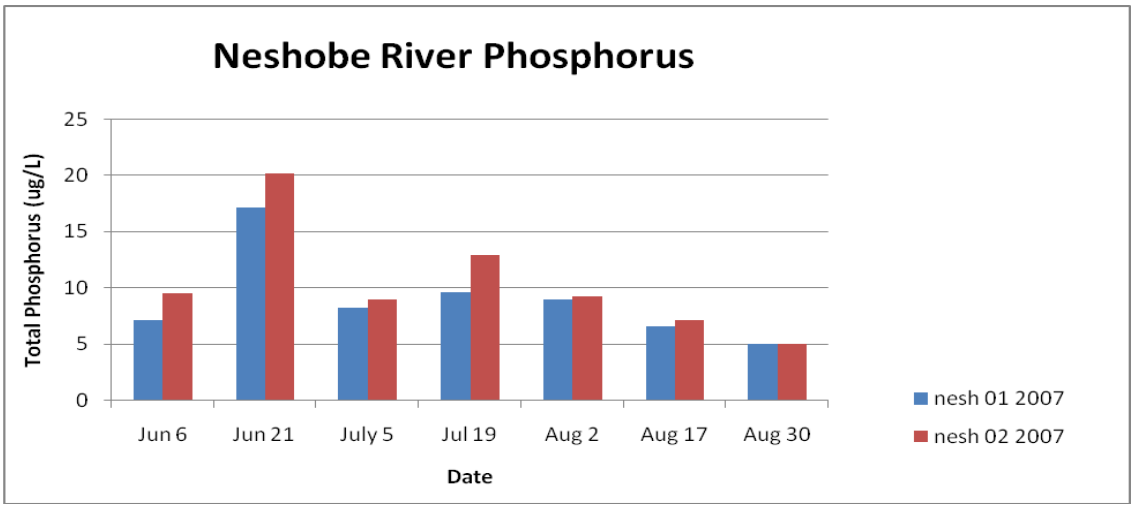

Mill Brook Phosphorus
Total Phosphorus (ug/L)
25
20
15
10
5
0
Jun 6
Jun 21
July 5
Jul 19
Aug 2
Aug 17
Aug 30
Date
mill 16 2006
mill 17 2006
mill 17 2007
mill 18 2006


Otter Creek Phosphorus
Total Phosphorus (ug/L)
40
35
30
25
20
15
10
5
0
Jun 6
Jun 21
July 5
Jul 19
Aug 2
Aug 17
Aug 30
Date
otter 14 2006
otter 14 2007
otter 16 2006
otter 16 2007
otter 17 2007
otter 18 2007
otter 19 2007


Tenney Brook Phosphorus
Total Phosphorus (ug/L)
45
40
35
30
25
20
15
10
5
0
Jun 6
Jun 21
July 5
Jul 19
Aug 2
Aug 17
Aug 30
Date
tenn 10 2006
tenn 10 2007
tenn 12 2006
tenn 12 2007


Weatherby Brook Phosphorus
Total Phosphorus (ug/L)
10
8
6
4
2
0
Jun 6
Jun 21
July 5
Jul 19
Aug 2
Aug 17
Aug 30
Date
weath 19 2007





According to Vermont DEC Watershed Coordinator, Ethan Swift, there is no Vermont State numerical standard for total phosphorus concentrations in streams and rivers. The General Policy states that "in all water, total phosphorous loadings shall be limited so that they will not contribute to the acceleration of eutrophication or the stimulation of the growth of aquatic biota in a manner that prevents the full support of uses." River Network information (*Testing the Waters*, Shannon Behar) states that phosphorous concentrations of 0.01 mg/L (10μg/L) or less may have measurable impact on nutrient poor upland streams, while larger rivers could be impacted when concentrations near 0.1 mg/L (100 μg/L). The phosphorus goal as per the Lake Champlain Phosphorus TMDL for the Otter Creek lake segment is 14 μg/L.

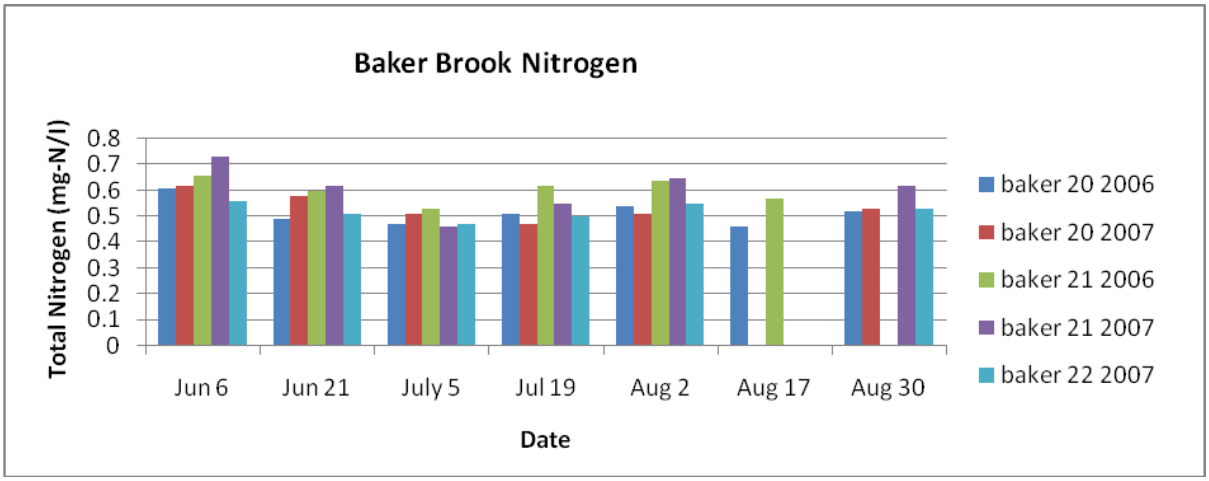
The phosphorus level in Baker Brook declined in 2007 from previous years as possibly influenced by less precipitation but is still considerably higher than other streams with similar land use, land cover, and topography. Urban streams, such as Moon and Mussey Brooks were moderately high throughout the summer with spikes associated with the rainfall events in June. Of these sites Moon03 and Muss04 were the highest as were the furthermost downstream sites monitored. The Moon Brook in particular showed elevated levels in phosphorus as compared to

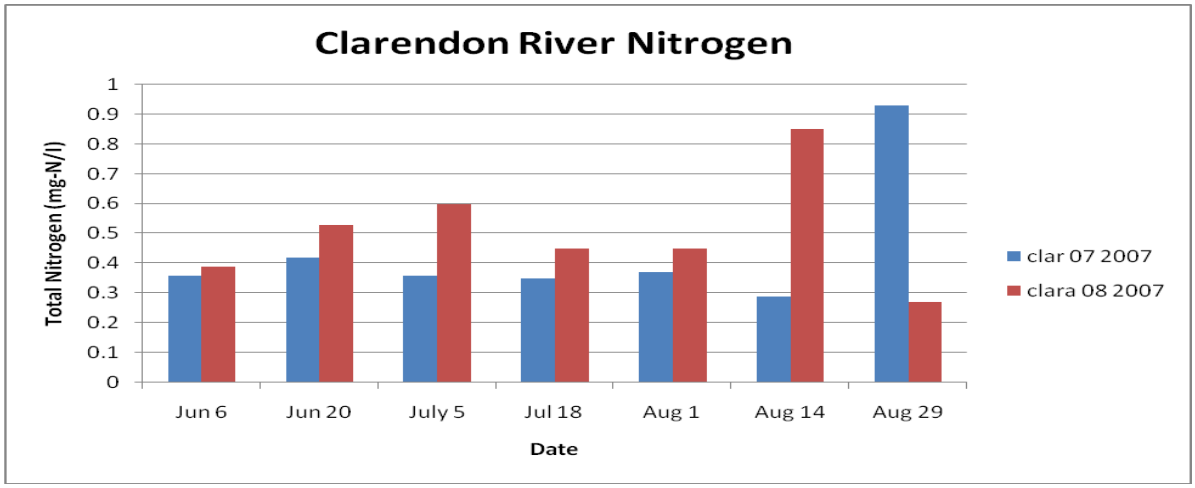
previous years. As with the E. coli, high phosphorus levels during dry periods may indicate failing septic systems or outfall pipes as the source. In addition, the Moon and Mussey are urban streams and may receive fertilizer in runoff from gardens and lawns. Other urban streams showed moderately elevated levels of phosphorus, especially the furthermost downstream site on East Creek (East07). The Tenney Brook site below Route 7 (Tenn10) showed a dramatic decline in overall phosphorus loading from previous years. All other Otter Creek sites showed Phosphorus levels to fall within acceptable ranges. The Mill Brook sites in Danby were particularly low in comparison to other locations.

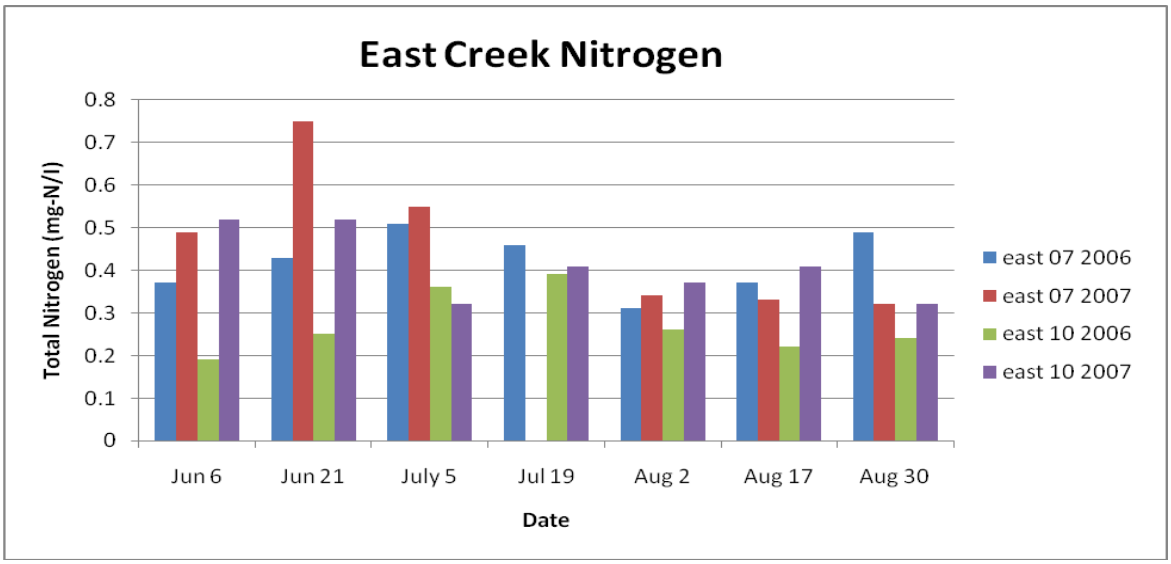
Total Nitrogen

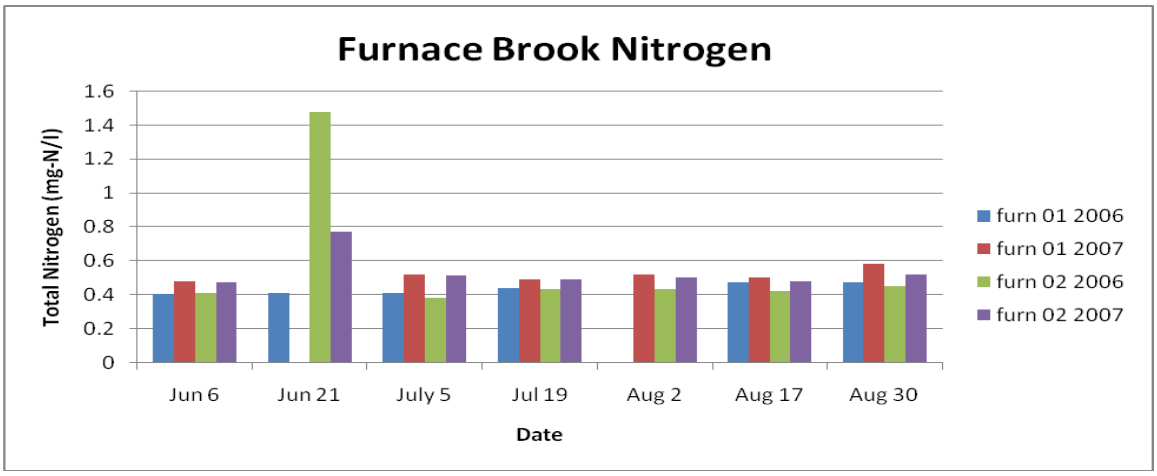
Pollutants such as sewage or manure contain high levels of nitrogen. Nitrogen may travel to groundwater or streams from fertilized fields, lawns, and golf courses, from septic system effluent or from runoff of manure.

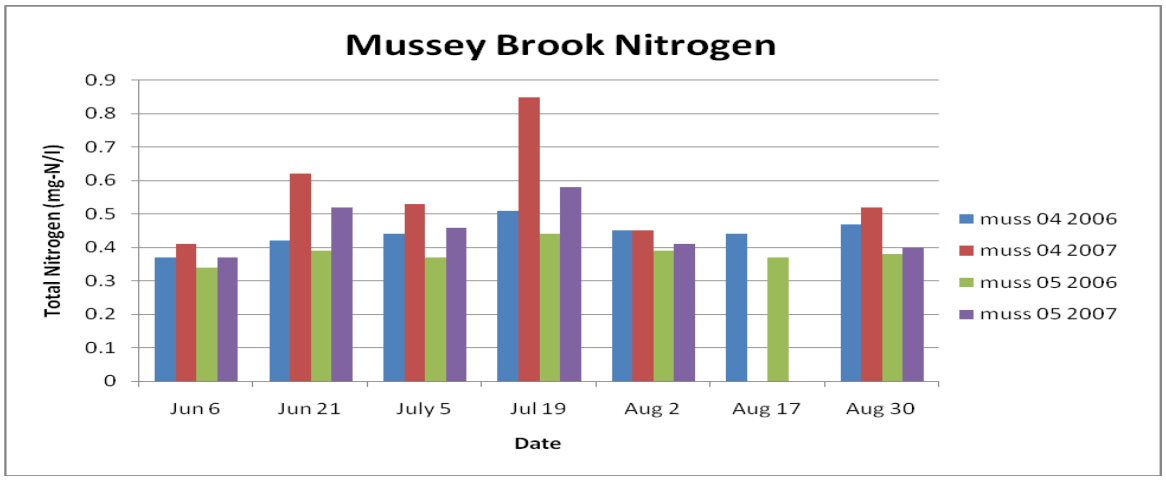
Charts: 43-53: Total nitrogen results for Upper Otter Creek

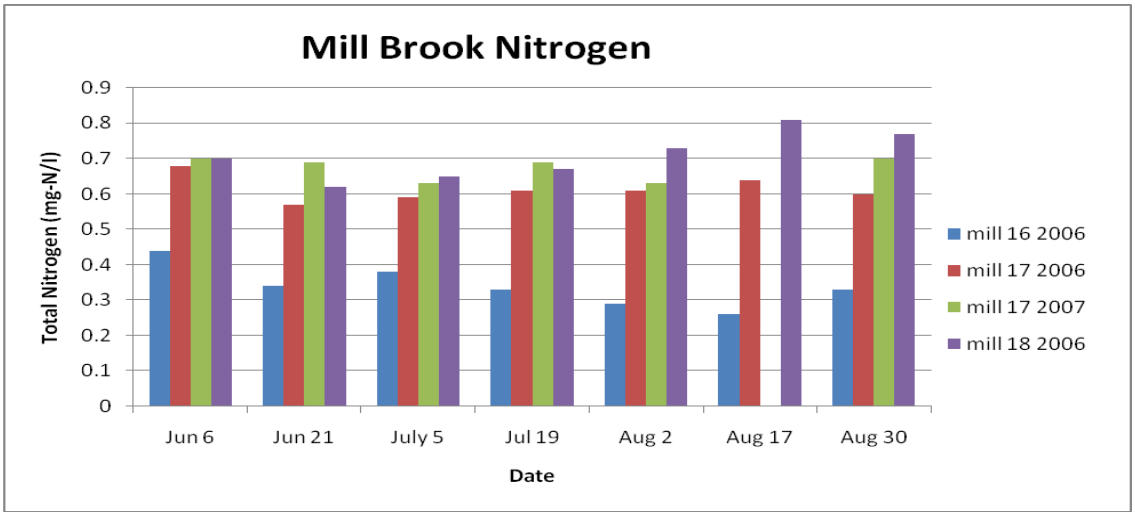


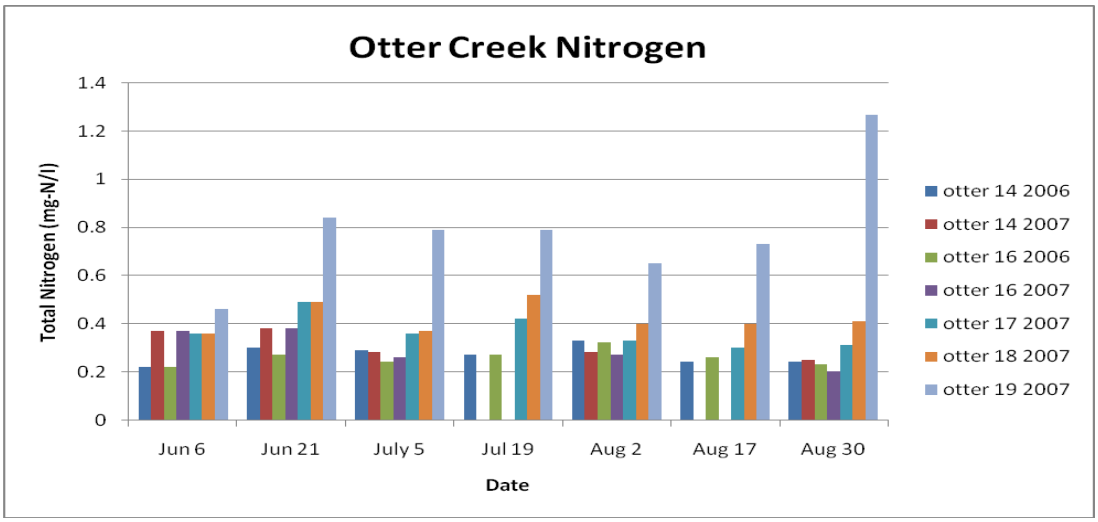


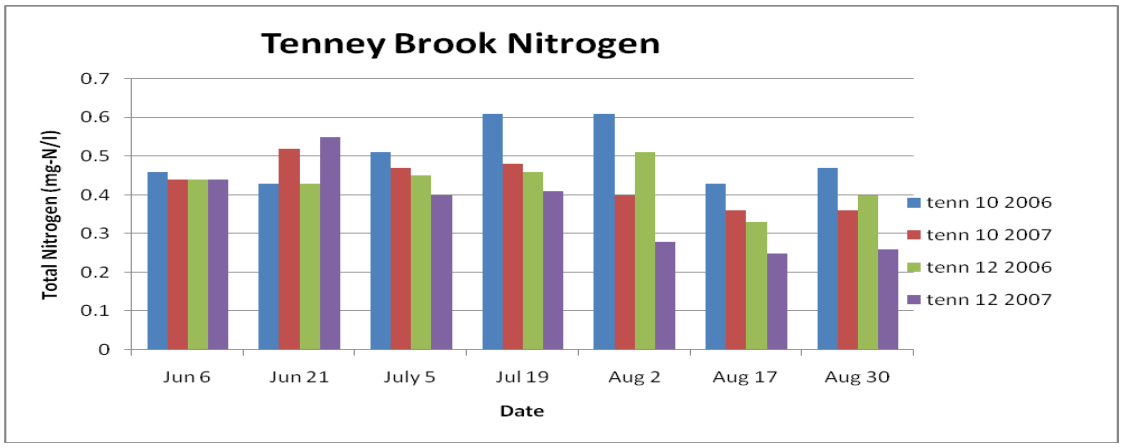

East Creek Nitrogen
Total Nitrogen (mg-N/l)
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
Jun 6
Jun 21
July 5
Jul 19
Aug 2
Aug 17
Aug 30
Date
east 07 2006
east 07 2007
east 10 2006
east 10 2007

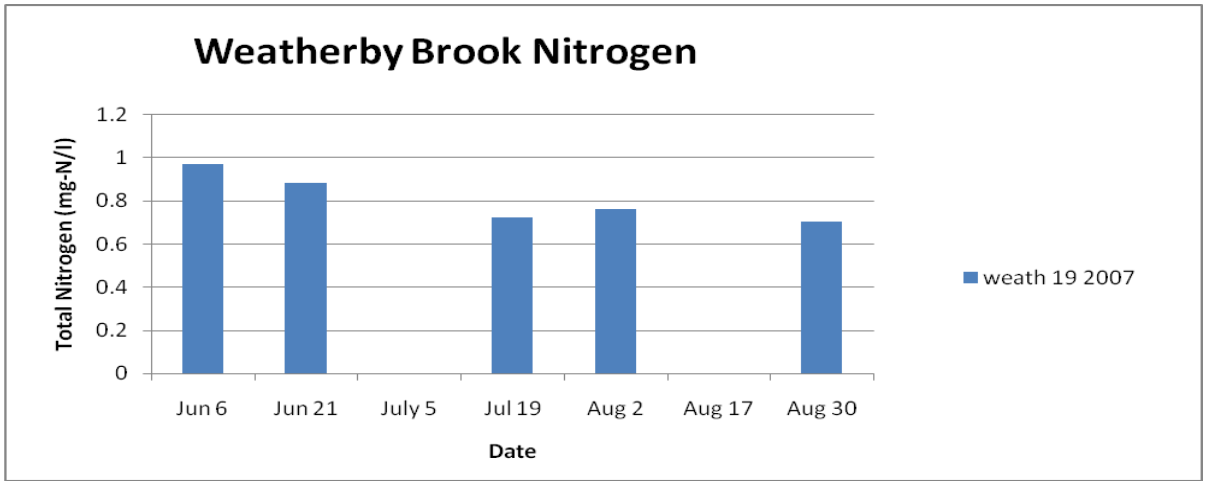

Furnace Brook Nitrogen
Total Nitrogen (mg-N/l)
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
Jun 6
Jun 21
July 5
Jul 19
Aug 2
Aug 17
Aug 30
Date
furn 01 2006
furn 01 2007
furn 02 2006
furn 02 2007

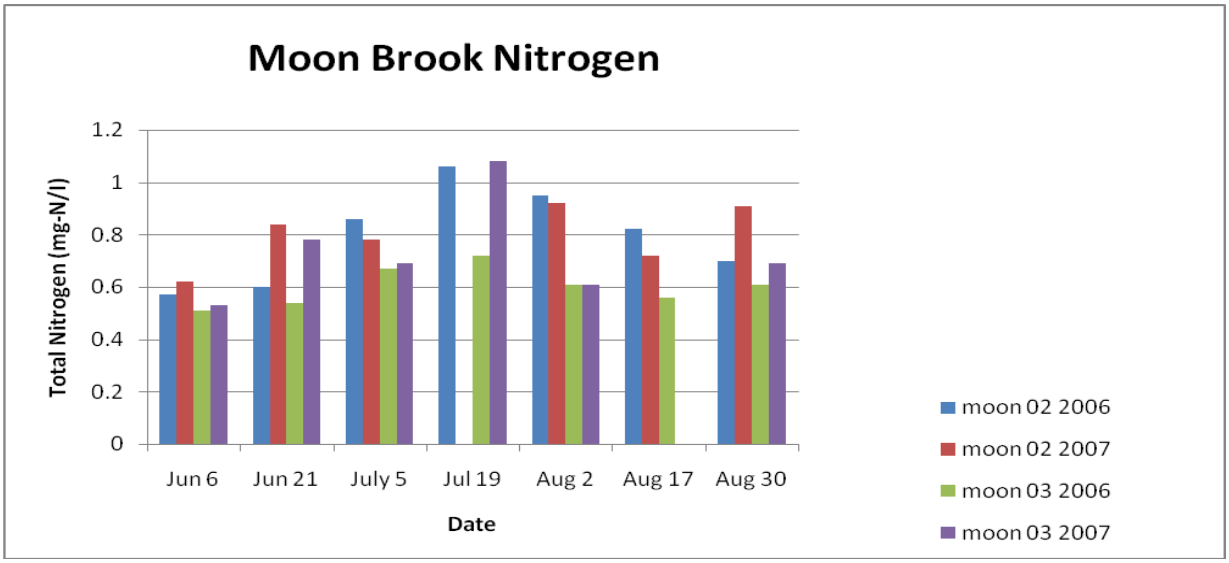

Mussey Brook Nitrogen
Total Nitrogen (mg-N/l)
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
Jun 6
Jun 21
July 5
Jul 19
Aug 2
Aug 17
Aug 30
Date
muss 04 2006
muss 04 2007
muss 05 2006
muss 05 2007

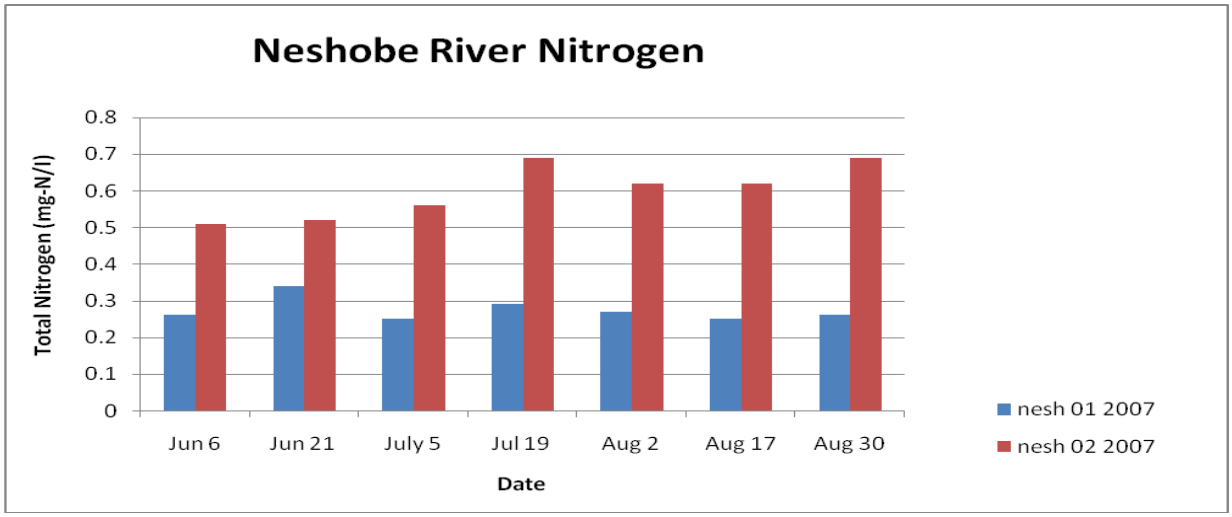

Mill Brook Nitrogen
Total Nitrogen (mg-N/l)
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
Jun 6
Jun 21
July 5
Jul 19
Aug 2
Aug 17
Aug 30
Date
mill 16 2006
mill 17 2006
mill 17 2007
mill 18 2006


Otter Creek Nitrogen
Total Nitrogen (mg-N/l)
1.4
1.2
1
0.8
0.6
0.4
0.2
0
Jun 6
Jun 21
July 5
Jul 19
Aug 2
Aug 17
Aug 30
Date
otter 14 2006
otter 14 2007
otter 16 2006
otter 16 2007
otter 17 2007
otter 18 2007
otter 19 2007


Tenney Brook Nitrogen
Total Nitrogen (mg-N/l)
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
Jun 6
Jun 21
July 5
Jul 19
Aug 2
Aug 17
Aug 30
Date
tenn 10 2006
tenn 10 2007
tenn 12 2006
tenn 12 2007


Weatherby Brook Nitrogen
Total Nitrogen (mg-N/l)
1.2
1
0.8
0.6
0.4
0.2
0
Jun 6
Jun 21
July 5
Jul 19
Aug 2
Aug 17
Aug 30
Date
weath 19 2007


Moon Brook Nitrogen
Total Nitrogen (mg-N/l)
1.2
1
0.8
0.6
0.4
0.2
0
Jun 6
Jun 21
July 5
Jul 19
Aug 2
Aug 17
Aug 30
Date
moon 02 2006
moon 02 2007
moon 03 2006
moon 03 2007


Neshobe River Nitrogen
Total Nitrogen (mg-N/l)
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
Jun 6
Jun 21
July 5
Jul 19
Aug 2
Aug 17
Aug 30
Date
nesh 01 2007
nesh 02 2007

The natural level of ammonia or nitrate in surface water is typically low (less than 1 mg/L); in the effluent of wastewater treatment plants, it can range up to 30 mg/L. The Vermont Water Quality Standard for Class B waters states that $N0_3$-N concentrations shall not exceed 5.0 mg/L during certain flow conditions. The UOCWC measured total nitrogen in the water. Total nitrogen includes all of the commonly-found forms of nitrogen in the environment. The nitrate concentration listed above does not apply to the type of nitrogen that we measured.

All sites monitored showed to be within accepted ranges for nitrogen under the Vermont Water Quality Standards. However, Otter 19 shows a disturbing trend of elevated nitrogen of more than 3 times the level of other Otter Creek sites on a consistent basis throughout the 2007 monitoring season. This site will continue to be monitored as such.

Conclusions

In conclusion, the Moon Brook and Mussey Brook (tributary to the Moon) showed consistently high nutrient, sediment and *E. coli* levels. Much of this pollution is carried to these urban creeks in stormwater. Other urban streams (Tenney Brook and East Creek) monitored this season show a similar trend. The UOCWC has partnered with the City to provide education and outreach about the program and how residents of Rutland can help keep pollutants out of the stormwater entering creeks.

Headwater tributary sites showed relatively low levels of *E. coli*, sediments and nutrients, with a few exceptions. Baker Brook, for example, had fairly high phosphorus results. This would indicate that nutrient enrichment is occurring higher in the watershed, possibly the result of the agriculture or other non-urban land use activities.

With the exception of taking measurements after storm events and creating an umbrella database to hold all of our data, all of the goals were met from last year's report.

Appendix A

UOCWC 2007 sample Collection Training Schedule

Sample Coordinator	Nanci McGuire
QA Officer	Ethan Swift
Watershed Coordinator	Ethan Swift

	UOCWC Site Location and Descriptions
3-May-2004	2004 sites
15-May-2005	New sites for 2005
30-May-2006	New sites for 2006
15 May - 2007	New Sites for 2007
	Sample Collection and Transportation Training at Vermont DEC
22-May-2007	Nanci McGuire & Ethan Swift
	UOCWC sample collection training
31-May-2007	Jerry Stevens

Appendix B -QAQC data

Table 1: Relative Percent Difference Analysis

The Relative Percent Difference (RPD) for duplicate averages for both turbidity and total suspended solids indicate that these mean RPD values exceed the Estimated Precision values as per the VT DEC LaRosa Laboratory Analysis Protocols for Water Samples (Table 7b) as indicated in the 2007 Water Quality Monitoring Project QAPP.

Sample Number	Location	Date	Test	Duplicate	Result	Mean	Actual-Duplicate	RPD Dupe Average
070432-01	Moon02	06/06/07	TP	22.8	23.1	22.8	0.6	2.63
070479-10	Otter16	06/20/07	TP	30.4	20.6	25.5	(9.8)	38.43
070479-07	Tenn10	06/20/07	TP	40.7	39.2	39.5	1.5	3.79
070482-11	Otter17	07/05/07	TP	15.8	15	15.4	(0.8)	5.19
070483-19	Furn01	07/18/07	TP	14.1	14	14.05	(0.1)	0.71
070483-23	Nesh01	07/18/07	TP	9.9	9.6	9.75	(.03)	0.31
070585-08	Tenn12	08/14/07	TP	13.9	15.8	14.85	1.9	12.79
070585-24	Nesh02	08/14/07	TP	6.99	7.1	7.045	0.11	1.56
070586-14	Mill17	08/29/07	TP	5.8	5.2	5.5	(0.6)	10.9
070586-20	Furn02	08/29/07	TP	17.1	18.5	17.8	1.4	7.865
								8.4175
Sample Number	**Location**	**Date**	**Test**	**Duplicate**	**Result**	**Mean**	**Actual-Duplicate**	**RPD Dupe Average**
070432-01	Moon02	06/06/07	E. coli	816	579	697.5	(237)	33.978
070479-06	East10	06/20/07	E. coli	687	435	561	(252)	44.92
070479-07	Tenn10	06/20/07	E. coli	1730	1990	1860	260	13.98

070482-09	Otter14	07/05/07	E. coli	461	579	520	118	22.7
070482-11	Otter17	07/05/07	E. coli	488	397	442.5	(91)	20.56
070483-19	Furn01	07/18/07	E. coli	387	579	483	192	39.75
070483-23	Nesh01	07/18/07	E. coli	26	27	26.5	1	3.77
070584-05	East07	08/01/07	E. coli	201	148	174.5	(53)	30.37
070584-03	Muss04	08/01/07	E. coli	345	411	483	192	39.75
070585-08	Tenn12	08/14/07	E. coli	51	70	60.5	19	31.4
070585-24	Nesh02	08/14/07	E. coli	687	461	574	(226)	19.68
070586-14	Mill17	08/29/07	E. coli	5	3	4	(2)	0.5
070586-20	Furn02	08/29/07	E. coli	345	304	324.5	(41)	12.63
								22.438
Sample Number	**Location**	**Date**	**Test**	**Duplicate**	**Result**	**Mean**	**Actual-Duplicate**	**RPD Dupe Average**
070432-01	Moon02	06/06/07	NTU	1.72	1.48	1.6	(0.24)	15
070479-06	East10	06/20/07	NTU	2.52	4.52	3.52	2	56.81
070479-07	Tenn10	06/20/07	NTU	5.05	5.61	5.33	0.56	10.51
070482-09	Otter14	07/05/07	NTU	4.6	4.7	4.65	1	21.505
070482-11	Otter17	07/05/07	NTU	2.29	2.08	2.185	(0.21)	9.61
070483-19	Furn01	07/18/07	NTU	0.51	0.64	0.575	0.13	22.608
070483-23	Nesh01	07/18/07	NTU	0.26	0.2	0.23	(0.06)	26.08
070584-05	East07	08/01/07	NTU	1.94	1.44	1.69	(0.5)	29.585

070584-03	Muss04	08/01/07	NTU	2.41	2.3	2.35	(0.11)	4.68
070585-24	Nesh02	08/14/07	NTU	0.75	0.54	0.645	(0.21)	32.56
070585-08	Tenn12	08/14/07	NTU	1.17	1.29	1.23	0.12	9.756
070586-14	Mill17	08/29/07	NTU	0.29	0.23	0.26	(0.06)	23.077
070586-20	Furn02	08/29/07	NTU	0.71	0.61	0.66	(0.1)	15.15
								21.3

Sample Number	Location	Date	Test	Duplicate	Result	Mean	Actual-Duplicate	RPD Dupe Average
070432-01	Moon02	06/06/07	TN	0.62	0.62	0.62	0	0
070479-06	East10	06/20/07	TN	0.54	0.52	0.53	(0.02)	3.77
070479-07	Tenn10	06/20/07	TN	0.49	0.52	0.505	0.03	5.94
070482-09	Otter14	07/05/07	TN	0.27	0.28	0.275	0.01	3.63
070482-11	Otter17	07/05/07	TN	0.35	0.36	0.355	0.01	2.81
070584-03	Muss04	08/01/07	TN	0.48	0.45	0.465	(0.03)	6.45
070584-05	East07	08/01/07	TN	0.35	0.34	0.345	(0.01)	2.89
070585-08	Tenn12	08/14/07	TN	0.25	0.25	0.25	0	0
070585-24	Nesh02	08/14/07	TN	0.61	0.62	0.615	0.01	1.62
070586-14	Mill17	08/29/07	TN	0.7	0.7	0.7	0	0
070586-20	Furn02	TN	08/29/07	0.5	0.52	0.51	0.02	3.92
								2.82

Special thanks to the following people for all of their assistance in putting this report together:
Ethan Swift, Michelle Smith, Amanda McGuire, Christina Barbarello and Joe Pryzpek.