

# **Charles River Monthly Monitoring Program**

*2006 Year-End Report*

*Submitted by:*

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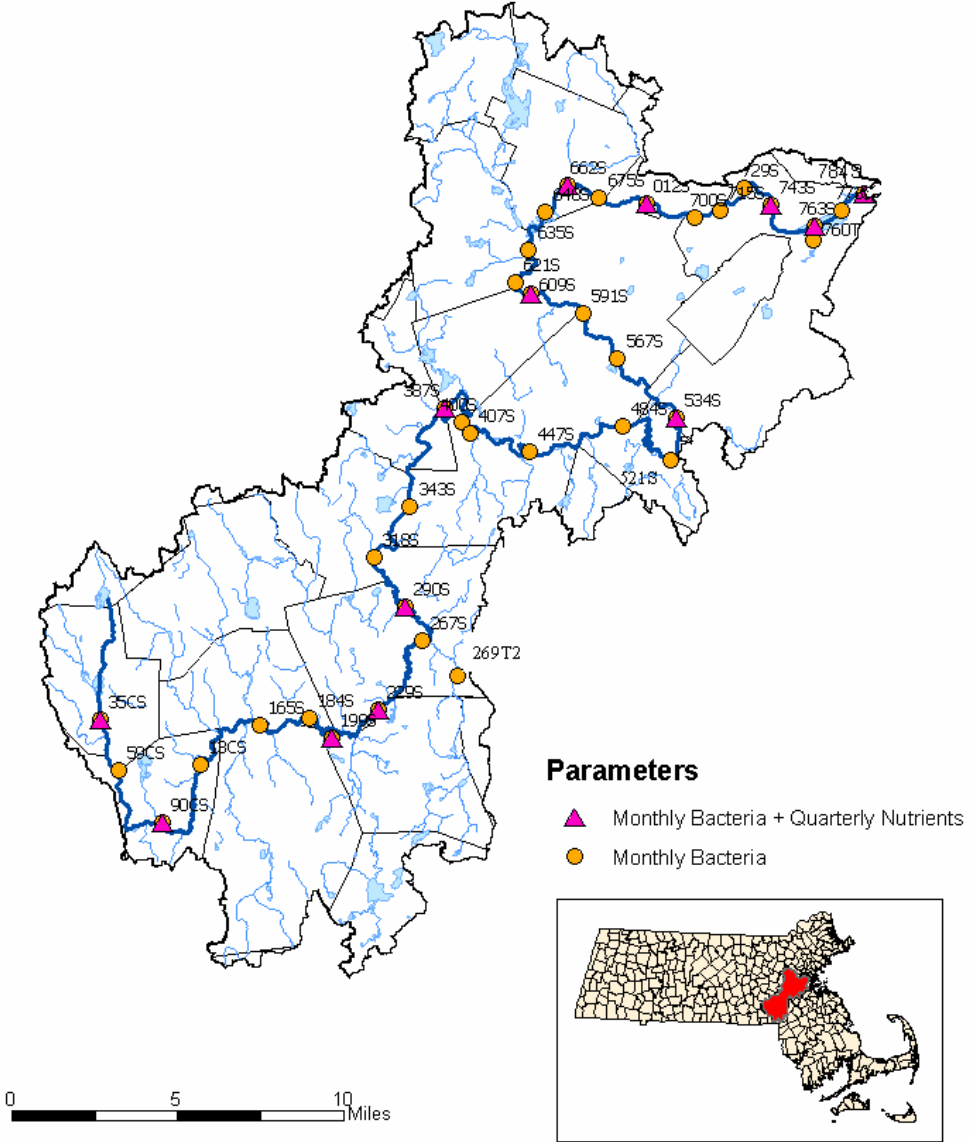
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## 1.0 Introduction

The Charles River Watershed Association (CRWA) is devoted to conducting and using sound science upon which to base its policy platforms, advocacy work, and public education. Monitoring the Charles River is extremely important because it helps us to understand the complex hydrological, biological and chemical interactions in the watershed, identify and resolve problem areas (hot spots), and track trends in water quality behavior over time and under different weather conditions. Water quality sampling is time and resource intensive and CRWA heavily relies upon volunteers to collect samples and make in-stream measurements. CRWA's Monthly Monitoring Program is essential to establishing baseline water quality information that helps us understand the overall health of the river, identify water quality issues and guide our management and restoration work. We greatly appreciate the time and effort you have put into making this type of work possible and hope that you will continue to feel closer to this beautiful and valuable natural resource that you are helping protect.

The Charles River Monthly Monitoring program involves river monitoring at 37 sampling sites, spanning the entire 80-mile stretch of the Charles River, and two tributary sites located on the Stop River in Medfield and Muddy River in Boston (Figure 1). A network of over 70 trained volunteers and CRWA staff collect samples and take *in situ* measurements at 6 am typically on the 3<sup>rd</sup> Tuesday of every month. Bacteria levels are monitored on a monthly basis at all sites while chlorophyll *a* and different chemical forms of nitrogen and phosphorus are monitored on a quarterly basis at 12 sites. *In situ* temperature and depth readings are taken at all sites on a monthly basis. In December 2006, two sites were assigned YSI 63 meters to take additional *in situ* readings including pH, temperature, salinity and conductivity. CRWA obtained these meters through US Environmental Protection Agency's (EPA) equipment loan grant program.

# Charles River Monthly Sampling Locations



**Figure 1: Charles River Watershed Sampling Locations**

**Table 1: Charles River Monthly Monitoring Locations**

<b>Site #</b>	<b>Description</b>	<b>Town</b>
35CS	Central Street Bridge	Milford
35CD	Discharge Pipe at Central Street	Milford
35C2	Discharge Pipe at Central Street on left side looking upstream	Milford
59CS	Mellen Street Bridge	Bellingham
90CS	Route 126, North Main Street	Bellingham
130S	Maple Street Bridge	Bellingham
165S	Shaw Street Bridge/Elm Street	Medway/Franklin
199S	Populatic Pond Boat Launch	Norfolk
229S	Route 115, Baltimore Street	Millis
267S	Dwight Street Bridge	Millis
269T	Causeway Street/Stop River	Medfield
290S	Old Bridge Street	Medfield
318S	Route 27 Bridge	Medfield/Sherborn
343S	Farm Road/Bridge Street	Dover/Sherborn
387S	Cheney Bridge	Wellesley
400S	Charles River Road Bridge	Dover
447S	Dover Gage	Dover
484S	Dedham Medical Center	Dedham
521S	Ames Street Bridge	Dedham
534S	Route 109 Bridge	Dedham
567S	Nahanton Park	Newton
591S	Route 9 Gaging Station	Newton
609S	Washington Street/Hunnewell Bridge	Wellesley
621S	Leo J. Martin Golf Course/Park Road	Weston
635S	2391 Commonwealth Avenue	Newton
648S	Lakes Region	Waltham
662S	Moody Street Bridge	Waltham
675S	Farwell/North Streets	Newton/Waltham
012S	Watertown Dam Footbridge	Watertown
700S	North Beacon Street Bridge	Watertown/Brighton
715S	Arsenal Street	Watertown/Brighton
729S	Elliot Bridge	Cambridge
743S	Western Avenue Bridge	Cambridge
760T	Muddy River/Back Bay Fens	Boston
763S	Harvard Bridge	Boston
773S	Longfellow Bridge	Cambridge
784S	New Charles River Dam	Boston

## 2.0 Highlighted Water Quality Results

Samples were not collected in January or February due to cold temperatures and frozen river conditions. Below are highlights of the 2006 monitoring results.

Table 2 shows the “action limits” for all of the parameters tested at CRWA. Action limits are numerical values that would cause CRWA to act. In many cases, the action limits are based on a regulatory threshold such as the surface water quality criteria established by Massachusetts Department of Environmental Protection (MassDEP) and the recommended nutrient criteria by EPA (MassDEP 2006a, US EPA 2000).

**Table 2: Water Quality Action Limits**

<b>Parameter</b>	<b>Action Limit</b>
<i>E. Coli</i> (bacteria)	126 cfu/100 mL (swim) 630 cfu/100 mL (boat)
Total Phosphorus	0.0238 mg/l (as P)
Orthophosphate	0.0238 mg/l (as P)
Ammonia	0.3 mg/l
Nitrate/Nitrite	0.31 mg/l (as N)
Total Nitrogen	0.5 mg/l
Chlorophyll a*	0.0037 mg/l

\*State has no established limit for phaeophytin, so the limit for Chlorophyll a is the limit for the total presence of Chlorophyll a & Phaeophytin combined.

### ***E. Coli* Bacteria**

*E. coli* levels are compared to the State surface water quality standards for primary and secondary contact recreation. In January 2007, MassDEP revised and approved changes to the State standards which included switching the bacteria criteria from fecal coliform to *E. Coli*.

The strain of *E. coli* bacteria cultured for water quality analysis is not directly implicated in causing adverse health effects, but its presence indicates the likely presence of other harmful bacteria. In 2006, a total of 309 *E. coli* samples were collected; 31% of the samples were below the safe swimming standard (126 colonies per 100 milliliters of water (cfu/100mL)) and 94% of which fell under the safe boating requirements (630 colonies/100mL of water) (Table 2) (MassDEP, 2006a). Please note that for analysis and comparison purposes CRWA uses the geometric mean criteria established by MassDEP instead of the single sample criteria. CRWA applies this approach to be more conservative and protective of the public’s health. Eighty one percent and 99% of samples taken during dry conditions, defined as less than 0.1 inch of rain falling within 72 hours before sampling at the rainfall gauge at Logan Airport, fell within safe swimming and boating standards, respectively, while 65% and 91% of samples taken in wet conditions fell within safe swimming and safe boating conditions, respectively.

In the Charles River Basin from Watertown Dam, Site 012S, to the New Charles River Dam, Site 784S, 46% of all samples fell within State limits for safe swimming and 88% fell within safe boating limits (Table 3). During seven wet weather events, 47% and 83% of samples taken in the Basin fell within safe swimming and boating standards, respectively. Water quality in the Basin improved slightly during three dry weather events with 45% and 100% of samples taken meeting State standards for safe swimming and boating, respectively (Table 3). Figure 2 shows the percentage of time that the river met the state standards for both swimming and boating. Figure 3 shows the average *E. coli* concentrations at each sampling location for 2006. Raw data and statistical analysis can be found in Water Quality Tables following the report.

**Table 3: Charles River Basin Bacteria Trends**



**Percent of Time  
CHARLES RIVER BASIN  
Meets State Water Quality Standards**

	Overall		Dry Weather		Wet Weather		River Grade
	Swimming	Boating	Swimming	Boating	Swimming	Boating	
1995	19	39					D
1996	21	57	40	94	15	45	C-
1997	34	70	56	87	22	61	C
1998	51	83	85	98	31	74	C+
1999	55	90	69	100	47	84	B-
2000	52	91	88	88	49	91	B
2001	69	87	87	96	36	71	B
2002 (a)	33	88	78	100	27	86	B
2003 (b)	50	89	48	90	56	89	B-
2004 (c)	53	98	48	96	57	100	B
2005	33	87	41	89	12	76	B+
2006	46	88	45	100	47	83	B+

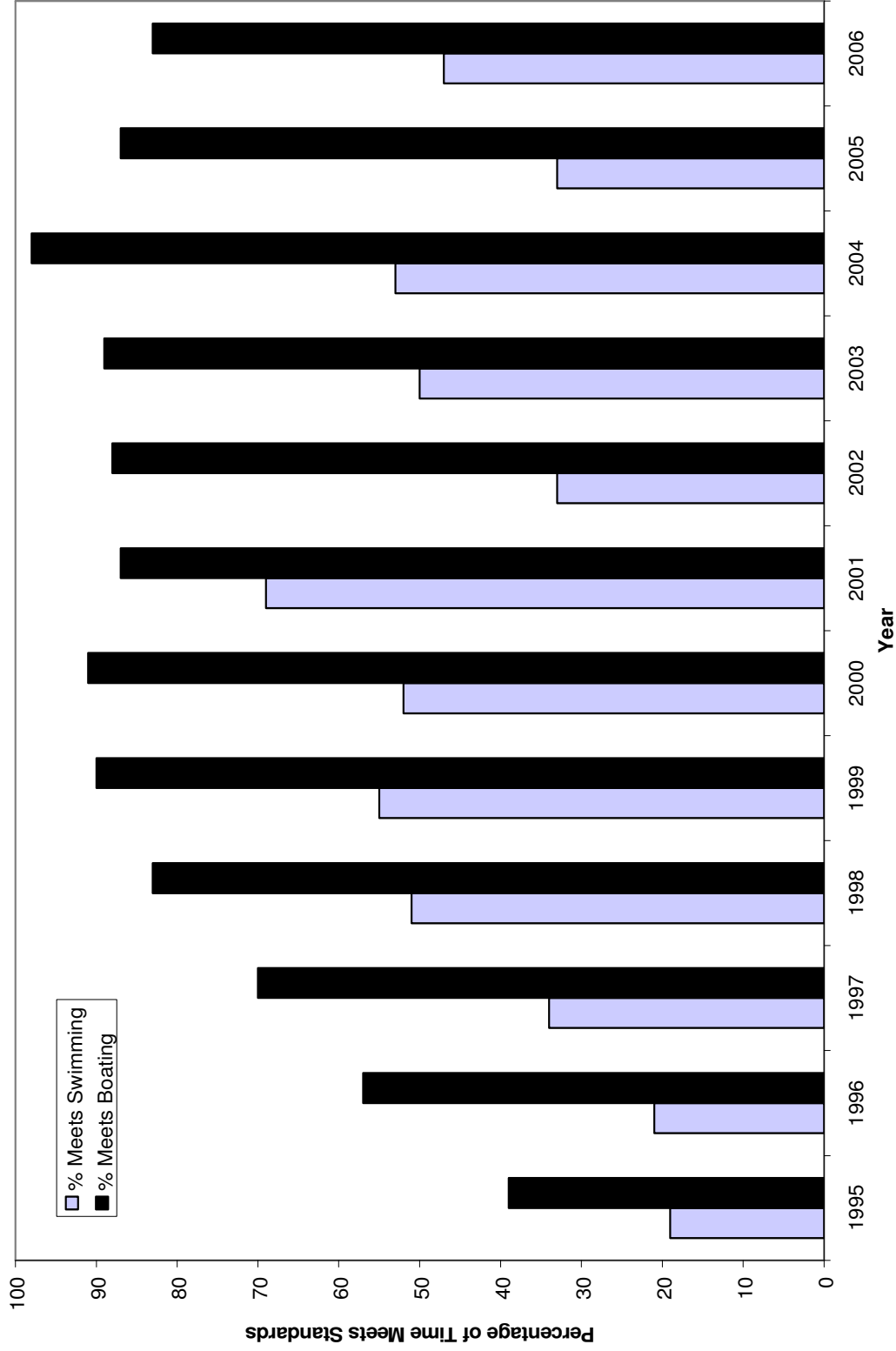
(a) Only one dry weather event (rainfall less than 0.1 inches in previous 72 hours) occurred in 2002. Rainfall data collected at Logan Airport in Boston.

(b) In 2003, monthly water quality monitoring was conducted seven out of twelve months; of which, only two monthly monitoring events occurred during wet weather, which may have skewed the percentages of the time the river met the swimming and boating standards.

(c) Statistics from 1995 to 2003 based on CRWA monthly fecal coliform testing at in Charles River Basin. Since 2004, samples were analyzed for E. coli bacteria instead of fecal coliform bacteria and these results were compared to the State surface water quality standards for primary and secondary contact recreation.

Contact CRWA at (781) 788-0007 or visit the website at [www.charlesriver.org](http://www.charlesriver.org) for more information.





**Figure 2: Charles River Basin Bacteria Graph**

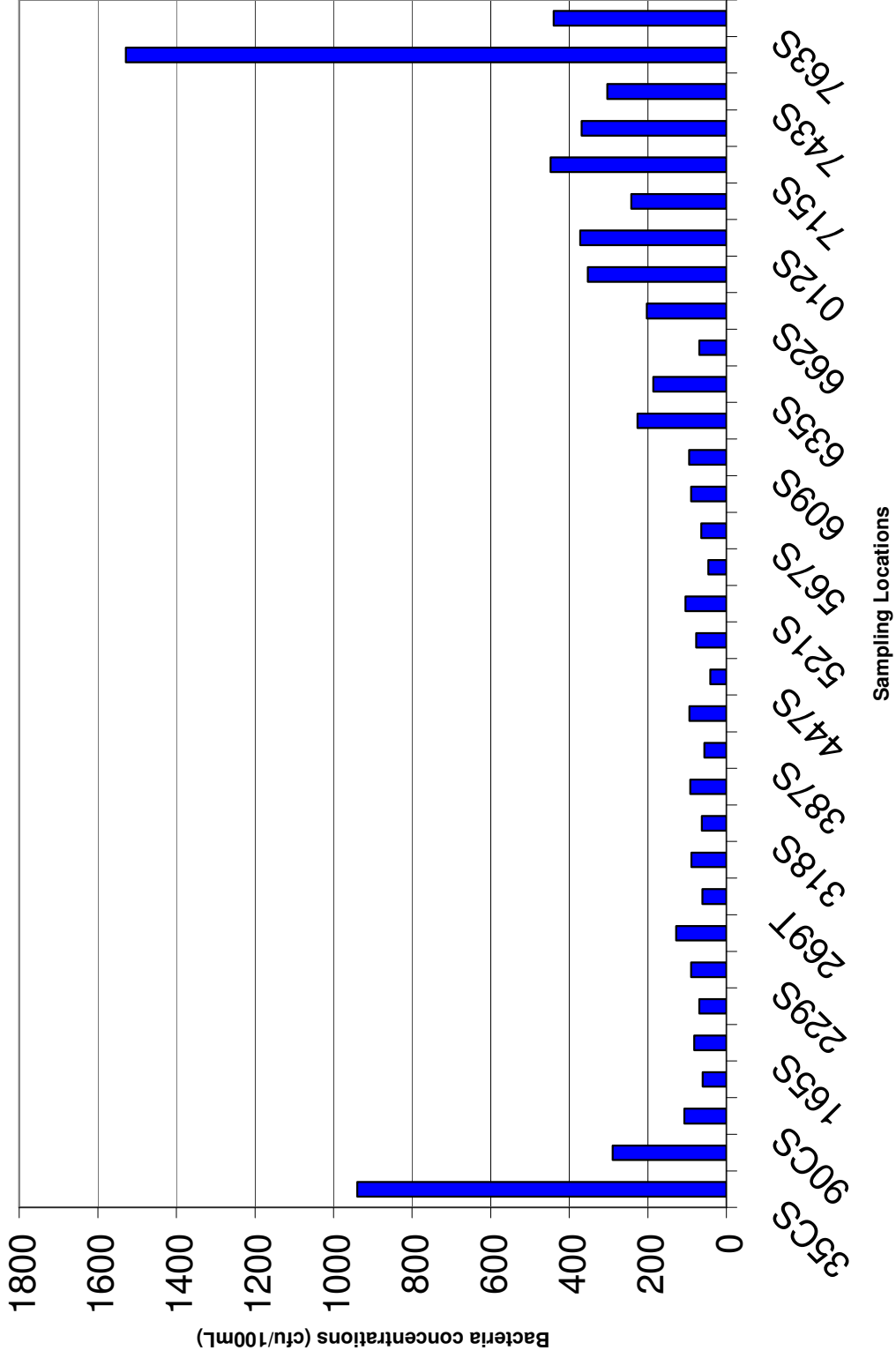


Figure 3: Average *E. coli* Concentrations by Site for 2006

## *Phosphorus*

The primary sources for phosphorus in urban river systems are stormwater runoff of fertilizers applied to residential yards, playing fields and golf courses, discharges from wastewater treatment plants, and releases from contaminated bottom sediments. In the Charles River watershed, phosphorus is the limiting nutrient, meaning that the growth rates of plants including algae are limited by the relatively lower supply of phosphorus. Therefore even minor increases in phosphorus concentrations can cause eutrophication or overgrowth of vegetation including algal blooms. Many stretches of the Charles River are listed as impaired for nutrients in the Massachusetts Year 2006 Integrated List of Waters, which identifies those water bodies that do not meet surface water quality standards (MassDEP, 2006b).. CRWA is currently working on a project to assess current phosphorus concentrations and sources in the upper watershed and determine the total maximum daily load (TMDL) the river can receive and still attain its designated use. Data collected from this Monthly Monitoring program is invaluable to CRWA's TMDL work.

The Monthly Monitoring Program includes analyses of total phosphorus and orthophosphate (the amount of phosphorus immediately available for algal use). In 2006, 37 total phosphorus samples were collected, of which 97% exceeded the EPA recommended criterion of 0.0238 milligrams per liter (mg/L) (Figure 3) (US EPA, 2000). However, of the 42 orthophosphate tests, only 33% did not meet 0.0238 mg/L, EPA's recommended criterion for total phosphorus (Figure 3). Raw data and statistical analysis for total phosphorus and orthophosphate can be found in Water Quality Tables following the report.

## *Nitrogen*

CRWA tests the river for total nitrogen, ammonia, and nitrate-nitrite which may originate from atmospheric deposition from automobile and electric power plant emissions, wastewater treatment plants, septic systems, animal wastes and fertilizers. Total nitrogen is the sum of all organic and inorganic nitrogen forms. Ammonia is commonly found in untreated sewage and its oxidation yields nitrite, which is quickly converted to nitrate, the nutrient form directly available to algae and other aquatic plants. Of the 42 ammonia samples taken, none exceeded EPA's recommended criterion (0.3 mg/L) for ambient waters in New England (Figure 4) (US EPA, 2000). Of the 42 nitrate-nitrite samples, 79% exceeded EPA recommended criterion for total nitrogen (0.57 mg/L) (Figure 4). Of the 40 total nitrogen samples, 95% exceeded EPA's recommended standard of 0.57mg/L for total nitrogen (Figure 4). Raw data and statistical analysis for ammonia, nitrate-nitrite, and total nitrogen can be found in Water Quality Tables following the report.

### 2006 Average Phosphorus Levels by Site

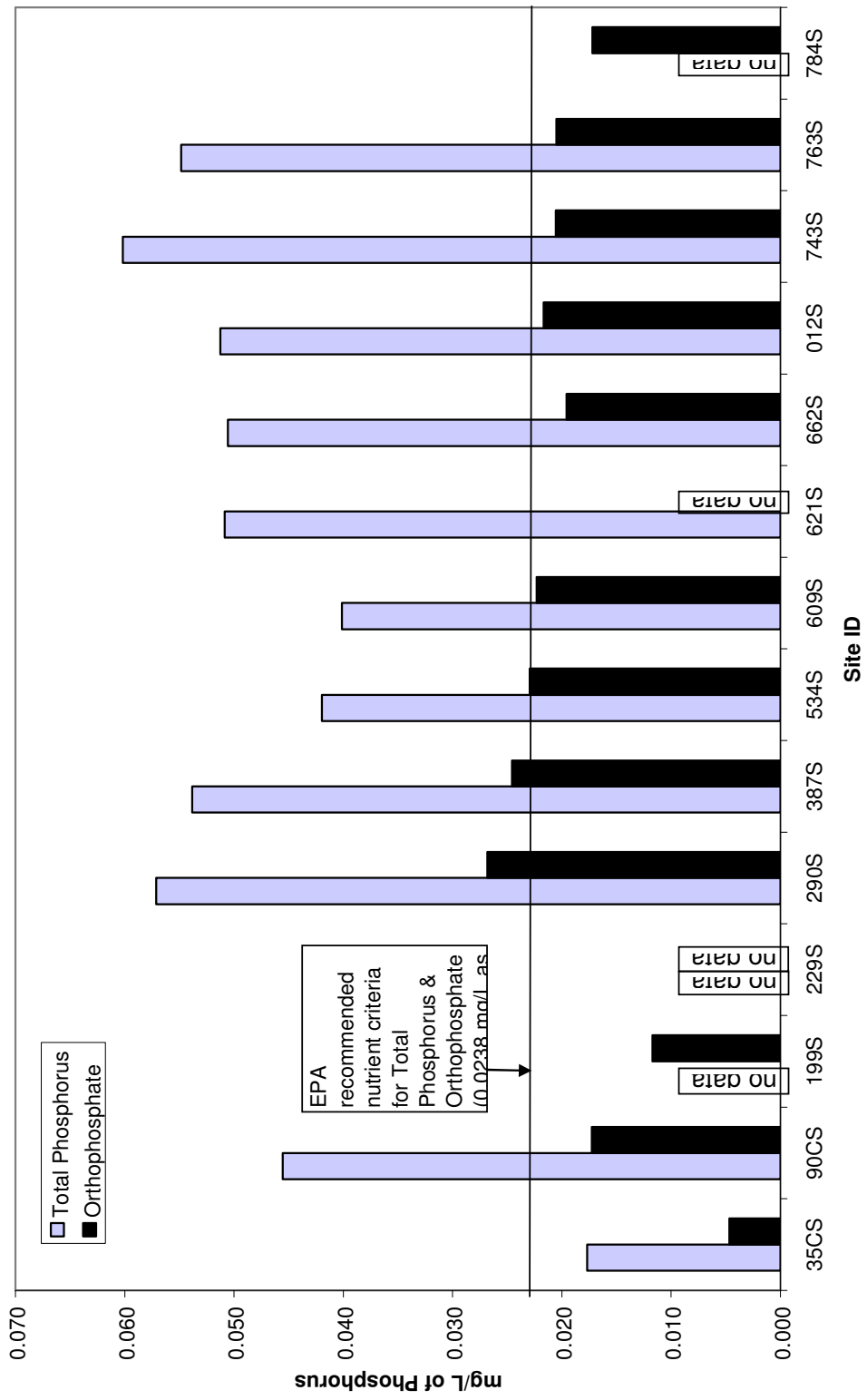
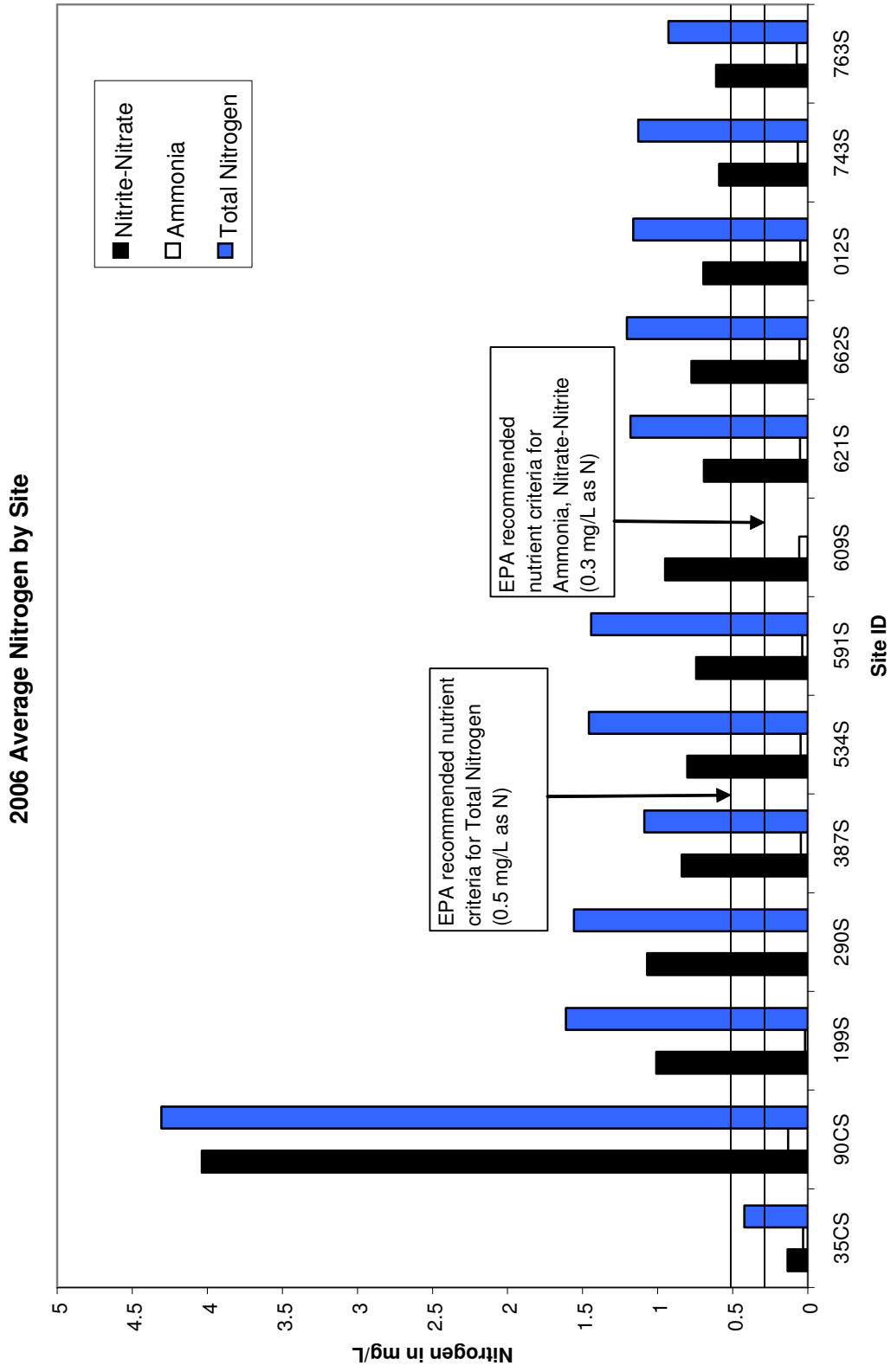


Figure 4: 2006 Phosphorus Trends



**Figure 5: 2006 Nitrogen Trends**

### ***Chlorophyll a & Phaeophytin***

Chlorophyll *a* is the principle photosynthetic pigment in algae and vascular plants. It is an indicator of algae concentrations in the water column. Increased algal content can lead to anoxic (no available oxygen) conditions detrimental to fish and other aquatic fauna as bacteria use oxygen to break algae down. In addition, it indicates the over-enrichment of nutrients in a river stretch. Of the 122 chlorophyll *a* samples, all failed to meet the EPA recommended limit of 0.00375 mg/L (US EPA, 2000). Raw data and statistical analysis of chlorophyll *a* can be found in Water Quality Tables following the report.

Phaeophytin are the end-products of the degradation of chlorophyll *a*. A high ratio of chlorophyll *a* to phaeophytin indicates active growth of vegetation while a low ratio indicates aging. Higher ratios signify the occurrence of eutrophication. The average ratios for chlorophyll *a*/phaeophytin ranged from 0.88 to 3.43. The sites with the highest chlorophyll *a*/phaeophytin ratios were sites 763S, the Massachusetts Avenue Bridge in Boston, and 784S, the New Charles River Dam in Boston. Raw data and statistical analysis of the chlorophyll *a*/phaeophytin ratios can be found in Water Quality Tables following the report.

### ***Total Suspended Solids (TSS)***

Starting in late winter through the spring, stormwater runoff is laden with sand and other types of materials to de-ice our roadways, parking lots and driveways. This influx of particles can often have adverse effects on our waterways, making the water muddy and murky. It can inhibit sunlight from reaching the river bottom and suspended algae. CRWA tests for TSS to determine areas where high levels of sand or silt are being washed off into the river and tributaries.

From March to May 2006, river samples were analyzed for TSS. Only the nine Charles River Basin sites were sampled for TSS in March and April while the entire river was sampled for TSS in May. May Results for TSS showed high levels in a few locations. At Site 290S, Old Bridge Street in Medfield, TSS levels were high, 18 mg/L. There are many major roadways crossing the river upstream of this site as well as residential properties abutting the river banks that may have been sources of sediment to this area. Also, a dramatic increase in TSS occurred from Site 521S, Ames St. Bridge in Dedham to Site 591S, Rte. 9 Gauging Station in Newton. TSS levels rose from not being detected at Site 521S to almost 9 mg/L at Site 591S. The Ames Street area is surrounded by wetlands adjacent to the river, providing a buffer from polluted runoff. As the river flows downstream to Site 591S, the adjacent land use is predominantly commercial and industrial, which typically has higher pollutant loading than other land use types. TSS levels were also higher starting from Site 675S, North Street Bridge in Brighton/Watertown to Site 763S, Harvard Bridge in Boston/Cambridge as compared to other upstream locations in the river. The highest TSS level in this section was 8.0 mg/L

at Site 729S, Eliot Bridge in Cambridge. Raw data can be found in Water Quality Tables following the report.

### ***Optical Brighteners***

Optical brighteners are fluorescent whitening agents found in human wash water that can be viewed under ultraviolet light. The presence of these whitening agents is an indicator of potential human sewage contamination. In 2006, the US EPA Laboratory in Chelmsford tested a new methodology for optical brighteners to determine its suitability for application in water quality monitoring. According to US EPA, optical brightener concentrations over 1,000 micrograms per liter ( $\mu\text{g/L}$ ) may indicate raw sewage contamination, concentrations of 500-1,000  $\mu\text{g/L}$  may be diluted sewage and septic, and levels less than 500  $\mu\text{g/L}$  are difficult to distinguish. CRWA provided river samples to EPA in June, a wet weather monitoring event. Most of the results in June were between 500 and 600  $\mu\text{g/L}$  with a few sites below 500  $\mu\text{g/L}$ . These numbers indicate that there was uncertainty on what were the sources of contamination to the areas with elevated bacteria levels (Raw data can be found in Water Quality Tables following the report).

### **3.0 Conclusions**

Data generated from this comprehensive water quality monitoring program helps to provide an indication of current overall stream health. Each month, we can identify new problems and refocus our efforts to tackle the most urgent water quality issues. Taken in conjunction with CRWA's other monitoring efforts including visual monitoring for our "Find It and Fix It" Stormwater Project, we can obtain a better picture of the river's health and target areas of the watershed for clean up and better watershed management.

As shown in Table 2, the bacteria results for the Charles River Basin have not improved from last year to this year and thus the river maintained a 'B+' grade for its water quality in 2006. The river's report card grade is determined by EPA using our monthly monitoring data making it essential to monitoring our progress towards achieving an A grade for the river by 2010.

Over the course of the twelve-year program, water quality in the Charles has been steadily improving in large part due to the monitoring work of CRWA staff and its volunteers which has identified the most problematic areas in the river and guided where remediation and management efforts should occur in the watershed.

### **4.0 References**

MA Department of Environmental Protection, 2006a. *Massachusetts Surface Water Quality Standards*. Massachusetts Department of Environmental Protection, Division of

Water Pollution Control, Technical Services Branch. Westborough, MA (Revision of 314 CMR 4.00).

MA Department of Environmental Protection, 2006b. *Massachusetts Year 2006 Integrated List of Waters – Proposed listing of the condition of MA waters pursuant to Sections 303(d) and 305(b) Clean Water Act*. MassDEP, Division of Watershed Management. Worcester, MA.

U.S. Environmental Protection Agency, 2000. *Ambient Water Quality Criteria Recommendations for Rivers and Streams in Nutrient Ecoregion XIV*. EPA-822/B-00/022. US EPA Office of Water Regulations and Standards, Washington, DC.



## **Water Quality Tables**







## Ammonia Results

Site #	Description	Town	River mile	3/21/2006 (a)	6/20/2006 (a)	10/17/2006 (a)	12/19/2006 (a)	Mean	Median	Stnd Dev	Min	Max
35CS	Central Street Bridge	Millford	3.5	0.022	0.067	0.035	0.005	0.032	0.028	0.026	0.005	0.067
90CS	Rt. 126, N. Main St.	Bellingham	9.0	0.136	0.206	0.076	0.105	0.131	0.121	0.056	0.076	0.206
229S	Populatic Pond Boat Launch	Norfolk	19.9			0.018		0.018	0.018		0.018	0.018
229S	Rt. 115, Baltimore St.	Norfolk/Mill	22.9									
290S	Old Bridge St.	Medfield	29.0	0.034	0.061	0.025	0.063	0.046	0.047	0.019	0.025	0.063
387S	S. Natick Dam	Natick	37.8	0.035	0.059	0.030	0.072	0.049	0.047	0.020	0.030	0.072
534S	Rt. 109 Bridge	Dedham	53.4	0.016	0.060	0.019	0.053	0.037	0.036	0.023	0.016	0.060
609S	Washington St. Hunnewell Bridge	Wellesley	60.9	0.042	0.062	0.032	0.092	0.057	0.052	0.026	0.032	0.092
662S	Moody St. Bridge	Waltham	66.2	0.031	0.064 (d)	0.018	0.093	0.052	0.048	0.034	0.018	0.093
012S	Watertown Dam Footbridge	Watertown	69.3	0.031	0.067	0.035	0.087	0.055	0.051	0.027	0.031	0.087
743S	Western Ave.	Cambridge	74.3	0.019 (d)	0.073	0.016	0.096	0.051	0.046	0.040	0.016	0.096
763S	Mass. Ave. at Harvard Bridge	Boston	76.3	0.032	0.113	0.057		0.067	0.057	0.041	0.032	0.113
784S	New Charles River Dam	Boston	78.4		0.108	0.038		0.073	0.073	0.049	0.038	0.108
	Total # of Samples exceeding action limit	0		0	0	0	0					
	Total # of Samples	42		10	11	12	9					
	% of samples exceeding action limit	0%		0%	0%	0%	0%					
	QA/QC Samples											
	Equipment Blank				0.005	0.002						
	Site No.				763S	534S						
	Rainfall At Logan International Airport (inches)			drv	wet	wet	drv					
	3 Days Prior to Sampling			trace	trace	0	0.01					
	2 Days Prior to Sampling			trace	0	0	0					
	1 Day Prior to Sampling			0	0	0	0.02					
	Day of Sampling			0	0.37	0.13	0					

- (a) Analysis performed at Massachusetts Water Resources
- (b) Analysis performed at National Environmental Testing, Inc.
- (c) Analysis performed at Analytical Balance Corp.
- (d) Average of duplicates
- (e) Scattered showers throughout the watershed
- (f) Not collected
- (g) Samples not collected due to very cold temperatures and frozen river.

## Nitrate/Nitrite Results

Site #	Description	Town	River mile	3/18/2006	6/20/2006	10/17/2006	12/19/2006	Mean	Median	Stnd Dev	Min	Max
35CS	Central Street Bridge	Milford	3.5	0.283	0.091	0.148	0.016	0.135	0.120	0.113	0.016	0.283
90CS	Rt. 126. N. Main St.	Bellingham	9.0	3.824	4.734	2.745	4.846	4.038	4.279	0.976	2.745	4.846
199S	Populatic Pond Boat Launch	Norfolk	19.9			1.010		1.010	1.010	#DIV/0!	1.010	1.010
290S	Old Bridge St.	Medfield	29.0	1.527	0.294	1.200	1.261	1.070	1.231	0.537	0.294	1.527
387S	S. Natick Dam	Natick	37.8	1.140	0.188	0.782	1.249	0.840	0.961	0.478	0.188	1.249
534S	Rt. 109 Bridge	Dedham	53.4	0.989	0.203	0.959	1.060	0.803	0.974	0.402	0.203	1.060
591S	Rt. 9 Gaging Station	Newton	59.1		0.233	0.980	1.020	0.744	0.980	0.444	0.233	1.020
609S	Washington St. Hunnewell Bridge	Wellesley	60.9	0.950				0.950	0.950	#DIV/0!	0.950	0.950
621S	Leo J. Martin Golf Course/Park Rd.	Weston			0.265 (a)	0.852	0.957					
662S	Moody St. Bridge	Waltham	66.2	0.931	0.317	0.859	0.991 (a)	0.774	0.895	0.310	0.317	0.991
012S	Watertown Dam Footbridge	Watertown	69.3	0.947	0.356	0.497	0.980	0.695	0.722	0.316	0.356	0.980
743S	Western Ave.	Cambridge	74.3	1.005 (a)	0.366	0.396		0.589	0.396	0.361	0.366	1.005
763S	Mass. Ave. at Harvard Bridge	Boston	76.3	1.130	0.366	0.333		0.610	0.366	0.451	0.333	1.130
784S	New Charles River Dam	Boston	78.4									
	Total # of Samples exceeding action limit			33	5	11	8					
	Total # of Samples			42	11	12	9					
	% of samples exceeding action limit			79%	45%	92%	89%					
QA/QC	Samples											
	Equipment Blank					0.006						
	Site No.					534S						
	Rainfall At Logan International Airport (inches)					dry	dry					
	3 Days Prior to Sampling			dry	wet	dry	dry					
	2 Days Prior to Sampling			trace	trace		0					
	1 Day Prior to Sampling			trace	0		0					
	Day of Sampling			0	0		0					
				0	0.37		0.13 (c)					

\* Analyzed at Massachusetts Water Resource Authority's Central Lab

(a) Average of duplicates

(b) Scattered showers throughout watershed.

(c) Rainfall occurred after 06:30am



## Chlorophyll a Results

Site #	Town	River mile	3/21/2006 Chlorophyll a	6/20/2006 Chlorophyll a	10/17/2006 Chlorophyll a	12/19/2006 Chlorophyll a	Mean	Median	Stnd Dev	Min	Max	
35CS	Milford	3.5					no data	no data	no data	no data	no data	
90CS	Beelingham	9.0	1.15	1.72	4.12	0.1	1.773	1.435	1.703	0.100	4.120	
199S	Norfolk	19.9	1.54	1.69	2.1	1.05	1.595	1.615	0.434	1.050	2.100	
290S	Medfield	29.0			5.82		5.820	5.820	N/A	5.820	5.820	
387S	Natick	37.8	1.67	2.19	2.05	0.89	1.700	1.860	0.583	0.890	2.190	
534S	Dedham	53.4	1.39	2.33	2.66	0.78	1.790	1.860	0.862	0.780	2.660	
609S	Wellesley	60.9	2.2	4.86	5.96	1.97	3.748	3.530	1.974	1.970	5.960	
621S	Weston	62.1	3.76	5.49	5.46	1.52	4.058	4.610	1.875	1.520	5.490	
662S	Waltham	66.2					no data	no data	no data	no data	no data	
012S	Watertown	69.3	4.58	7.2 (a)	16.6	1.65	7.508	5.890	6.472	1.650	16.600	
743S	Cambridge	74.3	4.86	5.22	7.97	0.98	4.758	5.040	2.876	0.980	7.970	
763S	Boston	76.3	6.145 (a)	7.19	19.5	1.115 (a)	8.488	6.668	7.806	1.115	19.500	
784S	Boston	78.4	11.6	7.55	14.1		11.083	11.600	3.305	7.550	14.100	
			all samples exceed limit by a great margin									
QA/QC Samples												
	Equipment Blank											
	Site No.											
	Equipment Blank											
	Site No.											
	Rainfall At Logan International Airport (inches)		dry	wet	wet	dry						
	3 Days Prior to Sampling		trace	trace	0	0.01						
	2 Days Prior to Sampling		trace	0	0	0						
	1 Day Prior to Sampling		0	0	0	0.02						
	Day of Sampling		0	0.37	0.13 (c)	0						

\* Samples analyzed at Massachusetts Water Resources

(a) Average of duplicates

(b) Scattered showers throughout watershed

(c) Rainfall occurred after 06:30





## Total Suspended Solids Results

Total Suspended Solids mg/L

Site #	Description	Town	River Mile	1/10/2006 *	3/21/2006†	4/11/2006	5/16/2006
35CS	Central Street Bridge	Milford	3.5				ND
35CD	Discharge Pipe @ Central St.	Milford	3.5				
35C2	2nd Discharge Pipe @ Central St.	Milford	3.5				
59CS	Mellen St. Bridge	Bellingham	5.9				ND
90CS	Rt. 126, N. Main St.	Bellingham	9.0				ND
130S	Maple St. Bridge	Bellingham	12.9				ND (a)
165S	Shaw St. Bridge	Franklin	16.5				ND
199S	Populatic Pond Boat Launch	Norfolk	19.9				ND
229S	Rt. 115, Baltimore St.	Norfolk/Millis	22.9				ND
267S	Dwight St. Bridge	Millis	26.7				ND
269T	Causeway St. Stop River	Medfield	26.9				ND
290S	Old Bridge St.	Medfield	29.0				18.0
318S	Rt. 27 Bridge	Medfield	31.8				
343S	Farm Rd./Bridge St.	Sherborn/Dover	34.3				ND
387S	S. Natick Dam	Natick	37.8				
400S	Charles River Road Bridge	Dover	40.0				
447S	Dover Gage	Dover	44.7				ND
484S	Dedham Medical Center	Dedham	48.4				5.6
521S	Ames St. Bridge	Dedham	52.1				ND
534S	Rt. 109 Bridge	Dedham	53.4				ND
567S	Nahanton Park	Newton	56.7				9.0
591S	Rt. 9 Gaging Station	Newton	59.1				8.6
609S	Washington St. Hunnewell Bridge	Wellesley	60.9				7.5
621S	Leo J. Martin Golf Course/Park Rd.	Weston	62.1				7.8
635S	2391 Commonwealth Ave.	Newton	63.5				
648S	Lakes Region	Waltham	64.8				
662S	Moody St. Bridge	Waltham	66.2				ND
675S	North St.	Waltham	67.6				5.8
012S	Watertown Dam Footbridge	Watertown	69.3		ND	5.3	6.4
700S	N. Beacon St.	Newton	70.9		ND	5.2	6.6
715S	Arsenal St.	Brighton	71.5		ND		7.3
729S	Eliot Bridge	Cambridge	72.9		ND	5.5	8.0
743S	Western Ave.	Cambridge	74.3		ND (a)	6.4	7.0
760S	Muddy River at Comm. Ave.	Boston	76.0		ND	10.9 (a)	5.9
763S	Mass. Ave. at Harvard Bridge	Boston	76.3		ND		ND
773S	Longfellow Bridge	Cambridge	77.3		ND	ND	ND
784S	New Charles River Dam	Boston	78.4			ND (a)	ND

QA/QC Samples

Equipment Blank		ND	<1
Site No.		729s	743s
Equipment Blank			
Site No.			

Rainfall At Logan International Airport (inches)

3 Days Prior to Sampling	Trace	0.12	3.84
2 Days Prior to Sampling	Trace	0	3.77
1 Day Prior to Sampling	0	0	0.36
Day of Sampling	0	0	0.52

\* Total suspended solids results reported in milligrams per liter (mg/L).

(a) Average of duplicate sample results

ND = Not Detected

## Optical Brightener Results

**Charles River Watershed Association**

Monthly Water Quality Sampling Data

Concentrations of Optical Brighteners in µg/L

<b>Site #</b>	<b>Description</b>	<b>Town</b>	<b>River mile</b>	<b>6/20/2006</b>
35CS	Central Street Bridge	Milford	3.5	404
35CD	Discharge Pipe @ Central St.	Milford	3.5	ND
35C2	2nd Discharge Pipe @ Central St.	Milford	3.5	ND
59CS	Mellen St. Bridge	Bellingham	5.9	436
90CS	Rt. 126, N. Main St.	Bellingham	9.0	470
130S	Maple St. Bridge	Bellingham	12.9	541
165S	Shaw St. Bridge	Franklin	16.5	584 (a)
199S	Populatic Pond Boat Launch	Norfolk	19.9	ND
229S	Rt. 115, Baltimore St.	Norfolk/Millis	22.9	521
267S	Dwight St. Bridge	Millis	26.7	549
269T	Causeway St. Stop River	Medfield	26.9	527
290S	Old Bridge St.	Medfield	29.0	545
318S	Rt. 27 Bridge	Medfield	31.8	565
343S	Farm Rd./Bridge St.	Sherborn/Dover	34.3	572
387S	Cheney Bridge	Wellesley	38.7	572
400S	Charles River Road Bridge	Dover	40.0	569
447S	Dover Gage	Dover	44.7	ND
484S	Dedham Medical Center	Dedham	48.4	565
521S	Ames St. Bridge	Dedham	52.1	569
534S	Rt. 109 Bridge	Dedham	53.4	576
567S	Nahanton Park	Newton	56.7	568
591S	Rt. 9 Gaging Station	Newton	59.1	558
609S	Washington St. Hunnewell Bridge	Wellesley	60.9	566
621S	Leo J. Martin Golf Course/Park Rd.	Weston	62.1	563
635S	2391 Commonwealth Ave.	Newton	63.5	559
648S	Lakes Region	Waltham	64.8	542
662S	Moody St. Bridge	Waltham	66.2	551
675S	North St.	Waltham	67.6	556
012S	Watertown Dam Footbridge	Watertown	69.3	563
700S	N. Beacon St.	Newton	70.9	559
715S	Arsenal St.	Brighton	71.5	ND
729S	Eliot Bridge	Cambridge	72.9	553
743S	Western Ave.	Cambridge	74.3	552
760S	Muddy River at Comm. Ave.	Boston	76.0	263
763S	Mass. Ave. at Harvard Bridge	Boston	76.3	543
773S	Longfellow Bridge	Boston	77.3	538
784S	New Charles River Dam	Boston	78.4	545
QA/QC Samples				
	Equipment Blank			1.46
	Site No.			400S
	Equipment Blank			-4.8
	Site No.			763S

(a) Average of Field Duplicates