CRWA 2005 Monthly Monitoring Program

FINAL REPORT

Created by:

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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 from which to understand the overall health of the river and identify and react to change. 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 sites located at Stop River in Medfield and Muddy River in Boston (Figure 1). 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.

Highlighted Results

Samples were not collected in January due to frozen conditions. Below are highlights of the 2005 monitoring results.

E. Coli

In 2004, Massachusetts Water Resources Authority (MWRA) switched analyzed bacterium from fecal coliform to *E. coli* since it is a better indicator of health risk. Bacteria levels are compared to recommended *E. coli* standards set by EPA ambient water quality criteria. For 2005, we continue to use *E. Coli* as a primary indicator of water quality health risks associated with recreational river use.

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 2005, a total of 313 *E. coli* samples were collected, 51% of which were below the safe swimming standard (126 colonies/100mL of water) and 92% of which fell under the safe boating requirements (630 colonies/100mL of water) (Table 1). 56% and 93% of samples taken during dry conditions (< 0.1 inch of rain fell within 72 hours before sampling at the rain gage at Logan Airport) fell within safe swimming and boating standards, respectively, and 27% and 90% 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 Charles River Dam, Site 784S, 33% of all samples fell within EPA limits for safe swimming and 85% fell within safe boating limits (Table 2). During three wet weather events, 12% and 76% of samples taken in the Basin fell within EPA safe swimming and boating standards, respectively. Water quality in the Basin improved slightly during three dry weather event with 48% and 84% of samples taken fell within EPA limits for safe swimming and boating, respectively (Table 2).

Phosphorus

The primary sources for phosphorus in urban river systems are fertilizers applied to residential yards, playing fields and golf courses, and detergent-rich wastewaters. In the Charles River watershed, phosphorus is the limiting nutrient, implying that minor increases in phosphorus concentrations can cause eutrophication or major algal blooms. Many stretches of the Charles River are listed in the EPA 303(d) list of impaired waters for nutrients. CRWA is currently working on a project to assess current phosphorus concentrations in the upper watershed and determine the maximum load the river can receive and still attain its designated use. Data collected from the Monthly Monitoring program is invaluable in this assessment. The Monthly Monitoring Program includes analyses of total phosphorus and orthophosphate (the amount of phosphorus immediately available for algal use). In 2005, 31 total phosphorus samples were collected, of which nearly 97% exceeded the EPA recommended criteria of 0.024 mg/L (Table 3). However, of the 34 orthophosphate tests, only 29% did not meet 0.024 mg/L, EPA's recommended criteria for total phosphorus (Table 4).

Nitrogen

CRWA tests waters for total nitrogen, ammonia, and nitrate-nitrite which may originate from atmospheric deposition, wastewater treatment plants septic systems, and fertilizers. Total nitrogen testing analyzes for both 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 32 ammonia samples taken, 9% exceeded EPA recommended criteria (0.3 mg/L) for suggested ambient waters (Table 5). Of 33 nitrate-nitrite samples, 79% exceeded EPA recommended criteria of 0.57 mg/L (Table 6). Of 26 total nitrogen samples, 100% exceeded EPA action standards of 0.57mg/L (Table 7).

Chlorophyll a

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. It is another measure of the over-enrichment of nutrients in a river stretch alongside phosphorus and nitrogen. Of the 34 chlorophyll analyses, 44% failed to meet EPA action limits of 0.00375 mg/L.

Conclusions

Each chemical and biological parameter is an indicator of overall stream health. With each month's data, we can identify new problems and refocus our efforts to tackle the most urgent water quality issues. With this year's *Find It and Fix It* program underway, we can combine monthly monitoring data with shoreline survey results to obtain a better picture of river health. We will be able to use this data to target sections for clean-up and watershed improvement.

As shown in Table 2, the bacteria results for the Charles River Basin have not improved this year from last year. While the river basin maintains a 'B+' for the year, the percent of time the river meets standards has decreased since 2004. The Monthly Monitoring data will continue to be essential to monitor our progress towards achieving an A grade for the river.

As shown by the accumulated data over the past 10 years and the 'grade' given by the EPA, Charles River water quality is improving. By continuously sampling over a long period of time, we find that overall trends are leading towards water quality improvement as CRWA, its staff and you work towards protecting our valuable rivers.

Figure 1: Charles River Watershed Sampling Locations

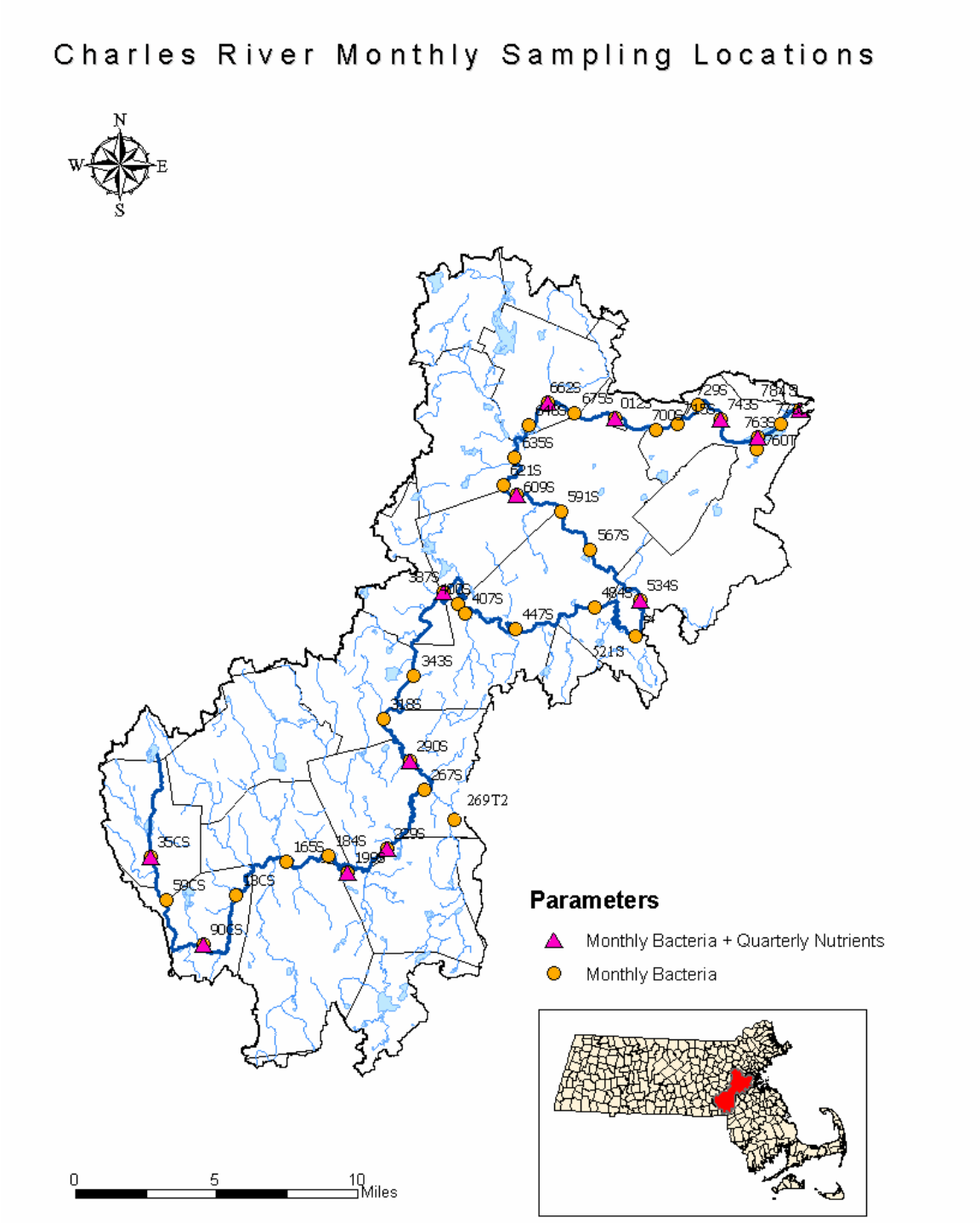

Table 1: E. coli Bacteria Results

Charles River Watershed Association
Monthly Water Quality Sampling Data
Concentrations of Escherichia Coli (E. coli) Bacteria (#/100 ml)

Site #	Description	Town	River mile	1/18/2005		2/15/2005		3/15/2005		4/12/2005		5/17/2005		6/21/2005	
35CS	Central Street Bridge	Milford	3.5	*cancelled		80		50	(a)	10		170		740	
35CD	Discharge Pipe @ Central St	Milford	3.5												
35C2	2nd Discharge Pipe @ Central S	Milford	3.5												
59CS	Mellen St. Bridge	Bellingham	5.9			3200		170		70		140		270	
90CS	Rt. 126, N. Main St.	Bellingham	9.0			2500		40		50		40		30	
13CS	Maple St. Bridge	Bellingham	12.9			270		10				40		40	
165S	Shaw St. Bridge	Franklin	16.5			95	(a)	50	(a)	40				380	
199S	Populatic Pond Boat Launch	Norfolk	19.9												
229S	Rt. 115, Baltimore St.	Norfolk/Millis	22.9							10		140		130	
267S	Dwight St. Bridge	Millis	26.7			200		10		<10		80		70	
269T	Causeway St. Stop River	Medfield	26.9			<10	(a)	<10		<10		<10		210	
290S	Old Bridge St.	Medfield	29.0			60				<10		40		110	
318S	Rt. 27 Bridge	Medfield	31.8			100		<10		<10		10		50	
343S	Farm Rd./Bridge St.	Sherborn/Dover	34.3			70		10		<10		40		60	
387S	Cheney Bridge	Wellesley	38.7			100		10		<10		10		50	
400S	Charles River Road Bridge	Dover	40.0									40			
447S	Dover Gage	Dover	44.7							20		90		30	
484S	Dedham Medical Center	Dedham	48.4			40		30		<10		50		40	
521S	Ames St. Bridge	Dedham	52.1					<10		40		60		30	(a)
534S	Rt. 109 Bridge	Dedham	53.4			190		120		<10	(a)	40		40	
567S	Nahanton Park	Newton	56.7			60		10		<10		20	(a)		
591S	Rt. 9 Gaging Station	Newton	59.1									20		225	(a)
609S	Washington St. Hunnewell Bridg	Wellesley	60.9			180		<10		<10					
621S	Leo J. Martin Golf Course/Park R	Weston	62.1			190		20		10		40		430	
635S	2391 Commonwealth Ave.	Newton	63.5							230		840		1700	
648S	Lakes Region	Waltham	64.8									810		1800	
662S	Moody St. Bridge	Waltham	66.2			1120		490		160		280		220	
675S	North St.	Waltham	67.6			1150		480		240		220		240	
012S	Watertown Dam Footbridge	Watertown	69.3			1180		410		260		240		260	
700S	N. Beacon St.	Newton	70.9			970		180		310		220		300	
715S	Arsenal St.	Brighton	71.5					340		280		570		130	
729S	Eliot Bridge	Cambridge	72.9			680		250	(a)	180		590		110	
743S	Western Ave	Cambridge	74.3			380		100		70		640		10	
760S	Muddy River at Comm. Ave.	Boston	76.0			400		550		380				120	
763S	Mass. Ave. at Harvard Bridge	Boston	76.3					880		260		120		70	
773S	Longfellow Bridge	Cambridge	77.3					270		70	(a)	<10		60	
784S	New Charles River Dam	Boston	78.4					240		30		15	(a)	30	
QA/QC Samples															
	Equipment Blank							<1				<1			
	Site No.					n/a		387S		n/a		521S			
	Equipment Blank														
	Site No.					n/a		n/a		n/a		n/a			
Rainfall At Logan International Airport (inches)															
	3 Days Prior to Sampling					trace		0.8		0		0		trace	
	2 Days Prior to Sampling					0		0		0		trace		0	
	1 Day Prior to Sampling					0		0		0		0		0	
	Day of Sampling					trace		0		0.03		0.01		0	

Site #	7/19/2005		8/16/2005		9/20/2005		10/18/2005		11/15/2005		12/13/2005		Mean	Median	Stnd Dev	Min	Max
35CS	840		n/a		540		180		130		130		287	150	303	10	840
35CD													No Data	No Data	No Data	No Data	No Data
35C2													No Data	No Data	No Data	No Data	No Data
59CS	170		210		180		750				190		535	185	955	70	3200
90CS	220		300		285	(a)	400		130				400	175	750	30	2500
13CS	60		2000		110		240		<10		20		310	60	641	10	2000
165S	170		n/a		200		180				20		142	133	118	20	380
199S	60		n/a		20		362						147	60	187	20	362
229S	50		n/a		90		220		40				97	90	72	10	220
267S	50		140		110		160		20		20		86	75	65	10	200
269T	130		400		250				20		17.5		171	170	147	18	400
290S	110		200		140		340		20				128	110	103	20	340
318S	90		50		100		340		<10				106	90	108	10	340
343S	<10.0				60		280		10		30		70	50	88	10	280
387S	120						290		20		40		80	45	94	10	290
400S	20		310		70		290		10				123	55	139	10	310
447S	20		10		10		320		20				65	20	106	10	320
484S	30	(a)	91		90		230		10		40		65	40	63	10	230
521S	40		170		70		320		<10				104	60	106	30	320
534S	50	(a)	490		60		250		10		10		126	55	150	10	490
567S	20		n/a				170		10		<10.0		48	20	62	10	170
591S			n/a		110		200		60				123	110	88	20	225
609S	450		340		310						30		262	310	161	30	450
621S	1490		370	(a)	190		280		<10				336	190	458	10	1490
635S	117		390		3690		230		40				905	310	1250	40	3690
648S	510				325	(a)	290		40				629	418	628	40	1800
662S	70		190		70		150		40		40		257	160	315	40	1120
675S	220		370		280		250		30		30		319	240	304	30	1150
012S			490		120		180		20		50		321	250	335	20	1180
700S	990		900		260		300		50		60		413	300	359	50	990
715S	3140		4600		230		430				140		1096	340	1621	130	4600
729S	510		220		210		530		60		170		319	220	215	60	680
743S	350		150		340		310		100		160		237	160	185	10	640
760S	1130								110				448	390	375	110	1130
763S	10		230				1020				240		354	235	380	10	1020
773S	10		100		150		820		310		170		218	150	246	10	820
784S	20		<10		40		960		200		110		183	40	303	15	960
	<1.00		<1.00		560		<1.00		n/a		<1.00						
	35CS		635S		662S		130S				743S						
	<1.00				<1.00						n/a						
	567S		n/a		130S		n/a		n/a								
	0		0.07		0.01		2.89		0		0						
	0		0.6		0		0		0		0						
	0.03		0.13		0		0		0		0						
	Trace		0		0.01		0.02	0.02	0.1		Trace						

Table 2: 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+**

(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 and 2005 based on CRWA monthly fecal coliform testing at in Charles River Basin. In 2004, samples were analyzed for e.coli bacteria instead of fecal coliform bacteria and these results were compared to US EPA recommended recreational standards. The numbers in parentheses are the statistics for the lower four sampling sites.

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

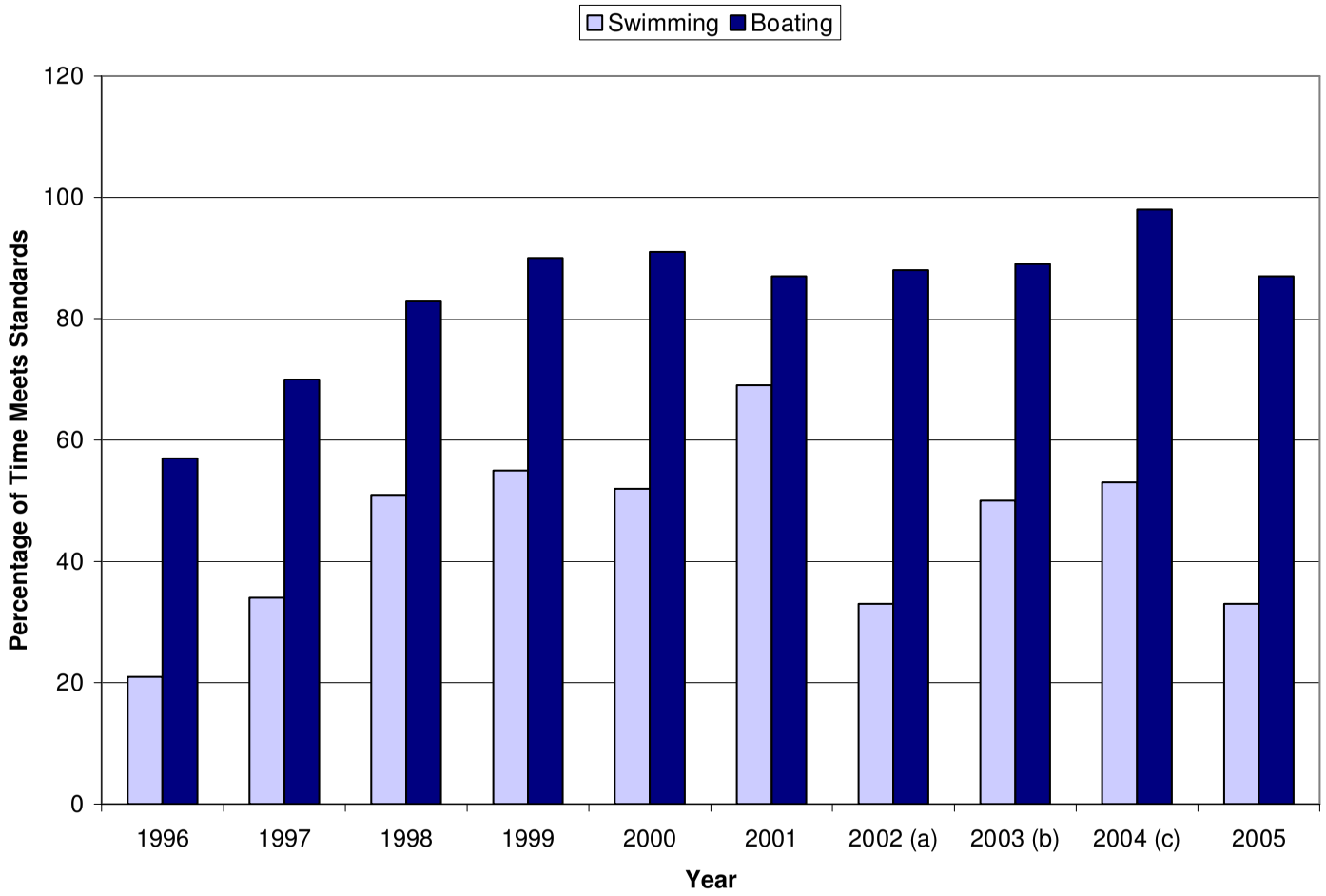

Figure 2: Charles River Basin Bacteria Trends

Table 3: Total Phosphorus Results

Site #	Description	Town	River mile	3/15/2005	6/21/2005	9/20/2005	12/21/2005	Mean	Median	St Dev	Min	Max
35CS	Central Street Bridge	Milford	3.5	0.021		0.240	0.037	0.100	0.037	0.122	0.021	0.240
90CS	Rt. 126, N. Main St.	Bellingham	9.0		0.057	0.046 (b)		0.051	0.051	0.007	0.046	0.057
199S	Populatic Pond Boat Launch	Norfolk	19.9			0.065		0.065	0.065	N/A	0.065	0.065
229S	Rt. 115, Baltimore St.	Norfolk/Millis	22.9					No Data	No Data	No Data	No Data	No Data
290S	Old Bridge St.	Medfield	29.0		0.069	0.075		0.072	0.072	0.004	0.069	0.075
387S	S. Natick Dam	Natick	37.8	0.028	0.073		0.057	0.052	0.057	0.023	0.028	1.830
534S	Rt. 109 Bridge	Dedham	53.4	0.025	0.069	0.072	0.053	0.055	0.061	0.022	0.025	0.072
609S	Washington St. Hunnewell Bridge	Wellesley	60.9					No Data	No Data	No Data	No Data	No Data
662S	Moody St. Bridge	Waltham	66.2	0.026	0.073	0.074 (b)	0.049	0.055	0.061	0.023	0.026	0.074
012S	Watertown Dam Footbridge	Watertown	69.3	0.038	0.085	0.055		0.060	0.055	0.024	0.038	0.085
743S	Western Ave	Cambridge	74.3	0.031	0.081	0.085	0.052	0.062	0.067	0.026	0.031	0.085
763S	Mass. Ave. at Harvard Bridge	Boston	76.3	0.046	0.096			0.071	0.071	0.035	0.046	0.096
784S	New Charles River Dam	Boston	78.4		0.085	0.098	0.057	0.080	0.085	0.021	0.057	0.098
QA/QC Samples												
	Equipment Blank											
	Site No.											
Rainfall At Logan International Airport (inches)												
	3 Days Prior to Sampling			0.8	trace	0.01	0					
	2 Days Prior to Sampling			0	0	0	0					
	1 Day Prior to Sampling			0	0	0	0					
	Day of Sampling			0	0	0.01	trace					

* Samples analyzed at Massachusetts Water Resources Authority's Central Lab.

(a) Concentrations reported in table is equal to less than twice of reported

(b) Average of duplicate samples.

(c) Equipment blank sample was collected incorrectly. It was observed that the sample appeared like

Table 4: Orthophosphate Results

Site #	Description	Town	River mile	3/15/2005		6/21/2005		9/21/2005		12/13/2005		Mean	Median	St Dev	Min	Max
35CS	Central Street Bridge	Milford	3.5	0.005				0.011		0.007		0.008	0.007	0.003	0.005	0.011
90CS	Rt. 126, N. Main St.	Bellingham	9.0	0.017		0.024		0.009				0.017	0.017	0.007	0.009	0.024
199S	Populatic Pond Boat Launch	Norfolk	19.9					0.004				0.004	0.004	N/A	0.004	0.004
229S	Rt. 115, Baltimore St.	Norfolk/Millis	22.9									No Data	No Data	No Data	No Data	No Data
290S	Old Bridge St.	Medfield	29.0			0.039		0.003				0.021	0.021	0.025	0.003	0.039
387S	S. Natick Dam	Natick	37.8	0.013		0.042				0.022		0.026	0.022	0.015	0.013	0.042
534S	Rt. 109 Bridge	Dedham	53.4	0.015		0.044		0.009		0.018		0.021	0.016	0.016	0.009	0.044
609S	Washington St. Hunnewell Bridge	Wellesley	60.9									No Data	No Data	No Data	No Data	No Data
621S	Leo J. Martin Golf course/Park Rd.	Weston						0.010				0.010	0.010	N/A	0.010	0.010
662S	Moody St. Bridge	Waltham	66.2	0.013		0.028		0.016	(e)	0.015		0.018	0.015	0.007	0.013	0.028
012S	Watertown Dam Footbridge	Watertown	69.3	0.013		0.036		0.022				0.024	0.022	0.012	0.013	0.036
743S	Western Ave.	Cambridge	74.3	0.010		0.031		0.005		0.016		0.016	0.013	0.011	0.005	0.031
763S	Mass. Ave. at Harvard Bridge	Boston	76.3	0.012		0.045				0.035		0.031	0.035	0.017	0.012	0.045
784S	New Charles River Dam	Boston	78.4			0.046		0.001		0.019		0.022	0.019	0.023	0.001	0.046
QA/QC Samples																
	Equipment Blank															
	Site No.															
Rainfall At Logan International Airport (inches)																
	3 Days Prior to Sampling			0.8		trace		0.01		0						
	2 Days Prior to Sampling			0		0		0		0						
	1 Day Prior to Sampling			0		0		0		0						
	Day of Sampling			0		0		0.01		trace						
*** Orthophosphate results reported in milligrams per liter (mg/L).**																
(a) Analysis performed at National Environmental Testing, Inc.																
(b) Analysis performed by Analytical Balance Corp.																
(c) Analysis performed by MWRA's Central Lab from 12/1997 to present.																
(d) Concentration reported here is half of less than concentration reported originally.																
(e) Average of duplicate samples																
(f) Equipment blank sample was collected incorrectly. The sample appeared like river water instead of distilled water.																

Table 5: Ammonia Results

Site #	Description	Town	3/15/2005		6/21/2005		9/20/2005		12/13/2005		Mean	Median	Stnd Dev	Min	Max
35CS	Central Street Bridge	Milford	0.093				0.562		0.133		0.262	0.133	0.260	0.093	0.562
90CS	Rt. 126, N. Main St.	Bellingham	0.223		0.100		0.098				0.140	0.100	0.072	0.098	0.223
199S	Populatic Pond Boat Launch	Norfolk					0.040				0.040	0.040	N/A	N/A	N/A
229S	Rt. 115, Baltimore St.	Norfolk/Millis									No Data	No Data	No Data	No Data	No Data
290S	Old Bridge St.	Medfield			0.066	(d)	0.030				0.048	0.048	0.026	0.030	0.066
387S	S. Natick Dam	Natick	0.011		0.040				0.078		0.043	0.040	0.034	0.011	0.078
534S	Rt. 109 Bridge	Dedham	0.020		0.034		0.277		0.062		0.098	0.048	0.121	0.020	0.277
609S	Washington St. Hunnewell Bridge	Wellesley									No Data	No Data	No Data	No Data	No Data
662S	Moody St. Bridge	Waltham	0.049		0.068		0.226		0.085		0.107	0.076	0.081	0.049	0.226
012S	Watertown Dam Footbridge	Watertown	0.047		0.075		0.174	(d)			0.098	0.075	0.067	0.047	0.174
743S	Western Ave.	Cambridge	0.057		0.037		0.148		0.090		0.083	0.074	0.049	0.037	0.148
763S	Mass. Ave. at Harvard Bridge	Boston	0.104		0.331						0.218	0.218	0.161	0.104	0.331
784S	New Charles River Dam	Boston			0.361		0.006		0.097		0.155	0.097	0.184	0.006	0.361
	Total # Samples	32													
	Total # Samples exceeding action limit (h)	3													
	% samples exceeding action limit	9.4													
QA/QC Samples															
	Equipment Blank														
	Site No.														
Rainfall At Logan International Airport (inches)															
	3 Days Prior to Sampling		0.8		trace		0.01		0						
	2 Days Prior to Sampling		0		0		0		0						
	1 Day Prior to Sampling		0		0		0		0						
	Day of Sampling		0		0		0.01		trace						

(a) Analysis performed at Massachusetts Water Resources Authority's Central Lab

(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.

(h) Action limit of 0.3 mg/L based on US EPA Ambient Water Quality Criteria Recommendations for Rivers and Streams in Nutrient Ecoregion XIV

Table 6: Nitrate/Nitrite Results

Site #	Description	Town	River mile	3/15/2005	6/21/2005	9/21/2005	12/13/2005	Mean	Median	St. Dev	Min	Max
35CS	Central Street Bridge	Milford	3.5	0.539		0.668	0.402	0.536	0.539	0.133	0.402	0.668
90CS	Rt. 126, N. Main St.	Bellingham	9.0	2.511	3.702	4.454		3.556	3.702	0.980	2.511	4.454
199S	Populatic Pond Boat Launch	Norfolk	19.9			2.283		2.283	2.283	N/A	2.283	2.283
290S	Old Bridge St.	Medfield	29.0		1.111	1.527		1.319	1.319	0.294	1.111	1.527
387S	S. Natick Dam	Natick	37.8	1.031	1.191		1.210	1.144	1.191	0.099	1.031	1.210
534S	Rt. 109 Bridge	Dedham	53.4	0.914	0.922	0.290	1.000	0.782	0.918	0.330	0.290	1.000
609S	Washington St. Hunnewell Bridge	Wellesley	60.9					No Data	No Data	No Data	No Data	No Data
621S	Leo J. Martin Golf Course/Park Rd.	Weston				0.263		0.263	0.263	N/A	0.263	0.263
662S	Moody St. Bridge	Waltham	66.2	0.924	0.697	0.190	(a) 0.888	0.675	0.793	0.338	0.190	0.924
012S	Watertown Dam Footbridge	Watertown	69.3	0.951	0.741	0.417		0.703	0.741	0.269	0.417	0.951
743S	Western Ave.	Cambridge	74.3	0.985	0.678	0.364	0.944	0.743	0.811	0.287	0.364	0.985
763S	Mass. Ave. at Harvard Bridge	Boston	76.3	0.990	0.636			0.813	0.813	0.250	0.636	0.990
784S	New Charles River Dam	Boston	78.4		0.632	0.060	0.727	0.473	0.632	0.361	0.060	0.727
Total # Samples		**33**										
Total # Samples Exceeding Action Limit (b)		**26**										
% Samples Exceeding Action Limit		**79**										
Rainfall At Logan International Airport (inches)												
	3 Days Prior to Sampling			0.8	trace	0.01	0.00					
	2 Days Prior to Sampling			0	0.00	0.00	0.00					
	1 Day Prior to Sampling			0	0.00	0.00	0.00					
	Day of Sampling			0	0.00	0.01	trace					
* Analyzed at Massachusetts Water Resource Authority's Central Lab												
(a) Average of duplicates												
(b) Scattered showers throughout watershed.												
** Action limit of 0.57 mg/L based on EPA Ambient Water Quality Criteria Recommendations for Rivers and Streams in Nutrient Ecoregion XIV												

Table 7: Total Nitrogen Results

Site #	Description	Town	River mile	3/15/2005		6/21/2005		9/21/2005		12/21/2005			Mean	Median	St Dev	Min	Max
35CS	Central Street Bridge	Milford	3.5	0.89				2.33		0.81			1.34	0.89	0.85	0.81	2.33
90CS	Rt. 126, N. Main St.	Bellingham	9.0	3.14				5.53	(a)				4.34	4.34	1.69	3.14	5.53
199S	Populatic Pond Boat Launch	Norfolk	19.9					3.19					3.19	3.19	N/A	3.19	3.19
290S	Old Bridge St.	Medfield	29.0					2.41					2.41	2.41	N/A	2.41	2.41
387S	S. Natick Dam	Natick	37.8	1.28						1.44			1.36	1.36	0.11	1.28	1.44
534S	Rt. 109 Bridge	Dedham	53.4	1.25				1.32		1.32			1.30	1.32	0.04	1.25	1.32
609S	Washington St. Hunnewell Bridge	Wellesley	60.9										No Data	No Data	No Data	No Data	No Data
621S	Leo J. Martin Golf Course/Park Rd.	Weston						1.01					1.01	1.01	N/A	1.01	1.01
662S	Moody St. Bridge	Waltham	66.2	1.32				0.99	(a)	1.25			1.19	1.25	0.18	0.99	1.32
012S	Watertown Dam Footbridge	Watertown	69.3	1.36		1.07		1.03					1.15	1.07	0.18	1.03	1.36
743S	Western Ave.	Cambridge	74.3	1.37		1.10		1.19		1.30			1.24	1.25	0.12	1.10	1.37
763S	Mass. Ave. at Harvard Bridge	Boston	76.3	1.56									1.56	1.56	N/A	1.56	1.56
784S	New Charles River Dam	Boston	78.4					1.26		1.18			1.22	1.22	0.06	1.18	1.26
Total # Samples		**26**															
Total # Samples Exceeding Action Limit (b)		**26**															
% Samples Exceeding Action Limit		**100**															
	Site No.																
Rainfall At Logan International Airport (inches)																	
	3 Days Prior to Sampling			0.8		trace		0.01		0.00							
	2 Days Prior to Sampling			0		0.00		0.00		0.00							
	1 Day Prior to Sampling			0		0.00		0.00		0.00							
	Day of Sampling			0		0.00		0.01		trace							
* Samples analyzed at Massachusetts Water Resources Authority's Central Lab.																	
(a) Average of duplicates																	
(b) Scattered showers throughout watershed.																	
(b) Action limit of 0.57 mg/L based on US EPA Ambient Water Quality Criteria Recommendations for Rivers and Streams in Nutrient Ecoregion XIV																	

Table 8: Chlorophyll a Results

Site #	Description	Town	River mile	3/15/2005 Chlorophyll a		6/21/2005 Chlorophyll a		9/20/2005 Chlorophyll a		12/13/2005 Chlorophyll a		Summary Statistics for Chlorophyll a				
												Mean	Median	St Dev	Min	Max
35CS	Central Street Bridge	Milford	3.5	0.82				49.9		1.05		17.25667	1.05	28.27019	0.82	49.9
90CS	Rt. 126, N. Main St.	Bellingham	9.0	0.89				1.285	(a)			1.0875	1.0875	0.279307	0.89	1.285
199S	Populatic Pond Boat Launch	Norfolk	19.9					11				11	11	N/A	11	11
290S	Old Bridge St.	Medfield	29.0			1.99		33.5				17.745	17.745	22.28093	1.99	33.5
387S	S. Natick Dam	Natick	37.8	1.42		3.39				0.68		1.83	1.42	1.40075	0.68	3.39
35CS	Central Street Bridge	Milford	3.5					49.9		1.05		25.475	25.475	34.54217	1.05	49.9
534S	Rt. 109 Bridge	Dedham	53.4	1.17		5.61		10.2		0.67		4.4125	3.39	4.451564	0.67	10.2
609S	Washington St. Hunnewell Bridge	Wellesley	60.9									No Data	No Data	No Data	No Data	No Data
621S	Leo J. Martin Golf Course/Park Rd.	Weston	62.1.					14.3				14.3	14.3	N/A	14.3	14.3
662S	Moody St. Bridge	Waltham	66.2	1.59		10.4		11.1	(a)	0.69		5.945	5.995	5.567827	0.69	11.1
012S	Watertown Dam Footbridge	Watertown	69.3	2.47		4.3		2.73				3.166667	2.73	0.990067	2.47	4.3
743S	Western Ave	Cambridge	74.3	1.52		25.5		14.7		0.64		10.59	8.11	11.83874	0.64	25.5
763S	Mass. Ave. at Harvard Bridge	Boston	76.3	1.68		4.97						3.325	3.325	2.326381	1.68	4.97
784S	New Charles River Dam	Boston	78.4			2.03		91.4		1.02		31.48333	2.03	51.89181	1.02	91.4
	Total # Samples				**34**											
	Total # Samples Exceeding Action Limit				**15**											
	**** % Samples Exceeding Action Limit**				**44.1**			10.3								
								662S								
QA/QC Samples																
	Equipment Blank															
	Site No.					trace		0.01		0						
						0		0		0						
Rainfall At Logan International Airport (inches)						0		0		0						
	3 Days Prior to Sampling			0.8		0		0.01		trace						
	2 Days Prior to Sampling			0												
	1 Day Prior to Sampling			0												
	Day of Sampling			0												

* Samples analyzed at Massachusetts Water Resources Authority's Central Lab.

(a) Average of duplicates

(b) Scattered showers throughout watershed

** Action Limit 3.75ug/L based on US EPA Ambient Water Quality Criteria Recommendations for Rivers and Streams in Nutrient Ecoregion XIV