

# **EPA's Annual Water Quality Report on the Lower Charles River 2005**

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## Table of Contents

|   |    |
|---|----|
| <b>Background</b> .....                                     | 1  |
| <b>Introduction</b> .....                                   | 1  |
| <b>Discussion of Results</b> .....                          | 1  |
| <b>Clarity</b> .....  | 2  |
| <b>Bacteria</b> .....                                       | 3  |
| <b>Dissolved Oxygen (DO), pH and Temperature</b> .....      | 3  |
| <b>Phosphorus</b> .....                                     | 5  |
| <b>Pharmaceutical and Person Care Products (PPCP)</b> ..... | 6  |
| <b>Data Usability</b> .....                                 | 6  |
| <b>References</b> .....                                     | 11 |

## List of Figures and Tables

### List of Figures

|  |    |
|--|----|
| Figure 1: Mean Monthly Stream Flow at the USGS Gaging Station in Waltham, MA.....                  | 1  |
| Figure 2: Transmissivity and Chlorophyll <i>a</i> concentrations.....                              | 2  |
| Figure 3: Total Phosphorus Concentrations from 1998 - 2005.....                                    | 5  |
| Figure 4: Caffeine Concentration Measured on June 7 & 8 and August 9 & 10, 2005.....               | 6  |
| Figure 5: EPA Charles River Dry Weather Trend Station Locations.....                               | 8  |
| Figure 6: Locations of EPA Charles River Water Chemistry Profiles Collected on August 11, 2005.... | 9  |
| Figure 7: EPA Charles River PPCP Sampling Locations and NPDES Discharges .....                     | 10 |

### List of Tables

|  |   |
|--|---|
| Table 1: Massachusetts Freshwater Bacteria Criteria.....   | 3 |
| Table 2: Massachusetts Class B Surface Water Quality Standards and Guidelines for Warm Waters .... | 4 |

## Background

In 1995, the U.S. Environmental Protection Agency - New England (EPA) established the Clean Charles Initiative to restore the lower Charles River (from Watertown to Boston harbor) to a swimmable and fishable condition by Earth Day in the year 2005. The initiative incorporated a comprehensive approach for improving water quality through: Combined Sewer Overflow (CSO) controls, illicit sanitary connection removals, stormwater management, public outreach, education, monitoring, enforcement, technical assistance, and the development of a Total Maximum Daily Load (TMDL) for the Lower Charles.

## Introduction

In 1998, EPA's Office of Environmental Measurement and Evaluation (OEME) initiated the Clean Charles Core Monitoring Program. The purpose of the program was to track water quality improvements in the lower Charles River and to identify where further pollution reductions or remediation actions were necessary to meet the Clean Charles Initiative goals. The program was designed to sample during the summer months coinciding with peak recreational uses.

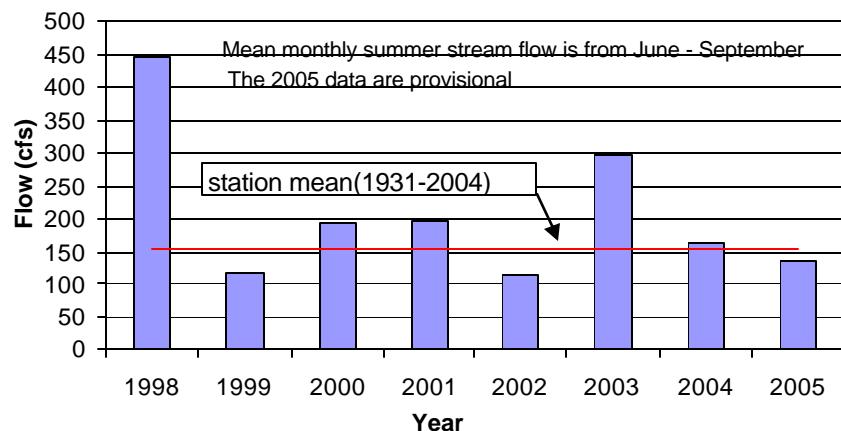
On Earth Day, 2005, the initiative's target date was reached for the lower Charles River to obtain swimmable and fishable conditions. The Clean Charles initiative has achieved significant improvements in water quality during the past ten years. However, water quality still needs improvements to obtain a healthy river. The Lower Charles continues to suffer from nutrient enrichment and sections continue to exceed bacteria standards.

In 2005, EPA changed the monitoring program to reflect changes in the initiative and existing trends in water quality conditions. The monitoring program was changed to monitor key parameters during dry weather conditions. Seven stations (Figure 5) were monitored during five dry weather sampling events. The seven trend stations were a subset of the original twelve Core Monitoring stations. During each sampling event field parameters (temperature, DO, pH, specific conductance, salinity, turbidity, Secchi disk transparency, and transmissivity) were measured and samples were analyzed for fecal coliform, E.coli, total phosphorus, ortho-phosphate, and Chlorophyll *a*. On August 11, an additional sampling event was added to measure depth profiles at ten selected stations for temperature, specific conductance, DO and pH during warm afternoon conditions. In addition Pharmaceutical and Personal Care Products (PPCP) were sampled throughout the watershed on three sampling events.

## Discussion of Results

The summary below reflects the EPA water quality monitoring data collected during 2005 and compares these data with previous Core Monitoring Program data collected from 1998 to 2004. Maps of all the sampling stations sampled by EPA during 2005 are presented in Figures 5, 6, and 7.

In addition to point source and non-point source pollutant loadings, water quality was influenced by yearly fluctuations in weather and river flows, making short-term trends difficult to determine. The weather conditions and river flow affect the transport of pollutants in the watershed. The flow data collected at the Waltham USGS gaging station revealed that in 2005, the mean monthly summer (June - September) flow was slightly below the mean monthly flow for



**Figure 1: Mean Monthly Stream Flow at the USGS Gaging Station in Waltham, MA**

all years (from 1931 – 2004) and slightly higher than the means recorded during the drier years of 1999 and 2002 (Figure 1). In 2005, the highest flows were recorded during the beginning of June and at the end of October.

When comparing the 2005 data to the past seven years of data, the following conclusions can be made. The majority of the time, the best water quality occurred near the mouth of the River (Mass Ave. Bridge to the New Charles River Dam; CRBL07, CRBLA8, CRBL11 & CRBL12). This part of the river met the swimming standards more often than any other part of the lower Charles River.

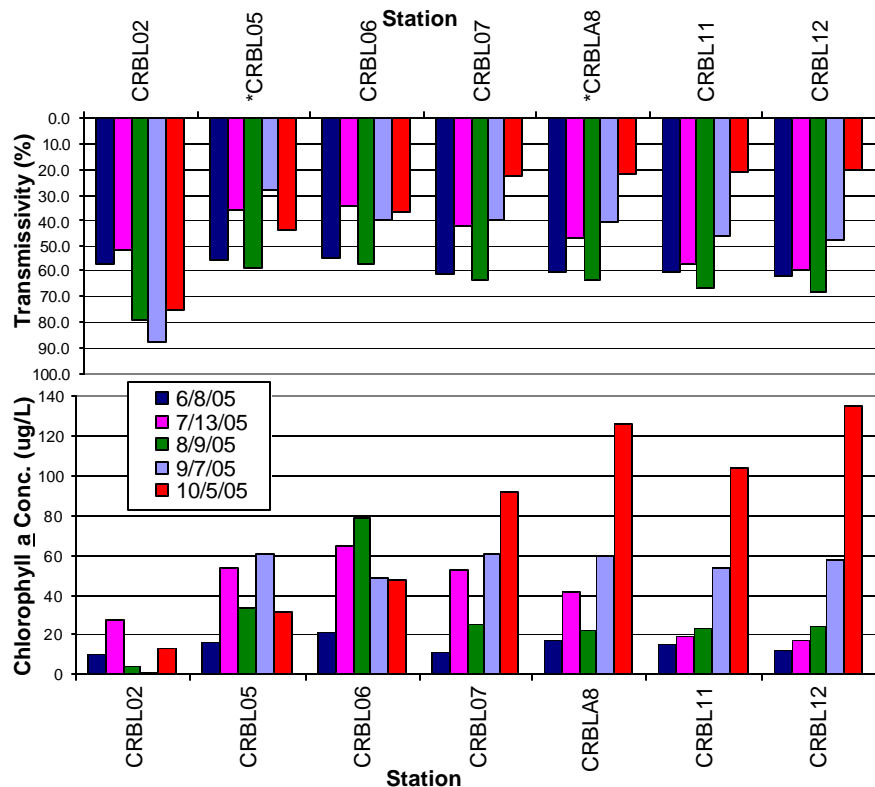
Some of the lowest and highest Secchi disk readings were recorded in 2005. The low readings occurred in October near the mouth of the River and were associated with an algae bloom. The mean total phosphorus values show a decreasing trend over the past eight years. During 2002, elevated nutrient concentrations were measured in the water below the pycnocline (the interface between water of different densities).

### Clarity

Water clarity was directly measured in the field using a Secchi disk. During four of the five sampling events increased clarity was measured down stream of station CRBL06 (Downstream of the BU bridge) toward the mouth of the River. The increased clarity at the mouth of the River has been a trend observed from the previous Core Monitoring Program data from 1998 - 2004 (EPA 2005). During the June 8 and August 9 sampling events, all stations met the Massachusetts Department of Environmental Protection primary contact (swimming) use support criterion of greater than or equal to 1.2 meters. Reviewing the data from the previous 8 years, at all but one station, the greatest clarity was recorded during June 8 or August 9, 2005. In addition, the clarity Secchi disk criterion was met during the July 13 sampling event at the two most down stream stations (CRBL11 and CRBL12). During the October sampling event, decreased

Secchi disk clarity was measured heading downstream. During this sampling event, at the most downstream stations, the lowest clarity and the most elevated chlorophyll *a* concentrations were record, indicating a significant algae bloom. The three down stream stations (CRBLA8, CRBL11, and CRBL12) measured chlorophyll *a* values above a 100 ug/l (Figure 2) and Secchi disk reading at 0.6 meters. These Secchi disk values were some of the lowest values recorded (1998 - 2005) at these three stations.

Based on the data collected over the last eight years, the most downstream station (upstream of the New Charles River Dam) met the MA DEP swimming criterion approximately 80% of the time, while the station at Magazine beach met the criterion less than 10% of the time.



**Figure 2: Transmissivity and Chlorophyll *a* concentrations**

Transmissivity is a measurement of water clarity which is independent of external light. As with Secchi disk readings, transmissivity was higher in June and August and lower transmissivity was measured at the downstream stations (CRBLA8, CRBL11, and CRBL12) during the October sampling event (Figure 2). There

was a greater correlation between transmissivity and chlorophyll a at the downstream station than the upstream locations (CRBL12,  $R^2 = 0.95$ ; CRBL02,  $R^2 = 0.68$ ).

## Bacteria

In 2005, the calculated dry weather fecal coliform geometric means<sup>1</sup> met the swimming standard at all seven locations. The highest geometric mean (174 cfu/100 ml) was at the Watertown Dam station (CRBL02), the lowest geometric mean (18 cfu/100 ml) and was between the Longfellow Bridge and the Old Dam (CRBL11). Fecal coliform concentrations were generally lower near the mouth of the River (Mass Ave. Bridge to the New Charles River Dam; CRBL07, CRBLA8, CRBL11, & CRBL12)). This is a consistent trend, which has occurred in the previous seven years of data collection. The area from station CRBL07 - CRBL12 is the most heavily recreated part of the River. This area contains the MIT (Massachusetts Institute of Technology) Sailing Pavilion and Community Boating where much sailing, kayaking, windsurfing, and occasional contact with the water occurs. In general, the fecal coliform concentrations measured in 2005 were similar to that of previous years.

**Table 1: Massachusetts Freshwater Bacteria Criteria**

| Indicator Organism | MA DEP Surface Water Quality Standards (314 CMR 4.00) and water quality guidelines  |  | MA DPH Minimum Criteria for Bathing Beaches (105 CMR 445.00)                        |
|--------------------|---|--|---|
|                    | Primary contact   | Secondary contact  | Bathing beaches   |
| E. coli            | Proposed  | Proposed   | ≤235 colonies/100ml and a geometric mean of most recent five samples ≤126 col/100ml |
| Enterococci        | Proposed  | Proposed   | ≤61 colonies/100ml and a geometric mean of most recent                              |
| Fecal coliform     | a geometric mean ≤200 col/100ml for ≥5 samples<br><br>≤400/100ml for not more than 10 % of the samples<br><br>≤400 col/100ml for <5 samples | a geometric mean ≤1000 col/100ml for ≥5 samples<br><br>≤2000/100ml for not more than 10 % of the samples<br><br>≤2000 col/100ml for <5 samples | NA  |

NA = Not applicable

In addition to fecal coliform, E. coli bacteria was sampled during all sampling events. Of all the dry weather samples, one sample exceeded the Department of Public Health (DPH) Bathing Beach single sample criterion<sup>2</sup>. This occurred at the station located above the Watertown Dam (CRBL02). All calculated geometric means were less than the DPH geometric mean criterion<sup>2</sup>.

## Dissolved Oxygen (DO), pH and Temperature

Dissolved Oxygen (DO) is required for a healthy ecosystem. Fish and other aquatic organisms require DO for survival. Massachusetts has established DO criterion<sup>3</sup> for class B waters. One DO violation was measured during 2005 in the surface water. This measurement occurred during the September sampling event at the

<sup>1</sup> The Massachusetts fecal coliform swimming criterion of less than 200 colonies/100ml is based on a geometric mean of five samples or more.

<sup>2</sup> The Massachusetts DPH E. coli Bathing Beach criterion for a single sample is less than or equal to 235 colonies/100ml. The geometric mean criterion is less than or equal to 126 colonies/100ml and is based on a geometric mean of the most recent five samples within the same bathing season.

<sup>3</sup> The Massachusetts water quality criteria for Class B water for DO is ≥ 5 mg/l and ≥60% saturation, for pH is in the range of 6.5 through 8.3, and for temperature is ≤ 28.3°C (83°F).

station located above the Watertown Dam (CRBL02). On August 11, depth profiles revealed water quality bottom conditions downstream of the BU Bridge were anoxic and failed to meet state DO criterion<sup>1</sup>. This condition has also been identified in previous reports (EPA 2002).

The pH of an aquatic system is an important parameter in evaluating toxicity. High acidity (a low pH) can convert insoluble metal sulfides to soluble forms, which increases the bioavailability. A high pH can also cause ammonia toxicity (EPA 1998). The surface measurements from the five dry weather sampling events showed pH violated the upper range of the criterion<sup>1</sup> 13 times or approximately 46 % of all field measurements. The highest of these exceedences was 9.3 and the mean exceedence was 8.8. On August 11, depth profiles revealed surface measurements violated the pH criterion at nine of the ten sampling locations. The highest of these exceedences was 8.9 and the mean exceedence was 8.7.

Temperature is a crucial factor in maintaining a natural ecosystem. Changes in the temperature can alter the existing or natural aquatic community (EPA 1986). Temperature also governs many biochemical and physiological processes in cold-blooded aquatic organisms (such as fish and the organisms they feed on). Increased temperature decreases the oxygen solubility in water and this can exacerbate the impact of oxygen-demanding waste. The surface measurements from the five dry weather sampling events showed the temperature criterion<sup>1</sup> was violated on August 9 at the two most downstream stations (CRBL11 and CRBL12). All of the measurements from the five dry weather sampling events occurred in the morning when water temperatures have generally not reached their peak daily values. On August 11, depth profiles revealed surface measurements violated the temperature criterion<sup>1</sup> at nine of the ten sampling locations. The highest temperature (38.1°C) was measured one meter below the water surface near the discharge of the Kendall Station NPDES non contact-cooling water discharge (Table A-2 in the Appendix). All of the temperature violations were likely influenced by the NPDES cooling water discharge from the Kendall Station.

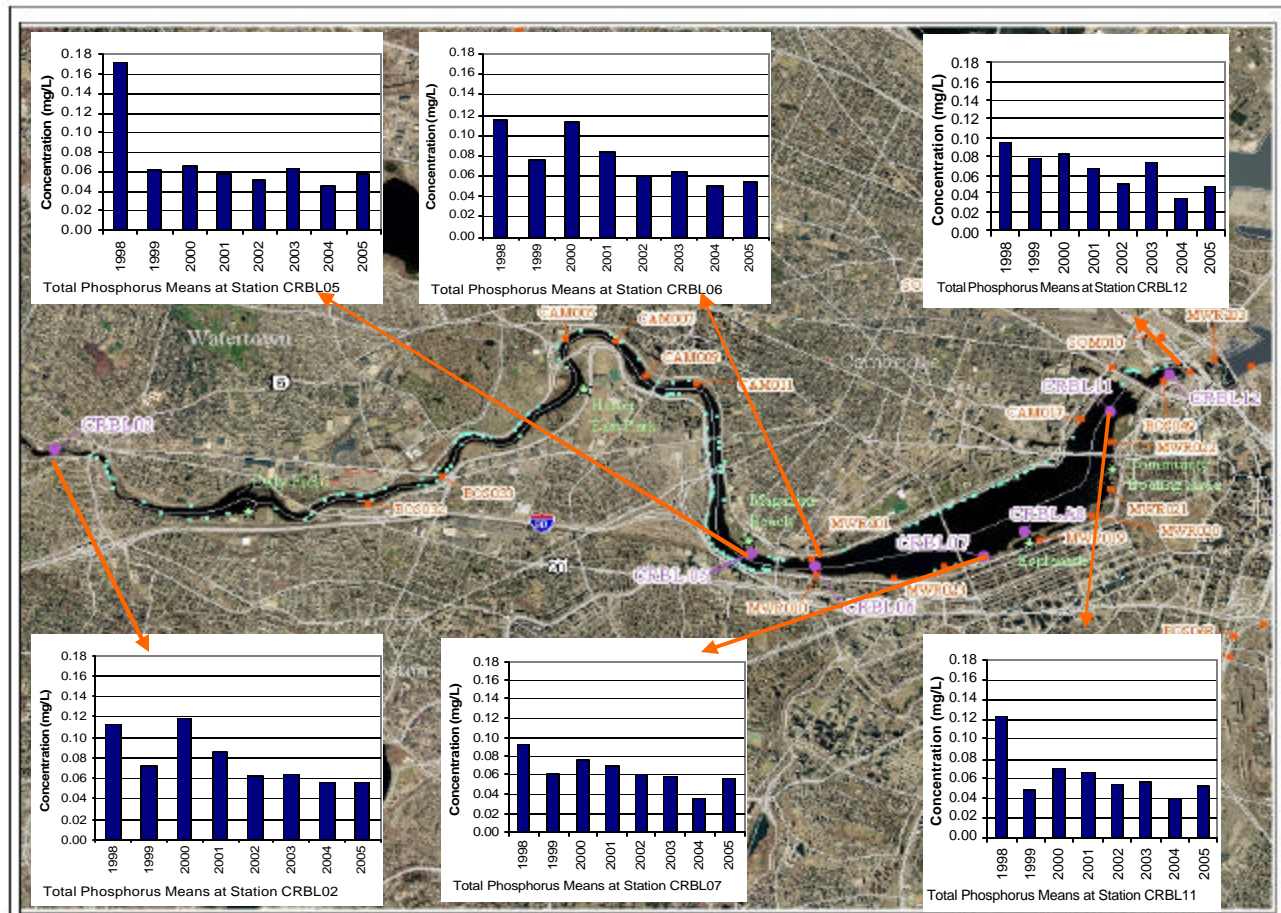
**Table 2: Massachusetts Class B Surface Water Quality Standards and Guidelines for Warm Waters**

| Parameter           | MA Surface Water Quality Standards (314 CMR 4.00) and Guidelines              |
|---------------------|---|
| Dissolved oxygen    | ≥ 5 mg/l and ≥ 60% saturation   |
| Temperature         | ≤ 83°F (28.3°C) and change 3°F (1.7°C) in Lakes, change 5°F (2.8°C) in Rivers |
| pH                  | Between 6.5 and 8.3   |
| Bacteria            | See Table 4   |
| Secchi disk depth   | Lakes ≥ 1.2 meters (for primary contact recreation use support)               |
| Solids              | Narrative and TSS ≤ 25.0 mg/l (for aquatic life use support)                  |
| Color and turbidity | Narrative Standard  |
| Nutrients           | Narrative “Control of Eutrophication” Site Specific                           |

<sup>1</sup> The Massachusetts water quality criteria for Class B water for DO is ≥ 5 mg/l and ≥60% saturation, for pH is in the range of 6.5 through 8.3, and for temperature is ≤ 28.3°C (83°F).

## Phosphorus

Elevated levels of nutrients in the water can lead to excessive growth of algae and other instream plants. This can cause nuisance conditions and reduce oxygen in the water during times of respiration. Phosphorus is the most significant nutrient in this system. Elevated phosphorus concentrations at many of the sampling stations indicated highly eutrophic conditions.



**Figure 3: Total Phosphorus Concentrations from 1998 - 2005**

Highest total phosphorus concentrations were recorded during the October sampling event at the three down stream stations (CRBLA8, CRBL11, and CRBL12). These high phosphorus values may have help trigger the significant algae bloom and reduced clarity on this sampling event.

All except one total phosphorus sample result exceeded the EPA recommended Ambient Water Quality Criterion (AWQC) for Rivers and Streams<sup>1</sup> and all sample results exceeded the recommended criterion for lakes and reservoirs<sup>2</sup> (EPA, 2001).

There appears to be a decreasing trend in phosphorus levels at most of the stations over the past eight years (Figure 3). A longitudinal analysis using the dry weather yearly means from the past 8 years shows there to be a significant rate of reduction (Rate ~ -.0081/year) over the 8 years (Heltshe).

<sup>1</sup> The EPA recommended total phosphorus criterion for rivers and stream in ecoregion XIV subcoregion 59 is 0.0237 mg/L.

<sup>2</sup> The EPA recommended total phosphorus criterion for lakes and reservoirs in ecoregion XIV subcoregion 59 is 0.008 mg/L.

In 2002, additional samples were collected at selected stations from various depths to support the development of a water quality model for the Total Maximum Daily Load (TMDL). The results from this sampling showed elevated concentrations of total phosphorus, ortho-phosphorous, total kjeldahl nitrogen, and ammonia below the pycnocline (the interface between water of different densities). The concentrations measured below the pycnocline were significantly higher than concentrations measured above the pycnocline and in the surface water (EPA, 2003).

### Pharmaceutical and Person Care Products (PPCP)

In 2006, twenty water samples were analyzed for Pharmaceutical and Personal Care Products (PPCP) throughout the watershed on three different sampling events. Thirty one different compounds were analyzed. The most upstream station was located in the headwaters at Echo Lake in Hopkinton, MA and the most downstream station was located in the lower Charles River Basin near the mouth in Boston, MA. These samples were analyzed by a contract laboratory to determine relative concentrations throughout the river and to determine possible correlation with bacteria levels in the river. The collection of these data was intended as an initial screening and for research purposes. A brief summary of the data is listed below and the data is presented in the Appendix.

On ten of the PPCP sampling events EPA measured corresponding bacteria (fecal coliform and E.coli) concentrations. The highest fecal coliform concentration (1342 cfu/100ml) was measured on September 7 at Laundry brook (LAUD01). The other three station sampled during this event were collected in the mainstem of the Charles River and had corresponding bacteria concentration all under 100 cfu/100ml. Of the four stations measured on this sampling event, Laundry Brook (LAUD01) measured the highest concentrations of caffeine (stimulant), carbamazepine (anti-seizure drug), and pentoxifylline (improves blood flow - drug). In addition, to bacteria data collected by EPA, USGS collected fecal coliform and E.coli data at two stations during the sampling event on June 8. Although elevated bacteria concentrations (fecal coliform = 43,000 cfu/100ml) were measured in Beaver Brook (CRBC), no correlations could be made with elevated caffeine, carbamazepine, and pentoxifylline concentrations. Of the nine stations sampled during this event, triclosan (antibiotic) was the highest at the Beaver Brook station.

The concentration of caffeine in the River generally increased heading down stream (Figure 4). Several compounds were higher downstream of the Charles River Pollution Control District (station CRPCDPDW). During both the June and August sampling events, the following compounds were higher downstream of the Charles River Pollution Control District: carbamazepine (anti-seizure drug), diazepam (muscle relaxant), dilantin (anti-convulsant drug), gemfibrozil (lipid regulator), meprobamate (anti-anxiety drug), and oxybenzone (sun screen).

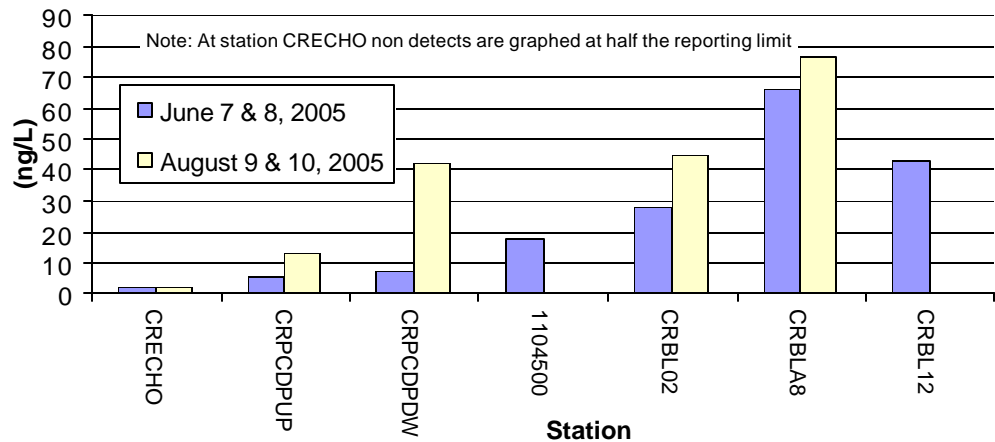


Figure 4: Caffeine Concentration Measured on June 7 & 8 and August 9 & 10, 2005

### Data Usability

Quality control criteria were established to insure data quality. Criteria were specified for holding times, sample preservation, and precision and accuracy goals. The quality control requirements for this project were documented in the Project Work/QA Plan – Clean Charles River Clean 2005 – 2010 Water Quality Study Dated



June 7, 2005. Laboratory generated data that did not meet laboratory quality control parameters were reported as estimated in this report. All estimated data was identified with a swung dash (~) preceding the value. All data that did not meet field or collection quality control parameters are described below.

Instruments used in the field to measure temperature, DO, pH, specific conductance, salinity, turbidity, and transmissivity were calibrated prior to sampling and verified after use. Field monitoring data that did not meet all the established quality control criteria were not presented in this report and are summarized below. The DO data collected on June 8 was not reported at six of the seven stations, because of a problem with the DO probe membrane. The pH data collected on July 13 was not reported because of a problem with the pH probe.

Additional chlorophyll measurements were collected during some of the sampling events using field optical instruments. These data were for method development and evaluation.

Duplicate field measurements (temperature, DO, pH, specific conductance, salinity, turbidity, and transmissivity) were collected during the sampling events. The Project Work/QA Plan did not specify Relative Percent Difference (RPD) goals between the regular and duplicate samples for any of these measurements. All RPDs between the regular and duplicate field samples were less than 5%. None of the field measurement data were qualified based on duplicate sampling results.

Chemistry data that partially met laboratory quality control criteria or concentrations that were less than the associated reporting limit were reported as estimated values. The chlorophyll a samples collected on September 7 were reported as estimated data since samples were not filtered by the laboratory on the same day of collection. All other holding times were met for all samples.

Field duplicate chemistry samples were collected during each of the six sampling events to evaluate sampling and analytical precision. All of the field duplicate samples collected for laboratory analyses met the precision quality control goals established in the Project Work/QA Plan. A trip blank was used to evaluate any contamination caused by: the sample container, sample preservation, sampling method, transportation to the laboratory, and/or laboratory processing. The trip blank collected on August 9 for chemistry analysis showed no contamination and all values were reported as "ND" (non detect). Therefore, all field quality control samples (duplicates and blank) met the requirements defined in the QAPP.

The Pharmaceutical and Person Care Product data (PPCP) were intended as an initial screening and for research purposes, therefore general quality control procedure were used and project specific quality control criteria were not established. Two field duplicates and one trip blank were collected for this project. In addition, two samples were collected as duplicates with the USGS.

The greatest RPD from all PPCP compounds for the field duplicate samples collected by EPA was 153%, the mean RPD was 36% and the median was 10%. Caffeine was the only compound that was analyzed by EPA and USGS during a joint sample collection on June 8, 2005. Of the two samples that were analyzed, the EPA results for caffeine were 105% and 25% RPD less than samples collected by USGS. A trip blank was collected with EPA's laboratory deionized and distilled water. Except for DEET, which was reported as twice the reporting limit, all compounds were reported as non detect. There were no additional qualifications made to the data from field quality control samples. The method for conducting PPCP analysis is still being refined and improved. The analyses were conducted by Columbia Analytical Services (CAS). CAS reported several problems conducting the analyses which are listed on the data sheet (Table A-3 in the Appendix).

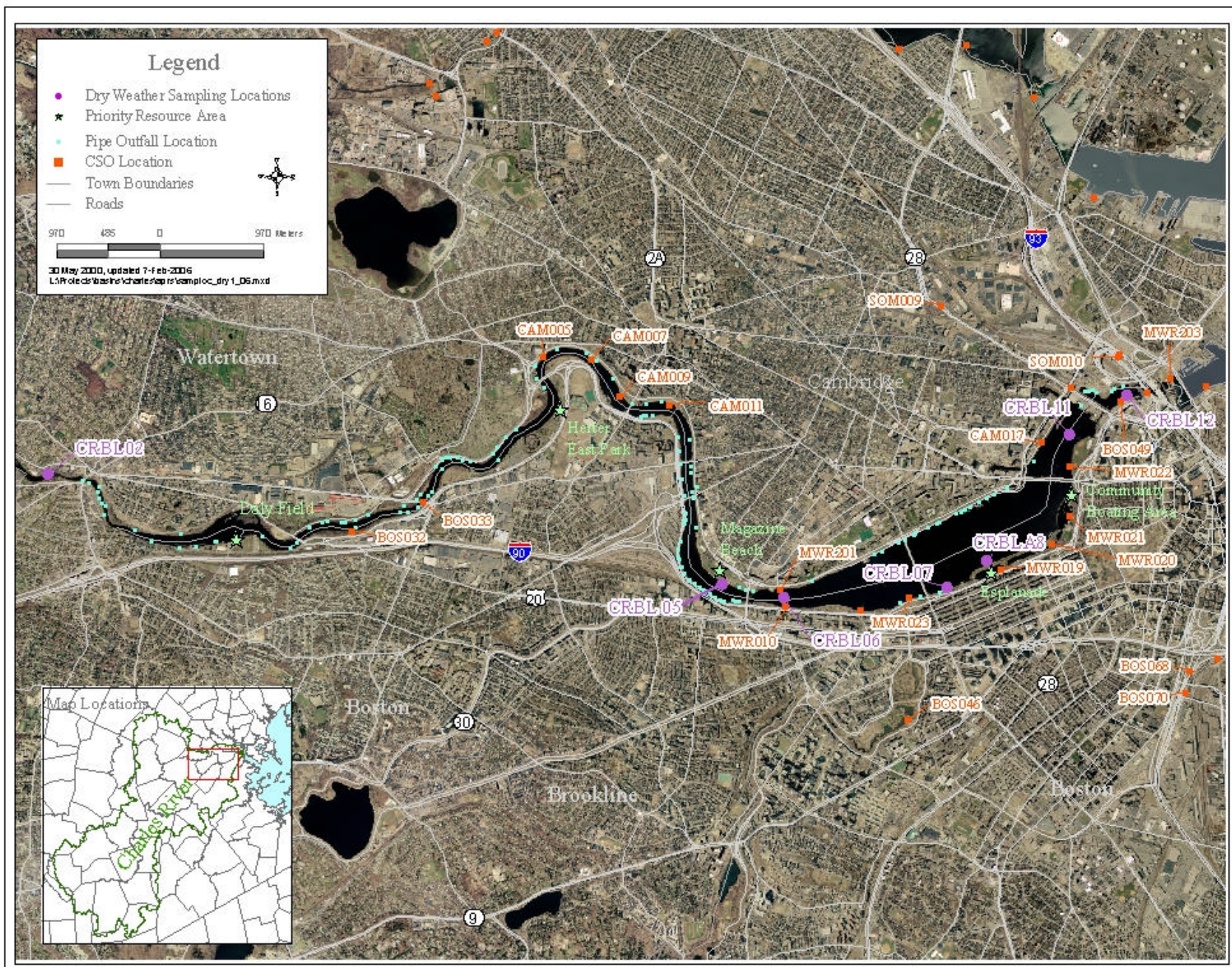


Figure 5: EPA Charles River Dry Weather Trend Station Locations

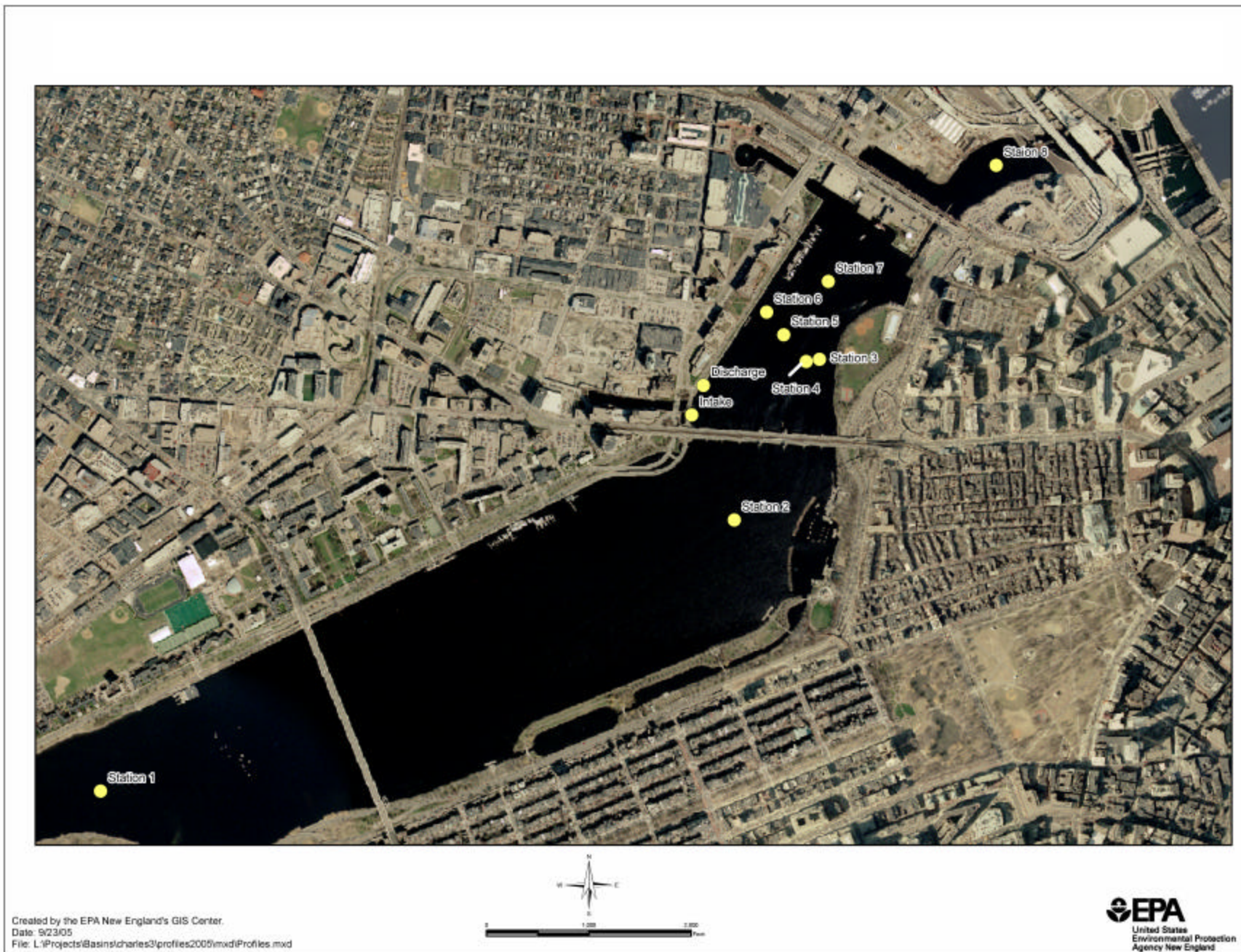


Figure 6: Locations of EPA Charles River Water Chemistry Profiles Collected on August 11, 2005

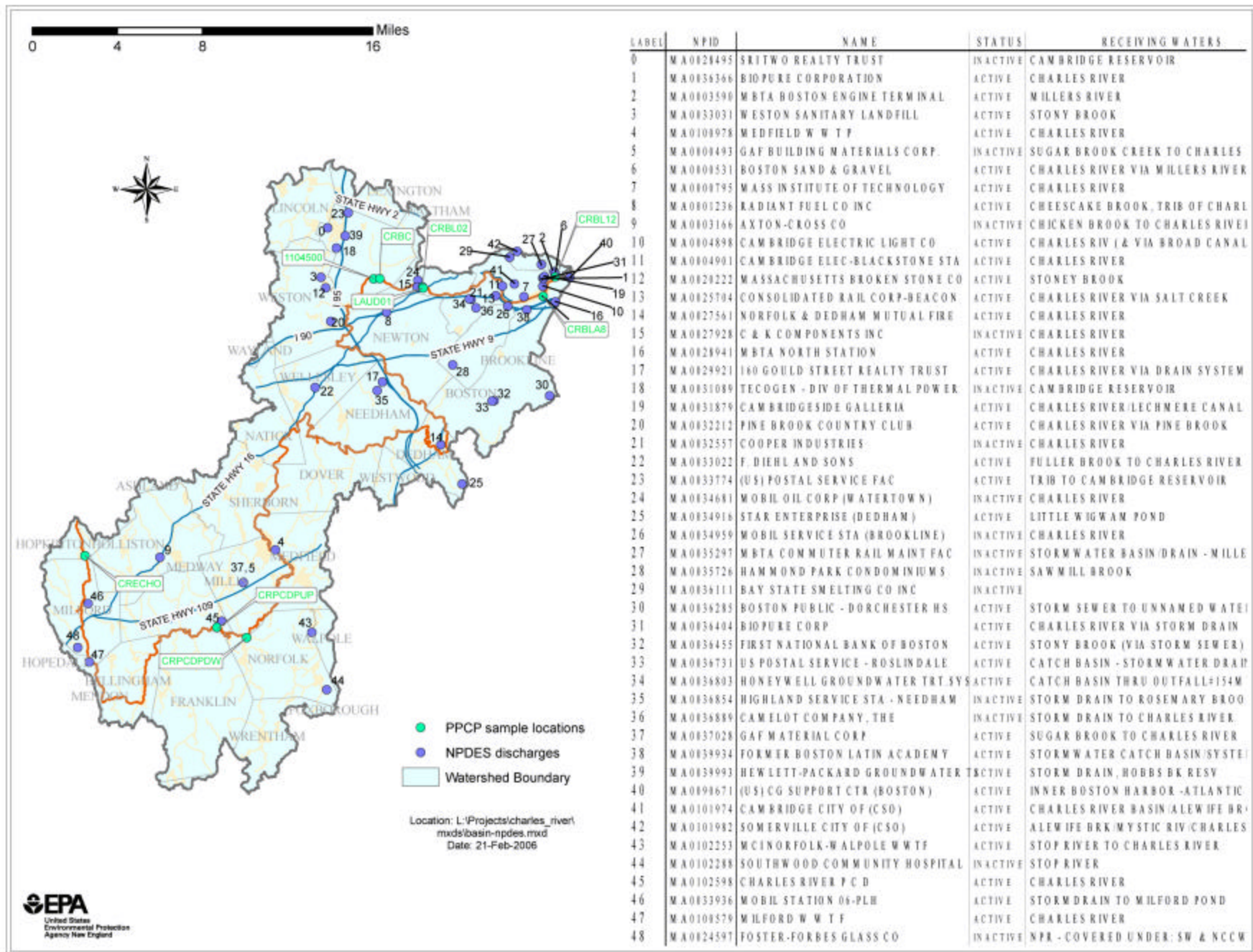


Figure 7: EPA Charles River PPCP Sampling Locations and NPDES Discharges

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APPENDIX

Table A-1 EPA Charles River Annual Monitoring Data - 2005

| Station  | Time  | Temp<br>(Deg C) | Sp Cond.<br>(uS/cm) | Salinity<br>(ppt) | DO<br>(%) | DO<br>(mg/l) | pH  | Turbidity<br>(NTU) | Secchi<br>(meters) | Transmissivity<br>(%) | Fecal<br>coliform<br>(cfu/100ml) | E.coli<br>(cfu/100ml) | Chlorophyll a<br>(ug/L) | Orthophosphate<br>as P<br>(ug/L) | Total<br>Phosphorus<br>(ug/L) | Sonde (in-situ)<br>Chlorophyll *<br>(ug/L) | Scufa (in-situ)<br>Chlorophyll *<br>(ug/L) |
|--|-------|-----------------|---------------------|-------------------|-----------|--------------|-----|--------------------|--------------------|-----------------------|----------------------------------|-----------------------|-------------------------|----------------------------------|-------------------------------|--|--|
| <b>Results from 6/8/05 Dry Weather Monitoring Sampling</b>   |       |                 |                     |                   |           |              |     |                    |                    |                       |                                  |                       |                         |                                  |                               |  |  |
| CRBL02   | 13:55 | 25.0            | 454                 | 0.22              | NA        | NA           | 7.4 | 2                  | NA                 | 57.5                  | 247                              | 186                   | 10                      | 11                               | 63                            | NA   | NA   |
| CRBL05   | 12:25 | 24.9            | 470                 | NA                | NA        | NA           | 7.3 | NA                 | 1.6                | 56.2                  | 33                               | 22                    | 16                      | 4.5                              | 58                            | NA   | NA   |
| CRBL06   | 12:10 | 24.4            | 472                 | NA                | NA        | NA           | 7.3 | NA                 | 1.6                | 55.2                  | 66                               | 47                    | 21                      | 5.9                              | 59                            | NA   | NA   |
| CRBL07   | 11:45 | 24.6            | 483                 | 0.23              | NA        | NA           | 7.3 | 1                  | 1.8                | 61.2                  | 50                               | 50                    | 11                      | 5.5                              | 50                            | NA   | NA   |
| CRBLA8   | 11:15 | 23.8            | 466                 | 0.22              | NA        | NA           | 7.3 | 1                  | 1.7                | 60.6                  | 44                               | 25                    | 17                      | -3.2                             | 48                            | NA   | NA   |
| CRBL11   | 10:50 | 25.0            | 507                 | NA                | NA        | NA           | 7.1 | NA                 | 1.9                | 60.6                  | 14                               | 14                    | 15                      | 5.1                              | 43                            | NA   | NA   |
| CRBL12   | 10:00 | 23.8            | 676                 | 0.33              | 92.6      | 7.8          | 7.0 | 1                  | 2.0                | 62.4                  | 22                               | 19                    | 12                      | 5.9                              | 24                            | NA   | NA   |
| CRBLA8 (dup)   | 11:15 | 23.8            | 466                 | 0.22              | NA        | NA           | 7.3 | 1                  | 1.7                | 60.3                  | 28                               | 8                     | 18                      | -3.6                             | 46                            | NA   | NA   |
| <b>Results from 7/13/05 Dry Weather Monitoring Sampling</b>  |       |                 |                     |                   |           |              |     |                    |                    |                       |                                  |                       |                         |                                  |                               |  |  |
| CRBL02   | 11:55 | 24.6            | 493                 | 0.24              | 104.7     | 8.7          | NA  | 4                  | NA                 | 52.1                  | 330                              | 240                   | 28                      | ND(5)                            | 53                            | 15.9                                       | NA   |
| CRBL05   | 10:25 | 24.4            | 530                 | 0.26              | 136.4     | 11.4         | NA  | 4                  | 1.0                | 35.7                  | 108                              | 64                    | 54                      | ND(5)                            | 63                            | 31.3                                       | NA   |
| CRBL06   | 10:10 | 24.1            | 522                 | 0.25              | 133.6     | 11.2         | NA  | 4                  | 1.0                | 34.0                  | 96                               | 52                    | 65                      | ND(5)                            | 71                            | 37.3                                       | NA   |
| CRBL07   | 9:45  | 24.1            | 608                 | 0.29              | 125.7     | 10.5         | NA  | 4                  | 1.0                | 42.4                  | 116                              | 84                    | 53                      | ND(5)                            | 75                            | 24.5                                       | NA   |
| CRBLA8   | 9:20  | 23.8            | 600                 | 0.29              | 119.7     | 10.1         | NA  | 3                  | 1.2                | 47.0                  | 124                              | 72                    | 42                      | ND(5)                            | 64                            | 23.7                                       | NA   |
| CRBL11   | 8:55  | 24.8            | 664                 | 0.32              | 91.6      | 7.6          | NA  | 3                  | 1.6                | 57.4                  | 116                              | 64                    | 19                      | -3.7                             | 56                            | 10.9                                       | NA   |
| CRBL12   | 8:40  | 24.0            | 790                 | 0.39              | 87.2      | 7.3          | NA  | 2                  | 1.7                | 59.4                  | 66                               | 53                    | 17                      | 5.8                              | 54                            | 10.0                                       | NA   |
| CRBL11 (dup)   | 8:55  | 24.9            | 664                 | 0.32              | 91.7      | 7.6          | NA  | 2                  | 1.6                | 56.7                  | 112                              | 64                    | 17                      | -4.4                             | 57                            | 10.3                                       | NA   |
| <b>Results from 8/09/05 Dry Weather Monitoring Sampling</b>  |       |                 |                     |                   |           |              |     |                    |                    |                       |                                  |                       |                         |                                  |                               |  |  |
| CRBL02   | 12:20 | 26.9            | 589                 | 0.28              | 74.1      | 5.9          | 7.2 | 0                  | NA                 | 79.2                  | 227                              | 115                   | 4                       | 5.2                              | 17                            | 4.8  | NA   |
| CRBL05   | 10:50 | 26.8            | 535                 | 0.26              | 122.1     | 9.8          | 7.8 | 2                  | 1.5                | 59.1                  | 53                               | 62                    | 34                      | ND(5)                            | 37                            | 14.0                                       | NA   |
| CRBL06   | 10:25 | 26.2            | 763                 | 0.37              | 106.6     | 8.6          | 7.5 | 3                  | 1.5                | 57.7                  | 55                               | 34                    | 79                      | ND(5)                            | 33                            | 19.5                                       | NA   |
| CRBL07   | 10:00 | 26.9            | 1170                | 0.58              | 116.4     | 9.3          | 8.5 | 2                  | 1.7                | 63.6                  | 8                                | 8                     | 25                      | ND(5)                            | 28                            | 7.4  | NA   |
| CRBLA8   | 9:40  | 27.4            | 1254                | 0.62              | 123.6     | 9.8          | 8.7 | 2                  | 1.9                | 63.9                  | 17                               | ND(4)                 | 22                      | ND(5)                            | ~30                           | 9.9  | NA   |
| CRBL11   | 9:00  | 29.9            | 1438                | 0.71              | 118.5     | 8.9          | 8.6 | 2                  | 2.1                | 66.3                  | 11                               | 4                     | 23                      | ND(5)                            | 24                            | 7.5  | NA   |
| CRBL12   | 8:35  | 28.9            | 1472                | 0.73              | 118.1     | 9.1          | 8.5 | 1                  | 2.1                | 68.0                  | 19                               | 16                    | 24                      | ND(5)                            | 29                            | 6.7  | NA   |
| CRBL07 (dup)   | 10:05 | 26.9            | 1168                | 0.58              | 116.5     | 9.3          | 8.5 | 2                  | 1.7                | 63.4                  | 17                               | 4                     | 22                      | ND(5)                            | 29                            | 7.8  | NA   |
| Blank  | 8:45  | NA              | NA                  | NA                | NA        | NA           | NA  | NA                 | NA                 | NA                    | NA                               | NA                    | ND(2)                   | ND(5)                            | ND(5)                         | NA   | NA   |
| <b>Results from 9/07/05 Dry Weather Monitoring Sampling</b>  |       |                 |                     |                   |           |              |     |                    |                    |                       |                                  |                       |                         |                                  |                               |  |  |
| CRBL02   | 12:00 | 22.6            | 705                 | 0.34              | 56.5      | 4.9          | 7.2 | 3                  | NA                 | 87.8                  | 53                               | 30                    | -ND(2)                  | 41                               | 84                            | 5.1  | NA   |
| CRBL05   | 10:15 | 24.1            | 1142                | 0.57              | 100.3     | 8.4          | 7.6 | 9                  | 0.7                | 28.0                  | 88                               | 25                    | -61                     | ND(5.0)                          | 67                            | 27.1                                       | 73.6                                       |
| CRBL06   | 10:00 | 24.3            | 1300                | 0.65              | 100.8     | 8.4          | 7.7 | 6                  | 0.8                | 40.5                  | 140                              | 101                   | -49                     | ND(5.0)                          | 52                            | 17.7                                       | 56.0                                       |
| CRBL07   | 9:40  | 24.7            | 1961                | 1                 | 133.3     | 11.0         | 9.0 | 7                  | 0.8                | 40.6                  | 57                               | 25                    | -61                     | ND(5.0)                          | ~60                           | 11.4                                       | 30.5                                       |
| CRBLA8   | 9:20  | 24.5            | 1860                | 0.94              | 129.9     | 10.8         | 9.0 | 7                  | 0.9                | 41.0                  | 28                               | 8                     | -60                     | ND(5.0)                          | 46                            | 11.5                                       | 32.3                                       |
| CRBL11   | 9:05  | 26.5            | 2252                | 1.15              | 115.1     | 9.2          | 8.7 | 6                  | 1.0                | 46.5                  | 19                               | 4                     | -54                     | ND(5.0)                          | 41                            | 9.8  | 28.0                                       |
| CRBL12   | 8:30  | 25.5            | 2412                | 1.24              | 115.7     | 9.4          | 8.8 | 6                  | 1.0                | 47.8                  | 38                               | 4                     | -58                     | ND(5.0)                          | 41                            | 9.8  | 27.9                                       |
| CRBLA8 (dup)   | 9:20  | 24.5            | 1860                | 0.94              | 130.1     | 10.8         | 9.0 | 7                  | 0.9                | 41.2                  | 47                               | 8                     | -64                     | ND(5.0)                          | 45                            | 11.4                                       | 30.3                                       |
| LAUD01   | 12:15 | NA              | NA                  | NA                | NA        | NA           | NA  | NA                 | NA                 | NA                    | 1342                             | 875                   | NA                      | NA                               | NA                            | NA   | NA   |
| <b>Results from 10/05/05 Dry Weather Monitoring Sampling</b> |       |                 |                     |                   |           |              |     |                    |                    |                       |                                  |                       |                         |                                  |                               |  |  |
| CRBL02   | 12:20 | 19.3            | 613                 | NA                | 76.8      | 7.1          | 7.3 | 2                  | NA                 | 75.5                  | 164                              | 76                    | 13                      | ND(5.0)                          | 71                            | 5.3  | NA   |
| CRBL05   | 10:45 | 20.1            | 1193                | NA                | 111.2     | 10.1         | 8.0 | 5                  | 0.9                | 44.2                  | 33                               | 33                    | 32                      | ND(5.0)                          | 54                            | 11.1                                       | 37.7                                       |
| CRBL06   | 10:30 | 19.9            | 1677                | NA                | 116.8     | 10.6         | 8.6 | 7                  | 0.8                | 36.6                  | 212                              | 128                   | 48                      | ND(5.0)                          | 60                            | 12.0                                       | 31.6                                       |
| CRBL07   | 9:45  | 20.0            | 2337                | NA                | 148.8     | 13.5         | 9.3 | 9                  | 0.6                | 22.7                  | 84                               | 76                    | 92                      | ND(5.0)                          | 71                            | 12.8                                       | 39.4                                       |
| CRBLA8   | 9:30  | 21.2            | 2721                | NA                | 136.6     | 12.0         | 9.2 | 10                 | 0.6                | 21.8                  | 11                               | 11                    | 126                     | ND(5.0)                          | 92                            | 13.1                                       | 37.7                                       |
| CRBL11   | 9:10  | 22.9            | 2798                | NA                | 135.8     | 11.6         | 9.2 | 10                 | 0.6                | 21.2                  | 6                                | 6                     | 104                     | ND(5.0)                          | 98                            | 12.8                                       | 35.6                                       |
| CRBL12   | 8:50  | 22.2            | 2944                | NA                | 129.4     | 11.2         | 9.1 | 10                 | 0.6                | 20.0                  | 4                                | 4                     | 135                     | ND(5.0)                          | 92                            | 13.0                                       | 43.4                                       |
| CRBLA8 (dup)   | 9:30  | 21.2            | 2721                | NA                | 136.8     | 12.1         | 9.2 | 10                 | 0.6                | 21.8                  | 6                                | 4                     | 114                     | ND(5.0)                          | 76                            | 13.5                                       | NA   |

Note:  
 ND = not detected above the associated detection limit  
 NA = not available  
 ~ = estimated data  
 \* = relative values to be used for method development

Table A-2 Charles River Water Chemistry Profiles Collected on August 11, 2005

| Time (hours) | Depth (m) | Temp @ | SpCond (uS/cm) | DO % | DO Conc (mg/L) | pH  | GPS                  | Station Location  | Total Depth (m) |
|--------------|-----------|--------|----------------|------|----------------|-----|----------------------|---|-----------------|
| Station 1    |           |        |                |      |                |     |                      |   |                 |
| 14:41        | Surface   | 27.3   | 1061           | 111  | 8.8            | 8.2 | 42deg. 21' 09.923" N | Midstream and upstream of Harvard Bridge.   | 4.6             |
| 14:42        | 0.6       | 27.2   | 1063           | 111  | 8.8            | 8.2 | 71deg. 06' 00.747" W |   |                 |
| 14:43        | 1.0       | 27.1   | 1073           | 110  | 8.7            | 8.2 |                      |   |                 |
| 14:44        | 2.0       | 26.5   | 1260           | 100  | 8.0            | 8.0 |                      |   |                 |
| 14:46        | 3.0       | 26.0   | 1175           | 84   | 6.8            | 7.6 |                      |   |                 |
| 14:49        | 4.0       | 23.8   | 2122           | 3    | 0.3            | 6.9 |                      |   |                 |
| 14:50        | 4.6       | 22.7   | 8749           | 3    | 0.3            | 6.9 |                      |   |                 |
| Station 2    |           |        |                |      |                |     |                      |   |                 |
| 15:14        | Surface   | 30.0   | 1554           | 127  | 9.5            | 8.7 | 42deg. 21' 33.613" N | Midstream and upstream of Longfellow Bridge. Between highway bridges on the north side and the containment buoys on the south side. | 6.7             |
| 15:15        | 0.6       | 30.0   | 1554           | 126  | 9.5            | 8.7 | 71deg. 04' 36.730" W |   |                 |
| 15:16        | 1.0       | 30.0   | 1553           | 126  | 9.5            | 8.8 |                      |   |                 |
| 15:18        | 2.0       | 29.3   | 1528           | 120  | 9.2            | 8.7 |                      |   |                 |
| 15:19        | 3.0       | 27.4   | 1387           | 112  | 8.9            | 8.5 |                      |   |                 |
| 15:20        | 4.0       | 26.7   | 2179           | 61   | 4.9            | 7.4 |                      |   |                 |
| 15:22        | 5.0       | 20.8   | 23764          | 2    | 0.1            | 7.1 |                      |   |                 |
| 15:24        | 6.0       | 20.5   | 29700          | 2    | 0.1            | 7.1 |                      |   |                 |
| Intake       |           |        |                |      |                |     |                      |   |                 |
| 15:35        | Surface   | 30.2   | 1541           | 151  | 11.3           | 8.9 | 42deg. 21' 43.925" N | Mouth of the intake canal.  | 2.4             |
| 15:36        | 0.6       | 29.9   | 1536           | 154  | 11.6           | 8.9 | 71deg. 04' 41.739" W |   |                 |
| 15:37        | 1.0       | 29.7   | 1531           | 152  | 11.5           | 8.9 |                      |   |                 |
| 15:39        | 2.0       | 29.1   | 1530           | 131  | 10.0           | 8.7 |                      |   |                 |
| Discharge    |           |        |                |      |                |     |                      |   |                 |
| 15:51        | Surface   | 37.1   | 1635           | 126  | 8.4            | 8.6 | 42deg. 21' 46.734" N | North side and down stream from intake 150m .   | 3.0             |
| 15:55        | 0.6       | 37.8   | 1642           | 126  | 8.3            | 8.6 | 71deg. 04' 40.039" W |   |                 |
| 15:56        | 1.0       | 38.1   | 1640           | 128  | 8.4            | 8.6 |                      |   |                 |
| Station 3    |           |        |                |      |                |     |                      |   |                 |
| 16:10        | Surface   | 30.7   | 1595           | 118  | 8.8            | 8.6 | 42deg. 21' 48.813" N | Near the west riverside across from the in-zone transect.   | 4.8             |
| 16:11        | 0.6       | 30.8   | 1603           | 121  | 9.0            | 8.6 | 71deg. 04' 24.806" W |   |                 |
| 16:12        | 1.0       | 30.7   | 1598           | 120  | 8.9            | 8.6 |                      |   |                 |
| 16:14        | 2.0       | 30.7   | 1601           | 120  | 9.0            | 8.6 |                      |   |                 |
| 16:16        | 3.0       | 27.8   | 1470           | 106  | 8.3            | 8.3 |                      |   |                 |
| 16:18        | 4.0       | 26.3   | 6677           | 11   | 0.9            | 7.1 |                      |   |                 |
| 16:20        | 4.8       | 21.2   | 30217          | 1    | 0.1            | 7.2 |                      |   |                 |
| Station 4    |           |        |                |      |                |     |                      |   |                 |
| 16:29        | Surface   | 30.5   | 1596           | 125  | 9.3            | 8.6 | 42deg. 21' 48.652" N | Between Station 3 and Station 5.  | 8.4             |
| 16:30        | 0.6       | 30.4   | 1596           | 124  | 9.3            | 8.6 | 71deg. 04' 26.530" W |   |                 |
| 16:31        | 1.0       | 30.5   | 1593           | 124  | 9.3            | 8.6 |                      |   |                 |
| 16:32        | 2.0       | 30.2   | 1587           | 120  | 9.0            | 8.6 |                      |   |                 |
| 16:33        | 3.0       | 27.8   | 1480           | 110  | 8.6            | 8.4 |                      |   |                 |
| 16:34        | 4.0       | 27.0   | 4864           | 38   | 3.0            | 7.3 |                      |   |                 |
| 16:35        | 5.0       | 21.7   | 26165          | 1    | 0.1            | 7.2 |                      |   |                 |
| 16:35        | 6.0       | 21.7   | 26154          | 1    | 0.1            | 7.2 |                      |   |                 |
| 16:37        | 7.0       | 19.6   | 34171          | 3    | 0.2            | 7.3 |                      |   |                 |

| Time (hours) | Depth (m) | Temp @ | SpCond (uS/cm) | DO % | DO Conc (mg/L) | pH  | GPS                  | Station Location  | Total Depth (m) |
|--------------|-----------|--------|----------------|------|----------------|-----|----------------------|---|-----------------|
| Station 5    |           |        |                |      |                |     |                      |   |                 |
| 16:43        | Surface   | 31.1   | 1612           | 131  | 9.7            | 8.6 | 42deg. 21' 51.324" N | Between Station 4 and Station 6.                          | 7.6             |
| 16:43        | 0.6       | 31.1   | 1612           | 132  | 9.7            | 8.6 | 71deg. 04' 29.322" W |   |                 |
| 16:44        | 1.0       | 30.8   | 1614           | 129  | 9.6            | 8.6 |                      |   |                 |
| 16:45        | 2.0       | 30.7   | 1615           | 128  | 9.5            | 8.6 |                      |   |                 |
| 16:46        | 3.0       | 30.4   | 1616           | 125  | 9.4            | 8.6 |                      |   |                 |
| 16:47        | 4.0       | 27.7   | 1529           | 108  | 8.5            | 8.2 |                      |   |                 |
| 16:49        | 5.0       | 27.1   | 4911           | 58   | 4.5            | 7.4 |                      |   |                 |
| 16:51        | 6.0       | 21.3   | 29570          | 2    | 0.1            | 7.2 |                      |   |                 |
| 16:52        | 7.0       | 20.0   | 34949          | 17   | 1.3            | 7.3 |                      |   |                 |
| Station 6    |           |        |                |      |                |     |                      |   |                 |
| 17:00        | Surface   | 32.0   | 1614           | 144  | 10.5           | 8.8 | 42deg. 21' 53.57" N  | Near the east riverside across from the in-zone transect. | 3.2             |
| 17:01        | 0.6       | 31.6   | 1611           | 148  | 10.9           | 8.9 | 71deg. 04' 31.43" W  |   |                 |
| 17:03        | 1.0       | 31.5   | 1611           | 145  | 10.7           | 8.9 |                      |   |                 |
| 17:03        | 2.0       | 30.6   | 1614           | 135  | 10.0           | 8.8 |                      |   |                 |
| 17:04        | 3.0       | 28.4   | 1918           | 97   | 7.5            | 8.0 |                      |   |                 |
| Station 7    |           |        |                |      |                |     |                      |   |                 |
| 17:18        | Surface   | 30.0   | 1794           | 118  | 8.9            | 8.7 | 42deg. 21' 56.295" N | West opening of the old dam and locks.                    | 7.2             |
| 17:19        | 0.6       | 30.0   | 1804           | 118  | 8.9            | 8.6 | 71deg. 04' 23.232" W |   |                 |
| 17:20        | 1.0       | 29.9   | 1819           | 117  | 8.8            | 8.6 |                      |   |                 |
| 17:21        | 2.0       | 29.3   | 1980           | 101  | 7.7            | 8.2 |                      |   |                 |
| 17:22        | 3.0       | 28.8   | 1900           | 92   | 7.1            | 8.0 |                      |   |                 |
| 17:23        | 4.0       | 26.7   | 9810           | 60   | 4.7            | 7.5 |                      |   |                 |
| 17:24        | 5.0       | 21.8   | 27914          | 24   | 1.9            | 7.3 |                      |   |                 |
| 17:25        | 6.0       | 19.5   | 37635          | 37   | 2.9            | 7.4 |                      |   |                 |
| 17:26        | 7.0       | 18.9   | 39527          | 50   | 4.0            | 7.5 |                      |   |                 |
| Station 8    |           |        |                |      |                |     |                      |   |                 |
| 17:36        | Surface   | 29.5   | 1734           | 121  | 9.2            | 8.7 | 42deg. 22' 06.831" N | Midstream and 100m upstream from new dam and locks.       | 5.7             |
| 17:37        | 0.6       | 29.5   | 1732           | 121  | 9.2            | 8.7 | 71deg. 04' 00.737" W |   |                 |
| 17:38        | 1.0       | 29.5   | 1733           | 121  | 9.2            | 8.7 |                      |   |                 |
| 17:39        | 2.0       | 29.2   | 1743           | 108  | 8.2            | 8.4 |                      |   |                 |
| 17:40        | 3.0       | 28.8   | 1767           | 96   | 7.4            | 8.1 |                      |   |                 |
| 17:42        | 4.0       | 27.0   | 9877           | 89   | 6.8            | 8.0 |                      |   |                 |
| 17:44        | 5.0       | 21.8   | 30212          | 61   | 4.8            | 7.7 |                      |   |                 |
| 17:45        | 5.7       | 19.4   | 37993          | 50   | 4.0            | 7.6 |                      |   |                 |

Table A-3: EPA Chalres River Pharmaceutical and Personal Care Products (PPCP) Results

| Sampling Station          |  | CRECHO | CRPCDPUP | CRPCDPDW | 1104500 | CRBC   | CRBL02 | CRBLA8 | CRBLA8 (DUP) | CRBL12 | CRECHO    | CRPCDPUP  | CRPCDPDW  | CRBL02   | CRBLA8   | CRBLA8 (dup) | LAUD01   | Blank    | CRBL02   | CRBLA8   | CRBL12   |      |      |      |      |       |      |      |      |       |       |      |      |      |      |      |      |      |     |
|---------------------------|--|--------|----------|----------|---------|--------|--------|--------|--------------|--------|-----------|-----------|-----------|----------|----------|--------------|----------|----------|----------|----------|----------|------|------|------|------|-------|------|------|------|-------|-------|------|------|------|------|------|------|------|-----|
| Sampling Time             |  | 11:30  | 10:30    | 10:55    | 7:20    | 8:30   | 13:55  | 11:15  | 11:15        | 10:00  | 10:00     | 8:45      | 8:15      | 12:20    | 9:40     | 9:40         | 12:15    | 15:05    | 12:00    | 9:20     | 8:30     |      |      |      |      |       |      |      |      |       |       |      |      |      |      |      |      |      |     |
| Sampling Date             |  | 6/7/05 | 6/7/05   | 6/7/05   | 6/8/05  | 6/8/05 | 6/8/05 | 6/8/05 | 6/8/05       | 6/8/05 | 8/10/2005 | 8/10/2005 | 8/10/2005 | 8/9/2005 | 8/9/2005 | 8/9/2005     | 9/7/2005 | 9/7/2005 | 9/7/2005 | 9/7/2005 | 9/7/2005 |      |      |      |      |       |      |      |      |       |       |      |      |      |      |      |      |      |     |
| Units                     |  | ng/l   | ng/l     | ng/l     | ng/l    | ng/l   | ng/l   | ng/l   | ng/l         | ng/l   | ng/l      | ng/l      | ng/l      | ng/l     | ng/l     | ng/l         | ng/l     | ng/l     | ng/l     | ng/l     | ng/l     |      |      |      |      |       |      |      |      |       |       |      |      |      |      |      |      |      |     |
| Compound                  | use                                    | conc.  | RL       | conc.    | RL      | conc.  | RL     | conc.  | RL           | conc.  | RL        | conc.     | RL        | conc.    | RL       | conc.        | RL       | conc.    | RL       | conc.    | RL       |      |      |      |      |       |      |      |      |       |       |      |      |      |      |      |      |      |     |
| 17-alpha-estradiol        | Estrogen                               | ND     | 0.5      | ND       | 0.5     | ND     | 0.5    | ND     | 0.5          | ND     | 0.5       | 0.96      | 0.5       | 0.63     | 0.5      | 0.58         | 0.5      | 0.76     | 0.6      | 0.73     | 0.5      | 2.8  | 0.6  | 1.3  | 0.5  | 3.4   | 0.5  | ND   | 0.77 | ND    | 0.5   | ND   | 0.5  | ND   | 0.5  | ND   | 0.5  | ND   | 0.5 |
| 17-alpha-ethynylestradiol | Ovulation Inhibitor/Synthetic Estrogen | ND     | 2        | ND       | 2       | ND     | 2      | ND     | 2            | ND     | 2         | ND        | 2         | ND       | 2        | ND           | 2        | ND       | 2.2      | ND       | 2.0      | ND   | 2.6  | ND   | 2.0  | ND    | 2.0  | ND   | 2.0  | ND    | 2.0   | ND   | 2.0  | ND   | 2.0  | ND   | 2.0  | ND   | 2.0 |
| 17-beta-estradiol         | Estrogen                               | ND     | 2        | ND       | 2       | ND     | 2      | ND     | 2            | ND     | 2         | ND        | 2         | ND       | 2        | ND           | 2        | ND       | 2.2      | ND       | 2.0      | ND   | 2.6  | ND   | 2.0  | ND    | 2.0  | ND   | 2.0  | ND    | 2.0   | ND   | 2.0  | ND   | 2.0  | ND   | 2.0  | ND   | 2.0 |
| Acetaminophen             | pain relievers & antipyretics          | NA     | NA       | NA       | NA      | NA     | NA     | NA     | NA           | NA     | NA        | NA        | NA        | NA       | NA       | NA           | NA       | NA       | ND       | 11       | ND       | 10.0 | ND   | 13   | ND   | 10.0  | ND   | 10.0 | ND   | 16.00 | ND    | 10.0 | ND   | 10.0 | ND   | 10.0 | ND   | 10.0 |     |
| Androstenedione           | Androgen                               | 1      | 1        | ND       | 1       | ND     | 1      | 1.3    | 1            | ND     | 1         | ND        | 1         | ND       | 1        | 1.1          | 1        | 1.7      | 1        | 0.72     | 0.55     | 1.7  | 0.5  | 1.6  | 0.63 | 1.4   | 0.5  | 5.3  | 0.5  | 2.3   | 0.77  | ND   | 1.0  | ND   | 1.0  | ND   | 1.0  |      |     |
| Atrazine                  | herbicide                              | 1.7    | 0.5      | 1.2      | 0.5     | 2      | 0.5    | 1.8    | 0.5          | 13     | 0.5       | 2.5       | 0.5       | 11       | 0.5      | 7.2          | 0.5      | 7.2      | 0.5      | ND       | 0.55     | ND   | 0.5  | 0.98 | 0.63 | ND    | 0.5  | 0.73 | 0.5  | ND    | 0.77  | 1.6  | 0.5  | ND   | 0.5  | ND   | 0.5  | 3.0  | 0.5 |
| Bisphenol A               | plasticizer                            | ND     | 10       | ND       | 10      | ND     | 10     | 12     | 10           | ND     | 10        | ND        | 10        | ND       | 10       | ND           | 10       | ND       | 11       | ND       | 10       | ND   | 10   | ND   | 10   | ND    | 10   | ND   | 10   | ND    | 10    | ND   | 10   | ND   | 10   | ND   | 10   | ND   | 10  |
| Caffeine                  | stimulant                              | -ND    | 5        | -5.8     | 5       | -7.3   | 5      | -18    | 5            | -33    | 5         | -28       | 5         | -66      | 5        | -55          | 5        | -43      | 5        | ND       | 5.5      | 13   | 5.0  | 42   | 6.3  | 45    | 5.0  | 77   | 5.0  | 120   | 7.70  | 120  | 5.0  | ND   | 5.0  | 38   | 5.0  | 21   | 5.0 |
| Carbamazepine             | Anti-seizure drug                      | -11    | 0.5      | -ND      | 0.5     | -28    | 0.5    | -ND    | 0.5          | -4.3   | 0.5       | -6.8      | 0.5       | -7.4     | 0.5      | -6.2         | 0.5      | -6.6     | 0.5      | 3.4      | 0.55     | 34   | 0.5  | 47   | 0.63 | 4.4   | 0.5  | 3.3  | 0.5  | 8.9   | 0.77  | 4.6  | 0.5  | ND   | 0.5  | 0.87 | 0.5  | 2.0  | 0.5 |
| Deet                      | Insect repellent                       | 5.9    | 5        | 75       | 5       | 65     | 5      | 77     | 5            | 18     | 5         | 33        | 5         | 28       | 5        | 29           | 5        | 21       | 5        | ND       | 5.5      | 47   | 5.0  | 35   | 6.3  | 31    | 5.0  | 29   | 5.0  | 93    | 7.70  | 48   | 2.0  | 4.0  | 2.0  | 45   | 2.0  | 27   | 2.0 |
| Diazepam                  | Muscle Relaxant                        | -ND    | 0.5      | -ND      | 0.5     | -0.54  | 0.5    | -ND    | 0.5          | -ND    | 0.5       | -ND       | 0.5       | -ND      | 0.5      | -ND          | 0.5      | -ND      | 0.5      | ND       | 0.55     | ND   | 0.5  | 0.77 | 0.63 | ND    | 0.5  | ND   | 0.5  | ND    | 0.77  | ND   | 0.5  | ND   | 0.5  | ND   | 0.5  | ND   |     |
| Diclofenac                | Anti-arthritis                         | -42    | 2        | -32      | 2       | -40    | 2      | -25    | 2            | -67    | 2         | -52       | 2         | -66      | 2        | -68          | 2        | -46      | 2        | ND       | 2.2      | ND   | 2.0  | ND   | 2.6  | ND    | 2.0  | ND   | 2.0  | ND    | 3.10  | ND   | 2.0  | ND   | 2.0  | ND   | 2.0  | ND   |     |
| Diethylstilbestrol        | Synthetic estrogen                     | -ND    | 0.5      | -ND      | 0.5     | -ND    | 0.5    | -ND    | 0.5          | -ND    | 0.5       | -ND       | 0.5       | -ND      | 0.5      | -ND          | 0.5      | -ND      | 0.5      | ND       | 0.55     | ND   | 0.5  | ND   | 0.63 | ND    | 0.5  | ND   | 0.5  | ND    | 0.77  | ND   | 0.5  | ND   | 0.5  | ND   | 0.5  | ND   |     |
| Dilantin                  | Anti-convulsant drug                   | 2.8    | 1        | 3.5      | 1       | 11     | 1      | 2.1    | 1            | 3.7    | 1         | 4.8       | 1         | 3.8      | 1        | 6.7          | 1        | 3.2      | 1        | ND       | 1.1      | 59   | 1.0  | 100  | 1.3  | 3.6   | 1.0  | 5.6  | 1.0  | 6.7   | 1.50  | 4.7  | 1.0  | 3.0  | 1.0  | 7.6  | 1.0  |      |     |
| Estriol                   | Estrogen                               | -ND    | 2        | -ND      | 2       | -ND    | 2      | -ND    | 2            | -ND    | 2         | -ND       | 2         | -ND      | 2        | -ND          | 2        | -ND      | 2        | ND       | 2.2      | ND   | 2.0  | 3.5  | 2.6  | ND    | 2.0  | ND   | 2.0  | ND    | 3.10  | ND   | 2.0  | ND   | 2.0  | ND   | 2.0  | ND   |     |
| Estrone                   | Estrogen                               | ND     | 1        | ND       | 1       | ND     | 1      | ND     | 1            | ND     | 1         | ND        | 1         | ND       | 1        | ND           | 1        | ND       | 1        | ND       | 1.1      | 2.8  | 1.0  | ND   | 1.3  | ND    | 1.0  | ND   | 1.0  | ND    | 3.10  | ND   | 1.0  | ND   | 1.0  | ND   | 1.0  | ND   |     |
| Fluoxetine                | Anti-depressant                        | -ND    | 1        | -ND      | 1       | -ND    | 1      | -ND    | 1            | -ND    | 1         | -ND       | 1         | -ND      | 1        | -ND          | 1        | -ND      | 1        | -1.2     | 1.1      | -1.2 | 1.0  | -3.6 | 1.3  | ND    | 1.0  | -3.6 | 1.0  | -9.4  | 1.50  | ND   | 1.0  | ND   | 1.0  | ND   | 1.0  | ND   |     |
| Gemfibrozil               | Lipid regulator                        | -3.6   | 0.5      | -24      | 0.5     | -26    | 0.5    | -3.6   | 0.5          | -5.8   | 0.5       | -5        | 0.5       | -9.1     | 0.5      | -8.4         | 0.5      | -6.7     | 0.5      | ND       | 0.55     | 2.8  | 0.5  | 18   | 0.63 | 3.3   | 0.5  | 21   | 0.5  | 16    | 0.77  | 6.7  | 0.5  | ND   | 0.5  | 1.4  | 0.5  |      |     |
| Hydrocodone               | Cough suppression / Analgesic          | NA     | NA       | NA       | NA      | NA     | NA     | NA     | NA           | NA     | NA        | NA        | NA        | NA       | NA       | NA           | NA       | NA       | NA       | 1.6      | 1.1      | 6.4  | 1.0  | 2.9  | 1.3  | 6.4   | 1.0  | 1.8  | 1.0  | 9.6   | 1.50  | 2.1  | 1.0  | ND   | 1.0  | ND   | 1.0  | 1.5  |     |
| Ibuprofen                 | antimflammatory                        | -140   | 10       | -83      | 10      | -170   | 10     | -86    | 10           | -220   | 10        | -150      | 10        | -235     | 10       | -230         | 10       | -140     | 10       | ND       | 11       | ND   | 10.0 | ND   | 13   | 14    | 10.0 | ND   | 10.0 | 60    | 16.00 | 22   | 10.0 | ND   | 10.0 | ND   | 10.0 | 27   |     |
| Iopromide                 | Contrast enhancer (Angiography)        | NA     | NA       | NA       | NA      | NA     | NA     | NA     | NA           | NA     | NA        | NA        | NA        | NA       | NA       | NA           | NA       | NA       | NA       | 1.6      | 1.1      | 6.4  | 1.0  | 2.9  | 1.3  | 6.4   | 1.0  | 1.8  | 1.0  | 9.6   | 1.50  | 2.1  | 1.0  | ND   | 1.0  | ND   | 1.0  | 1.5  |     |
| Meprobamate               | Anti-anxiety drug                      | ND     | 5        | 13       | 5       | 21     | 5      | -24    | 5            | ND     | 5         | -4.3      | 5         | 9.2      | 5        | ND           | 5        | ND       | 5        | ND       | 5.5      | 46   | 5.0  | 21   | 6.3  | ND    | 5.0  | ND   | 5.0  | ND    | 7.70  | ND   | 5.0  | ND   | 5.0  | ND   | 5.0  |      |     |
| Naproxen                  | Analgesic                              | -ND    | 0.5      | -0.73    | 0.5     | -0.52  | 0.5    | -0.77  | 0.5          | -0.66  | 0.5       | -0.67     | 0.5       | -0.58    | 0.5      | -0.68        | 0.5      | -2       | 0.5      | ND       | 0.55     | ND   | 1.2  | ND   | 1.4  | ND    | 0.64 | ND   | 1.10 | ND    | 3.10  | 0.52 | 0.5  | ND   | 0.5  | 1.1  | 0.5  |      |     |
| Oxybenzone                | Sun Screen                             | -ND    | 2        | -ND      | 2       | -3.9   | 2      | -2.5   | 2            | -7.7   | 2         | -3.7      | 2         | -3.3     | 2        | -10          | 2        | -10      | 2        | 0.71     | 2.2      | 7.6  | 2.0  | 8.7  | 2.6  | 18    | 2.0  | 200  | 2.0  | 89    | 3.10  | 34   | 2.0  | ND   | 2.0  | 6.1  | 2.0  |      |     |
| Pentoxifylline            | Improve blood flow                     | -2.3   | 1        | -ND      | 1       | -ND    | 1      | -ND    | 1            | -ND    | 1         | -2.4      | 1         | -3.7     | 1        | -1.4         | 1        | -1.9     | 1        | 1.2      | 1.1      | 2.2  | 1.0  | 3.2  | 1.3  | 3.6   | 1.0  | 1.5  | 1.0  | 5.2   | 1.50  | 4.1  | 1.0  | ND   | 1.0  | ND   | 1.0  | 1.2  |     |
| Phenytoin                 | anticonvulsant                         | 2.8    | 1        | 3.5      | 1       | 11     | 1      | 2.1    | 1            | 3.7    | 1         | 4.8       | 1         | 3.8      | 1        | 6.7          | 1        | 3.2      | 1        | NA       | NA       | NA   | NA   | NA   | NA   | NA    | NA   | NA   | NA   | NA    | NA    | NA   | NA   | NA   | NA   | NA   | NA   |      |     |
| Progesterone              | Ovulation Inhibitor / Estrogen         | 0.53   | 0.5      | ND       | 0.5     | ND     | 0.5    | 0.53   | 0.5          | 0.62   | 0.5       | 1         | 0.5       | 0.58     | 0.5      | ND           | 0.5      | 0.64     | 0.5      | -1.6     | 0.55     | -1.3 | 0.5  | -1.8 | 0.63 | -0.94 | 0.5  | -2   | 0.5  | ND    | 0.77  | ND   | 0.5  | ND   | 0.5  | ND   | 0.5  |      |     |
| Sulfamethoxazole          | antibiotic                             | -ND    | 0.5      | -ND      | 0.5     | -ND    | 0.5    | -ND    | 0.5          | -ND    | 0.5       | -ND       | 0.5       | -ND      | 0.5      | -ND          | 0.5      | -ND      | 0.5      | ND       | 0.55     | ND   | 1.8  | 0.5  | -8.1 | 0.63  | ND   | 0.5  | ND   | 0.77  | ND    | 0.5  | ND   | 0.5  | ND   | 0.5  | ND   | 0.5  |     |
| Testosterone              | Androgen                               | ND     | 2        | ND       | 2       | ND     | 2      | ND     | 2            | ND     | 2         | ND        | 2         | ND       | 2        | ND           | 2        | ND       | 2        | ND       | 1.1      | ND   | 2.0  | 0.64 | 2.6  | ND    | 2.0  | ND   | 2.0  | ND    | 3.10  | ND   | 2.0  | ND   | 2.0  | ND   | 2.0  |      |     |
| Triclosan                 | antimicrobial disinfectant             | -ND    | 5        | -ND      | 5       | -ND    | 5      | -ND    | 5            | -9.8   | 5         | -ND       | 5         | -ND      | 5        | -ND          | 5        | -ND      | 5        | ND       | 5.5      | ND   | 5.0  | ND   | 6.3  | ND    | 5.0  | ND   | 5.0  | 9.2   | 7.70  | ND   | 5.0  | ND   | 5.0  | 8.1  | 5.0  |      |     |
| Trimethoprim              | antibiotic                             | -ND    | 1        | -ND      | 1       | -ND    | 1      | -ND    | 1            | -ND    | 1         | -ND       | 1         | -ND      | 1        | -ND          | 1        | -ND      | 1        | 2.5      | 1.1      | 24   | 1.0  | 12   | 1.3  | 1.4   | 1.0  | 7.8  | 1.0  | 6.5   | 1.50  | 4.7  | 1.0  | ND   | 1.0  | 2.4  | 1.0  |      |     |

| STATION  | STATION DESCRIPTION  |
|----------|--|
| CRECHO   | Echo lake, left side of dam from downstream (from shore/dam)   |
| CRPCDPUP | Walker st bridge/ poplatic st just upstream of Charles River Pollution Control District Plant (wadens) |
| CRPCDPDW | Canoe launch, river street just before confluence of mill river (wadens)                               |
| 1104500  | Crwa site on the pedestrian bridge just east of moody st bridge in waltham                             |
| CRBC     | Crwa site at Beaver Brook at confluence with the Charles, West Culvert                                 |
| CRBL02   | Upstream of Watertown Dam  |
| LAUD01   | Laundry brook at confluence of Charles   |
| CRBLA8   | Off the esplanade  |
| CRBL12   | Upstream of the Railroad Bridge near the locks   |

Notes:  
 RL = Reporting Limit  
 NA = Not available  
 On June 7 & 8 much of the data were reported as estimated data because of poor recoveries in the laboratory control/duplicate samples.  
 On June 7 and 8 Gemfibrozil was reported as estimated data. An error associated with the an elevated laboratory recovery equates to potential high.  
 On August 9 and 10 the there was method blank contamination for fluoxetine, sulfamethoxazole, progesterone and bisphenol -A, sample results less than 20 times the level in the method blank are reported as estimated.  
 On August 9 and 10 the the reporting limit for naproxen was elevated for samples CRBLA8, CRBL02, CRBL99P, CRPCDPUP, and CRPCDPDW.  
 On August 9 and 10 the reporting limit (RL) was elevated for all analytes associated with samples CRBL99P, CRPCDPDW, and CRECHO.  
 On September 7 the reporting limit for Progesterone was elevated for sample CRBLA8