

# **Mystic River Watershed Association**

## **Water Quality Monitoring: Malden River May 28<sup>th</sup> 2002**

### **Introduction**

The Mystic River Watershed Association, through its Mystic Monitoring Network (MMN) program, has been collecting water samples from the Medford Street Bridge on the Malden River for over two years as part of its baseline monitoring program. Due to elevated levels of fecal coliform bacteria detected from this monitoring, the MMN implemented an ancillary study along the River to better characterize the bacteria concentrations and determine point sources, if possible.

This document was designed to accompany the data and graphs of the water quality results.

### **Study Descriptions**

In addition to continuing the baseline monitoring at the Medford Street Bridge, the MMN sampled from several pipes and at several locations along the river on May 28<sup>th</sup> 2002. The rainfall for the previous day was < 0.10 inches (conditions were dry). Baseline monitoring has occurred the second Wednesday of each month since July 2000, including two wet weather events on May 22, 2001 and March 27, 2002. The rain during the May 22<sup>nd</sup> 2001 event was 0.49 inches. For the March 27<sup>th</sup> 2002 event, rain measured 0.38 inches but was preceded by 0.50 inches the day before.

### **Site Descriptions**

The baseline samples were all collected from MAR036, Malden River at Medford Street.

For the May 28<sup>th</sup> study, the following locations were sampled:

MBTW48:	Center of three MBTA Wellington Station outfalls to river
LIC01S:	Little Creek at Commercial Ave - South pipe of main culvert
MAR036:	Baseline sampling location at Medford Street Bridge
MARUNT:	1st green plastic pipe from east inside east half of double culvert due north
MARUIN:	under grate after angle left inside North double-culvert
MARUPE:	headwall to NE of upper basin end - apparent main river flow
MAC001:	Malden River 'canal' by Oak Grove T as it disappears underground
MACCEM:	Tributary from cemetery to east of Oak Grove T
MACEND:	North end of above ground 'canal' segment

Please see the attached map.

### **Methodology**

For baseline monitoring, volunteers collected water by first triple-rinsing a decontaminated bucket, and then pouring the sample from the bucket into a sterile 250 ml container. The

MWRA laboratory analyzed the samples by membrane filtration procedures with m-FC broth or m-FC agar media (Standard Methods for the Examination of Water and Wastewater, 20<sup>th</sup> Edition, 1998. Section 9222D).

For the May 28<sup>th</sup> sampling, sites were selected by the following criteria: sample locations must be at least 0.1 miles from each other, and must have above-ground access. A volunteer collected 100 ml of water by attaching the sample bottle to a pole and dipping it into the streamflow. For bacteria analyses, the EPA Region 1 Laboratory used OEME standard membrane filtration procedures with m-FC and Nutrient Agar with MUG media. (Standard Methods for the Examination of Water and Wastewater, 20th Edition, 1998. Section 9223). At one location we collected a duplicate.

The temperature, pH, and dissolved oxygen readings were taken with a YSI-85 meter and a pH meter. The meter probe was immersed directly in the streamflow. The meter was calibrated for dissolved oxygen according to YSI manual instructions.

### **Quality Assurance**

In accordance with the MyRWA Quality Assurance Project Plan (QAPP), one out of every ten samples taken was a duplicate. All duplicate results for this study were within the parameters established in the QAPP: for bacteria  $\pm 100\%$ , for dissolved oxygen  $\pm 20\%$ . No results were discarded.

### **Results**

All of the waters tested have been classified as Class B waters, meaning that the water should meet swimming and boating standards. The Massachusetts Surface Water Quality Standard (MASWQS) is based on fecal coliform and is 200 cfu/100 ml for primary contact (swimming) and 1,000 cfu/100 ml for secondary contact (boating).

For the baseline monitoring, the geometric mean for MAR036 is 265 cfu/100 ml for the period 7/2000 – 5/2002. Even though this figure is relatively low, several sampling events had results well above the MASWQS. For these samples, 64% violated the standard for primary contact, and 23% violated the standard for secondary contact. See Table 1 and Figure 1.

Additionally, beginning in June 2002, MMN samples were analyzed for *E. coli* bacteria rather than fecal coliform. Although the current standard for Class B water is based on fecal coliform, studies have shown that *E. coli* is a better indicator of the risk to human health and thus the MASWQS will soon be changing from fecal coliform to *E. coli*. The exceptionally high results in July and October indicate potential sewage contamination. See Table 2 and Figure 2.

For the May 28<sup>th</sup> monitoring, 3 samples violated the primary contact standard, and only 2 violated the secondary contact standard. The two secondary standard violations occurred at MARUNT with 30,000 cfu/100 ml for fecal coliform and MARUIN with 1,600 cfu/100 ml for fecal coliform. See Table 3 and Figure 3.

One sampling location had dissolved oxygen (DO) results below one of the criteria established by the state. MARUNT had a percent saturation of 22.4%, well below the state standard of 60%.

While there are no state standards for salinity, salinity can be an indicator of probable contamination. For the March 26<sup>th</sup> sampling, salinity ranged from 0.2 ppt at MACCEM to 0.4 ppt at all other locations with results.

All of the temperature readings were within normal ranges.

## **Conclusion**

The high levels of fecal coliform and E. coli bacteria are of concern for public health, especially because the River is used recreationally by the Tufts Crew Team and others. Due to the high concentrations of fecal coliform in two of the sampled pipes, we hypothesize that sewage is contaminating these pipes at some point. Additional bracket sampling would be required via manholes to determine precise locations. The Mystic River Watershed Association would be happy to assist the City of Malden in any further sampling and investigation.

For further questions, please contact Libby Larson, Monitoring Coordinator, Mystic River Watershed Association, (781)316-3438, libbywiz@yahoo.com.

**Table 1: MMN Baseline Results 7/2000 - 5/2002**

<b>Date</b>	<b>Fecal Coliform</b>
7/12/00	10
8/9/00	210
9/13/00	940
10/11/00	10
11/8/00	50
3/14/01	920
4/11/01	200
5/9/01	50
5/22/2001 <b>Wet</b>	680
6/13/01	4,500
7/11/01	370
8/8/01	360
9/12/01	960
10/10/01	10
11/14/01	120
12/12/01	9,700
1/9/02	1,310
2/13/02	2,800
3/13/02	10
3/27/2002 <b>Wet</b>	1,600
4/10/02	345
5/8/02	250
<b>Geometric Mean</b>	<b>265</b>

**Table 2: MMN Baseline Results 6/2002 - 12/2002**

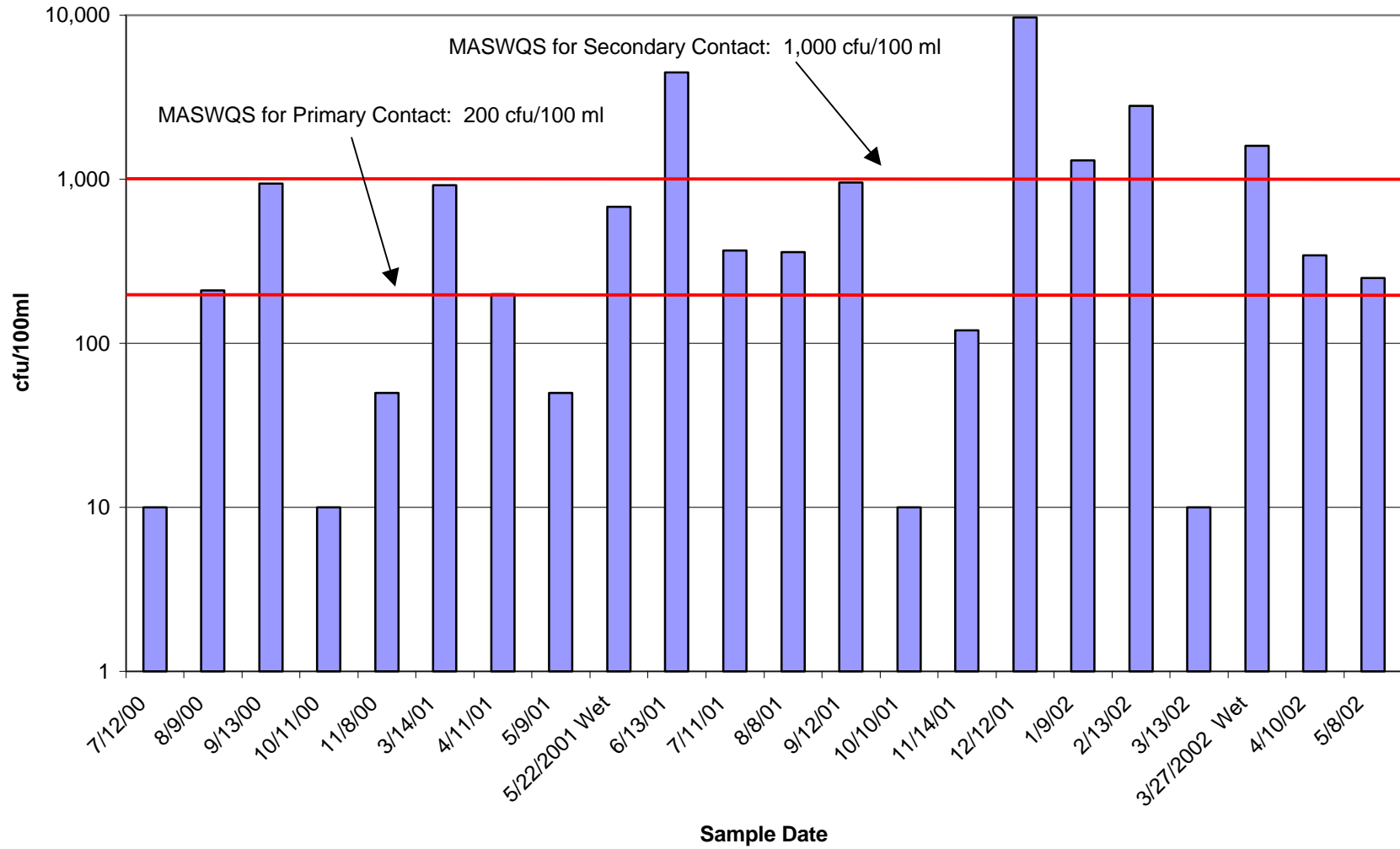
<b>Date</b>	<b>E. coli</b>
6/12/02	550
7/10/2002 <b>Wet</b>	71,000
8/14/02	160
9/11/02	20
10/9/02	49,000
11/13/2002 <b>Wet</b>	6,800
12/11/02	1,130
<b>Geometric Mean</b>	<b>1,576</b>



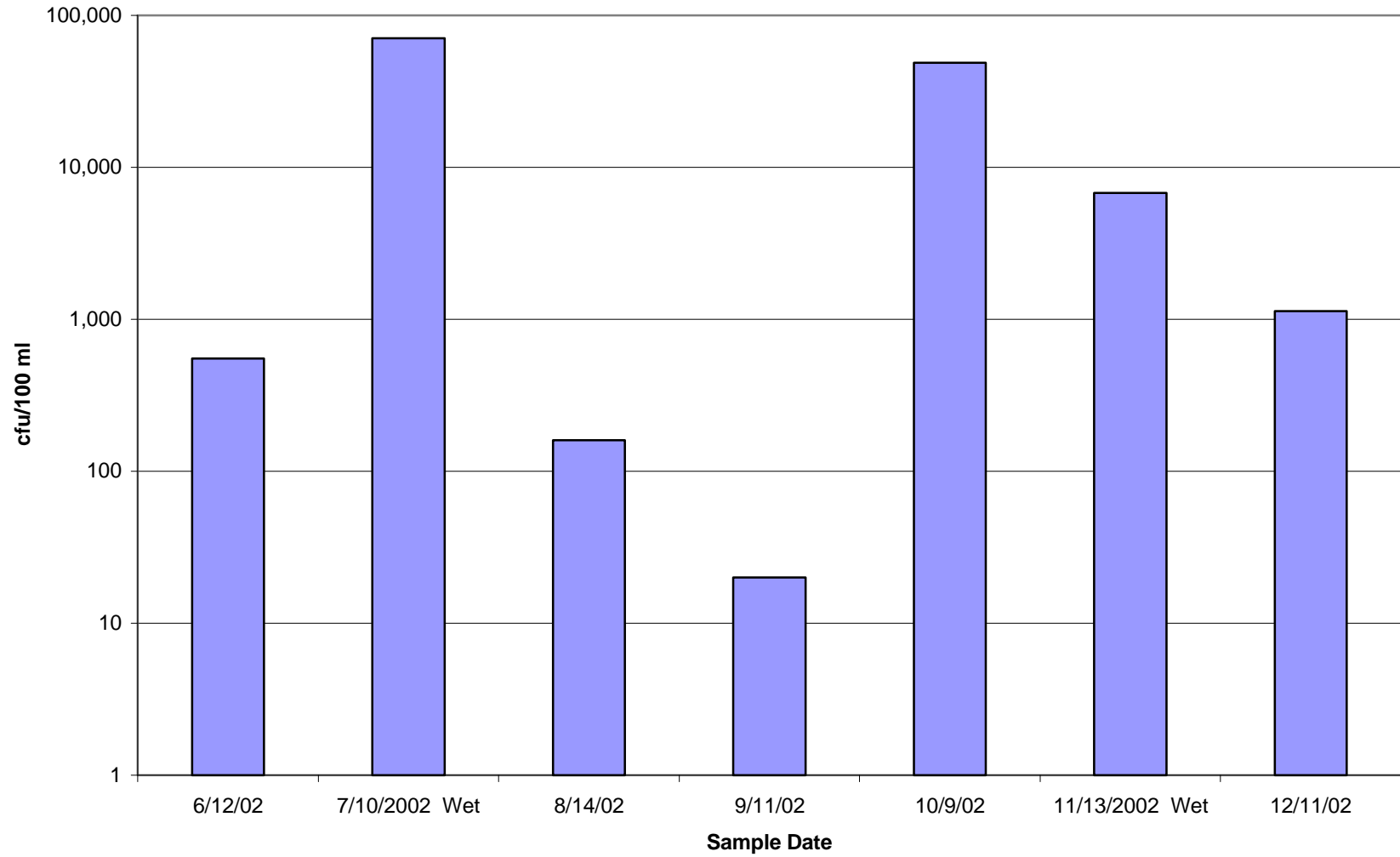
**Table 3: MMN Monitoring Results Malden River May 28th 2002**

Site	Time	Fecal Coliform	E. coli	Temp C	DO % sat	DO mg/L	cond. uS	T/C cond.	salinity ppt
MBTW48: Center of three MBTA Wellington Station outfalls to river	6:08	4	4	13.2	78.2	8.2			
LIC01S: Little Creek at Commercial Ave - South pipe of main culvert	6:44	52	52	13.9	66.2	6.8	649	824	0.4
MAR036: Baseline sampling location at Medford Street Bridge	7:03	40	40	19.2	103.7	9.6	680	765	0.4
MARUNT: first green plastic pipe from east inside east half of double culvert due north	7:17	30,000	6,000	14.9	22.4	2.3			
MARUIN: under grate after angle left inside North double-culvert	7:25	1,600	1,600	13.7	74.4	7.7	601	765	0.4
MARUPE: headwall to NE of upper basin end - apparent main river flow	7:44	40	28	15.3	85.8	8.6	627	769	0.4
MAC001: Malden River 'canal' by Oak Grove T as it disappears underground	9:01	310	270	16.5	93.9	9.2	648	773	0.4
MACCEM: Tributary from cemetery to east of Oak Grove T	9:17	120	88	15.2	72.6	7.3	390	481	0.2
MACEND: North end of above ground 'canal' segment	9:50	172	116	16.4	90.6	8.8	660	789	0.4

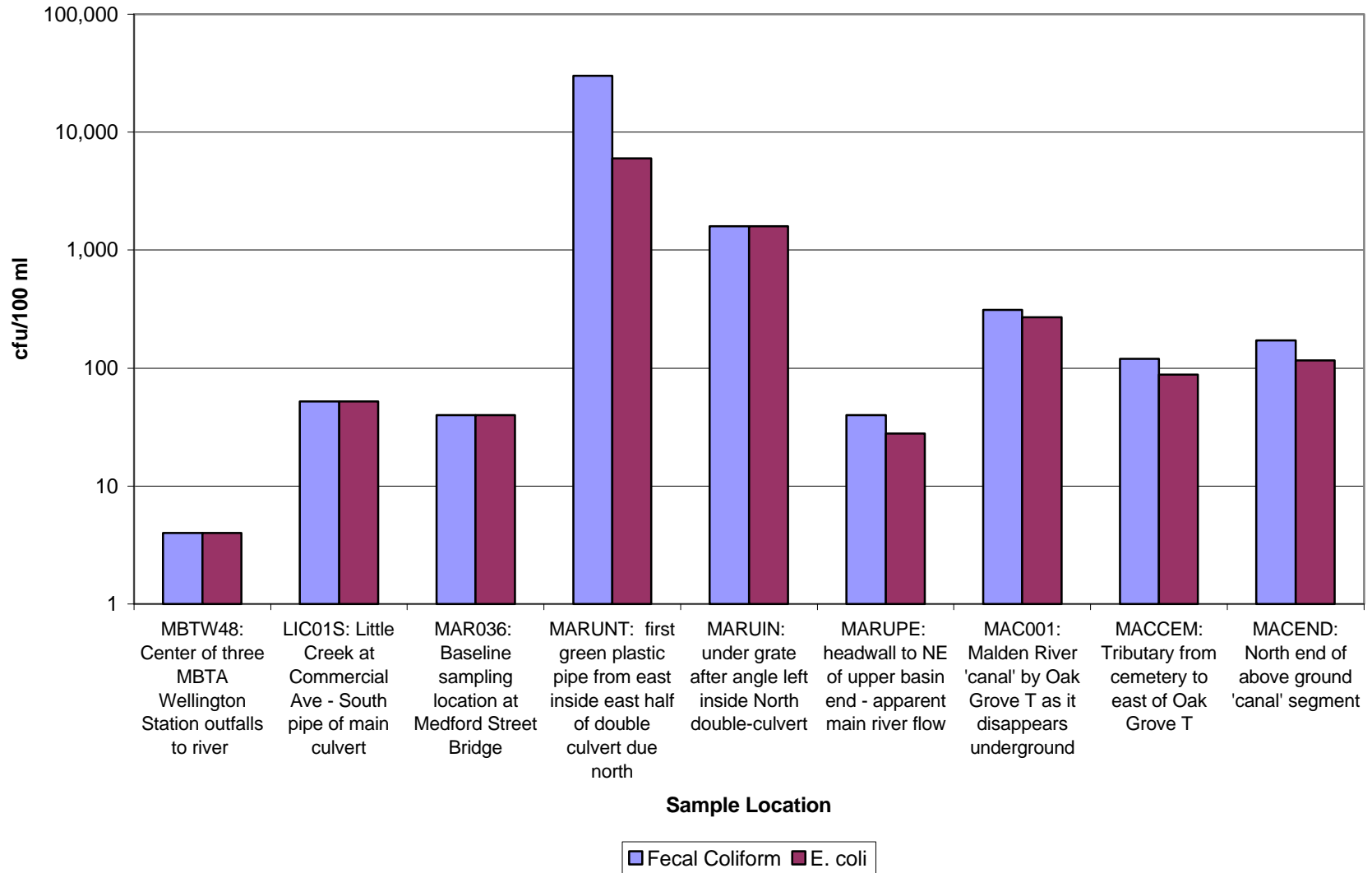
**Figure 1: MMN Baseline Sampling: Fecal Coliform Results for Malden River at Medford St. July 2000 - May 2002**



**Figure 2: MMN Baseline Monitoring: E. coli Results for Malden River at Medford Street June 2002 - December 2002**



**Figure 3: MMN Monitoring: Malden River May 28th 2002**



# Malden River Sampling Locations May 28<sup>th</sup> 2002

