

**Bacterial Assessment:**  
Winter Hill Brook, Medford;  
Ell Pond, Melrose;  
Sales Creek and Belle Isle Inlet, Revere

**Report Date: September 11, 2007**

*Technical Report # 9-004*

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**Summary: This report documents bacteria counts at levels that exceed the Massachusetts Department of Environmental Protection State Water Quality Standards at sites in Medford, Melrose, and Revere. Samples collected from one site in Melrose and one site in Revere were more than 1,000 times greater than allowable limits designated by the state. MyRWA requests a meeting with representatives from these communities so that a strategy can be developed for addressing bacteria contamination.**

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CITATION

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This report describes hotspot monitoring data collected on a monthly basis by MyRWA under its MassDEP-approved Quality Assurance Project Plan with funding support from the EOEA, the Caswell Foundation, the Massachusetts Environmental Trust, and the EPA.

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## **Executive Summary**

### **Monitoring Results: June 27, 2007**

On 27 June 2007, the Mystic River Watershed Association (MyRWA) collected 37 dry weather samples from Winter Hill Brook and an unnamed tributary to the Mystic River in Medford, Ell Pond in Melrose, and Sales Creek in Revere. Twenty-five of these samples failed to meet water quality standards for a Class B water body (235 cfu *E. coli* / 100 ml water), the designation of each of the water bodies assessed here. Water samples were collected from either culverts, outfall pipes, or the stream channel of each water body in order to assess the level of bacterial contamination (*E. coli*) in the water. A full report detailing the results of the bacteria analysis is attached here, and includes maps of all sampling locations. A summary of the results for each town is below.

#### *Medford*

Three out of seven samples collected in Medford failed to meet water quality standards. Two of these samples were taken from Winter Hill Brook, and were 44 – 51 times the allowable limit of bacteria. WNTBR03, the highest of the two, was collected downstream of the Rt. 38 bridge over Winter Hill Brook. WNTBR05 was a centerline sample upstream of the Rt. 38 bridge. Unacceptably high levels of bacteria have been found in Winter Hill Brook on other occasions as well (see data online from 6/15/05 and 1/23/07). An unacceptably high bacteria count was also detected behind the State Police building at the intersection of Rt. 28 and Rt. 16.

#### *Melrose*

Four samples were collected in Melrose at Ell Pond and all failed to meet water quality standards. Two of these samples were collected from both sides of the double culvert at the head of the northern inlet to Ell Pond, off Lynn Fells Parkway. The western culvert tested higher than the eastern. Two samples were also collected near the swimming pool off Tremont St. A sample collected right at the base of an outfall pipe (ELP003A) tested above the maximum detection limit of our methods, at >24,196 cfu *E. coli*. Another sample (ELP003B) was collected slightly downstream, at the red pedestrian bridge, which also tested extremely high (24,196 cfu *E. coli*). MyRWA re-sampled ELP003A on July 25, 2007 using methods with a higher detection limit, and found that bacteria levels exceeded 241,960 cfu *E. coli* (details of this report are forthcoming). This is a dangerous level of bacteria contamination and the source of this contamination needs to be identified immediately.

#### *Revere*

In Revere, duplicate samples were collected at 11 sites. One set of samples was analyzed at the EPA Region 1 Laboratory in Chelmsford, and the other set was analyzed at MyRWA's lab at Tufts University. We have treated the two sets of data as duplicates, and report the results as averages.

In general, bacteria levels were very high in Revere, with nine out of thirteen samples exceeding allowable limits for bacteria. The worst of these samples was collected at Lee's Trailer Park on Green St. (near intersection of 1A and Revere Beach Parkway). This sample (TRAILER) exceeded the upper detection limit of both the MyRWA tests (>24,196 cfu *E. coli* / 100 ml) and the EPA tests (>241,920 cfu / 100 ml). One of MyRWA's monitors spoke with a construction worker near the creek, who reported a strong sewer smell coming from the water. These observations in combination with the alarmingly high bacteria concentrations at Sales Creek suggest the presence of a possible illicit connection.

Other samples from Revere also tested above allowable limits for bacteria. Please review the maps and data tables included here for information on the other locations in Revere where high bacteria levels were measured.

MyRWA would like to meet with each municipality to further discuss the results contained in this report. This meeting could involve a discussion of our sampling protocol, pipe locations, bacteria results, or assistance with developing plans for further monitoring. In 30 days, we will post this report to our website and forward it to additional stakeholders as well as the United States Environmental Protection Agency (EPA) and the Massachusetts Department of Environmental Protection (MassDEP).

**Conclusions and Action Items:**

1. The source of bacteria in Winter Hill Brook needs to be identified. We recommend testing for optical brighteners to determine whether the bacteria are from sewage contamination or wildlife. Please contact us to discuss a strategy for accomplishing this task.
2. We recommend conducting water quality tests under sewer covers upstream from the culvert at Tremont Street that flows into Ell Pond to target the source of bacteria contamination. Please contact us to discuss how MyRWA can be of assistance.
3. Outfall pipes in Sales Creek near the trailer park off Rt. 1A should be sampled in order to identify the source of bacteria contamination to the creek.
4. We recommend that the towns of Medford, Melrose, and Revere conduct a public outreach campaign to educate citizens about bacteria contamination.

## **Introduction**

**Background.** The Mystic Monitoring Network (MMN) was created in 2000 by the Mystic River Watershed Association (MyRWA) to collect valuable water quality data along the Mystic River and its tributaries. The MMN is a volunteer-based project that is made up of trained citizen volunteers, student interns, and scientific advisors throughout the region.

The goals of the MMN are to establish a high quality baseline of data for the Mystic River Watershed, identify and address water pollution problems, raise public, municipal and state agency awareness of water quality in the Mystic, and create a network of informed and active citizen advocates.

MMN's Hot Spot monitoring program at MyRWA allows the organization to test water quality in locations not regularly sampled in our baseline program or that are suspected of having problems with bacteria loading.

## **Methods**

Water quality samples are always collected by trained MyRWA staff and volunteers following the protocol written in MyRWA's Quality Assurance Project Plan (QAPP). For centerline locations, bacteria samples are collected directly from the river and for end-of-pipe samples, water is collected directly from the outfall. In fresh water, samples are analyzed for the bacteria *E. coli* and in saltwater, samples are analyzed for the presence of *Enterococcus*. The bacteria samples are collected in sterile containers containing a sodium thiosulfate tablet and kept on ice until delivery to either the EPA lab in Chelmsford, or MyRWA's lab at Tufts University. Samples are analyzed using the Colilert method for enumerating colony forming units (cfu) of bacteria.

Physical habitat parameters are measured according to the QAPP. A YSI meter is used to collect measurements for water temperature, dissolved oxygen, specific conductivity, and salinity. The coordinates of each sample location are recorded with a Garmin 76Cx GPS unit. Air temperature is recorded with an alcohol thermometer at the beginning and end of the sampling period. Data on precipitation during the past 48 hours are obtained from the USGS website (real-time data for stream gage located at Muddy River in Brookline: <http://waterdata.usgs.gov/nwis/uv?01104683>).

## **Results**

Below, tables and graphs summarize the results of bacteria sampling in each community. ND = bacteria not detected in sample. Each water body we tested is a Class B water body, and any bacteria level above 235 cfu/100 ml *E. coli* or 61 cfu/100 ml *Enterococcus* is a violation of the state water quality standard for bacteria. For reference purposes, we also compare our results to the bacteria water quality standard for boating established for a Class C water body (1260 cfu/100 ml *E. coli* or 350 cfu/100 ml *Enterococcus*).

Table 1. Results of MMN bacteria sampling on 27 June 2007. Please refer to the maps for precise locations of sample sites.

<b>Sample #</b>	<b>Site ID</b>	<b><i>E coli</i> cfu/100ml</b>
T0100	MEDSPB	241
T0101	MEDPED	86
T0102	MEDCU16	52
T0103	WNTBR01	62
T0104	WNTBR05	10,462
T0105	WNTBR03	12,033
T0106	WNTBR01A	74
T0107	MELx02	1296
T0108	MELx02E	457
T0109	ELP003A	24,196
T0110	ELP003B	>24,196
T0111 / 1516	BEI016	212
T0112 / 1517	BEI15N	372
T0113 / 1518	SAC01	302
T0114 / 1519	SACPUM	nd
T0115 / 1520	SACSUF	697
T0116 / 1521	SACWES	2514
T0117 / 1522	SACSS	193
T0118 / 1523	TARGET	41
T0120 / 1525	TRAILER	>241,920
T0121 / 1526	SACRBP	702
T0122 / 1527	SACRR1	1131
T0123	SACRR2	417
T0124	SACPED	1250
T0100	MEDSPB	241

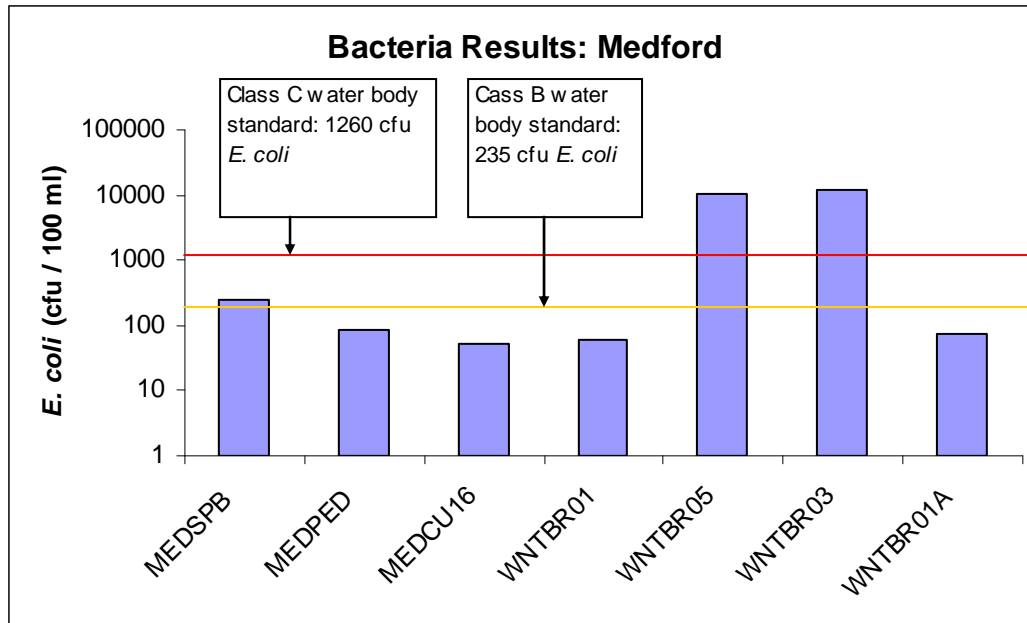


Figure 1. Bacteria counts from samples collected in Medford on 27 June 2007. Three of seven samples failed to meet the state water quality bacteria standard for a Class B water body (235 cfu / 100 ml). Two samples collected from Winter Hill Brook also exceeded the bacteria limit for a Class C water body (1260 cfu *E. coli*).



Map 1. Sample locations in Medford, MA.

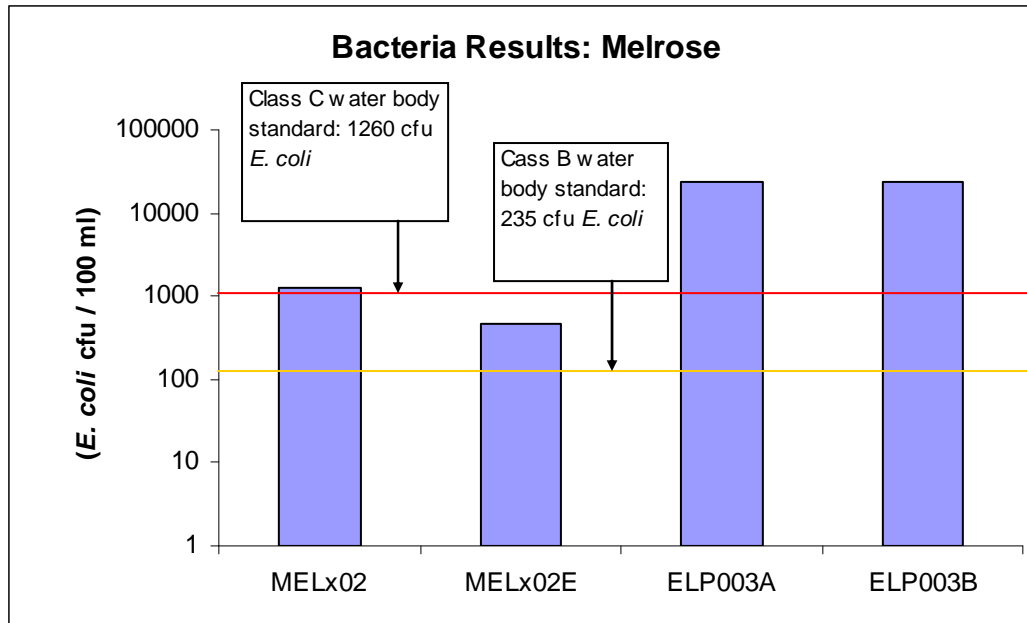
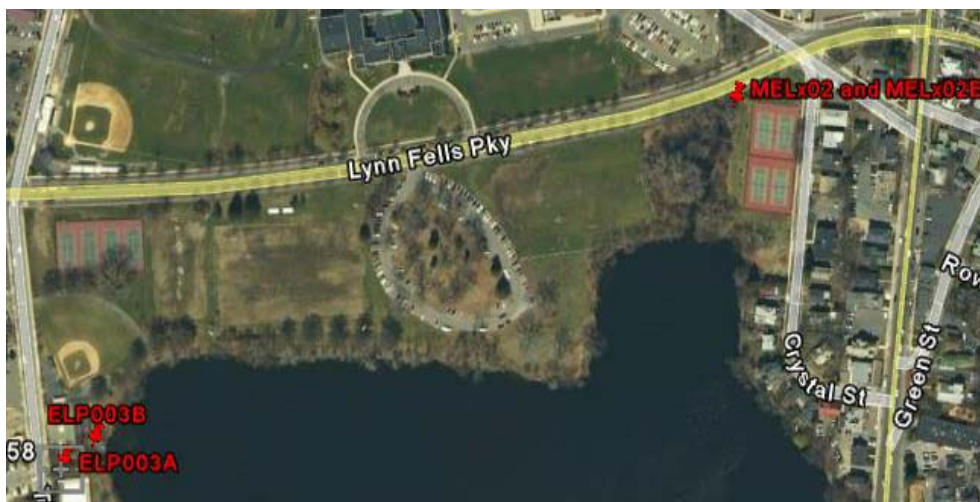


Figure 2. Samples collected on 27 June 2007 from EII Pond, a Class B water body in Melrose. All samples failed to meet the state water quality standard for *E. coli* for a Class B water body, and 3 samples failed to meet the standard for a Class C water body (235 cfu / 100 ml and 1260 cfu / 100 ml, respectively).



Map 2. Locations of samples collected from EII Pond in Melrose.

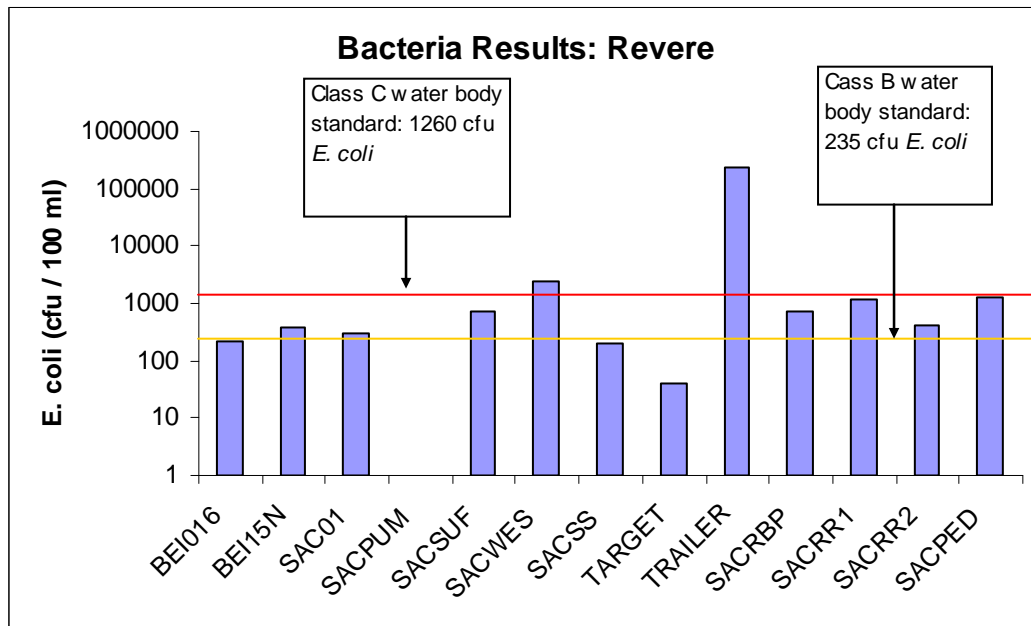
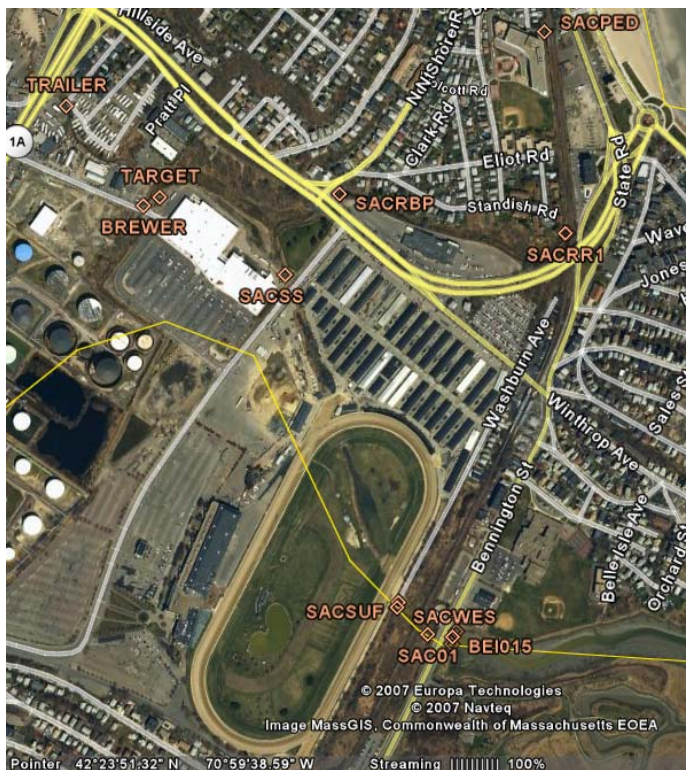


Figure 3. Samples collected on 27 June 2007 from Sales Creek and Belle Isle Inlet in Revere. Nine of thirteen samples failed to meet the state water quality standard for *E. coli* for a Class B water body, and two samples failed to meet the standard for a Class C water body (235 cfu / 100 ml and 1260 cfu / 100 ml, respectively).





Maps 3 and 4. Locations of samples collected in Revere.

## **Appendix A**

### Quality Assurance

Quality control procedures have been documented for each parameter tested by MyRWA, and can be reviewed in Table B5-1 of the QAPP (approved December 2006). Quality control of data is ensured in several ways. YSI meters are subjected to pre- and post-calibration for each sampling event. Thermometers are calibrated on an annual basis. GIS coordinates are marked at an accuracy of  $\leq 20'$ . As discussed in the QAPP, field duplicates are not collected due to the heterogeneous nature of bacteria in an aquatic medium. EPA Region 1 Laboratory has submitted a copy of their quality assurance plan and standard operating procedures. They do not submit results of their quality control measures, such as relative percent difference, but QC protocol are followed according to their standard operating procedures (available on request).

During this sample event, no violations of QC occurred. All samples were delivered to the EPA lab within the designated holding time, and the EPA lab did not report any violations of their standards.

Data received from the EPA lab and collected from the field were entered into MyRWA's Excel database by the Project Manager and were checked for error by another staff person. No changes to the data entry were made. Following the QAPP, these data, as reported here, are sent to the Department of Public Works and the Board of Health of the relevant municipalities (Winchester, Woburn, and Chelsea). After 30 days, the data will be sent to MassDEP, the EPA, conservation commissions of the relevant communities, and any other stakeholders that have expressed interest in receiving water quality data from MyRWA. A full list of these recipients is available upon request.

**Appendix B**Site Information

Sample #	Site ID	Town	Water Body	Type	Location Description	Coordinates ( Lat -- Long)	
T0100	MEDSPB	Medford	Unnamed trib. To Mystic River	pipe	large pool behind State Police Barracks at intersection of Rt 16 and Rt 28, across from Starbucks	N42 24.218	W71 04.964
T0101	MEDPED	Medford	Unnamed trib. To Mystic River	centerline	pedestrian bridge downstream of the State Police Barracks	N42 24.095	W71 05.014
T0102	MEDCU16	Medford	Unnamed trib. To Mystic River	pipe	culvert under bridge near parking lot of Macdonald Reservation off 16	N42 24.247	W71 05.177
T0103	WNTBR01	Medford	Winter Hill Brook	pipe	culvert where WNTBR comes above ground, in Mystic Reservation	N42 24.312	W71 05.863
T0104	WNTBR05	Medford	Winter Hill Brook	centerline	walk thru a fence in parking lot across the stream from the boat sales place	N42 24.257	W71 06.082
T0105	WNTBR03	Medford	Winter Hill Brook	centerline	sampled from bridge at Rt 28 near Staples	N42 24.297	W71 06.033
T0106	WNTBR01A	Medford	Winter Hill Brook	centerline	downstream of culvert, near confluence with mystic	N42 24.306	W71 05.841
T0107	MELx02	Melrose	Ell Pond	pipe	large inflow to Ell Pond -- sample by Fells Pkwy from W culvert (L when facing pond)	N42 27.801	W71 03.811
T0108	MELx02E	Melrose	Ell Pond	pipe	on right of MELx02	N42 27.801	W71 03.811

T0109	ELP003A	Melrose	Ell Pond	pipe	Ell Pond inflow across from DPW and next to swimming pool on Tremont St - sample at culvert near road	N42 27.669	W71 04.158
T0110	ELP003B	Melrose	Ell Pond	centerline	Ell Pond inflow next to DPW -- sample upstream of red bridge	N42 27.677	W71 04.142
T0111	BEI015	Revere	Belle Isle Inlet	pipe	main tidegates at Bennington St; 1.4 miles from start of Inlet.	42.39326	70.99425
T0112	BEI15N	Revere	Belle Isle Inlet	pipe	North corner at inlet end, by smaller tidegate and smaller pipe	42.39336	70.99416
T0113	SAC01	Revere	Sales Creek	centerline	Sales Creek upstream of Bennington St	42.39347	70.99473
T0114	SACPUM	Revere	Sales Creek	pipe	pipe from abutment to pumpstation	42.3935	70.99485
T0115	SACSUF	Revere	Sales Creek	centerline	Suffolk Downs	42.39387	70.99554
T0116	SACWES	Revere	Sales Creek	centerline	Suffolk Downs	42.39378	70.99557
T0117	SACSS	Revere	Sales Creek	centerline	Sales Creek upstream of racetrack	42.39962	70.99824
T0118	TARGET	Revere	unnamed	centerline	new retail drainage by Target	42.40081	71.00136
T0119	BREWER	Revere	Sales Creek	centerline	old oil farm drainage by Brewer Oil lot	42.40083	71.00162
T0120	TRAILER	Revere	Sales Creek	centerline	West Branch of Sales Creek under pedestrian bridge to trailer park	42.40258	71.00346
T0121	SACRBP	Revere	Sales Creek	centerline	upstream side of Revere Beach Pkwy	42.40104	70.99695
T0122	SACRR1	Revere	Sales Creek	centerline	North branch Sales Creek behind Star	42.40035	70.99157

T0123	SACRR2	Revere	Sales Creek	centerline	North branch of Sales Creek behind Star Mkt	42.40035	70.99152
T0124	SACPED	Revere	Sales Creek	centerline	North Branch under pedestrian bridge	42.40389	70.99207