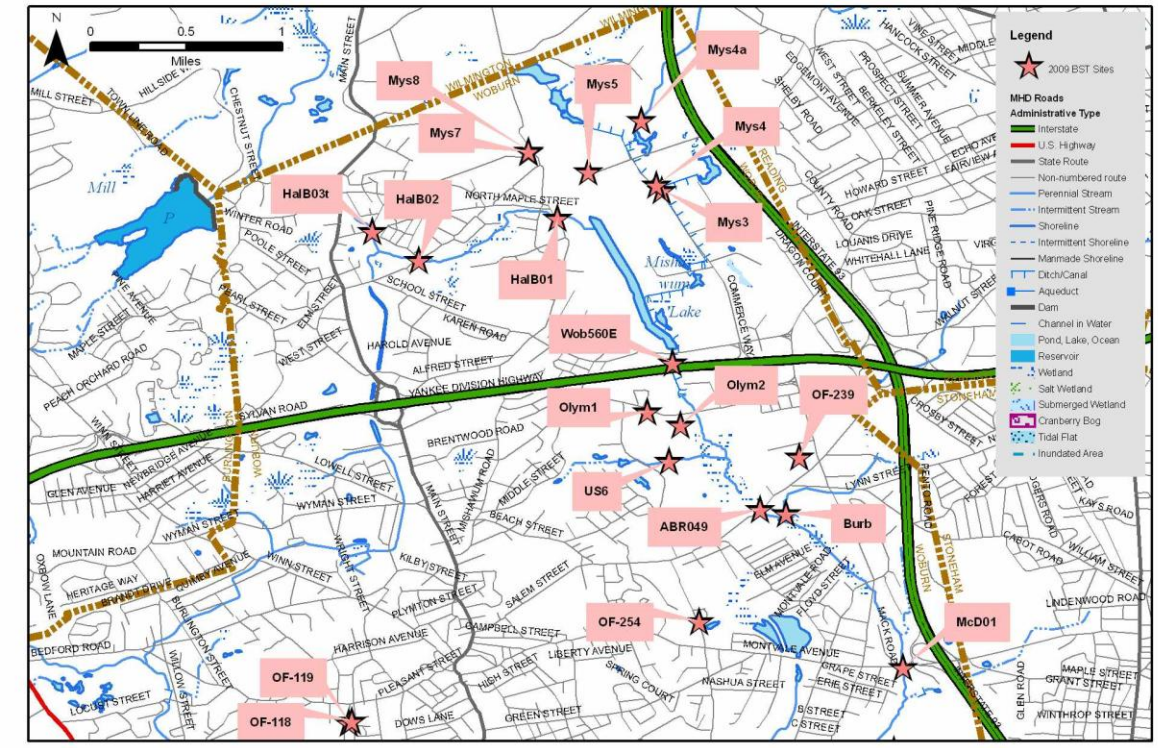
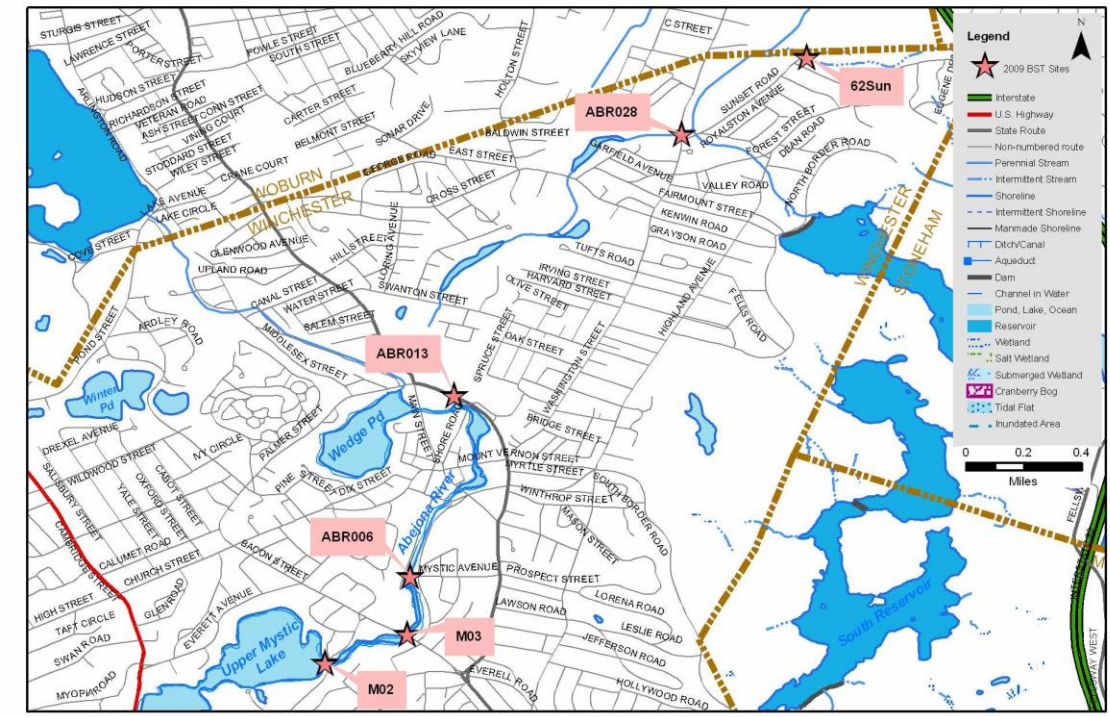
MASSDEP BACTERIAL SOURCE TRACKING PROGRAM

2009 Monitoring Data

Aberjona River (Woburn)

Figure 3.1. 2009 Bacteria Source Tracking Sites in the Aberjona River Sub-watershed





Results

Table 3.1 *E. coli* Concentrations (MPN/100mL) in the Aberjona River Sub-watershed

Site ID	Type	Water Body	Town	6/17/2009	6/18/2009	7/29/2009	7/30/2009	8/25/2009	8/27/2009
M02	Stream	Aberjona River	Winchester	ns	461.1	ns	648.8	ns	547.5[d]
M03	Stream	Aberjona River	Winchester	ns	770.1	ns	435.2	ns	517.2[d]
ABR006	Stream	Aberjona River	Winchester	ns	466.5	ns	461.1	ns	770.1[d]
ABR013	Stream	Aberjona River	Winchester	ns	275.5	ns	517.2	ns	727[d]
ABR028	stream	Aberjona River	Winchester	ns	365.4	ns	214.3	ns	1,046.2[d]
62Sun	tributary	Aberjona River	Winchester	ns	81.3	ns	27.2	ns	104.6[d]
McD01	stream	Aberjona River	Woburn	ns	435.2	ns	1,413.6	ns	365.4[d]
OF-254	pipe	Whittemore Pond	Woburn	ns	110.6	ns	ns	ns	ns
Burb	tributary	Aberjona River	Woburn	121.1[d]	ns	214.3	ns	313	ns
ABR049	stream	Aberjona River	Woburn	123.6[d]	ns	1,732.9	ns	1,553.1	ns
US6	tributary	Aberjona River	Woburn	ns	218.7	ns	261.3	ns	435.2[d]
Olym2	tributary	Aberjona River	Woburn	ns	235.9	ns	461.1	ns	365.4[d]
Olym1	tributary	Aberjona River	Woburn	ns	185.0	ns	365.4	ns	260.3[d]
OF-239	pipe	Aberjona River tributary	Woburn	20[d]	ns	98.5	ns	209.8	ns
Wob560E	pipe	Aberjona River	Woburn	142.1[d]	ns	165.8	ns	69.1	ns
HalB01	stream	Halls Brook	Woburn	727.0[d]	ns	461.1	ns	770.1	ns
HalB02	stream	Halls Brook	Woburn	259.5[d]	ns	191.8	ns	150	ns
HalB03t	tributary	Halls Brook	Woburn	325.5[d]	ns	648.8	ns	1,413.6	ns
Mys7	tributary	Aberjona River	Woburn	235.9[d]	ns	88.4	ns	328.2	ns
Mys8	tributary	Aberjona River	Woburn	105.0[d]	ns	115.3	ns	222.4	ns
Mys5	tributary	Aberjona River	Woburn	36.9[d]	ns	42.2	ns	77.6	ns
Mys3	tributary	Aberjona River	Woburn	48.0[d]	ns	59.1	ns	56.3	ns
Mys4	stream	Aberjona River	Woburn	235.9[d]	ns	110	ns	325.5	ns
Mys4a	stream	Aberjona River	Woburn	275.5[d]	ns	435.2	ns	1,986.3	ns
OF-119	pipe	Town Meadow Brook	Woburn	ns	517,200	ns	31	ns	52[d]
OF-118	pipe	Town Meadow Brook	Woburn	ns	288	ns	613.1	ns	461.1[d]

ns = not sampled, [d] = precision of field or laboratory duplicates did not meet data quality objectives

= wet weather conditions

Table 3.2 Detergents (ppm) and Ammonia (NH_3, ppm) Concentrations in the Aberjona River Sub-watershed

	6/18/2009		7/29/2009		7/30/2009	
Site ID	**Detergents**	**NH_3**	**Detergents**	**NH_3**	**Detergents**	**NH_3**
OF-239	ns	ns	0.5	nd	ns	ns
Wob560E	ns	ns	0.5	nd	ns	ns
OF-119	>3	17.9[S]	ns	ns	0.25	nd
OF-118	0.25-0.5	0.5[S]	ns	ns	0.25	nd
ns = not sampled, nd = not detected, [S] = sample analyzed using Hach spectrophotometer in the lab						

Significant Findings

- Generally, samples in the Aberjona River sub-watershed contained moderately elevated bacteria concentrations without an evident pattern of contamination, which has not been uncommon in urban watersheds.
- The City of Woburn was notified of a seriously contaminated sample collected from outfall #119 (OF-119). The City has initiated IDDE efforts, but has been having some difficulty identifying the source because the contamination appears to be intermittent in nature. MassDEP continues to monitor the City's response.
- After measuring an elevated bacteria concentration at the McD01 site the end of July, several outfalls upstream of the location were inspected on August 27th. These outfalls were not flowing and the bacteria concentration at McD01 was fairly low.
- Samples collected from the instream location, ABR049, contained elevated bacteria concentrations on two dates. The location is immediately downstream of a wetland area, and animal sources are a suspected contributor.
- At the instream location, ABR028, an elevated bacteria concentration was measured on one date. This site is downstream of the confluence of Sweetwater Brook (a known source of contamination) with the Aberjona River.
- Although Mys4a and HalB03t samples collected on August 25th contained elevated bacteria concentrations, the former is located in a wetland type area (and is usually either stagnant or nearly so) and the latter is located immediately downstream of a wetland area, so animal sources again are suspected to be contributors.
- **MassDEP is reviewing Woburn's IDDE work, and monitoring progress.**

Ell Pond (Melrose)

Sampling locations were chosen in consultation with the City of Melrose as follow-up to work conducted in 2008.

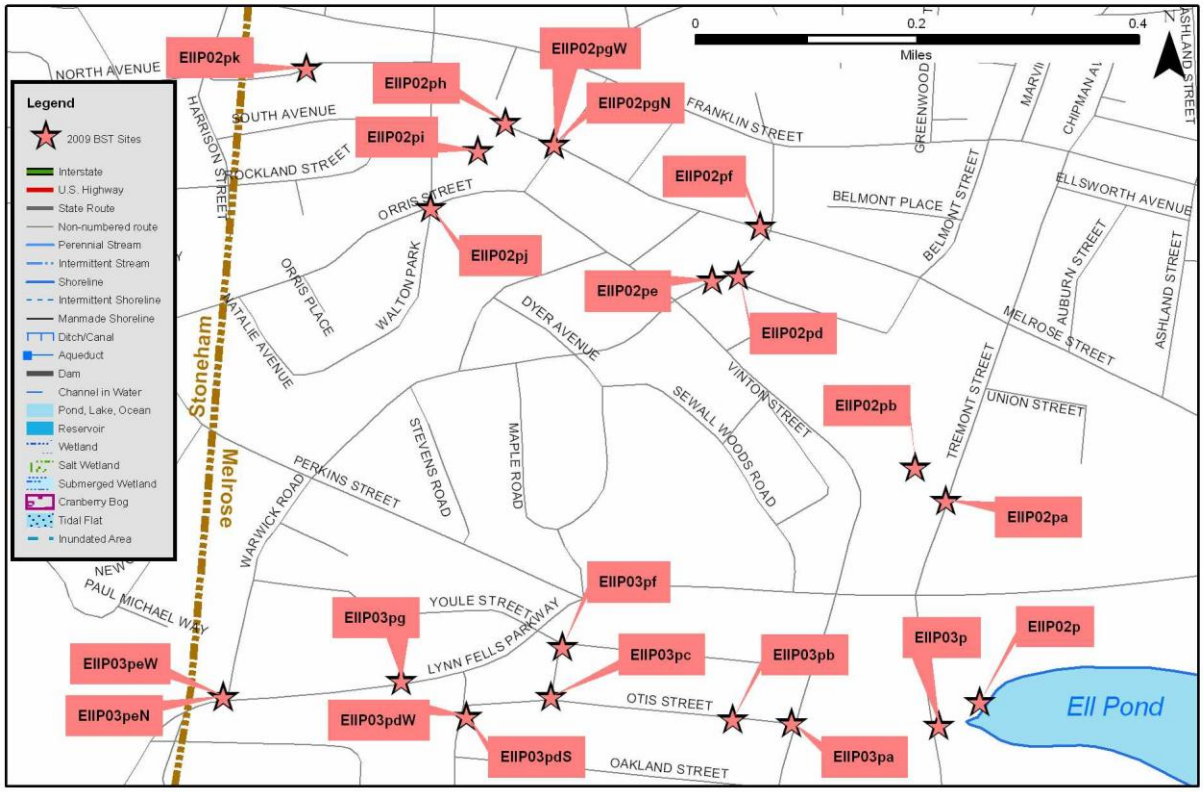
Sub-watershed Description

- Ell Pond is located in Melrose. It receives some baseflow from historical streams which combine with stormwater and discharge through outfalls on the North and

West sides. The outflow from the pond forms Spot and Ell Pond Brook, which flows underground for a time and becomes the Malden River, a major tributary of the Mystic River.

- The sub-watershed is urban, with mixed residential and commercial use.
- Ell Pond is listed as impaired for pathogens on the 2008 303(d) list.
- Melrose is a NPDES Phase II community, with 100% of the population connected to the sewer system.

Figure 3.2 2009 Bacteria Source Tracking Sites in the Ell Pond Sub-watershed



Results

Table 3.3. *E. coli* Concentrations (MPN/100mL) in the Ell Pond Sub-watershed

Site ID	Type	Water Body	Town	5/21/2009	8/20/2009
EllP02p	pipe	Ell Pond	Melrose	2,489	ns
EllP02pa	manhole	Ell Pond	Melrose	1,664	ns
EllP02pb	manhole	Ell Pond	Melrose	4,884	ns
EllP02pd	manhole	Ell Pond	Melrose	4,106	ns
EllP02pe	manhole	Ell Pond	Melrose	5,247	1,616*
EllP02pf	manhole	Ell Pond	Melrose	8,664	ns
EllP02pgW	manhole	Ell Pond	Melrose	7,701	ns
EllP02pgN	manhole	Ell Pond	Melrose	933	ns
EllP02ph	manhole	Ell Pond	Melrose	12,997	ns
EllP02pi	manhole	Ell Pond	Melrose	>24,196	ns (damp)
EllP02pj	manhole	Ell Pond	Melrose	10	ns

Site ID	Type	Water Body	Town	5/21/2009	8/20/2009
EllP02pk	manhole	Ell Pond	Melrose	24,196	17,329
EllP03p	pipe	Ell Pond	Melrose	488	>24,196**
EllP03pa	manhole	Ell Pond	Melrose	ns	ns (damp)
EllP03pb	manhole	Ell Pond	Melrose	ns	19,863
EllP03pc	manhole	Ell Pond	Melrose	ns	>24,196
EllP03pdW	manhole	Ell Pond	Melrose	ns	>24,196
EllP03pdS	manhole	Ell Pond	Melrose	ns	ns (damp)
EllP03pg	manhole	Ell Pond	Melrose	ns	ns
EllP03peW	manhole	Ell Pond	Melrose	ns	<10
EllP03peN	manhole	Ell Pond	Melrose	ns	<10
EllP03pf	manhole	Ell Pond	Melrose	ns	ns (dry)
ns = not sampled, * = sample collected after blocking manhole with sandbag, ** = stagnant,					

Table 3.4 Detergents (ppm) and Ammonia (NH_3, ppm) Concentrations in the Ell Pond Sub-watershed

	5/21/2009		8/20/2009	
Site ID	**Detergents**	**NH_3**	**Detergents**	**NH_3**
EllP02p	0-0.25	0-0.25	ns	ns
EllP02pa	0-0.25	ns	ns	ns
EllP02pb	0.25	ns	ns	ns
EllP02pd	0.25	ns	ns	ns
EllP02pe	ns	ns	0.25	nd[S]
EllP02pf	0-0.25	ns	ns	ns
EllP02pgW	0.25	ns	ns	ns
EllP02pgN	0.25	ns	ns	ns
EllP02ph	0.25	ns	ns	ns
EllP02pi	[C]	ns	ns	ns
EllP02pj	0.25	ns	ns	ns
EllP02pk	0.5	0.3[S]	0-0.25	nd[S]
EllP03p	0.25	ns	ns	ns
EllP03peW	ns	ns	0-0.25	nd[S]
EllP03peN	ns	ns	0.25	0.1[S]
ns = not sampled, nd = not detected, [C] = result censored due to problems with the analytical method, [S] = sample analyzed using Hach spectrophotometer in the lab				

Significant Findings

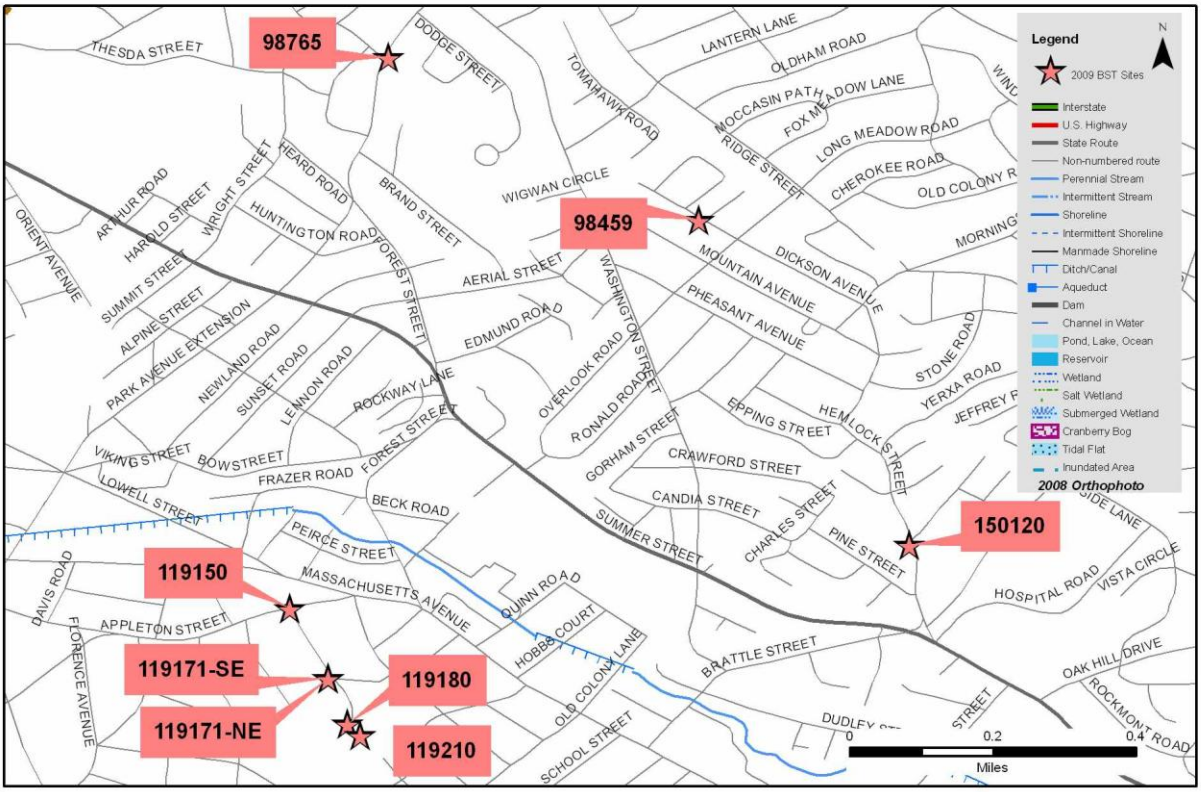
- Sampling in the Ell Pond sub-watershed was conducted in collaboration with the City of Melrose.
- In the "Melrose St" drainage (EllP02p* series), most of the wastewater contamination appears to be entering the system at the intermunicipal border with the Town of Stoneham (EllP02pk), while a smaller amount of contamination appears to enter the system in the EllP02pe branch. This data has been shared with the USEPA, which has the Town of Stoneham under an Administrative Order.
- In the "Tremont St" drainage (EllP03p* series), the wastewater contamination has been isolated to a small segment of the drain line (EllP03pdW).

- Human Marker sampling (Appendix A) indicated that there is strong evidence of a human bacteria source at the three areas described above. A fourth site (EllP03pg) located up-gradient of EllP03pdW had weak evidence (which is still a likely indicator of a human bacteria source).
- **MassDEP issued a Notice of Noncompliance (NON) to Melrose and continues to monitor progress.**

Mill Brook Manholes (Arlington)

Sampling locations were chosen in consultation with the Town of Arlington as part of a pilot project (Appendix F) to assess the effectiveness of newly designed Optical Brightener (OB) cages. The goal of the project was to assess optical brightener presence in a drainage where animals were suspected of contributing to bacteria concentrations ("Ryder St"), versus two control drainages where there were known failures in nearby sewage infrastructure ("Grove St" and "Ryder-DS").

Figure 3.5 2009 Bacteria Source Tracking Sites in the Mill Brook Sub-watershed



Results

Table 3.5 *Enterococcus* spp. (ENT, MPN/100mL), Detergents (ppm) and Ammonia (NH_3, ppm) Concentrations, and Optical Brightener (OB) Presence in Manholes in the Mill Brook Sub-watershed, April 15, 2009

Site ID	Type	Water Body	Town	ENT	Detergents	NH_3	OB
119150	manhole	Mill Brook / Ryder St drainage	Arlington	<10	0 - 0.25	nd	-
119171-SE	manhole	Mill Brook / Ryder St drainage	Arlington	<10	0 - 0.25	nd	-
119171-NE	manhole	Mill Brook / Ryder St drainage	Arlington	<10	0.25	nd	+
119180	manhole	Mill Brook / Ryder St drainage	Arlington	<10	0 - 0.25	nd	-
119210	manhole	Mill Brook / Ryder St drainage	Arlington	<10	0 - 0.25	nd	-
098765	manhole	Mill Brook / Ryder-DS drainage	Arlington	<10	0 - 0.25	nd	-
098459	manhole	Mill Brook / Ryder-DS drainage	Arlington	121	0 - 0.25	nd	-
150120	manhole	Mill Brook / Grove St drainage	Arlington	41	0 - 0.25	nd	+
nd = not detected For Optical Brighteners, - = no fluorescence, + = fluorescence present, Inc. = inconclusive							

Significant Findings

- Although *Enterococcus* spp. concentrations were very low, optical brighteners were detected in one of the study sites (119171-NE) and one of the control sites (150120).
- The results were communicated to the Town of Arlington and MassDEP recommended that the section of pipe up-gradient of 119171-NE be televised to account for tie-ins. Dye testing the middle school up-gradient of the manhole may be necessary as well.
- **MassDEP issued an NON to the Town of Arlington and continues to monitor progress on Mill Brook discharges.**

Marginal Line Manholes (Somerville)

MassDEP received data from the USEPA and Mystic River Watershed Association indicating that the outfall for the Somerville Marginal Combined Sewer Overflow Facility contained elevated *E. coli* concentrations during dry weather and low tide or outgoing tide conditions. The goal of sampling was to assess Somerville drainage outlets to the Marginal line down-gradient of the Marginal Facility (where flow is treated). Sampling locations were chosen in consultation with the Massachusetts Water Resources Authority (MWRA).

Figure 3.6 2009 Bacteria Source Tracking Sites in the Marginal Line

Results

Table 3.6 *E. coli* (EC, MPN/100mL), Detergents (ppm), and Ammonia (NH_3, ppm) Concentrations in Manholes in the Marginal Line, August 18, 2009

Site ID	Type	Water Body	Town	EC	Detergents	NH_3
MWRA230-895	manhole	Mystic River	Somerville	>24,196	1.5	5.5^S
MWRA230-1708	manhole	Mystic River	Somerville	>24,196	1.5	6.9^S
MWRA230-1982	manhole	Mystic River	Somerville	355	0.5	nd^S
MWRA230-2401	manhole	Mystic River	Somerville	>24,196	3.0	12.7^S
MWRA205AB	manhole	Mystic River	Somerville	>24,196	>3	11.2^S
nd = not detected, ^{S} = sample analyzed using Hach spectrophotometer in the lab						

Significant Findings

- Due to significant rainfall in the early part of the summer, sampling was conducted at the first dry weather opportunity, although at high tide. Flow was in the downstream direction at the most down-gradient manhole (MWRA230-895);

however, some of the other manholes contained stagnant water or flow in the wrong direction.

- Bacteria concentrations were highly elevated and wastewater screening indicators were similarly high in the main Marginal Line. The one Somerville drain inlet (MWRA230-1982) that was directly sampled had a fairly low bacteria concentration, and another inlet was dry (not listed).
- **Actions: MassDEP and EPA met with MWRA and Somerville in December 2009. MWRA will conduct followup sampling during dry weather. MassDEP will review information submitted by Somerville to investigate illegal connections in upstream areas.**

Other Cities and Town under actions by MassDEP:

Belmont: Belmont was issued an NON and continues to make progress toward identifying and eliminating illicit discharges in the Winn's Brook and Wellington Brook watersheds.

Somerville: Somerville has been issued an NON for discharges from the stormdrain system near Capen Court and from Two Penny Brook.

Cambridge: Cambridge continues to sample all storm drain outfalls on a quarterly basis.