Bacterial Assessment: Wellington Brook, Atkin's Brook, Little Pond, Winns Brook, and Alewife Brook

Hotspot Sampling Date: February 26, 2014
Report Date: April 25, 2014

Technical Report # 1404-002

Executive Summary:

The Mystic River Watershed Association conducted dry weather monitoring in the municipalities of Belmont and Cambridge on February 26, 2014. The main goal of the monitoring event was to evaluate outfalls at Wellington Brook, Atkin's Brook, Little Pond, Winns Brook, and Alewife Brook that are contributing to degraded water quality conditions.

Multiple stormwater outfalls were identified with high levels of bacteria concentrations in the discharge. Samples collected at CAMD33OF0000, BELHWY001, WEB010, and WEB013, had values of *E. coli* > 2,000 MPN/1000mL.

MassDEP Water Quality Standards for Class B water bodies are 1260 *E. coli* / 100 ml. for swimming and 235 *E. coli* / 100 ml for boating. Water quality samples were taken in accordance with the MyRWA MA-DEP approved QAPP along with accurate notes.

Citation

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Katrina Sukola, John Rolland Elliot

Lab Analysis:
EPA Region 1 Laboratory, Chelmsford MA

This report describes monitoring data collected by MyRWA under its MassDEP-approved Quality Assurance Project Plan.

This project was undertaken in connection with settlement of an enforcement action, United States v. Sterling Suffolk Racecourse LLC, taken on behalf of the U.S. Environmental Protection Agency under the Clean Water Act.

EPA Region 1 Laboratory in Chelmsford, MA conducted all laboratory sample analyses. These services were provided in-kind to this project.

This report should be cited in the literature in the following manner:

Bacterial Assessment: Wellington Brook, Atkin's Brook, Little Pond, Winns Brook, and Alewife Brook —*Technical Report 1404-002.* Mystic River Watershed Association, Arlington, MA.

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Water Quality Data

Hotspot Sampling and Results

On February 26, 2014. MyRWA conducted a dry weather sampling event along the Alewife Brook, Little River, Little Pond and Spy Pond in Arlington, Belmont, Cambridge and Somerville. During this sampling event, MyRWA collected twelve water samples and tested them for bacteria levels to identify potential sources of contamination that could affect water quality in the surface water bodies.

Elevated *E. coli* levels adversely impacting water quality were observed at four sites where measured values exceeded MassDEP Water Quality Standards for boating safety in Class B water bodies.

These includes two sites on Wellington Brook, WEB010 (*E. coli* levels of 2,747 MPN/1000mL) and WEB013 (*E. coli* levels of 7,945 MPN/1000mL). WEB013 had the highest measured value of the surveyed sites.

Two other sites showed *E. coli* values higher than 2,000 MPN/1000mL: CAMD33OF0000 (*E. coli* levels of 2747 MPN/1000mL) in Cambridge and BELHWY001 (*E. coli* levels of 2190 MPN/1000mL).

Conclusions and Action items:

1) A meeting should be facilitated among the Town of Belmont and City of Cambridge to discuss resolution of contamination at CAMD33OF0000. This is a drainage area with contributions from the Town of Belmont

2) Town of Belmont will need to continue efforts to resolve bacteria contamination issues in Wellington Brook.

MyRWA 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 Enterolert method for enumerating the most probable number (MPN) 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). Detergent data was collected using the CHEMetrics Detergents Kit utilizing the Methylene Blue method for analysis.

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 January 2011).

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 ≤ 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 Access 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. 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.

Location	Belmont, Cambridge
Water Bodie(s)	Wellington Brook, Atkin's Brook, Little Pond, Winns Brook, Alewife Brook
Hot Spot Sample Date	2/26/2014
Rain Events (past 48 hours)	Dry (0.0" 48 hr prior to sampling)
Monitor(s)	Katrina Sukola, John Rolland Elliot
Lab	EPA Region 1 - Chelmsford

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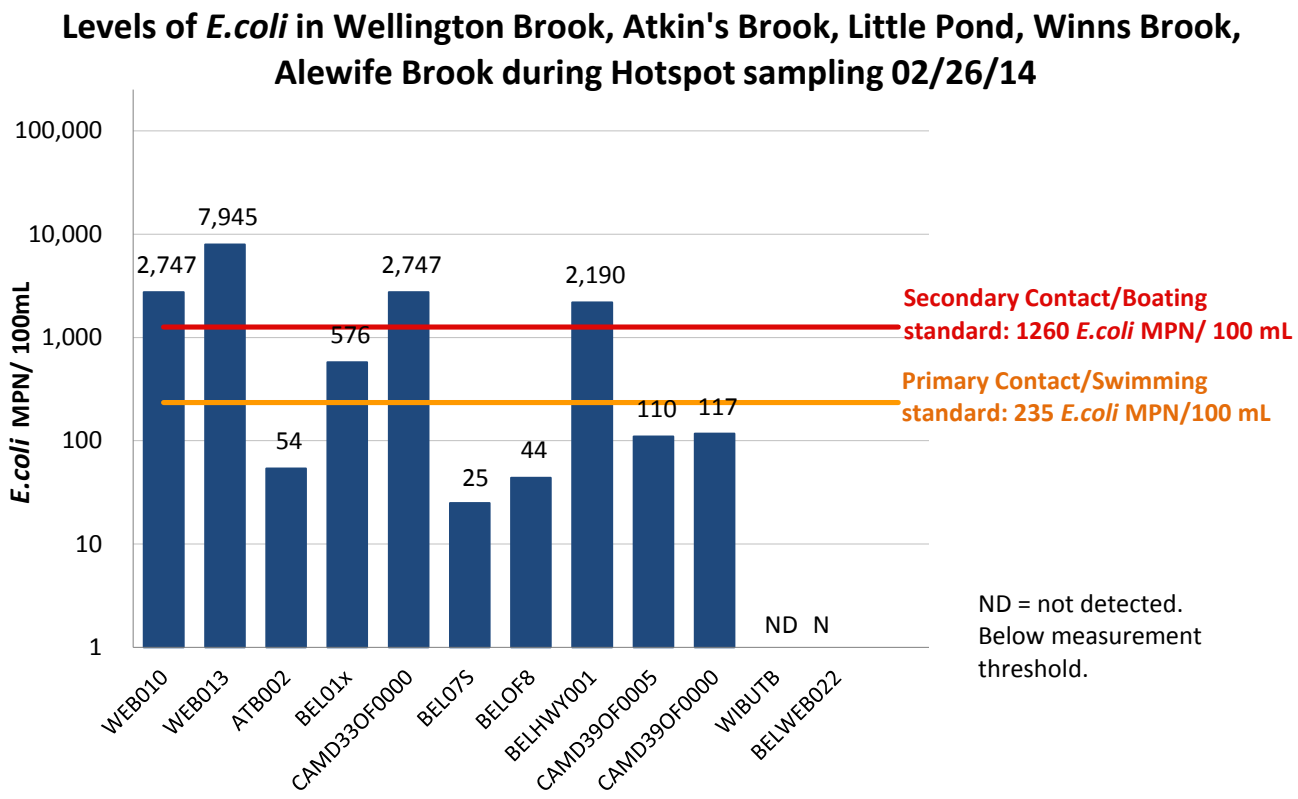

Figure 1. Bacteria counts from samples collected by MyRWA on 02/26/2014 during Hotspot sampling event. **Four** of twelve samples exceeded water quality standards for secondary contact/boating in a Class B water body (1260 MPN/100mL). See maps and site descriptions for information on sampling locations.

Location	Belmont, Cambridge
Water Bodies	Wellington Brook, Atkin's Brook, Little Pond, Winns Brook, Alewife Brook
Hot Spot Sample Date	2/26/2014
Rain Events (past 48 hours)	Dry (0.0" 48 hr prior to sampling)
Monitor(s)	Katrina Sukola, John Rolland Elliot
Lab	EPA Region 1 - Chelmsford

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Table 1. Data collected from sampling sites

Sample #	Site ID	E.coli (MPN/ 100mL)	H2O Temp (C°)	DO (mg/l)	Sp. Cond. (µs/cm)	Salinity (ppt)	Surfacants* (mg/L)	Ammonia (mg/L)	Time	Type	Comments
290	WEB010	2,747	5	11.9	2384	1.2	0.325	0	7:47	Centerline	
291	WEB013	7,945	7	10.69	2058	1.1	0.25	0.25	8:08	Centerline	
292	ATB002	54	1	12.8	1415	0.7			8:28	Centerline	
293	BEL01x	576	2	10.4	1598	0.8			8:56	Outfall	
294	CAMD33OF0000	2,747	6	9.7	1905	1.0	0.25	0.25	9:12	Outfall	
295	BEL07S	25	3	10.0	2809	1.4	0.25	0.25	9:28	Outfall	
296	BELOF8	44	4	10.2	2884	1.5	0	0	9:42	Outfall	
297	BELHWY001	2,190							10:05	Outfall	
298	CAMD39OF0005	110	5	11.2	3244	1.7			10:25	Outfall	
299	CAMD39OF0000	117							10:30	Outfall	
300	WIBUTB	ND	2.205	12.5	1263	0.6	0.325	0	11:05	Outfall	
301	BELWEB022	ND	9.297	8.8	4429	2.4	0.625	0	11:40	Outfall	Suspended material, orange precipitate in area, sampled from seep
	Dry Pipes										
	BELHWYUNK									Outfall	Not flow on sampling day, but flowing when visted the previous week

* Surfactants measured using Chemetrics Test Kit

Data Entry:	AJH
Data QA:	PMH

Primary Contact/Swimming standard: 235 *E.coli* MPN/ 100 ml
Secondary Contact/Boating standard: 1260 *E.coli* MPN/ 100 mL

Table 2. Sampling locations

Sample	Site	Town	Water Body	Latitude	Longitude	Directions
290	WEB010	Belmont	Wellington Brook	42.3943	-71.1720	Sampled on east side of library before brook goes underground
291	WEB013	Belmont	Wellington Brook	42.3952	-71.1763	Sampled from brige where brook emerges from underground
292	ATB002	Belmont	Atkin's Brook	42.4005	-71.1805	Atkins Brook at Somerset St (near Shady Brook Lane)
293	BEL01x	Belmont	Little Pond	42.3983	-71.1593	Drain to Pond in wooded area
294	CAMD33OF0000	Cambridge	Wellington Brook	42.3945	-71.1583	Rectangular (south) outfall where Brook emerges from Blanchard Rd/Brighton St
295	BEL07S	Belmont	Wellington Brook	42.3945	-71.1583	Middle of two circular pipes where Brook emerges from Blanchard Rd/Brighton St
296	BELOF8	Belmont	Wellington Brook	42.3945	-71.1584	North of two circular pipes where Brook emerges from Blanchard Rd/Brighton St
297	BELHWY001	Belmont	Little Pond	42.4021	-71.1577	Outfall near Lake St and Acorn Park Dr
298	CAMD39OF0005	Cambridge	Alewife Brook	42.3965	-71.1435	Outfall under bike path bridge, west side of Access Rd
299	CAMD39OF0000	Cambridge	Alewife Brook	42.3967	-71.1426	Outfall to pond on west side of Alewife T station
300	WIBUTB	Belmont	Winns Brook	42.4040	-71.1767	Where Brook emerges at intersection of Clifton and Prospect St
301	BELWEB022	Belmont	Wellington Brook	42.3915	-71.1895	Accessed from McLean Hospital on Olmsted Dr

Maps of sampling locations:

Blue labels = water quality standards met (*E.coli* concentrations < 235 cfu / 100 mL)
Yellow labels = primary contact / swimming standards not met (*E.coli* between 235 - 1260 cfu / 100 mL)
Red labels = secondary contact / boating standards not met (*E.coli* > 1260 cfu / 100 mL)

Map 1. Sampling locations WEB010 and WEB013, Wellington Brook, off Concord Avenue and Common Street.

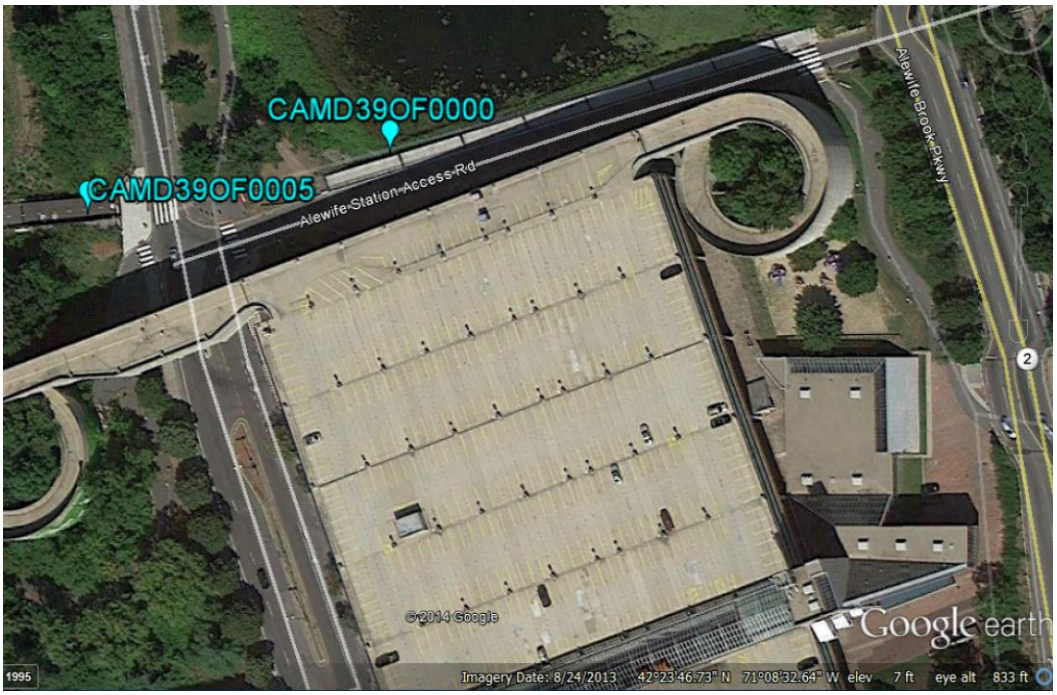
Map 2. Sampling location ATB002, near the intersection of Somerset St. and Shady Brook Lane in Belmont.

Blue labels = water quality standards met (*E.coli* concentrations < 235 cfu / 100 mL)
Yellow labels = primary contact / swimming standards not met (*E.coli* between 235 - 1260 cfu / 100 mL)
Red labels = secondary contact / boating standards not met (*E.coli* > 1260 cfu / 100 mL)

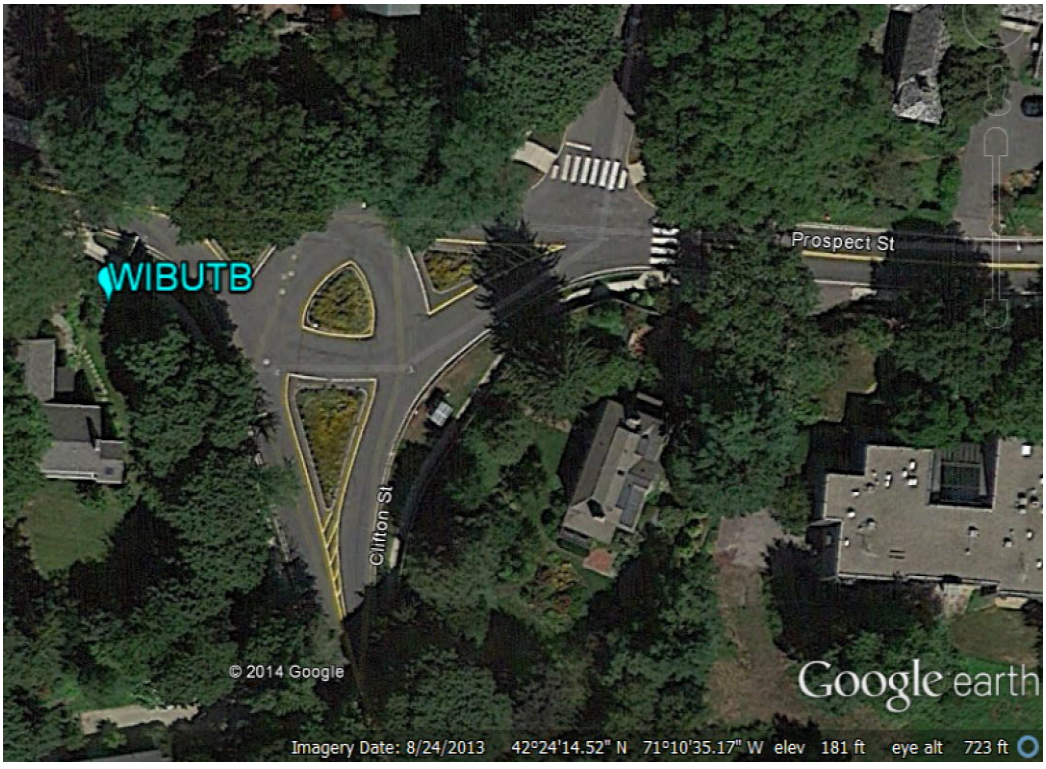
Map 3.. Sampling locations BELHWY001 and BEL01x, near Little Pond in Belmont.

Map 4.. Sampling locations CAMD33OF0000, BELOF7S, and BELOF8.

Blue labels = water quality standards met (*E.coli* concentrations < 235 cfu / 100 mL)
Yellow labels = primary contact / swimming standards not met (*E.coli* between 235 - 1260 cfu / 100 mL)
Red labels = secondary contact / boating standards not met (*E.coli* > 1260 cfu / 100 mL)



Map 5.. Sampling locations CAMD390F0000 and CAMD390F0005, near Alewife Station Access Road.

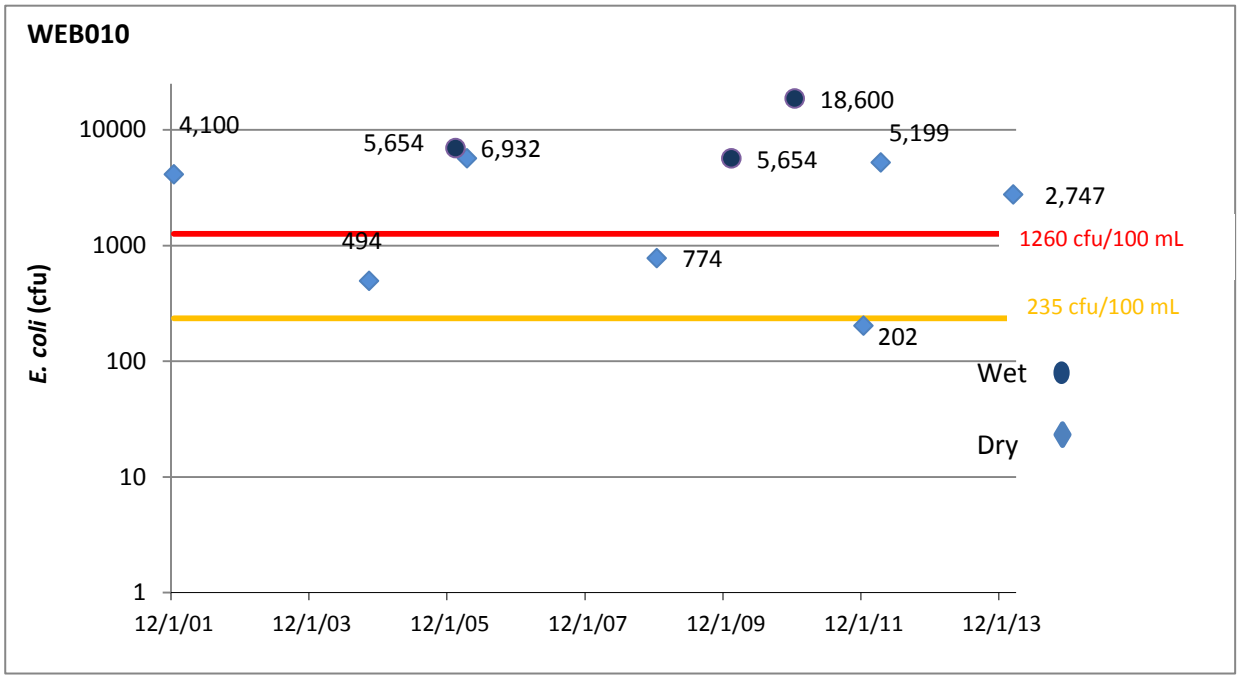


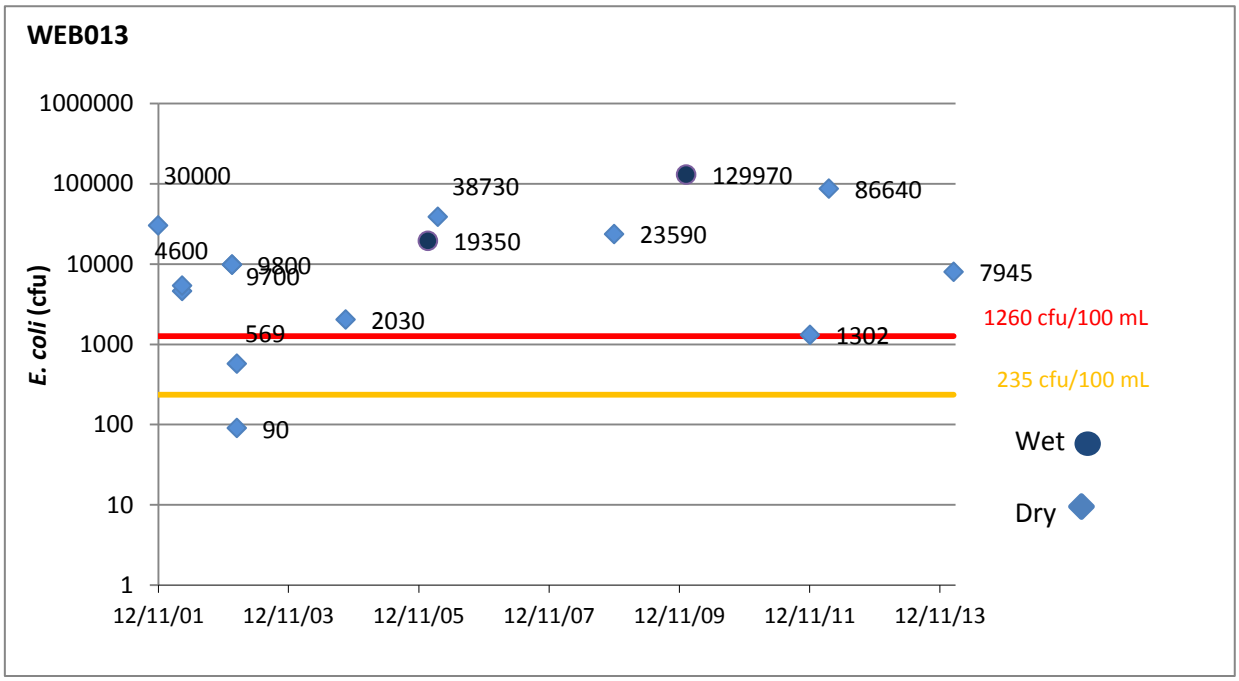
Map 6.. Sampling location WIBUTB near the intersection of Clifton St. and Prospect in Belmont.

Map 7.. Sampling location BELWEB022 off Olmstead Drive.

Table 3. Archive Data

The graphs presented below display the record of bacteria sampling performed by MyRWA.
All bacteria data presented is *e. coli* MPN/100 ml. Data was collected during wet and dry weather.
Note: Bacteria counts are plotted logarithmically.





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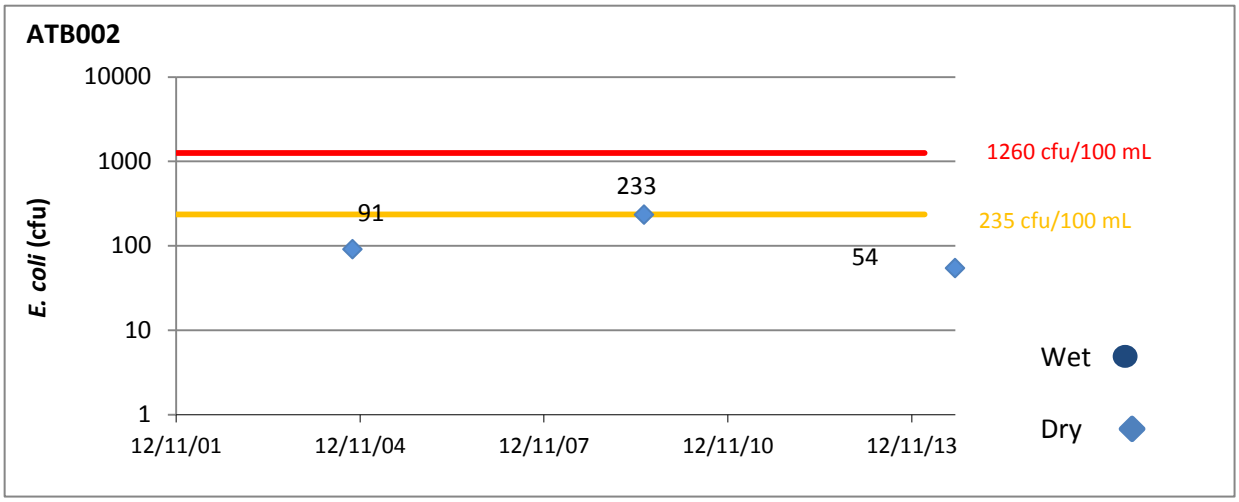
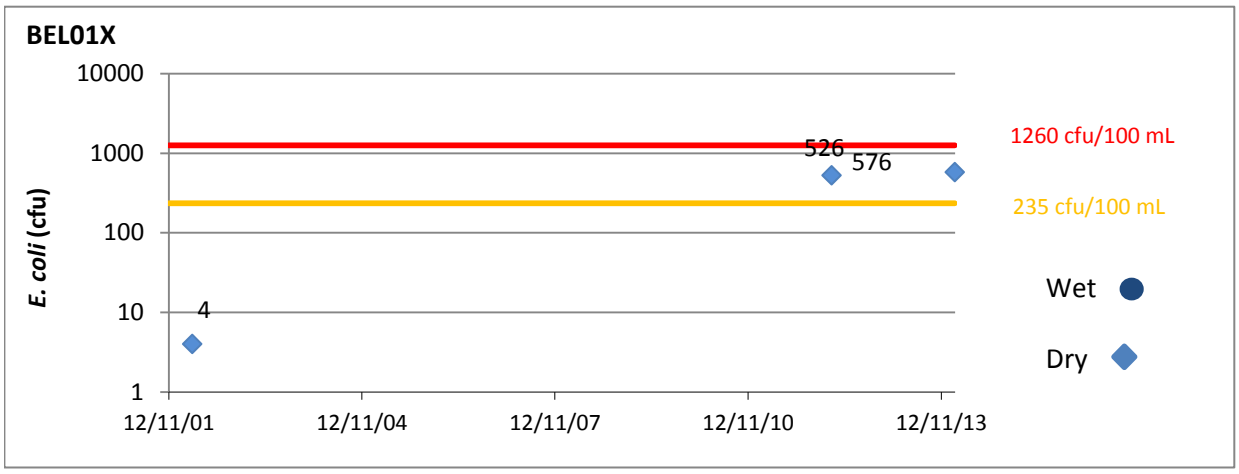

ATB002
10000
1000
100
10
1
E. coli (cfu)
91
233
54
1260 cfu/100 mL
235 cfu/100 mL
Wet
Dry
12/11/01
12/11/04
12/11/07
12/11/10
12/11/13


BEL01X
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1000
100
10
1
E. coli (cfu)
4
526
576
1260 cfu/100 mL
235 cfu/100 mL
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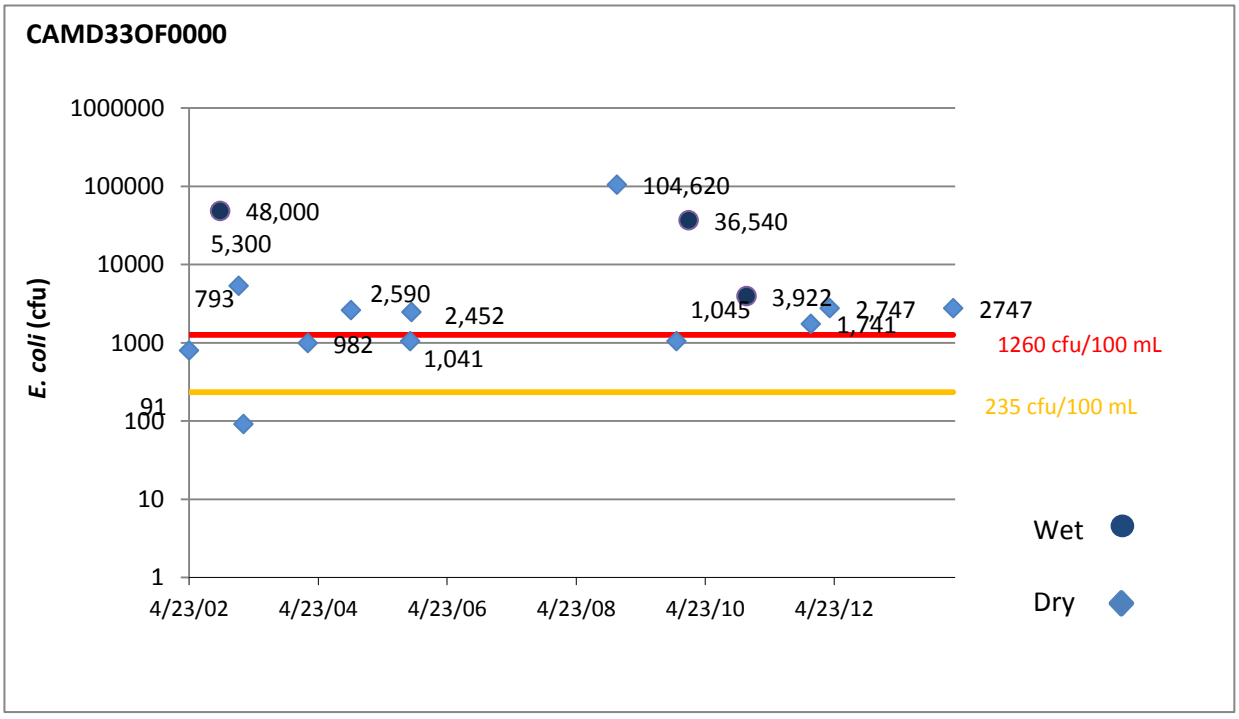
12/11/07
12/11/10
12/11/13

15


CAMD33OF0000
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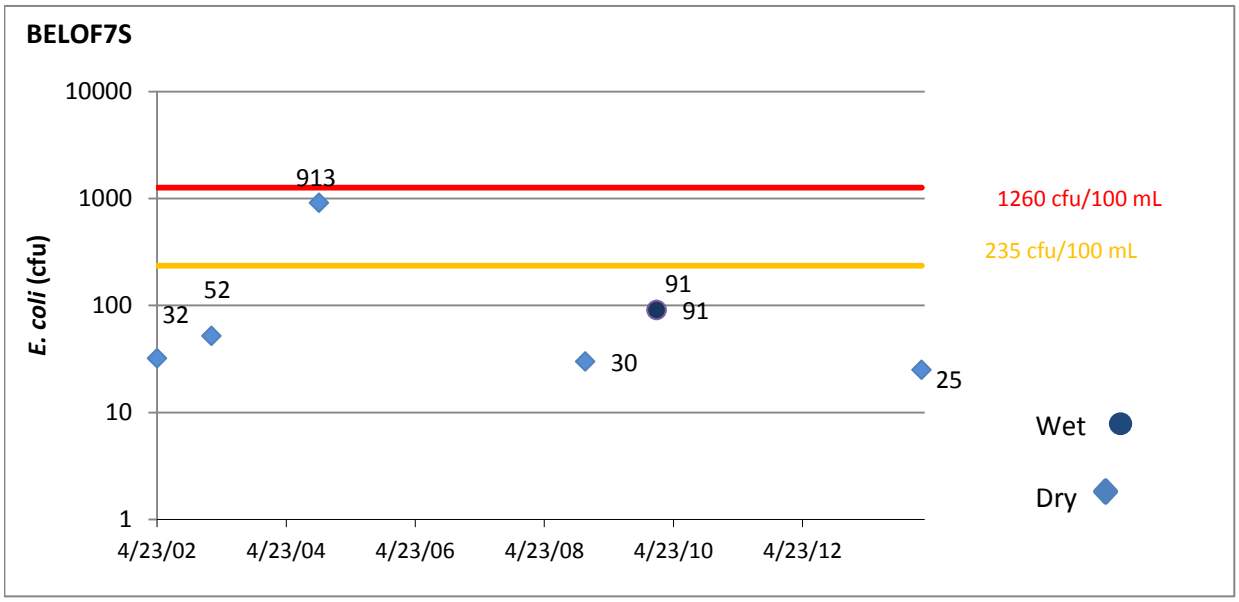
100000
10000
1000
100
10
1
E. coli (cfu)
48,000
5,300
104,620
36,540
793
2,590
2,452
982
1,041
1,045
3,922
2,747
1,741
2747
1260 cfu/100 mL
91
235 cfu/100 mL
Wet
Dry
4/23/02
4/23/04
4/23/06
4/23/08
4/23/10
4/23/12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1000
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10
1
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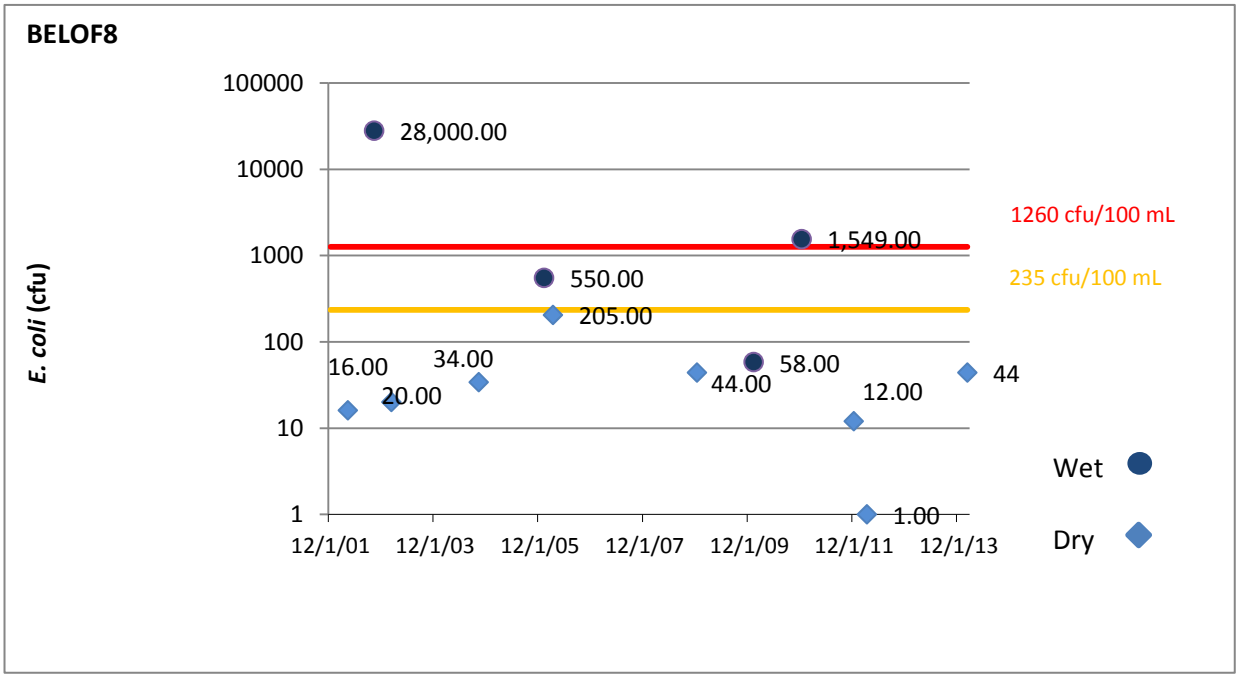
4/23/04
4/23/06
4/23/08
4/23/10
4/23/12
913
52
32
91
91
30
25
1260 cfu/100 mL
235 cfu/100 mL
Wet
Dry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100
10
1
12/1/01
12/1/03
12/1/05
12/1/07
12/1/09
12/1/11
12/1/13
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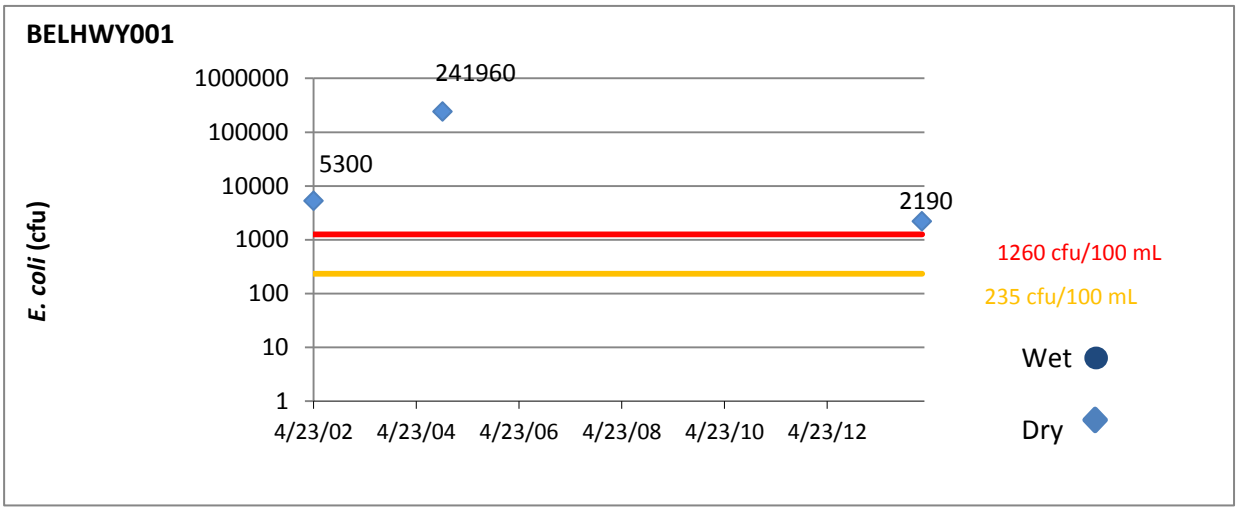
1,549.00
550.00
205.00
16.00
34.00
20.00
58.00
44.00
12.00
44
1.00
1260 cfu/100 mL
235 cfu/100 mL
Wet
Dry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1000
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5300
2190
4/23/02
4/23/04
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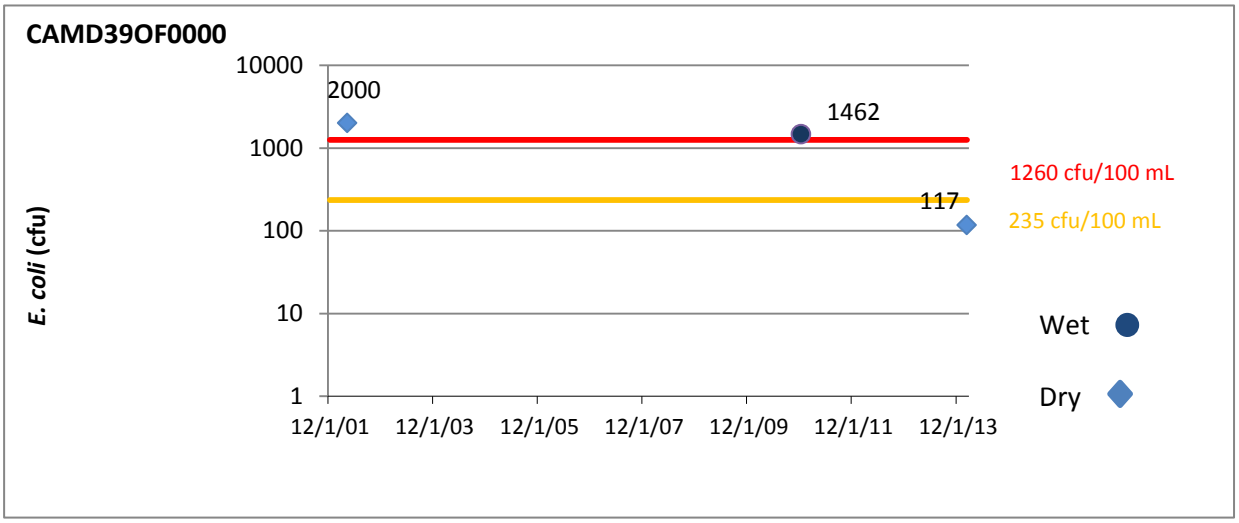
4/23/08
4/23/10
4/23/12
1260 cfu/100 mL
235 cfu/100 mL
Wet
Dry


CAMD39OF0000
E. coli (cfu)
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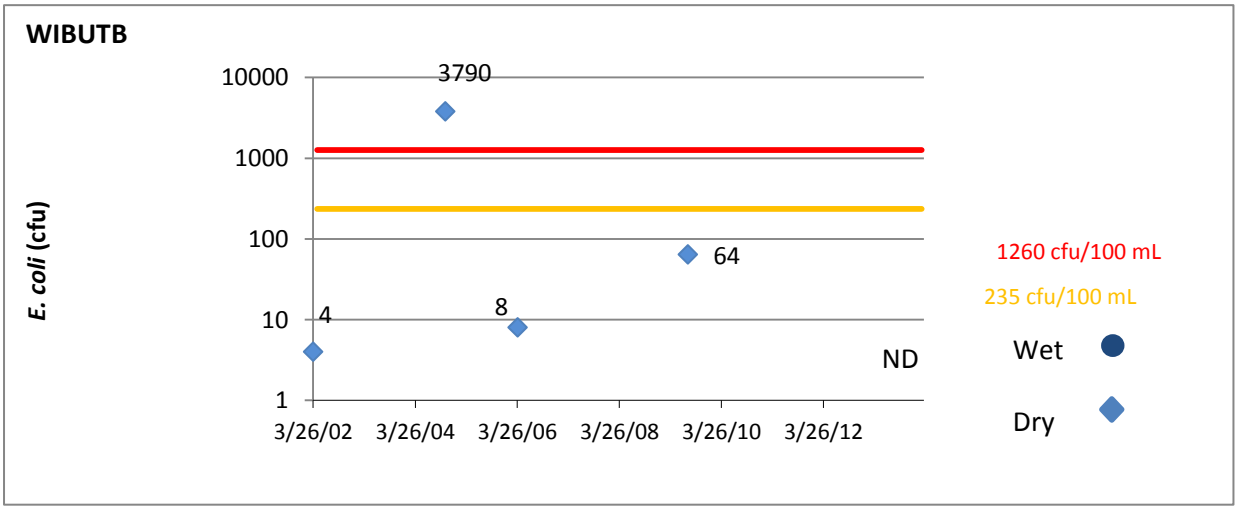
1000
100
10
1
2000
1462
117
12/1/01
12/1/03
12/1/05
12/1/07
12/1/09
12/1/11
12/1/13
1260 cfu/100 mL
235 cfu/100 mL
Wet
Dry


WIBUTB
E. coli (cfu)
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100
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1
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8
4
ND
3/26/02
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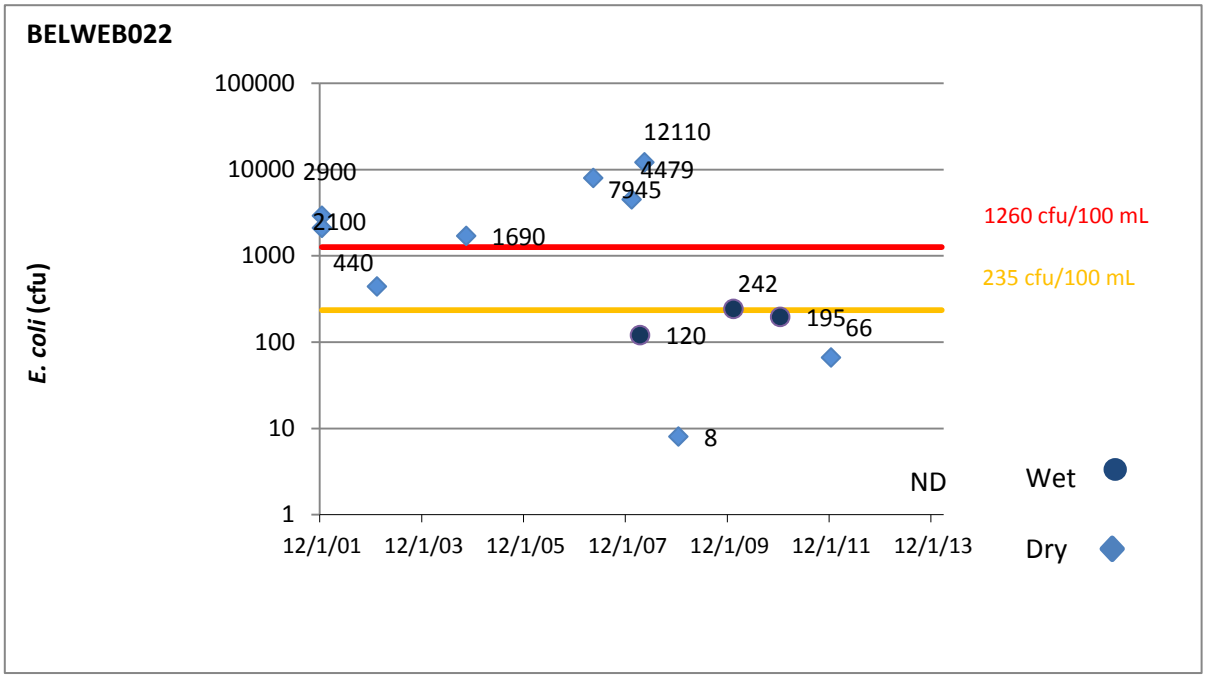
3/26/12
1260 cfu/100 mL
235 cfu/100 mL
Wet
Dry



Note: There was not historical sampling data for CAMD39OF0005