

4. **Article Two, B.5- Water Quality Monitoring (“WQM”) Plan – Report on whether any of the semi-annual (or annual) WQM required under Article Two, B.5, was conducted during the quarter, and if so, in which sewer basins, and report the results of that monitoring (both BST and fecal coliform) for each such sewer basin.**

The 2013 annual round of water quality monitoring was conducted on March 28, 2013. All 26 of the sewer basins were sampled (semi-annual and annual). Human source fecal bacteria were identified by library-based Polymerase Chain Reaction (PCR) testing in one or more samples from fifteen sewer basins; however, human sources were confirmed in only twelve of these basins using an independent verification test as discussed below.

As part of continuing re-evaluation of the Water Quality Monitoring Plan and of the methodologies used, the Virginia Tech laboratory that provides the bacterial source tracking (BST) testing services now conducts a verification test for human bacterial sources using a library-independent analytical method (Human Bacteroides HF183) on all samples. These results are presented below.

The 2013 semi-annual round of water quality sampling is planned for September, and results will be reported in the Fourth Quarter of 2013.

Basins Subject to Semi-Annual Monitoring and Reporting Requirements:

a. Broad Creek-

Fecal Bacteria Results:

BST Results:

(*Enterococcus* CFU/100ml)

BRC001 – downstream (Henson Creek)	Human Bacteroides HF183: Negative BOX-PCR Source Determination: Too few bacteria for BOX-PCR	<10
BRC002 – upstream (Henson Creek)	Human Bacteroides HF183: Negative BOX-PCR Source Determination: Human – 0% Avian – 39% Canine – 6% Deer – 8% Horse – 0% Misc. Wildlife – 26% Non-human Unknown – 21%	42

b. Cabin John-

Fecal Bacteria Results:

BST Results:

(*Enterococcus* CFU/100ml)

CBJ001 – downstream	Human Bacteroides HF183: Negative BOX-PCR Source Determination: Human – 2% Avian – 36% Canine – 9% Deer – 13% Horse – 0% Misc. Wildlife – 23% Non-human Unknown – 17%	22
CBJ002 – upstream	Human Bacteroides HF183: Negative BOX-PCR Source Determination: Too few bacteria for BOX-PCR	<10

c. Horsepen-

Fecal Bacteria Results:

BST Results:

(*Enterococcus* CFU/100ml)

HSP001 – downstream	Human Bacteroides HF183: Negative BOX-PCR Source Determination: Human – 3% Avian – 40% Canine – 6% Deer – 9% Horse – 13% Misc. Wildlife – 17% Non-human Unknown – 12%	53
HSP002 – upstream	Human Bacteroides HF183: Negative BOX-PCR Source Determination:	<10

	Too few bacteria for BOX-PCR	
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d. Indian Creek- **Fecal Bacteria Results:**
(*Enterococcus* CFU/100ml)

	BST Results:	
INC001 – downstream	Human Bacteroides HF183: Too few bacteria for HF183 BOX-PCR Source Determination: Too few bacteria for BOX-PCR	<10
INC002 – upstream	Human Bacteroides HF183: Too few bacteria for HF183 (Too few bacteria for HF183) BOX-PCR Source Determination: Too few bacteria for BOX-PCR (Too few bacteria for BOX-PCR)	<10 (<10)

Note: Values in parentheses for station INC002 are for field duplicate sample.

e. Little Falls- **Fecal Bacteria Results:**
(*Enterococcus* CFU/100ml)

	BST Results:	
LFS001 – downstream	Human Bacteroides HF183: Positive BOX-PCR Source Determination: Human – 17% Avian – 39% Canine – 6% Deer – 9% Horse – 0% Misc. Wildlife – 18% Non-human Unknown – 11%	215
LFS002 – upstream	Human Bacteroides HF183: Positive BOX-PCR Source Determination: Human – 6% Avian – 44% Canine – 7% Deer – 13% Horse – 0% Misc. Wildlife – 17% Non-human Unknown – 13%	35

f. Lower Anacostia- **Fecal Bacteria Results:**
(*Enterococcus* CFU/100ml)

	BST Results:	
ANA001 – downstream	Human Bacteroides HF183: Positive BOX-PCR Source Determination: Human – 9% Avian – 41% Canine – 13% Deer – 6%	462

	Horse – 0% Misc. Wildlife – 16% Non-human Unknown – 15%	
ANA002 – upstream	Human Bacteroides HF183: Positive BOX-PCR Source Determination: Human – 16% Avian – 43% Canine – 11% Deer – 3% Horse – 0% Misc. Wildlife – 15% Non-human Unknown – 12%	1,077

g. Lower Beaverdam Creek- Fecal Bacteria Results:
BST Results: (Enterococcus CFU/100ml)

LBD001 – downstream	Human Bacteroides HF183: Positive (Positive) BOX-PCR Source Determination: Human – 13 (14)% Avian – 43 (41)% Canine – 8 (9)% Deer – 7 (7)% Horse – 0 (0)% Misc. Wildlife – 15 (16)% Non-human Unknown – 14 (13)%	183 (210)
LBD002 – upstream	Human Bacteroides HF183: Positive BOX-PCR Source Determination: Human – 9% Avian – 38% Canine – 5% Deer – 9% Horse – 0% Misc. Wildlife – 22% Non-human Unknown – 17%	81

Note: Values in parentheses for station LBD001 are for field duplicate sample.

h. Muddy Branch- Fecal Bacteria Results:
BST Results: (Enterococcus CFU/100ml)

MDB001 – downstream	Human Bacteroides HF183: Negative BOX-PCR Source Determination: Too few bacteria for BOX-PCR	<10
MDB002 – upstream	Human Bacteroides HF183: Too few bacteria for HF183 BOX-PCR Source Determination: Too few bacteria for BOX-PCR	<10

i. Northeast Branch-		Fecal Bacteria Results: (<i>Enterococcus</i> CFU/100ml)
BST Results:		
NEB001 – upstream	Human Bacteroides HF183: Negative BOX-PCR Source Determination: Human – 0% Avian – 36% Canine – 7% Deer – 11% Horse – 0% Misc. Wildlife – 28% Non-human Unknown – 18%	18
NEB002 – downstream	Human Bacteroides HF183: Positive BOX-PCR Source Determination: Human – 7% Avian – 30% Canine – 8% Deer – 12% Horse – 0% Misc. Wildlife – 26% Non-human Unknown – 17%	57

j. Northwest Branch-		Fecal Bacteria Results: (<i>Enterococcus</i> CFU/100ml)
BST Results:		
NWA001 – downstream	Human Bacteroides HF183: Positive BOX-PCR Source Determination: Human – 19% Avian – 29% Canine – 6% Deer – 14% Horse – 0% Misc. Wildlife – 21% Non-human Unknown – 11%	2,725
NWA002 – upstream	Human Bacteroides HF183: Positive BOX-PCR Source Determination: Human – 9% Avian – 35% Canine – 8% Deer – 9% Horse – 0% Misc. Wildlife – 26% Non-human Unknown – 13%	15

k. Oxon Run-	BST Results:	Fecal Bacteria Results: (<i>Enterococcus</i> CFU/100ml)
OXN001 – downstream	Human Bacteroides HF183: Negative BOX-PCR Source Determination: Too few bacteria for BOX-PCR	<10
OXN002 – upstream (Watts Branch)	Human Bacteroides HF183: Positive BOX-PCR Source Determination: Human – 7% Avian – 41% Canine – 13% Deer – 9% Horse – 0% Misc. Wildlife – 11% Non-human Unknown – 19%	40

l. Paint Branch-	BST Results:	Fecal Bacteria Results: (<i>Enterococcus</i> CFU/100ml)
PNT001 – downstream	Human Bacteroides HF183: Too few bacteria for HF183 BOX-PCR Source Determination: Too few bacteria for BOX-PCR	<10
PNT002 – upstream	Human Bacteroides HF183: Too few bacteria for HF183 BOX-PCR Source Determination: Too few bacteria for BOX-PCR	<10

m. Parkway-	BST Results:	Fecal Bacteria Results: (<i>Enterococcus</i> CFU/100ml)
PKY001 – downstream (Bear Branch)	Human Bacteroides HF183: Negative BOX-PCR Source Determination: Human – 5% Avian – 37% Canine – 9% Deer – 12% Horse – 0% Misc. Wildlife – 22% Non-human Unknown – 15%	20
PKY002 – upstream (Walker Branch)	Human Bacteroides HF183: Positive BOX-PCR Source Determination: Human – 8% Avian – 33% Canine – 12% Deer – 8% Horse – 0% Misc. Wildlife – 23%	37

	Non-human Unknown – 16%	
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n. Piscataway-

	BST Results:	Fecal Bacteria Results: (<i>Enterococcus</i> CFU/100ml)
PSW001 – downstream	Human Bacteroides HF183: Negative (Negative) BOX-PCR Source Determination: Human – 0 (0)% Avian – 38 (39)% Canine – 10 (11)% Deer – 9 (9)% Horse – 0 (0)% Misc. Wildlife – 23 (22)% Non-human Unknown – 20 (19)%	18 (33)
PSW002 – upstream	Human Bacteroides HF183: Too few bacteria for HF183 BOX-PCR Source Determination: Too few bacteria for BOX-PCR	<10

Note: Values in parentheses for station PSW001 are for field duplicate sample.

o. Rock Creek-

	BST Results:	Fecal Bacteria Results: (<i>Enterococcus</i> CFU/100ml)
RKC001 – downstream	Human Bacteroides HF183: Positive BOX-PCR Source Determination: Human – 9% Avian – 34% Canine – 13% Deer – 9% Horse – 5% Misc. Wildlife – 14% Non-human Unknown – 16%	45
RKC002 – upstream	Human Bacteroides HF183: Too few bacteria for HF183 BOX-PCR Source Determination: Too few bacteria for BOX-PCR	<10

p. Seneca Creek-

	BST Results:	Fecal Bacteria Results: (<i>Enterococcus</i> CFU/100ml)
SNC001 – downstream	Human Bacteroides HF183: Too few bacteria for HF183 BOX-PCR Source Determination: Too few bacteria for BOX-PCR	<10
SNC002 – upstream	Human Bacteroides HF183: Too few bacteria for HF183 BOX-PCR Source Determination:	<10

	Too few bacteria for BOX-PCR	
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q. Sligo Creek- Fecal Bacteria Results:
BST Results: (Enterococcus CFU/100ml)

SLC001 – downstream	Human Bacteroides HF183: Positive BOX-PCR Source Determination: Human – 11% Avian – 31% Canine – 16% Deer – 9% Horse – 0% Misc. Wildlife – 21% Non-human Unknown – 12%	31
SLC002 – upstream	Human Bacteroides HF183: Negative BOX-PCR Source Determination: Human – 3% Avian – 37% Canine – 13% Deer – 11% Horse – 0% Misc. Wildlife – 23% Non-human Unknown – 13%	18

r. Upper Beaverdam Creek- Fecal Bacteria Results:
BST Results: (Enterococcus CFU/100ml)

UBD001 – downstream	Human Bacteroides HF183: Negative BOX-PCR Source Determination: Too few bacteria for BOX-PCR	<10
UBD002 – upstream	Human Bacteroides HF183: Positive BOX-PCR Source Determination: Human – 6% Avian – 29% Canine – 8% Deer – 10% Horse – 0% Misc. Wildlife – 21% Non-human Unknown – 26%	13

s. Watts Branch- Fecal Bacteria Results:
BST Results: (Enterococcus CFU/100ml)

WTB001 – downstream	Human Bacteroides HF183: Negative BOX-PCR Source Determination: Too few bacteria for BOX-PCR	<10
WTB002 – upstream	Human Bacteroides HF183: Positive BOX-PCR Source Determination:	23

	<p>Human – 7% Avian – 36% Canine – 6% Deer – 13% Horse – 0% Misc. Wildlife – 18% Non-human Unknown – 20%</p>	
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t. Western Branch-

Fecal Bacteria Results:

BST Results:

(*Enterococcus* CFU/100ml)

WNB001 – downstream	<p>Human Bacteroides HF183: Positive BOX-PCR Source Determination: Human – 9% Avian – 41% Canine – 9% Deer – 11% Horse – 0% Misc. Wildlife – 17% Non-human Unknown – 13%</p>	35
WNB002 – upstream	<p>Human Bacteroides HF183: Positive BOX-PCR Source Determination: Human – 11% Avian – 39% Canine – 7% Deer – 10% Horse – 0% Misc. Wildlife – 23% Non-human Unknown – 10%</p>	31

Basins Subject to Annual Monitoring and Reporting Requirements-

a. Dulles Interceptor-

Fecal Bacteria Results:

BST Results:

(*Enterococcus* CFU/100ml)

DSI001	<p>Human Bacteroides HF183: Negative BOX-PCR Source Determination: Human – 0% Avian – 47% Canine – 8% Deer – 12% Horse – 0% Misc. Wildlife – 19% Non-human Unknown – 14%</p>	12
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b. Mattawoman-		Fecal Bacteria Results: (<i>Enterococcus</i> CFU/100ml)
BST Results:		
MTW001	Human Bacteroides HF183: Negative BOX-PCR Source Determination: Human – 0% Avian – 43% Canine – 5% Deer – 13% Horse – 0% Misc. Wildlife – 26% Non-human Unknown – 13%	52

c. Monacacy-		Fecal Bacteria Results: (<i>Enterococcus</i> CFU/100ml)
BST Results:		
MCY001	Human Bacteroides HF183: Negative BOX-PCR Source Determination: Too few bacteria for BOX-PCR	<10

d. Patuxent Center-		Fecal Bacteria Results: (<i>Enterococcus</i> CFU/100ml)
BST Results:		
PTC001 (Mill Branch)	Human Bacteroides HF183: Negative (Negative) BOX-PCR Source Determination: Too few bacteria for BOX-PCR (Too few bacteria for BOX-PCR)	<10 (<10)

Note: Values in parentheses for station PTC001 are for field duplicate sample.

e. Patuxent North-		Fecal Bacteria Results: (<i>Enterococcus</i> CFU/100ml)
BST Results:		
PTN001 (Hawlings River)	Human Bacteroides HF183: Negative (Too few bacteria for HF183) BOX-PCR Source Determination: Human – 5 (NA)% Avian – 34 (NA)% Canine – 8 (NA)% Deer – 11 (NA)% Horse – 6 (NA)% Misc. Wildlife – 17 (NA)% Non-human Unknown – 19 (NA)%	25 (<10)

Note: Values in parentheses for station PTN001 are for field duplicate sample.

NA: Too few bacteria for BOX-PCR source determination in duplicate sample.

f. Rock Run-	BST Results:	Fecal Bacteria Results: (<i>Enterococcus</i> CFU/100ml)
RCM001	Human Bacteroides HF183: Too few bacteria for HF183 BOX-PCR Source Determination: Too few bacteria for BOX-PCR	<10