**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 2012 annual round of water quality monitoring was conducted on April 4, 2012. 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 seventeen sewer basins; however, human sources were confirmed in only eleven 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 library-independent verification test for human bacterial sources using a quantitative PCR (qPCR) analytical method on all samples. These results are presented below.

The 2012 semi-annual round of water quality sampling is planned for September, and results will be reported in the Fourth Quarter of 2012.

**Basins Subject to Semi-Annual Monitoring and Reporting Requirements:**

**a. Broad Creek-**

| | **BST Results:** | **Fecal Bacteria Results:** (*Enterococcus* CFU/100ml) |
|---|---|---|
| BRC001 – downstream (Henson Creek) | **Human – 8%** **(qPCR <u>Negative</u> for human)** Avian – 41% Canine – 7% Deer – 11% Horse – 0% Misc. Wildlife – 19% Non-human Unknown – 14% | 272 |
| BRC002 – upstream (Henson Creek) | **Human – 11%** **(qPCR <u>Negative</u> for human)** Avian – 43% Canine – 8% Deer – 8% Horse – 0% Misc. Wildlife – 12% Non-human Unknown – 18% | 30 |

**b. Cabin John-**

| | **BST Results:** | **Fecal Bacteria Results:** (*Enterococcus* CFU/100ml) |
|---|---|---|
| CBJ001 – downstream | **Human – 21%** **(qPCR <u>Positive</u> for human)** Avian – 32% Canine – 6% Deer – 6% Horse – 3% Misc. Wildlife – 20% Non-human Unknown – 12% | 43 |
| CBJ002 – upstream | Too few bacteria for BST source determination | <10 |

**c. Horsepen-**

| | **BST Results:** | **Fecal Bacteria Results:** (*Enterococcus* CFU/100ml) |
|---|---|---|
| HSP001 – downstream | **Human – 22%** **(qPCR <u>Positive</u> for human)** Avian – 31% Canine – 8% Deer – 9% Horse – 10% Misc. Wildlife – 13% Non-human Unknown – 7% | 290 |

| | | |
|---|---|---|
| HSP002 – upstream | **Human – 6%**<br>**(qPCR <u>Negative</u> for human)**<br>Avian – 29%<br>Canine – 9%<br>Deer – 12%<br>Horse – 17%<br>Misc. Wildlife – 16%<br>Non-human Unknown – 11% | 57 |

**d. Indian Creek-**

| **BST Results:** | | **Fecal Bacteria Results:** (*Enterococcus* CFU/100ml) |
|---|---|---|
| INC001 – downstream | **Human – 9%**<br>**(qPCR <u>Negative</u> for human)**<br>Avian – 38%<br>Canine – 7%<br>Deer – 8%<br>Horse – 14%<br>Misc. Wildlife – 10%<br>Non-human Unknown – 14% | 28 |
| INC002 – upstream | **Human – 0%**<br>**(qPCR <u>Negative</u> for human)**<br>Avian – 35%<br>Canine – 9%<br>Deer – 14%<br>Horse – 17%<br>Misc. Wildlife – 12%<br>Non-human Unknown – 13% | 33 |

**e. Little Falls-**

| **BST Results:** | | **Fecal Bacteria Results:** (*Enterococcus* CFU/100ml) |
|---|---|---|
| LFS001 – downstream | **Human – 14%**<br>**(qPCR <u>Negative</u> for human)**<br>Avian – 30%<br>Canine – 8%<br>Deer – 12%<br>Horse – 1%<br>Misc. Wildlife – 27%<br>Non-human Unknown – 8% | 195 |
| LFS002 – upstream | **Human – 20%**<br>**(qPCR <u>Positive</u> for human)**<br>Avian – 33%<br>Canine – 6%<br>Deer – 11%<br>Horse – 0%<br>Misc. Wildlife – 25% | 120 |

| | | |
|---|---|---|
| | Non-human Unknown – 5% | |

**f. Lower Anacostia-**

| | **BST Results:** | **Fecal Bacteria Results:** (*Enterococcus* CFU/100ml) |
|---|---|---|
| ANA001 – downstream | **Human – 7%**<br>**(qPCR <u>Negative</u> for human)**<br>Avian – 45%<br>Canine – 9%<br>Deer – 9%<br>Horse – 0%<br>Misc. Wildlife – 21%<br>Non-human Unknown – 9% | 52 |
| ANA002 – upstream | Too few bacteria for BST source determination | <10 |

**g. Lower Beaverdam Creek-**

| | **BST Results:** | **Fecal Bacteria Results:** (*Enterococcus* CFU/100ml) |
|---|---|---|
| LBD001 – downstream | **Human – 4%**<br>**(qPCR <u>Negative</u> for human)**<br>Avian – 43%<br>Canine – 4%<br>Deer – 10%<br>Horse – 0%<br>Misc. Wildlife – 22%<br>Non-human Unknown – 17% | 58 |
| LBD002 – upstream | **Human – 11%**<br>**(qPCR <u>Negative</u> for human)**<br>Avian – 37%<br>Canine – 12%<br>Deer – 7%<br>Horse – 0%<br>Misc. Wildlife – 19%<br>Non-human Unknown – 14% | 23 |

**h. Muddy Branch-**

| | **BST Results:** | **Fecal Bacteria Results:** (*Enterococcus* CFU/100ml) |
|---|---|---|
| MDB001 – downstream | Too few bacteria for BST source determination | <10 |
| MDB002 – upstream | **Human – 2%**<br>**(qPCR <u>Negative</u> for human)**<br>Avian – 44%<br>Canine – 13%<br>Deer – 15%<br>Horse – 2%<br>Misc. Wildlife – 15%<br>Non-human Unknown – 9% | 63 |

**i. Northeast Branch-**

| | **BST Results:** | **Fecal Bacteria Results:** (*Enterococcus* CFU/100ml) |
|---|---|---|
| NEB001 – upstream | **Human – 0%**<br>**(qPCR <u>Negative</u> for human)**<br>Avian – 30%<br>Canine – 7%<br>Deer – 11%<br>Horse – 0%<br>Misc. Wildlife – 27%<br>Non-human Unknown – 25% | 40 |
| NEB002 – downstream | **Human – 0%**<br>**(qPCR <u>Negative</u> for human)**<br>Avian – 34%<br>Canine – 12%<br>Deer – 15%<br>Horse – 0%<br>Misc. Wildlife – 22%<br>Non-human Unknown – 17% | 45 |

**j. Northwest Branch-**

| | **BST Results:** | **Fecal Bacteria Results:** (*Enterococcus* CFU/100ml) |
|---|---|---|
| NWA001 – downstream | **Human – 3%**<br>**(qPCR <u>Negative</u> for human)**<br>Avian – 36%<br>Canine – 9%<br>Deer – 9%<br>Horse – 0%<br>Misc. Wildlife – 26%<br>Non-human Unknown – 17% | 53 |
| NWA002 – upstream | **Human – 0%**<br>**(qPCR <u>Negative</u> for human)**<br>Avian – 42%<br>Canine – 11%<br>Deer – 9%<br>Horse – 2%<br>Misc. Wildlife – 21%<br>Non-human Unknown – 15% | 45 |

**k. Oxon Run-**

| | **BST Results:** | **Fecal Bacteria Results:** (*Enterococcus* CFU/100ml) |
|---|---|---|
| OXN001 – downstream | **Human – 3%**<br>**(qPCR <u>Negative</u> for human)**<br>Avian – 34%<br>Canine – 8%<br>Deer – 13%<br>Horse – 0%<br>Misc. Wildlife – 25%<br>Non-human Unknown – 17% | 25 |
| OXN002 – upstream (Watts Branch) | **Human – 29%**<br>**(qPCR <u>Positive</u> for human)**<br>Avian – 21%<br>Canine – 8%<br>Deer – 12%<br>Horse – 0%<br>Misc. Wildlife – 17%<br>Non-human Unknown – 13% | 770 |

**l. Paint Branch-**

| | **BST Results:** | **Fecal Bacteria Results:** (*Enterococcus* CFU/100ml) |
|---|---|---|
| PNT001 – downstream | **Human – 6%**<br>**(qPCR <u>Positive</u> for human)**<br>Avian – 36%<br>Canine – 8%<br>Deer – 11%<br>Horse – 0%<br>Misc. Wildlife – 26%<br>Non-human Unknown – 13% | 22 |
| PNT002 – upstream | **Human – 0%**<br>**(qPCR <u>Negative</u> for human)**<br>Avian – 31%<br>Canine – 11%<br>Deer – 16%<br>Horse – 0%<br>Misc. Wildlife – 25%<br>Non-human Unknown – 17% | 67 |

**m. Parkway-**

| | **BST Results:** | **Fecal Bacteria Results:** (*Enterococcus* CFU/100ml) |
|---|---|---|
| PKY001 – downstream (Bear Branch) | **Human – 11% (15%)**<br>**(qPCR <u>Positive</u> for human)**<br>Avian – 31% (33%)<br>Canine – 9% (6%)<br>Deer – 10% (7%)<br>Horse – 0% (0%) | 78 (40) |

| | | |
|---|---|---|
| | Misc. Wildlife – 28% (22%)<br>Non-human Unknown – 11% (17%) | |
| PKY002 – upstream (Walker Branch) | **Human – 13%**<br>**(qPCR <u>Positive</u> for human)**<br>Avian – 33%<br>Canine – 12%<br>Deer – 9%<br>Horse – 3%<br>Misc. Wildlife – 24%<br>Non-human Unknown – 6% | 27 |

<u>Note</u>: Values in parentheses for station PKY001 are for field duplicate sample.

**n. Piscataway-**

| **BST Results:** | **Fecal Bacteria Results:** (*Enterococcus* CFU/100ml) |
|---|---|
| PSW001 – downstream | **Human – 0%**<br>**(qPCR <u>Negative</u> for human)**<br>Avian – 42%<br>Canine – 9%<br>Deer – 12%<br>Horse – 0%<br>Misc. Wildlife – 21%<br>Non-human Unknown – 16% | 26 |
| PSW002 – upstream | Too few bacteria for BST source determination | <10 |

**o. Rock Creek-**

| **BST Results:** | **Fecal Bacteria Results:** (*Enterococcus* CFU/100ml) |
|---|---|
| RKC001 – downstream | **Human – 0%**<br>**(qPCR <u>Negative</u> for human)**<br>Avian – 36%<br>Canine – 5%<br>Deer – 18%<br>Horse – 0%<br>Misc. Wildlife – 26%<br>Non-human Unknown – 15% | 98 |
| RKC002 – upstream | Too few bacteria for BST source determination | <10 |

**p. Seneca Creek-**

| **BST Results:** | **Fecal Bacteria Results:** (*Enterococcus* CFU/100ml) |
|---|---|
| SNC001 – downstream | Too few bacteria for BST source determination | <10 |
| SNC002 – upstream | **Human – 16%**<br>**(qPCR <u>Positive</u> for human)**<br>Avian – 43%<br>Canine – 8% | 24 |

| | | |
|---|---|---|
| | Deer – 12%<br>Horse – 0%<br>Misc. Wildlife – 13%<br>Non-human Unknown – 8% | |

**q. Sligo Creek-**

| | **BST Results:** | **Fecal Bacteria Results:** (*Enterococcus* CFU/100ml) |
|---|---|---|
| SLC001 – downstream | **Human – 28% (25%)**<br>**(qPCR <u>Positive</u> for human)**<br>Avian – 30% (32%)<br>Canine – 11% (8%)<br>Deer – 9% (7%)<br>Horse – 0% (0%)<br>Misc. Wildlife – 15% (12%)<br>Non-human Unknown – 7% (16%) | 102 (137) |
| SLC002 – upstream | **Human – 0%**<br>**(qPCR <u>Negative</u> for human)**<br>Avian – 36%<br>Canine – 14%<br>Deer – 13%<br>Horse – 0%<br>Misc. Wildlife – 25%<br>Non-human Unknown – 12% | 83 |

<u>Note</u>: Values in parentheses for station SLC001 are for field duplicate sample.

**r. Upper Beaverdam Creek-**

| | **BST Results:** | **Fecal Bacteria Results:** (*Enterococcus* CFU/100ml) |
|---|---|---|
| UBD001 – downstream | **Human – 0%**<br>**(qPCR <u>Negative</u> for human)**<br>Avian – 33%<br>Canine – 11%<br>Deer – 15%<br>Horse – 0%<br>Misc. Wildlife – 22%<br>Non-human Unknown – 19% | 40 |
| UBD002 – upstream | Too few bacteria for BST source determination | <10 |

**s. Watts Branch-**

| | **BST Results:** | **Fecal Bacteria Results:** (*Enterococcus* CFU/100ml) |
|---|---|---|
| WTB001 – downstream | **Human – 0%**<br>**(qPCR <u>Negative</u> for human)**<br>Avian – 35%<br>Canine – 8%<br>Deer – 11%<br>Horse – 0% | 68 |

| | | |
|---|---|---|
| | Misc. Wildlife – 25%<br>Non-human Unknown – 21% | |
| WTB002 – upstream | **Human – 0%**<br>**(qPCR <u>Negative</u> for human)**<br>Avian – 31%<br>Canine – 10%<br>Deer – 12%<br>Horse – 0%<br>Misc. Wildlife – 27%<br>Non-human Unknown – 20% | 41 |

**t. Western Branch-**

| | **BST Results:** | **Fecal Bacteria Results:** (*Enterococcus* CFU/100ml) |
|---|---|---|
| WNB001 – downstream | Too few bacteria for BST source determination | <10 |
| WNB002 – upstream | Too few bacteria for BST source determination | <10 |

**Basins Subject to Annual Monitoring and Reporting Requirements-**

**a. Dulles Interceptor-**

| | **BST Results:** | **Fecal Bacteria Results:** (*Enterococcus* CFU/100ml) |
|---|---|---|
| DSI001 | **Human – 19%**<br>**(qPCR <u>Positive</u> for human)**<br>Avian – 36%<br>Canine – 11%<br>Deer – 13%<br>Horse – 0%<br>Misc. Wildlife – 17%<br>Non-human Unknown – 4% | 160 |

**b. Mattawoman-**

| | **BST Results:** | **Fecal Bacteria Results:** (*Enterococcus* CFU/100ml) |
|---|---|---|
| MTW001 | **Human – 18% (20%)**<br>**(qPCR <u>Positive</u> for human)**<br>Avian – 36% (31%)<br>Canine – 9% (8%)<br>Deer – 6% (9%)<br>Horse – 0% (0%)<br>Misc. Wildlife – 21% (18%)<br>Non-human Unknown – 10% (14%) | 37 (30) |

<u>Note</u>: Value in parentheses for station MTW001 is for field duplicate sample.

**c. Monacacy-**

| | **BST Results:** | **Fecal Bacteria Results:** (*Enterococcus* CFU/100ml) |
|---|---|---|
| MCY001 | **Human – 0% (0%)**<br>**(qPCR Negative for human)**<br>Avian – 41% (39%)<br>Canine – 12% (11%)<br>Deer – 12% (10%)<br>Horse – 0% (0%)<br>Misc. Wildlife – 24% (27%)<br>Non-human Unknown – 11% (13%) | 22 (35) |

Note: Value in parentheses for station MCY001 is for field duplicate sample.

**d. Patuxent Center-**

| | **BST Results:** | **Fecal Bacteria Results:** (*Enterococcus* CFU/100ml) |
|---|---|---|
| PTC001<br>(Mill Branch) | **Human – 4% (5%)**<br>**(qPCR Negative for human)**<br>Avian – 37% (41%)<br>Canine – 7% (7%)<br>Deer – 5% (6%)<br>Horse – 2% (0%)<br>Misc. Wildlife – 26% (24%)<br>Non-human Unknown – 19% (17%) | 28 (45) |

Note: Value in parentheses for station PTC001 is for field duplicate sample.

**e. Patuxent North-**

| | **BST Results:** | **Fecal Bacteria Results:** (*Enterococcus* CFU/100ml) |
|---|---|---|
| PTN001<br>(Hawlings River) | **Human – 0%**<br>**(qPCR Negative for human)**<br>Avian – 38%<br>Canine – 8%<br>Deer – 11%<br>Horse – 0%<br>Misc. Wildlife – 26%<br>Non-human Unknown – 17% | 42 |

**f. Rock Run-**

| | **BST Results:** | **Fecal Bacteria Results:** (*Enterococcus* CFU/100ml) |
|---|---|---|
| RCM001 | **Human – 0%**<br>**(qPCR <u>Positive</u> for human)**<br>Avian – 33%<br>Canine – 9%<br>Deer – 6%<br>Horse – 0%<br>Misc. Wildlife – 24%<br>Non-human Unknown – 28% | 105 |