

# Bacterial Source Tracking for Kalamalka Lake Intake



**2012**



**Greater Vernon Water  
9848 Aberdeen Road  
Coldstream, BC  
V1B -2K9**

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# **1 Introduction**

## **1.1 Project Background**

Greater Vernon Water (GVW) received a Water Quality Improvement Grant for Bacterial Source Tracking (BST) at the intakes located in the north end of Kalamalka Lake. The BST method analyzes fecal contamination and identifies the probable source using a known reference library compiled by the University of Victoria (UVIC). The project allows GVW to further investigate the multiple sources of fecal contamination which could impact water quality at the intakes; the North Kalamalka Intake which provides water to the to the Greater Vernon urban area and the East Kalamalka Intake which provided drinking water to a small area in Coldstream until it was decommissioned on April 26, 2011.

Since 2004, GVW has routinely sample at both intakes for multiple parameters including total coliform, fecal and *E.coli* (*Escherichia coli*) bacteria. Data analysis show bacteria counts increase during the months of October through February. BST sampling will help in determining where bacterial loading might be originating and therefore be an important component to GVW development of a protection zone and watershed control program for the north end of Kalamalka Lake.

The Okanagan Basin Water Board (OBWB) annual milfoil harvesting program runs from December through February. This program coincides with the increased fecal counts; therefore GVW requested that OBWB provide harvesting reports for the north end of Kalamalka Lake.

## **1.2 Objectives**

The objectives of the BST project were to determine where the bacterial loading might originate and if the milfoil program has an influence on the bacterial counts. The outcome will assist GVW to target efforts correctly for the watershed control program.

## **2 Methods**

### **2.1 Sampling Sites**

The two sample sites include the North Kalamalka Intake and Coldstream Creek Intake. The North Kalamalka Intake, located on Westkal Road, is a 900mm pipe which extends 252 meters in length and 20 meters deep. The Coldstream Creek intake, located at the west end of Coldstream Creek Road, extends 35 meters in length and 4 meters deep.

### **2.2 Sampling schedule**

East Kalamalka Intake was sampled monthly from May 2010 until March 2011. North Kalamalka Intake was sampled bi-weekly from May 2010 until September 2010, weekly from October 2010 until June 2011, bi-weekly from July 2011 until September 2011 and weekly from October 2011 until January 2012.

Grab samples were collected at each site consisting of: one sterile 1L bottle for BST, couriered to University of Victoria (UVIC), and one sterile 250 ml bacterial bottle, couriered to Caro Analytical and one sterile 100 mL presence/absence bottle for internal analysis (GVW lab).

#### **2.2.1 Incident Sampling**

Coldstream Meadows, 9104 Mackie Drive Coldstream, BC, reported a sewage breach at the Coldstream Meadows lift station into Coldstream Creek, August 17, 2011. The report was followed up by Interior Health and relayed to GVW on August 23, 2011. Extra grab samples were collected at the intakes after the spill. Coldstream Creek is located just south of Coldstream Meadows (Figure 1).



**Figure 1 Coldstream Creek Meadows and Coldstream Creek**

## **2.4 OBWB Milfoil Program**

During the BST project May 11, 2010 until January 31, 2012, the milfoil rototiling occurred from January 19, 2011 until February 15, 2011. The Source Water Assessment for Kalamalka Lake (Larratt Aquatic Consulting 2011) included a map that identified the Two Hour Travel Zone, the Intake Protection Zone and the two intakes on Kalamalka Lake. OBWB provided GVW with the milfoil operational area with hand-held GPS coordinates (Figure 2). A GIS layer (green) was placed on the Protection Zone map.

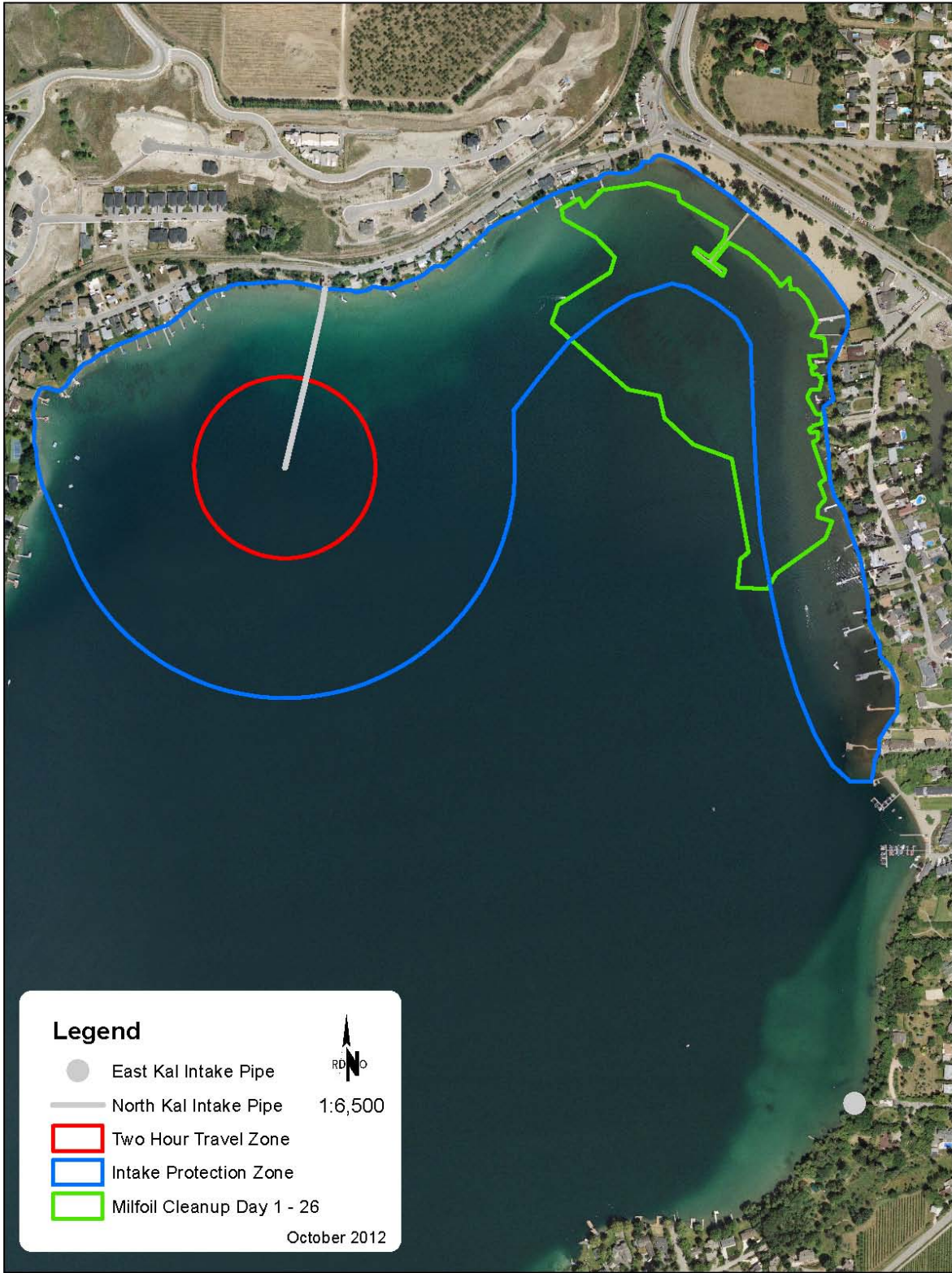


Figure 2 North Kalamalka Lake

## 2.5 Laboratory Analysis

GVW BST samples were sent to the University of Victoria's Water and Aquatic Science Research Program Lab for analysis. There are 12 animal sources within the BST library. For more details on BST protocol Refer to Appendix B.

## 3 Results

### 3.1 Annual Trending

Turbidity samples have been collected as grab samples since 2004 and trended since 2006 as a 24 hour online average from GVW SCADA (Figures 3 and 4). There is some annual variation in the turbidity but a seasonal increase of turbidity occurs normally between mid July to early August as Kalamalka Lake experiences summer marl precipitation. The marl precipitation occurs due to naturally high calcium and sulphate concentrations in the lake.

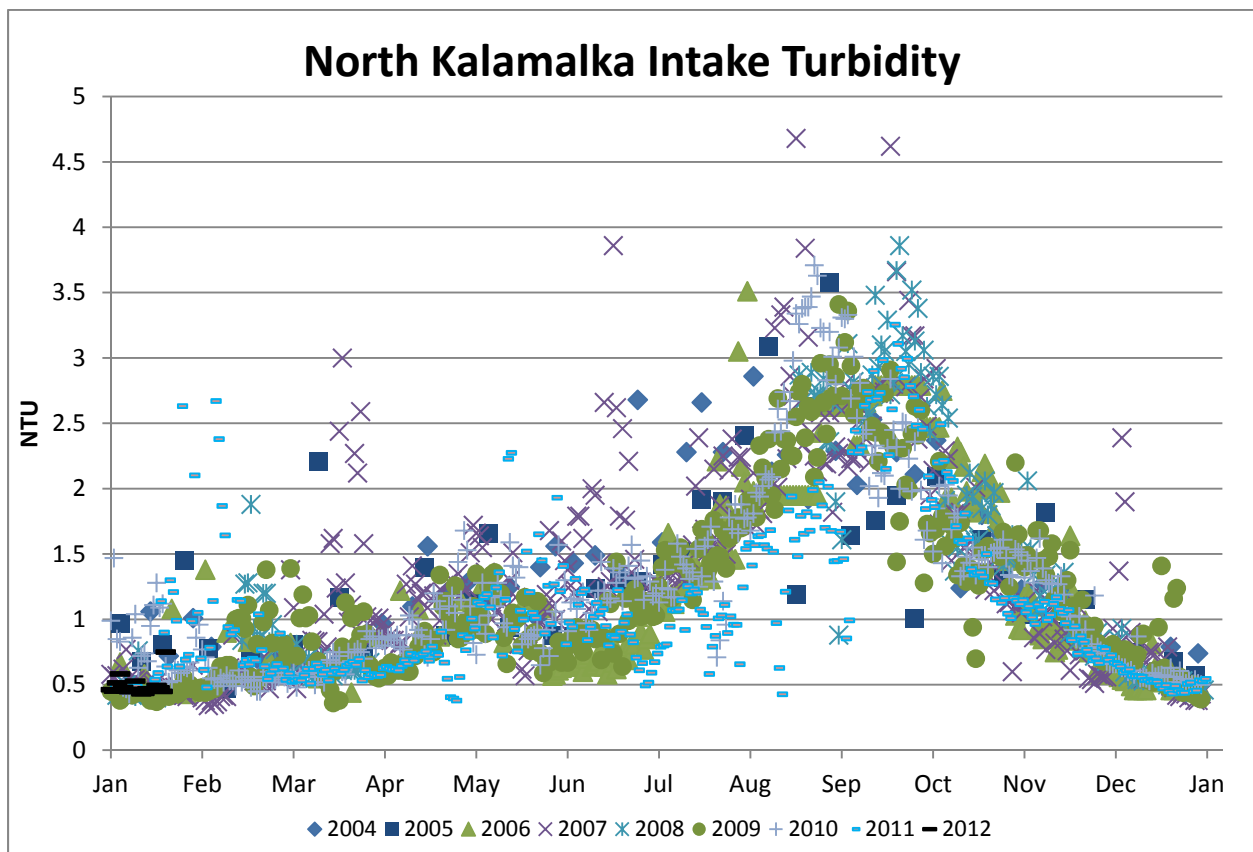
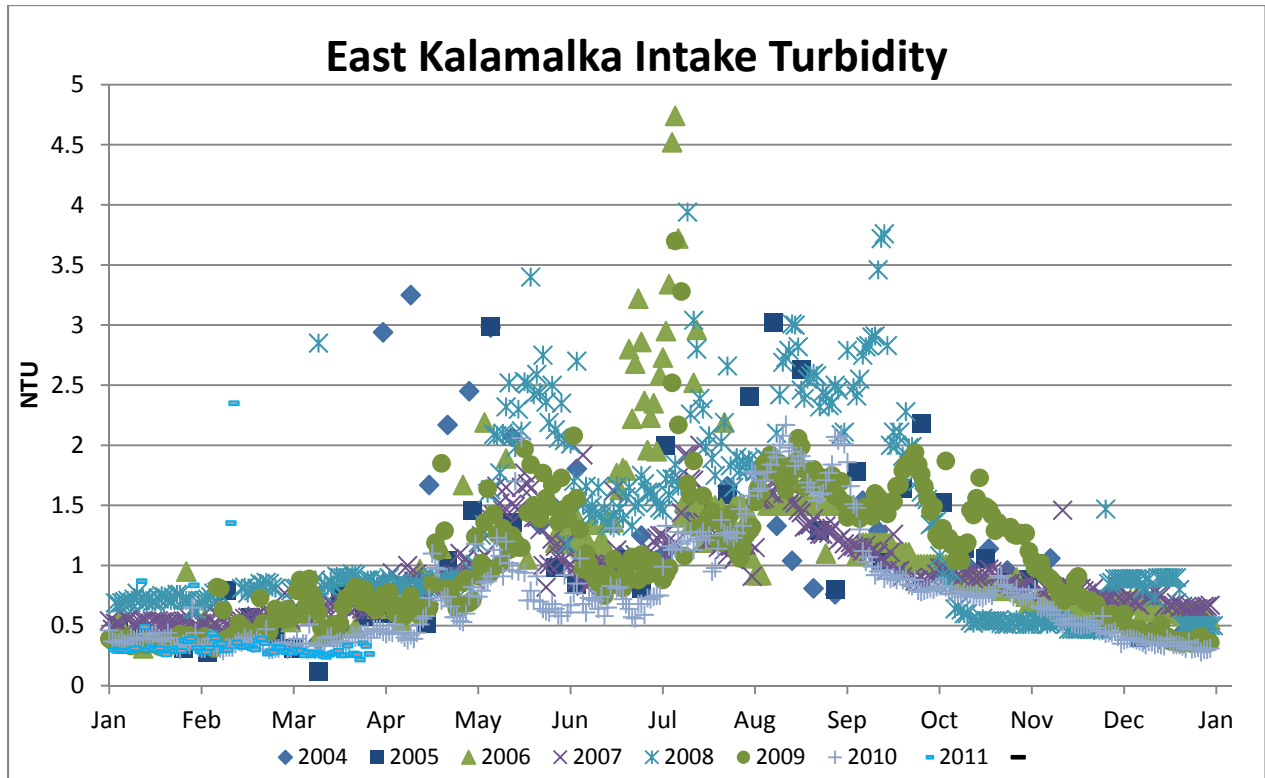


Figure 3 Turbidity at North Kalamalka Intake



**Figure 4 Turbidity at East Kalamalka**

Since 2004, bacteria samples have been routinely taken at the North Kalamalka Intake and East Kalamalka Intake. Bacterial analyses were completed at Caro and GVW labs (Figure 5, 6, 7 and 8). *E.coli* counts at North Kalamalka Intake start to increase in August and continue to be elevated until February. *E.coli* counts at the East Kalamalka Intake start to increase in November and continue to be elevated until February.

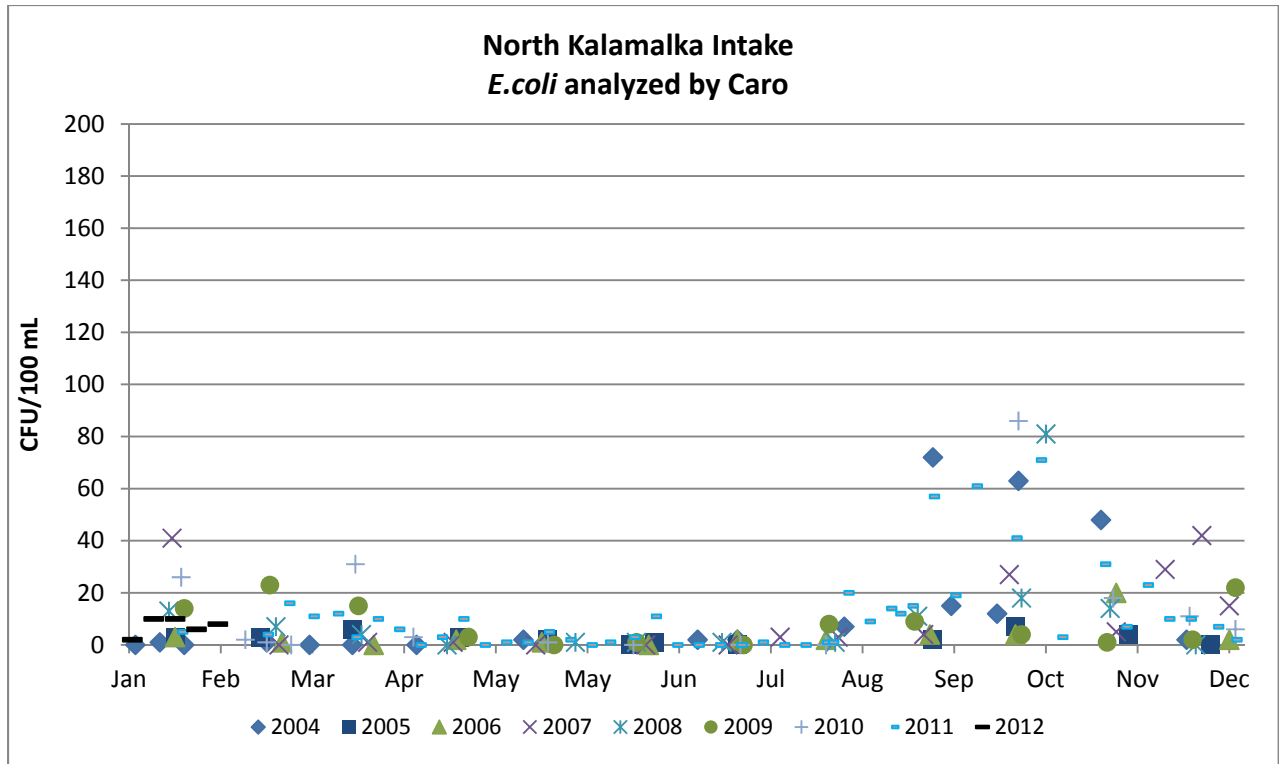


Figure 5 *E.coli* at North Kalamalka Intake analyzed by Caro

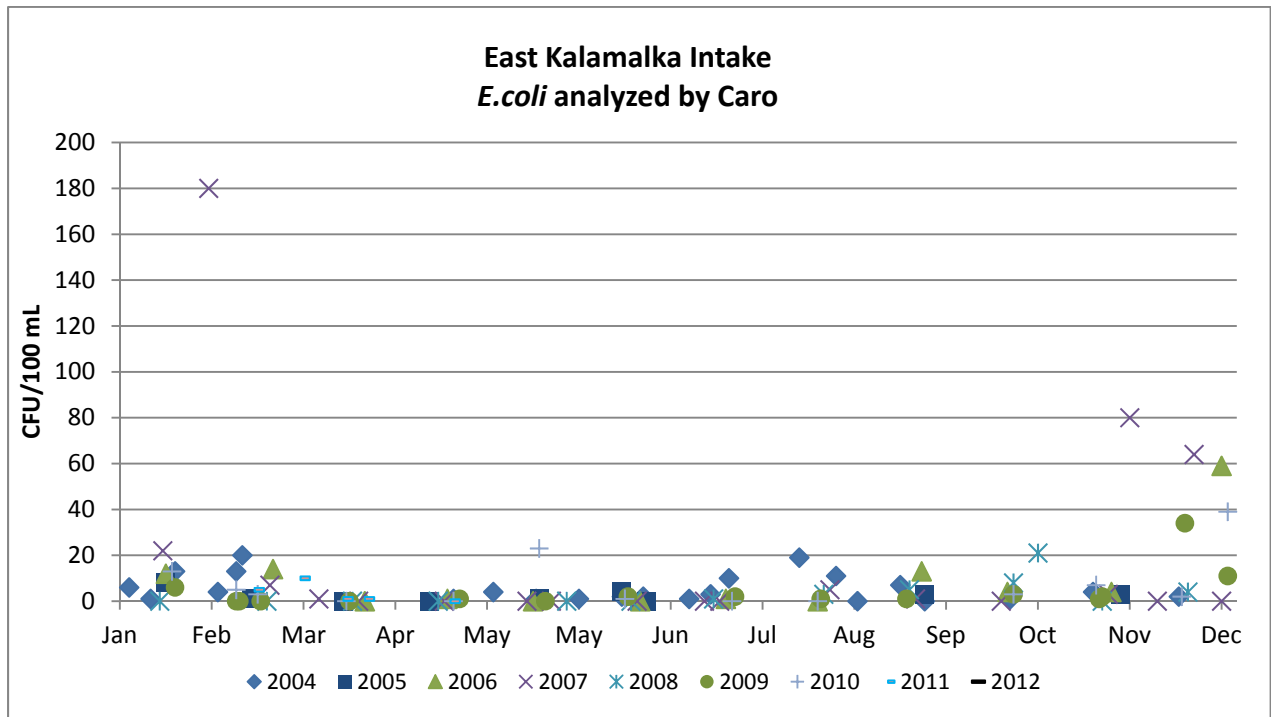
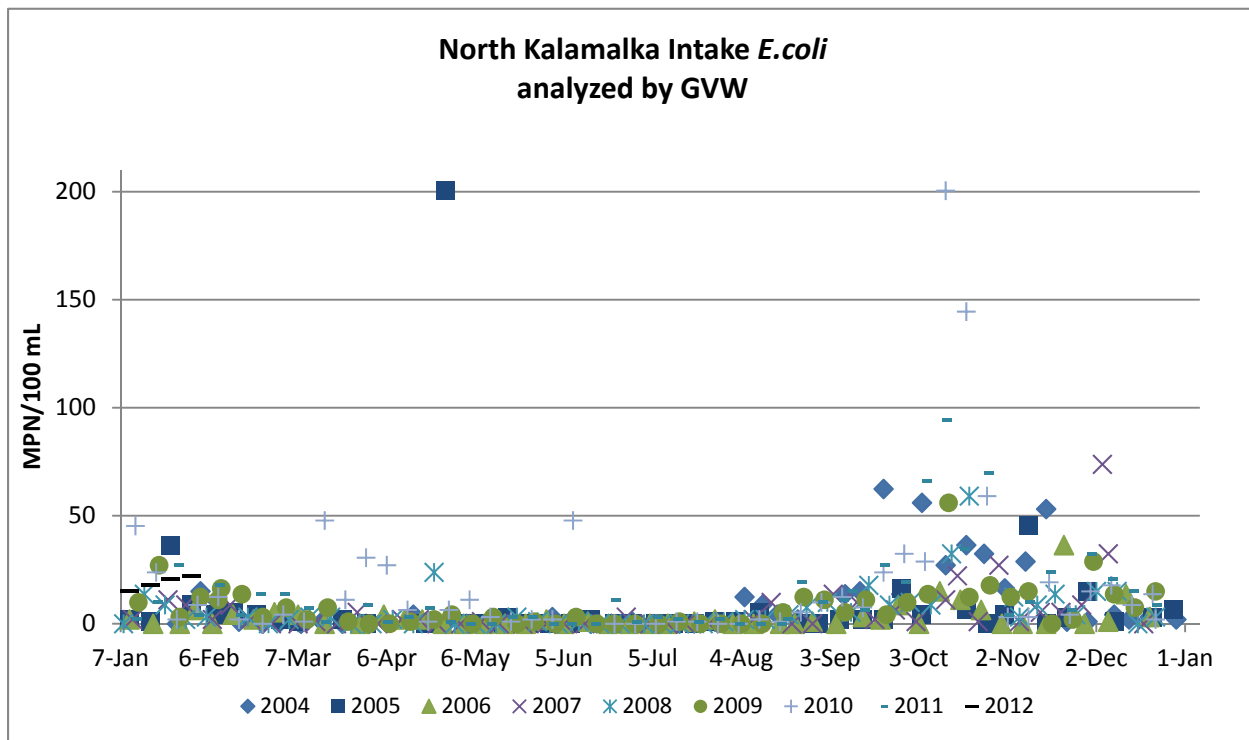
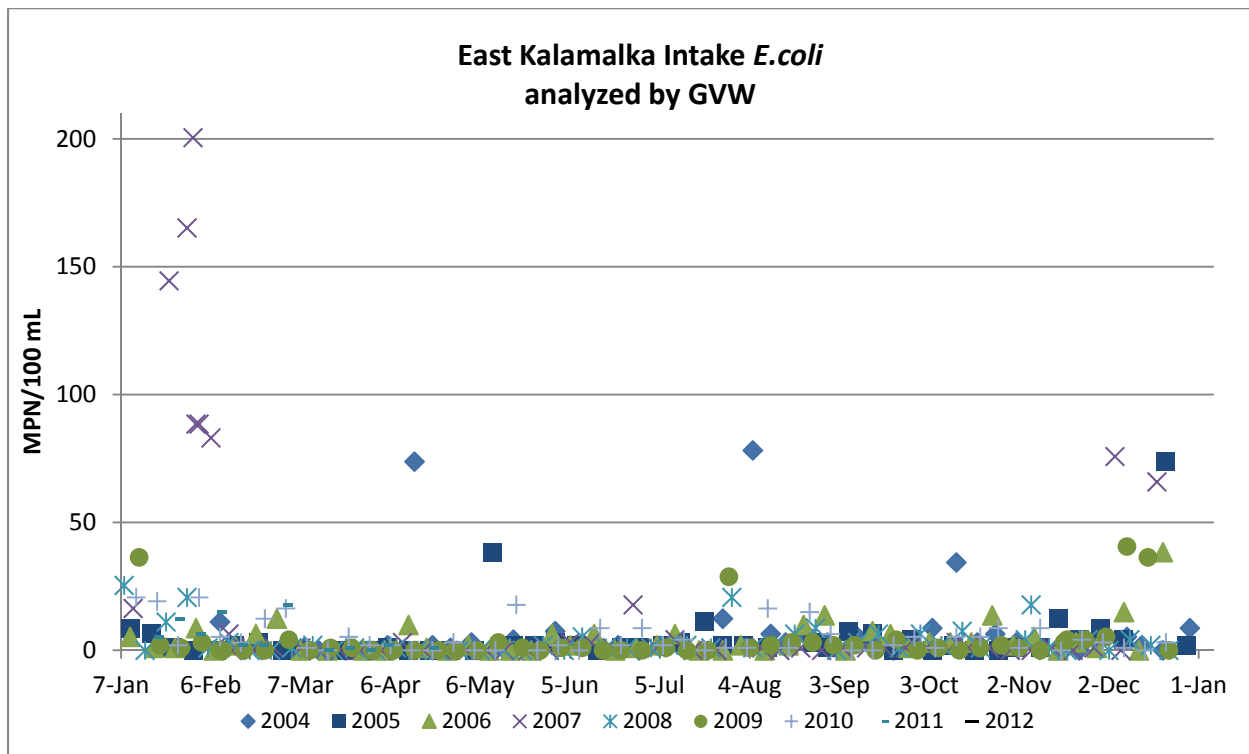


Figure 6 *E.coli* at East Kalamalka Intake analyzed by Caro



**Figure 7 *E.coli* at North Kalamalka Intake analyzed by GVW**



**Figure 8 *E.coli* at East Kalamalka Intake analyzed by GVW**

### 3.2 BST Results

BST sampling began May 11, 2010 and was completed January 31, 2012. The analysis of the BST results at the North Kalamalka Intake shows an increase in counts starting mid August then decreasing in January (Figure 9). The East Kalamalka Intake was sampled for nearly 12 months and did not show any significant trending (Figure 10).

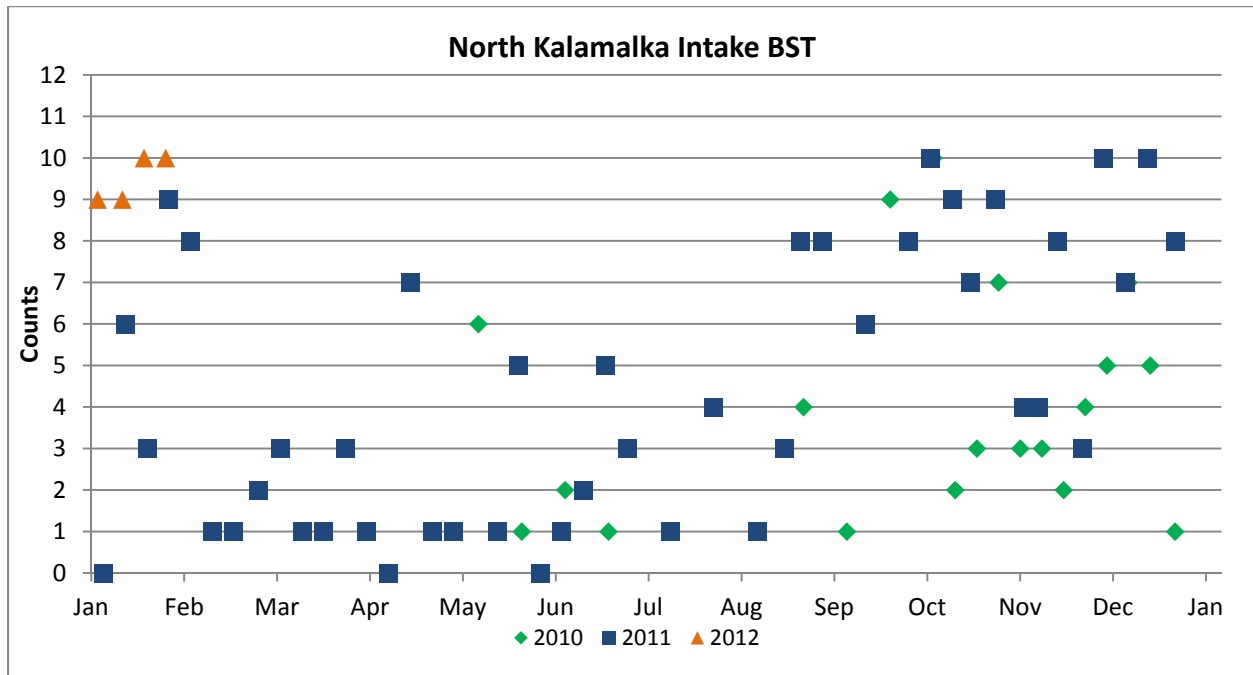


Figure 9 North Kalamalka Intake BST *E.coli* counts

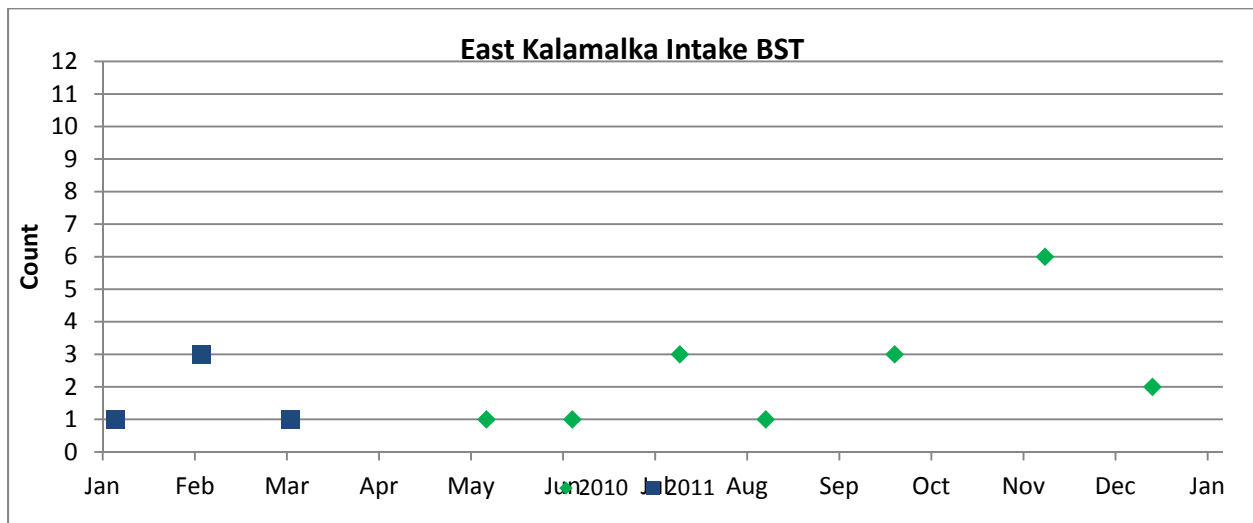


Figure 10 East Kalamalka Intake BST *E.coli* counts

The OBWB Milfoil rototiling was in progress once during the BST sampling project from January 19, 2011 until February 15, 2011. Reviewing the 2011 data, during the Milfoil rototiling process increased turbidity and *E. coli* counts were observed at the both intakes on Kalamalka Lake (Figure 11 and 12).

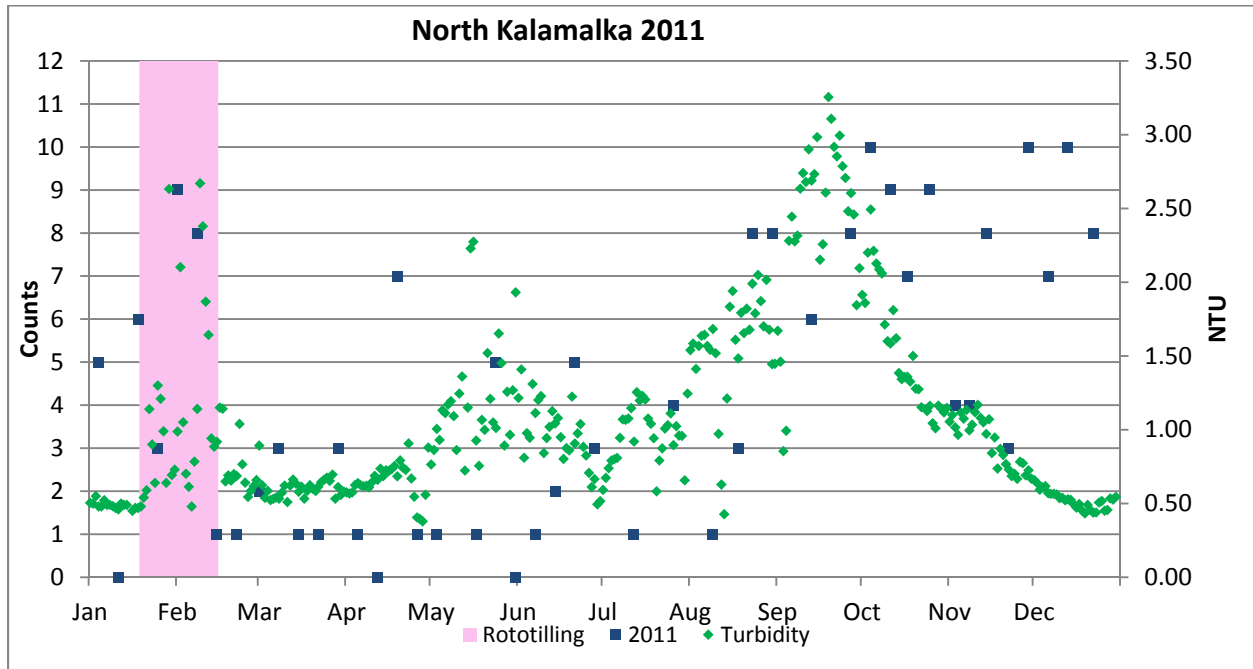


Figure 11 Milfoil removal effects on North Kalamalka Intake

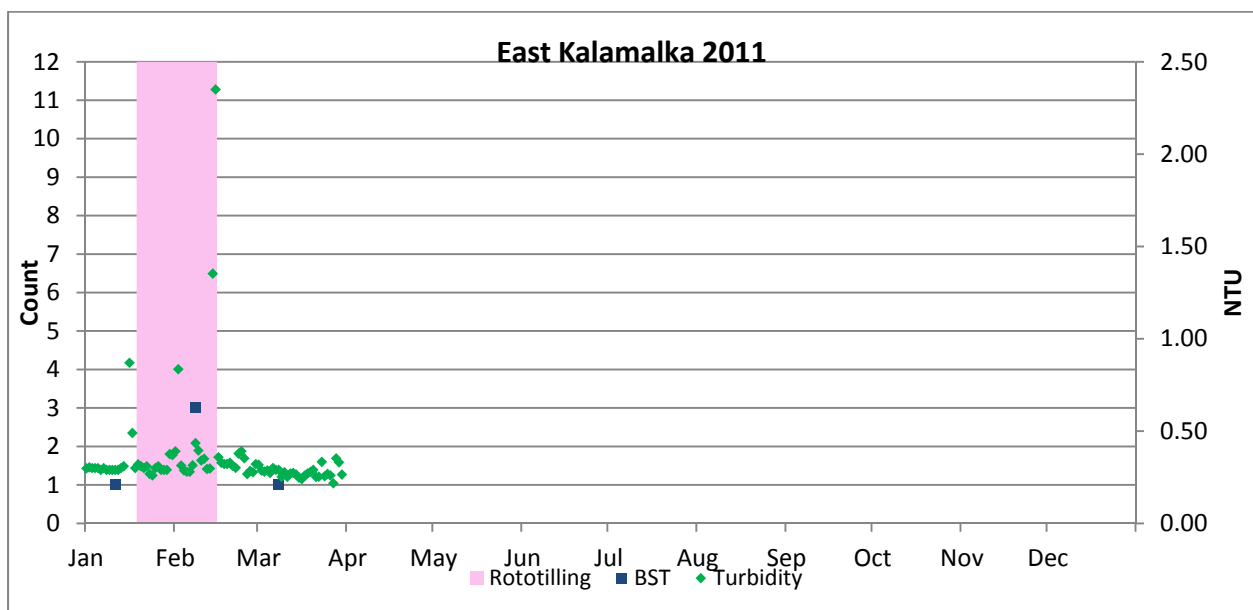
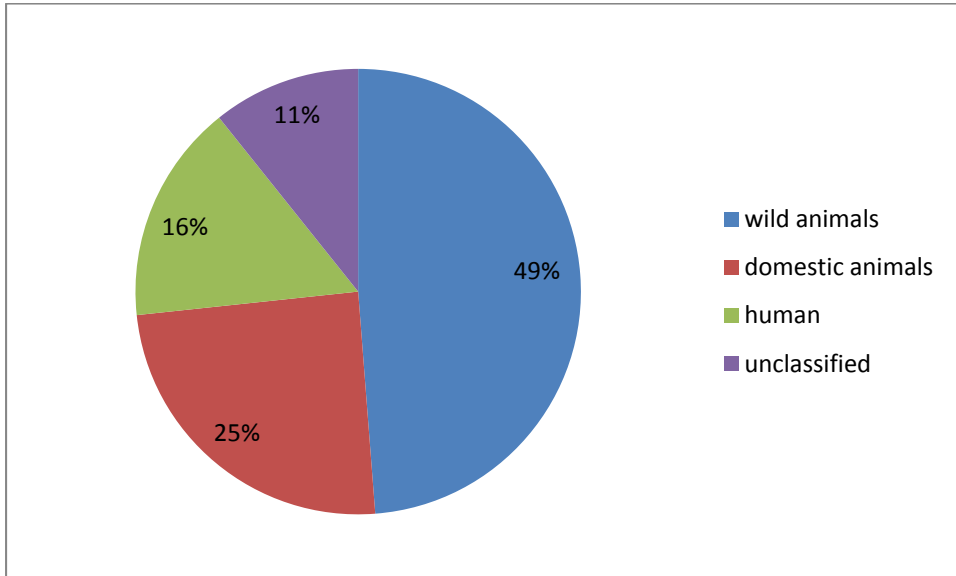
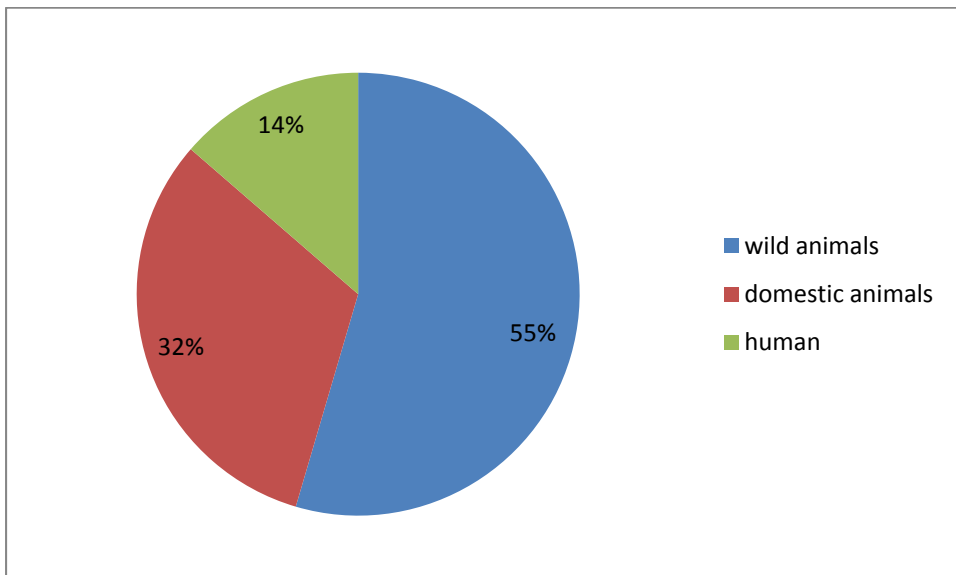


Figure 12 Milfoil removal effects on East Kalamalka Intake

The results of the BST analysis for the North Kalamalka Intake and the East Kalamalka Intake are similar. Wild animals made up about 50% of the results, which include: mule deer, elk, wolf, coyote, black bear, racoon, marmot and gull. Domestic animals made up 25% to 32% of the results, which include: horse, cow and dog. Human made up 14% to 16 %of the results. At the North Kalamalka Intake, 11% of the results were unclassified (Figure 13 and 14).

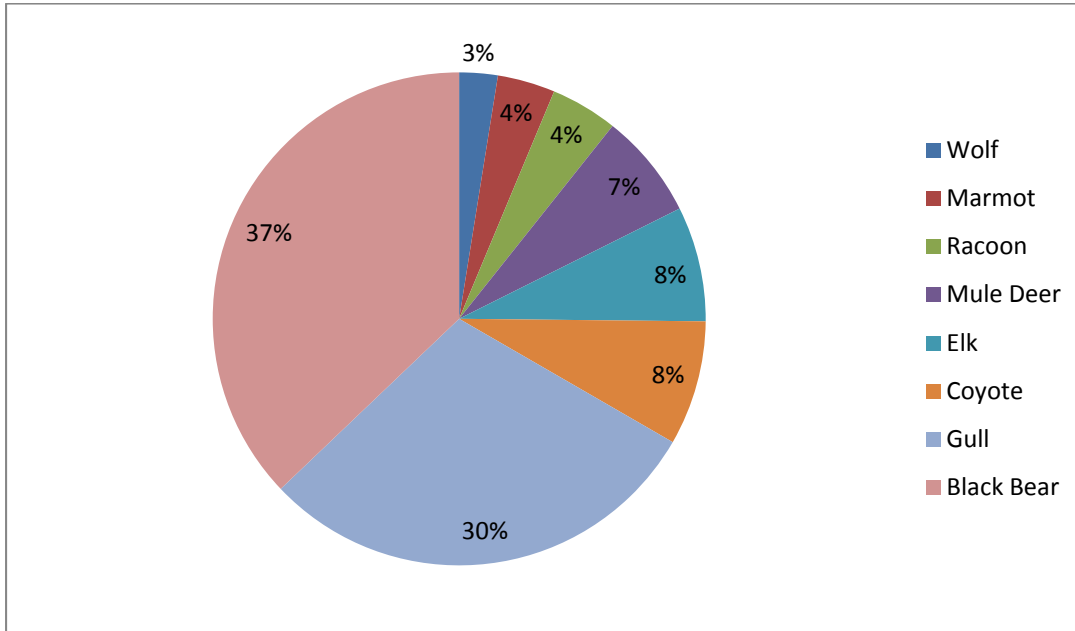


**Figure 13 BST Results for North Kalamalka Intake**

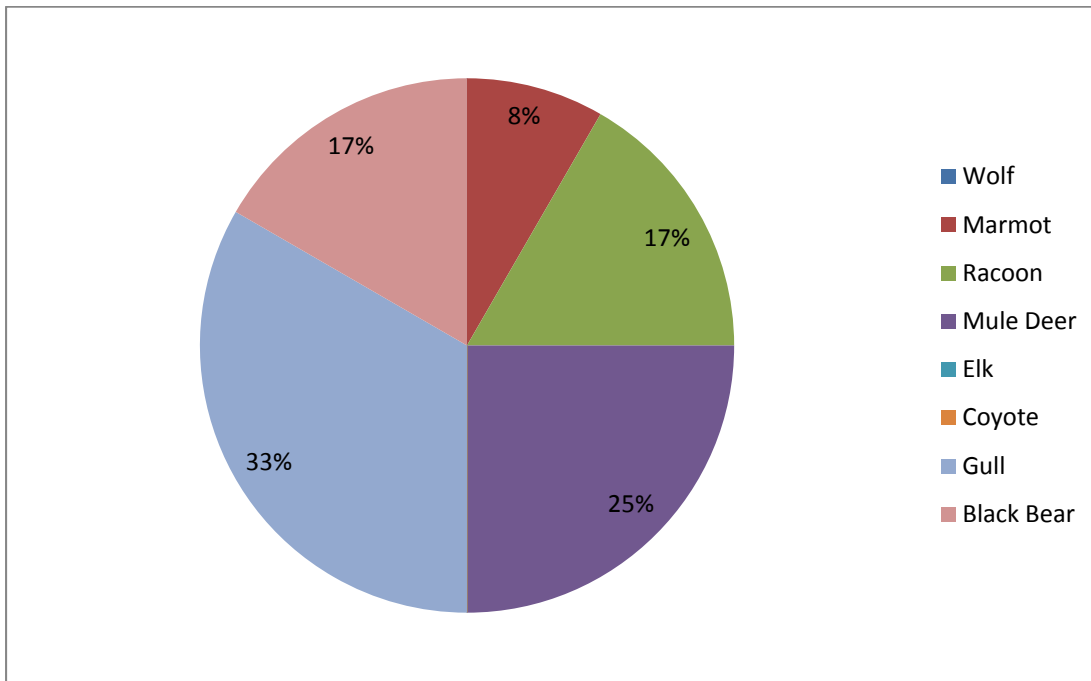


**Figure 14 BST Results for East Kalamalka Intake**

In the following charts the wild and domestic animal results were divided into specific animals. At the North Kalamalka Intake the majority of wild animals were black bear and gull, whereas the majority of domestic animals were horses (Figure 15 and 17). At the East Kalamalka Intake the majority of wild animals were gull and mule deer, whereas, the majority of domestic animals were dogs (Figure 16 and 18).



**Figure 15 BST Results for Wild Animals at the North Kalamalka Intake**



**Figure 16 BST Results for Wild Animals at the East Kalamalka Intake**

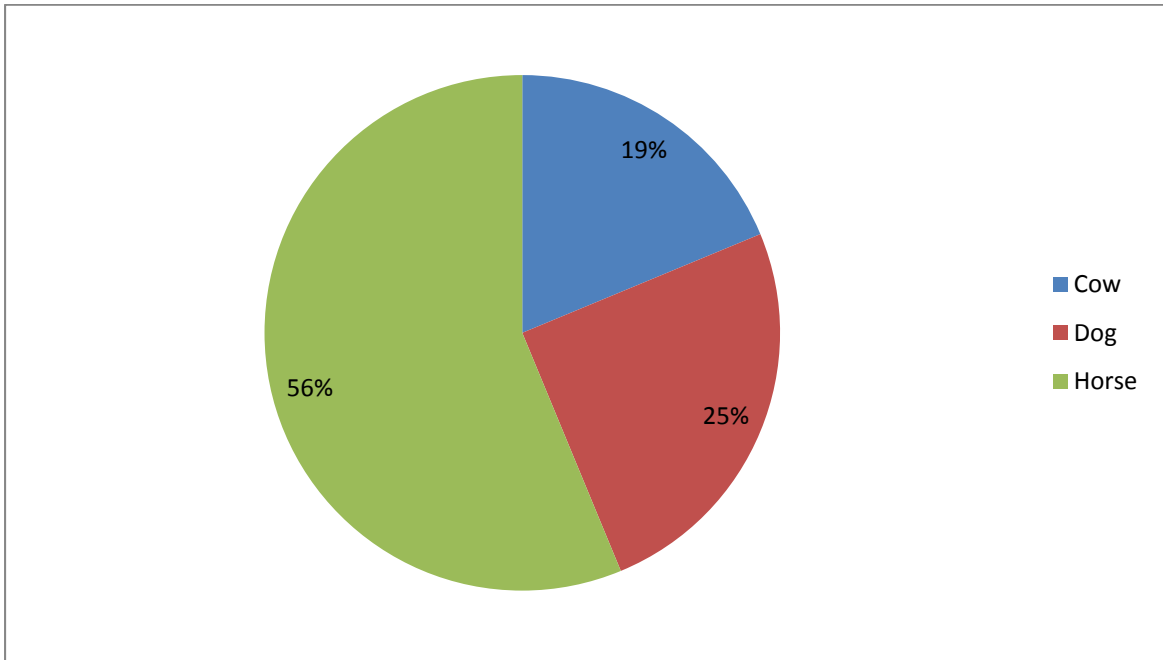


Figure 17 BST Results for Domestic Animals at the North Kalamalka Intake

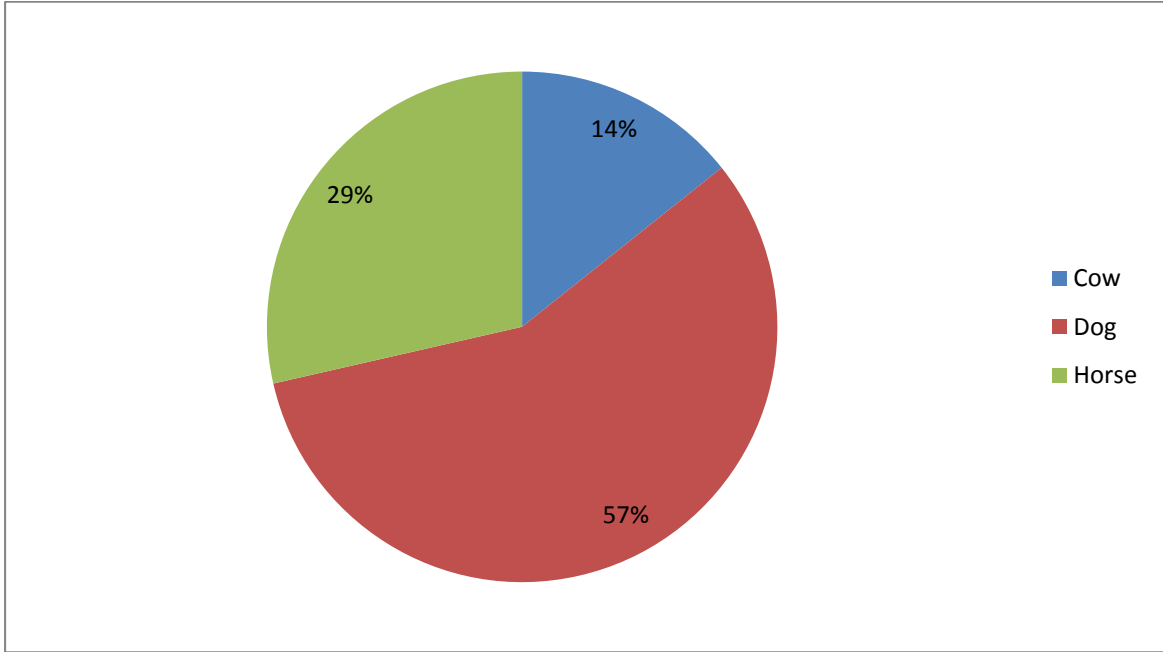


Figure 18 Results for Domestic Animals at the East Kalamalka Intake

## 4 Discussion

The two intakes on Kalamalka Lake have been monitored for multiple parameters since 2004. East Kalamalka intake was decommissioned in March of 2011. North Kalamalka Intake is still monitored regularly.

Annually the turbidity at the North Kalamalka Intake starts to increase around mid July then peaks in September, it stays elevated until November. In 2007 the North Kalamalka Intake water experienced a few spikes and higher than average turbidity. There were three spikes; one in March, one in June and then the naturally occurring spike in August and September. In 2011 the North Kalamalka Intake experienced a spike at the end of January and beginning of February which coincides with the OBWB milfoil program.

The turbidity at the East Kalamalka Intake starts to increase mid April until November. In 2011 there was a spike in February which coincides with the OBWB milfoil rototiling program.

Both Caro and GVW data shows the North Kalamalka Intake has an increase trend in *E.coli* counts from October through February. The highest *E.coli* counts occurred in 2010.

The Caro and GVW data shows increased bacterial counts in November though February at the East Kalamalka Intake.. In January and February of 2007 there were multiple samples with high *E.coli* counts.

BST sampling began May 11, 2010 for both intakes. The North Kalamalka Intake sampling was completed January 31, 2012; however the East Kalamalka Intake was completed March of 2011 due to the intake being decommissioned. The North Kalamalka Intake shows an increased in bacterial counts in August 2011 which continued through until February, where there was a slight decline (Figure 11). The East Kalamalka intake had consistent counts between 1 and three. November was the only month that had a high count of 6.

BST results were categorized into 4 major groups: wild animals, domestic animals, human and unclassified. Wild animals included: mule deer, elk, wolf, coyote, black bear, racoon, marmot and gull. Domestic animals included: horse, cow and dog. The BST results showed 50% of the results came from wild animals. The Kalamalka Lake watershed around the North end of Kalamalka Lake is both urban and rural.

There are many fields and orchards along with parks which attract wild animals. Coldstream Creek, a salmon bearing stream enters the North end of Kalamalka Lake from the east side. The orchards and salmon could explain why black bear makes up 37% of the wild animals at the North Kalamalka Intake, and 17% at the East Kalamalka Intake. At the North Kalamalka Intake the black bear results increased from October 2011 through January 2011. Within these 16 weeks there was at least one black bear result every week with the exception of one week, totalling 35 counts.

Kalamalka Beach is located at the very north end of the Lake where many birds congregate , which would explain why both Intakes have about 30% of the wild animals being gulls (refer to photos 4, 5 and 6 in appendix A). Mule deer also enjoy the orchards within the watershed and the East Kalamalka Intake showed 25% of mule deer of the wild animals.

The domestic animals showed various results for both intakes. The North Kalamalka Intake had 56% horse, 25% dog and 19% cow. The East Kalamalka Intake had 29% horse, 57% dog and 14% cow. Coldstream Creek Park, which is a dog park, surrounds a part of Coldstream Creek just East of where it flows into Kalamalka Lake. This could explain the higher counts of dog at the East Kalamalka Intake.

The UVIC Reference Library for the BST program is limited to 12 animals, which do not include ducks, Canadian Geese, beaver or rabbit. Any one of these animals could be the cause of the unclassified results at the North Kalamalka Intake.

## **5 Conclusions and Recommendations**

### **5.1 Conclusions**

The BST project has shown that the OBWB milfoil program does have an effect on the *E.coli* and turbidity at the North Kalamalka Intake. The milfoil program does have an effect on the turbidity at the East Kalamalka Intake, however not the *E.coli* counts.

At the North Kalamalka Intake 50% of the *E.coli* results came from wild animals, 25% from domesticated animals, 16% from human and 11% unclassified. Black bear and gull made up 63% of the wild animals. The domesticated animals, 56% were horses, 25% were dogs and 19% cows.

At the East Kalamalka Intake 55% of the *E.coli* results came from wild animals, 32% from domesticated animals and 14% from human. There were no unclassified results. Of the 8 wild animals in the UVIC library, only 5 showed up at the East Kalamalka Intake. The results were: 33% Gulls, 25% mule deer, 17% black bear, 17% racoon and 8% marmot.

## 5.2 Recommendations

The following recommendations to reduce *E.coli* counts in the north end of Kalamalka Lake:

- Bird control at the north end of Kalamalka Lake, especially along Kalamalka Beach where the birds congregate.
- Black bear control during the fall and early winter when the apple orchards are ready for harvest and the salmon in Coldstream Creek are spawning.
- Monitor Coldstream Creek Park for proper use of the dog park and feces control.
- Encourage proper septic tank maintenance and repair. Educate the public on septic care.
- 
- Monitor and inspect stormwater outfall pipes around Kalamalka Lake and Coldstream Creek to understand their impact top water quality.
- The extension of the North Kalamalka intake. This is being determined by Heather Larratt' study on Kalamalka Lake
- Investigate if there was Milfoil Harvest in 2007 that affected the E.coli and turbidity.

## References

Larratt Aquatic Consulting. 2001. Source Assessment of the Regional District of North Okanagan – Greater Vernon Water (RDNO-GVW) North Kalamalka Lake Intake.

Summit Environmental Consultants Inc. 2012. Kalamalka Lake Storm Outfall Sampling: fall 2011 – Spring 2012.

Ministry of Environment, Environmental Protection Division, Penticton. 2009. Coldstream Creek Water Quality Monitoring: 2008-2009.

Meays, C.L., Broersma, K, Nordin, R., and Mazumder A. 2004. Source Tracking Fecal Bacteria in Water: A Critical Review of Current Methods. *Journal of Environmental Management* 73: 71-79

**Appendix A – photographs**



Photo 1: East Kalamalka Intake sample site



Photo 2: North Kalamalka Intake Sample site



Photo 3: North Kalamalka Intake



Photo 4: Seagulls on Kalamalka Beach



Photo 5: Canadian Geese on Kalamalka Lake by Kalamalka Beach



Photo 6: Seagulls and Canadian Geese on Kalamalka Beach

**Appendix B – University of Victoria - BST Protocol**

### *Confirmation of presumptive E. coli by PCR*

Whole cells from isolated presumptive *E. coli* colonies on McConkey agar were swirled in 200 µL nuclease free water and used as DNA templates. A PCR targeting *upsA* gene was used to confirm these isolated colonies as true *E. coli*. Forward primer sequence was 5'-CCGATACGCTGCCAATCAGT-3' and reverse primer sequence was 5'-ACGCAGACCGTAGGCCAGAT-3' (Chen *et al* 1998). Final concentrations in the *uspA*-PCR reaction (25 µL) were 150 nM of each of the primers (Invitrogen), 3.75 mM of MgCl<sub>2</sub>, 3 µM of dNTPs, 0.04 U *Taq* DNA Polymerase (Fermentas), PCR buffer and nuclease free water to complete the volume. Amplification was performed in a PxEO.2 thermal cycler (Thermo Electron Corporation, U.S.A.) with an initial denaturation at 95°C for 5 min; 30 cycles consisting of 94 °C for 2 min, 70 °C for 1 min, and 72 °C for 1 min. *E. coli* K12 was used as the positive control, and nuclease free water as the negative control. The PCR products were separated by horizontal gel electrophoresis on a 1.8% agarose gel, stained in SYBR Safe DNA gel stain (Invitrogen Canada, Burlington, Canada) for 30 min, and the gel images were processed in a Gel Doc XR+ instrument (Bio-Rad, Canada). The expected amplicon size for a positive *uspA* sample was 884 bp. A BOX-PCR was then performed on these 'true' *E. coli* in order to track the animal source of their presence in the raw water.

### *Source Tracking of Fecal Bacteria*

The BOX-PCR reaction was performed using 2 µM BOX A1R primer (5'-CTACGGCAAGGCGACGCTGACG-3', purchased from Invitrogen), 5 µL of whole cells as DNA templates, 2.5x 5 PRIME MasterMix (final concentrations in the PCR reaction of 1.25 U *Taq* DNA Polymerase, 50 mM KCl, 30 mM Tris-HCl, 1.5 mM Mg<sup>2+</sup>, 0.1% Igepal®-CA360, and 200 µM of each dNTP), and nuclease free water. Amplification was performed in the same PxEO.2 thermal cycler, with an initial denaturation at 95°C for 2 min; 30 cycles consisting of 94 °C for 3 sec, 92 °C for 30 sec, 50 °C for 1 min, and 65 °C for 8 min; followed by a single step extension at 65 °C for 8 min. *E. coli* K12 was used as the positive control, and nuclease free water as the negative control. The PCR products were separated by horizontal gel electrophoresis on a 1.8% agarose gel, stained in SYBR Safe DNA gel stain for 130 min, and the gel

images were processed in the Gel Doc XR+ instrument. The rep-PCR fingerprints of the isolates were normalized with a 1 kb plus DNA ladder (Fermentas Canada Inc., Burlington, CA) before the band patterns were captured by the Gel Doc XR+ image acquisition and analysis software.

#### *Statistical analysis of BOX-PCR DNA fingerprints*

*E. coli* DNA fingerprints from water samples were compared against our existing *E. coli* DNA fingerprints library which is composed 535 of fingerprints from different known animal sources collected in Canada. Our library contains BOX-PCR DNA fragment sizes between 250-bp and 8000-bp (showing distinctive DNA bands) from humans, horses, cows, dogs, raccoons, mule deers, black bears, coyotes, gulls, marmots, elks, and wolves.

Discriminant function analysis (unstandardized function coefficients; unexplained variance method; all groups equal prior probabilities, within groups covariance matrix, within groups correlation matrix, leave-one-out classification) was performed on the library BOX-PCR DNA fingerprints to determine the number and percentage of isolates from each known source that were classified in the correct source categories (SPSS, ver. 19.0 for Windows). For each known source, the percentage of isolates that were classified in the correct source category is named rate of correct classification (RCC) while the weighted average of the percentages of all isolates correctly classified in their source categories corresponds to the average rate of correct classification (ARCC). The leave-one-out classification or cross-validation is generated when the library isolates are self-crossed as both the calibration data set and test data set. The characteristics of the Bacterial Source Tracking (BST) library used in this study are summarized in **Table 1**. This BST Library presents an original RCC of 93.1 % and an overall cross-validation ARCC of 86.9 % for the 12 source groups' distribution.

After analyzing unknown samples with Discriminant Analysis, the probabilities of group membership were analyzed manually in Excel (Microsoft Office 2007) and a threshold of group membership was set at 0.80. If a sample presented a group membership probability in one of the source groups superior or equal to 0.80, then

it was classified in this group. If a sample presented a group membership probability inferior to 0.80, it was then assigned the Non-Identified (NI) tag.

Table 1. Characteristics of the Bacterial Source Tracking (BST) library used in this study

Animal Source	Number of library fingerprints	Original RCC %	Cross-Validation RCC %
Horse	38	100.0	97.4
Cow	55	100.0	100
Dog	45	100.0	100
Mule Deer	26	76.9	76.9
Elk	56	100.0	94.6
Wolf	60	90.0	85
Coyote	48	95.8	95.8
Black Bear	30	90.0	80
Marmot	53	100.0	98.1
Raccoon	37	100.0	100
Gull	28	85.7	64.3
Human	59	72.9	45.8
Total	535	93.1	86.9

ARCC

RCC = Rate of Correct Classification

ARCC = Average Rate of Correct Classification

## **Appendix C – Laboratory Reports**

## BST REPORT-KALAMALKA: Batch # 1 (May-27-2010)

Bacterial source tracking (SPSS discriminant function analysis) of fresh water samples (KALAMALKA)

Sample-ID	Sample location/type	Collection date	Analysis date	Probable source
6D65-1	North Kalamalka intake	May-11-2010	May-12-2010	Human
6D65-2	North Kalamalka intake	May-11-2010	May-12-2010	Elk
6D65-4	North Kalamalka intake	May-11-2010	May-12-2010	Gull
6D65-5	North Kalamalka intake	May-11-2010	May-12-2010	Gull
6D65-6	North Kalamalka intake	May-11-2010	May-12-2010	Dog
6D65-9	North Kalamalka intake	May-11-2010	May-12-2010	Black Bear
6CC6-1	East Kalamalka intake	May-11-2010	May-12-2010	Human

We filtered (0.45µm pore size membrane filter) and incubated 2 duplicates, one of each sample, plus a duplicate of negative control (autoclaved double distilled water) on m-coli blue (a differential medium for *E. coli*) at 37°C for 24h.

For sample 6D65, out of all (11) colonies (on the plate) analyzed for molecular identification by *uspA*-PCR, 6 were identified as true *E. coli*. Those 6 isolates were used in the BST analysis.

For sample 6CC6, only 1 colony grew on the plate. It was analyzed by *uspA*-PCR and was identified as true *E. coli*. That isolate was used in the BST analysis.

This BST analysis was done with the new update of the library with the addition of 3 sources (Wolf, Coyote, and Marmot) in addition to Horse, Cow, Dog, Mule Deer, Raccoon, Gull, Canadian Goose, Duck, Song bird, and Human.

### BST REPORT-KALAMALKA: Batch # 1 (May-25-2010)

Bacterial source tracking (SPSS discriminant function analysis) of fresh water samples (KALAMALKA)

Sample-ID	Sample location/type	Collection date	Analysis date	Probable source
6D65	North Kalamalka intake	May-25-2010	May-27-2010	Human

We filtered (0.45µm pore size membrane filter) and incubated 2 duplicates, one of each sample, plus a duplicate of negative control (autoclaved double distilled water) on m-coli blue (a differential medium for *E. coli*) at 37°C for 24h.

Only 1 colony grew on the filtration plate. It was analyzed by *uspA*-PCR and was identified as true *E. coli*. That isolate was used in the BST analysis.

This BST analysis was done with the DNA fingerprint library composed of Horse, Cow, Dog, Mule Deer, Raccoon, Gull, Canadian Goose, Duck, Song bird, Wolf, Coyote, Marmot and Human.

### BST REPORT-KALAMALKA: Batch # 3 (June-08-2010)

Bacterial Source Tracking (SPSS Discriminant Function Analysis) - Fresh Water Samples (KALAMALKA)

Sample ID / Colony #	Sample Location	Date of Collection	Date of Analysis	Probable Source
6D65-1	North Kalamalka Intake	June 8, 2010	June 9, 2010	Black Bear
6D65-2	North Kalamalka Intake	June 8, 2010	June 9, 2010	Horse
6CC6-1	East Kalamalka Intake	June 8, 2010	June 9, 2010	Mule Deer

For each sample, two duplicates of 100-mL water were filtered through a sterile 0.45 µm gridded membrane filter. Filter membrane was placed on m-coliBlue absorbent pad in petri dish. Samples were incubated at 37°C for 24 hours before bacteria enumeration.

For sample 6D65, 2 CFU/ 100 mL were confirmed positive as *E.coli*.

For sample 6CC6, 1 CFU/100 mL was confirmed positive as *E.coli*.

### **BST REPORT-KALAMALKA: Batch # 4 (June-22-2010)**

Bacterial Source Tracking (SPSS Discriminant Function Analysis) - Fresh Water Samples  
(KALAMALKA)

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<b>Sample ID / Colony #</b>	<b>Sample Location</b>	<b>Date of Collection</b>	<b>Date of Analysis</b>	<b>Probable Source</b>
6D65-1	North Kalamalka Intake	June 22, 2010	June 24, 2010	Gull

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For each sample, two duplicates of 100-mL water were filtered through a sterile 0.45 µm gridded membrane filter. Filter membrane was placed on m-coliBlue absorbent pad in petri dish. Samples were incubated at 37°C for 24 hours before bacteria enumeration.

For sample 6D65, 1 CFU/ 100 mL were confirmed positive as *E.coli*.

### **BST REPORT-KALAMALKA: Batch # 5 (July-13-2010)**

Bacterial Source Tracking (SPSS Discriminant Function Analysis) - Fresh Water Samples  
(KALAMALKA)

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<b>Sample ID / Colony #</b>	<b>Sample Location</b>	<b>Date of Collection</b>	<b>Date of Analysis</b>	<b>Probable Source</b>
6CC6-2	East Kalamalka Intake	July 13, 2010	July 15, 2010	Dog
6CC6-4	East Kalamalka Intake	July 13, 2010	July 15, 2010	Dog
6CC6-5	East Kalamalka Intake	July 13, 2010	July 15, 2010	Mule Deer

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For each sample, two duplicates of 100-mL water were filtered through a sterile 0.45 µm gridded membrane filter. Filter membrane was placed on m-coliBlue absorbent pad in petri dish. Samples were incubated at 37°C for 24 hours before bacteria enumeration.

For sample 6CC6, 3 CFU/ 100 mL were confirmed positive as *E.coli*.

### **BST REPORT-KALAMALKA: Batch # 7 (August-10-2010)**

Bacterial Source Tracking (SPSS Discriminant Function Analysis) - Fresh Water Samples  
(KALAMALKA)

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<b>Sample ID / Colony #</b>	<b>Sample Location</b>	<b>Date of Collection</b>	<b>Date of Analysis</b>	<b>Probable Source</b>
6CC6-7	East Kalamalka Intake	August 10, 2010	August 12, 2010	Racoon

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For each sample, two duplicates of 100-mL water were filtered through a sterile 0.45 µm gridded membrane filter. Filter membrane was placed on m-coliBlue absorbent pad in petri dish. Samples were incubated at 37°C for 24 hours before bacteria enumeration.

For sample 6CC6, 1 CFU/ 100 mL was confirmed positive as *E.coli*.

### **BST REPORT-KALAMALKA: Batch # 8 (Augst-24-2010)**

Bacterial Source Tracking (SPSS Discriminant Function Analysis) - Fresh Water Samples  
(KALAMALKA)

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<b>Sample ID / Colony #</b>	<b>Sample Location</b>	<b>Date of Collection</b>	<b>Date of Analysis</b>	<b>Probable Source</b>
6D65 - 1	North Kalamalka Intake	August 24, 2010	August 25, 2010	Black Bear
6D65 - 2	North kalamalka Intake	August 24, 2010	August 25, 2010	Elk
6D65 - 3	North kalamalka Intake	August 24, 2010	August 25, 2010	Wolf
6D65 - 4	North kalamalka Intake	August 24, 2010	August 25, 2010	Human

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For each sample, two duplicates of 100-mL water were filtered through a sterile 0.45 µm gridded membrane filter. Filter membrane was placed on m-coliBlue absorbent pad in petri dish. Samples were incubated at 37°C for 24 hours before bacteria enumeration.

For sample 6D65, 4 CFU/ 100 mL were confirmed positive as *E.coli*.

## BST REPORT-KALAMALKA: Batch # 9 (September-07-2010)

Bacterial Source Tracking (SPSS Discriminant Function Analysis) - Fresh Water Samples  
(KALAMALKA)

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Sample ID / Colony #	Sample Location	Date of Collection	Date of Analysis	Probable Source
6D65 - 6	North Kalamalka Intake	September 7, 2010	September 8, 2010	Horse

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For each sample, two duplicates of 100-mL water were filtered through a sterile 0.45 µm gridded membrane filter. Filter membrane was placed on m-coliBlue absorbent pad in petri dish. Samples were incubated at 37°C for 24 hours before bacteria enumeration.

For sample 6D65, 1 CFU/ 100 mL were confirmed positive as *E.coli*.

## BST REPORT-KALAMALKA: Batch # 10 (September-21-2010)

Bacterial Source Tracking (SPSS Discriminant Function Analysis) - Fresh Water Samples  
(KALAMALKA)

Sample ID / Colony #	Sample Location	Date of Collection	Date of Analysis	Probable Source
6D65 – 2	North Kalamalka Intake	21-Sep-10	23-Sep-10	Gull
6D65 – 3	North Kalamalka Intake	21-Sep-10	23-Sep-10	Dog
6D65 – 4	North Kalamalka Intake	21-Sep-10	23-Sep-10	Gull
6D65 – 5	North Kalamalka Intake	21-Sep-10	23-Sep-10	Black Bear
6D65 – 6	North Kalamalka Intake	21-Sep-10	23-Sep-10	Black Bear
6D65 – 7	North Kalamalka Intake	21-Sep-10	23-Sep-10	Horse
6D65 – 8	North Kalamalka Intake	21-Sep-10	23-Sep-10	Human
6D65 – 9	North Kalamalka Intake	21-Sep-10	23-Sep-10	Horse
6D65 – 10	North Kalamalka Intake	21-Sep-10	23-Sep-10	Dog
6CC6– 1	East Kalamalka Intake	21-Sep-10	23-Sep-10	Gull
6CC6 – 2	East Kalamalka Intake	21-Sep-10	23-Sep-10	Horse
6CC6 – 3	East Kalamalka Intake	21-Sep-10	23-Sep-10	Human

For each sample, two duplicates of 100-mL water were filtered through a sterile 0.45 µm gridded membrane filter. Filter membrane was placed on m-coliBlue absorbent pad in petri dish. Samples were incubated at 37°C for 24 hours before bacteria enumeration.

For sample 6D65, 9 CFU/ 100 mL were confirmed positive as *E.coli*.

For sample 6CC6, 3 CFU/ 100 mL were confirmed positive as *E.coli*.

### BST REPORT-KALAMALKA: Batch # 11 (October-05-2010)

Bacterial Source Tracking (SPSS Discriminant Function Analysis) - Fresh Water Samples  
(KALAMALKA)

Sample ID / Colony #	Sample Location	Date of Collection	Date of Analysis	Probable Source
6D65 – 1	North Kalamalka Intake	5-Oct-10	6-Oct-10	Dog
6D65 – 2	North Kalamalka Intake	5-Oct-10	6-Oct-10	Dog
6D65 – 3	North Kalamalka Intake	5-Oct-10	6-Oct-10	Human
6D65 – 4	North Kalamalka Intake	5-Oct-10	6-Oct-10	Gull
6D65 – 5	North Kalamalka Intake	5-Oct-10	6-Oct-10	Gull
6D65 – 6	North Kalamalka Intake	5-Oct-10	6-Oct-10	Human
6D65 – 7	North Kalamalka Intake	5-Oct-10	6-Oct-10	Horse
6D65 – 8	North Kalamalka Intake	5-Oct-10	6-Oct-10	Mule Deer
6D65 – 9	North Kalamalka Intake	5-Oct-10	6-Oct-10	Black Bear
6D65 – 10	North Kalamalka Intake	5-Oct-10	6-Oct-10	Black Bear

For each sample, two duplicates of 100-mL water were filtered through a sterile 0.45 µm gridded membrane filter. Filter membrane was placed on m-coliBlue absorbent pad in petri dish. Samples were incubated at 37°C for 24 hours before bacteria enumeration.

For sample 6D65, 10 CFU/ 100 mL were confirmed positive as *E.coli*.

### BST REPORT-KALAMALKA: Batch # 12 (October-12-2010)

Bacterial Source Tracking (SPSS Discriminant Function Analysis) - Fresh Water Samples  
(KALAMALKA)

Sample ID / Colony #	Sample Location	Date of Collection	Date of Analysis	Probable Source
6D65 – 3	North Kalamalka Intake	12-Oct-10	13-Oct-10	Human
6D65 – 7	North Kalamalka Intake	12-Oct-10	13-Oct-10	Coyote

For each sample, two duplicates of 100-mL water were filtered through a sterile 0.45 µm gridded membrane filter. Filter membrane was placed on m-coliBlue absorbent pad in petri dish. Samples were incubated at 37°C for 24 hours before bacteria enumeration.

For sample 6D65, 2 CFU/ 100 mL were confirmed positive as *E.coli*.

### BST REPORT-KALAMALKA: Batch # 13 (October-19-2010)

Bacterial Source Tracking (SPSS Discriminant Function Analysis) - Fresh Water Samples  
(KALAMALKA)

Sample ID / Colony #	Sample Location	Date of Collection	Date of Analysis	Probable Source
6D65 – 4	North Kalamalka Intake	19-Oct-10	21-Oct-10	Wolf
6D65 – 5	North Kalamalka Intake	19-Oct-10	21-Oct-10	Mule Deer
6D65 – 7	North Kalamalka Intake	19-Oct-10	21-Oct-10	Mule Deer

For each sample, two duplicates of 100-mL water were filtered through a sterile 0.45 µm gridded membrane filter. Filter membrane was placed on m-coliBlue absorbent pad in petri dish. Samples were incubated at 37°C for 24 hours before bacteria enumeration.

For sample 6D65, 3 CFU/ 100 mL were confirmed positive as *E.coli*.

### BST REPORT-KALAMALKA: Batch # 14 (October-26-2010)

Bacterial Source Tracking (SPSS Discriminant Function Analysis) - Fresh Water Samples  
(KALAMALKA)

Sample ID / Colony #	Sample Location	Date of Collection	Date of Analysis	Probable Source
6D65 – 1	North Kalamalka Intake	26-Oct-10	27-Oct-10	Human
6D65 – 2	North Kalamalka Intake	26-Oct-10	27-Oct-10	Human
6D65 – 3	North Kalamalka Intake	26-Oct-10	27-Oct-10	Gull
6D65 – 4	North Kalamalka Intake	26-Oct-10	27-Oct-10	Human
6D65 – 5	North Kalamalka Intake	26-Oct-10	27-Oct-10	Gull
6D65 – 7	North Kalamalka Intake	26-Oct-10	27-Oct-10	Human
6D65 – 8	North Kalamalka Intake	26-Oct-10	27-Oct-10	Human

For each sample, two duplicates of 100-mL water were filtered through a sterile 0.45 µm gridded membrane filter. Filter membrane was placed on m-coliBlue absorbent pad in petri dish. Samples were incubated at 37°C for 24 hours before bacteria enumeration.

For sample 6D65, 7 CFU/ 100 mL were confirmed positive as *E.coli*.



### **BST REPORT-KALAMALKA: Batch # 15 (November-02-2010)**

Bacterial Source Tracking (SPSS Discriminant Function Analysis) - Fresh Water Samples  
(KALAMALKA)

<b>Sample ID / Colony #</b>	<b>Sample Location</b>	<b>Date of Collection</b>	<b>Date of Analysis</b>	<b>Probable Source</b>
6D65 – 2	North Kalamalka Intake	2-Nov-10	4-Nov-10	Black Bear
6D65 – 6	North Kalamalka Intake	2-Nov-10	4-Nov-10	Gull
6D65 – 7	North Kalamalka Intake	2-Nov-10	4-Nov-10	Human

For each sample, two duplicates of 100-mL water were filtered through a sterile 0.45 µm gridded membrane filter. Filter membrane was placed on m-coliBlue absorbent pad in petri dish. Samples were incubated at 37°C for 24 hours before bacteria enumeration.

For sample 6D65, 3 CFU/ 100 mL were confirmed positive as *E.coli*.

### **BST REPORT-KALAMALKA: Batch # 16 (November-09-2010)**

Bacterial Source Tracking (SPSS Discriminant Function Analysis) - Fresh Water Samples  
(KALAMALKA)

<b>Sample ID / Colony #</b>	<b>Sample Location</b>	<b>Date of Collection</b>	<b>Date of Analysis</b>	<b>Probable Source</b>
6D65 – 1	North Kalamalka Intake	9-Nov-10	10-Nov-10	Gull
6D65 – 2	North Kalamalka Intake	9-Nov-10	10-Nov-10	Gull
6D65 – 3	North Kalamalka Intake	9-Nov-10	10-Nov-10	Human
6CC6 – 2	East Kalamalka Intake	9-Nov-10	10-Nov-10	Gull
6CC6 – 3	East Kalamalka Intake	9-Nov-10	10-Nov-10	Raccoon
6CC6 – 6	East Kalamalka Intake	9-Nov-10	10-Nov-10	Human
6CC6 – 8	East Kalamalka Intake	9-Nov-10	10-Nov-10	Gull
6CC6 – 9	East Kalamalka Intake	9-Nov-10	10-Nov-10	Dog
6CC6 – 10	East Kalamalka Intake	9-Nov-10	10-Nov-10	Marmot

For each sample, two duplicates of 100-mL water were filtered through a sterile 0.45 µm gridded membrane filter. Filter membrane was placed on m-coliBlue absorbent pad in petri dish. Samples were incubated at 37°C for 24 hours before bacteria enumeration.

For sample 6D65, 3 CFU/ 100 mL were confirmed positive as *E.coli*.

For sample 6CC6, 6 CFU/ 100 mL were confirmed positive as *E.coli*

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**BST REPORT-KALAMALKA: Batch # 17 (November-16-2010)**

Bacterial Source Tracking (SPSS Discriminant Function Analysis) - Fresh Water Samples  
(KALAMALKA)

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Sample ID / Colony #	Sample Location	Date of Collection	Date of Analysis	Probable Source
6D65 – 5	North Kalamalka Intake	16-Nov-10	17-Nov-10	Gull
6D65 – 6	North Kalamalka Intake	16-Nov-10	17-Nov-10	Gull

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For each sample, two duplicates of 100-mL water were filtered through a sterile 0.45 µm gridded membrane filter. Filter membrane was placed on m-coliBlue absorbent pad in petri dish. Samples were incubated at 37°C for 24 hours before bacteria enumeration.

For sample 6D65, 2 CFU/ 100 mL were confirmed positive as *E.coli*.

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**BST REPORT-KALAMALKA: Batch # 18 (November-23-2010)**

Bacterial Source Tracking (SPSS Discriminant Function Analysis) - Fresh Water Samples  
(KALAMALKA)

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Sample ID / Colony #	Sample Location	Date of Collection	Date of Analysis	Probable Source
6D65 – 1	North Kalamalka Intake	23-Nov-10	24-Nov-10	Dog
6D65 – 2	North Kalamalka Intake	23-Nov-10	24-Nov-10	Dog
6D65 – 3	North Kalamalka Intake	23-Nov-10	24-Nov-10	Dog
6D65 – 4	North Kalamalka Intake	23-Nov-10	24-Nov-10	Raccoon

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For each sample, two duplicates of 100-mL water were filtered through a sterile 0.45 µm gridded membrane filter. Filter membrane was placed on m-coliBlue absorbent pad in petri dish. Samples were incubated at 37°C for 24 hours before bacteria enumeration.

For sample 6D65, 4 CFU/ 100 mL were confirmed positive as *E.coli*.

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### **BST REPORT-KALAMALKA: Batch # 19 (November-30-2010)**

Bacterial Source Tracking (SPSS Discriminant Function Analysis) - Fresh Water Samples  
(KALAMALKA)

<b>Sample ID / Colony #</b>	<b>Sample Location</b>	<b>Date of Collection</b>	<b>Date of Analysis</b>	<b>Probable Source</b>
6D65 – 1	North Kalamalka Intake	30-Nov-10	1-Dec-10	Unclassified
6D65 – 4	North Kalamalka Intake	30-Nov-10	1-Dec-10	Gull
6D65 – 5	North Kalamalka Intake	30-Nov-10	1-Dec-10	Coyote
6D65 – 7	North Kalamalka Intake	30-Nov-10	1-Dec-10	Horse
6D65 – 9	North Kalamalka Intake	30-Nov-10	1-Dec-10	Cow

For each sample, two duplicates of 100-mL water were filtered through a sterile 0.45 µm gridded membrane filter. Filter membrane was placed on m-coliBlue absorbent pad in petri dish. Samples were incubated at 37°C for 24 hours before bacteria enumeration.

For sample 6D65, 5 CFU/ 100 mL were confirmed positive as *E.coli*.

### **BST REPORT-KALAMALKA: Batch # 20 (December-7-2010)**

Bacterial Source Tracking (SPSS Discriminant Function Analysis) - Fresh Water Samples  
(KALAMALKA)

<b>Sample ID / Colony #</b>	<b>Sample Location</b>	<b>Date of Collection</b>	<b>Date of Analysis</b>	<b>Probable Source</b>
6D65 – 1	North Kalamalka Intake	7-Dec-10	8-Dec-10	Human
6D65 – 2	North Kalamalka Intake	7-Dec-10	8-Dec-10	Human
6D65 – 3	North Kalamalka Intake	7-Dec-10	8-Dec-10	Coyote
6D65 – 4	North Kalamalka Intake	7-Dec-10	8-Dec-10	Gull
6D65 – 5	North Kalamalka Intake	7-Dec-10	8-Dec-10	Gull
6D65 – 9	North Kalamalka Intake	7-Dec-10	8-Dec-10	Black Bear
6D65 – 10	North Kalamalka Intake	7-Dec-10	8-Dec-10	Gull

For each sample, two duplicates of 100-mL water were filtered through a sterile 0.45 µm gridded membrane filter. Filter membrane was placed on m-coliBlue absorbent pad in petri dish. Samples were incubated at 37°C for 24 hours before bacteria enumeration.

For sample 6D65, 7 CFU/ 100 mL were confirmed positive as *E.coli*.

### **BST REPORT-KALAMALKA: Batch # 21 (December-14-2010)**

Bacterial Source Tracking (SPSS Discriminant Function Analysis) - Fresh Water Samples  
(KALAMALKA)

<b>Sample ID / Colony #</b>	<b>Sample Location</b>	<b>Date of Collection</b>	<b>Date of Analysis</b>	<b>Probable Source</b>
6D65 – 1	North Kalamalka Intake	14-Dec-10	15-Dec-10	Human
6D65 – 2	North Kalamalka Intake	14-Dec-10	15-Dec-10	Gull
6D65 – 3	North Kalamalka Intake	14-Dec-10	15-Dec-10	Gull
6D65 – 4	North Kalamalka Intake	14-Dec-10	15-Dec-10	<i>Unknown</i>
6D65 – 5	North Kalamalka Intake	14-Dec-10	15-Dec-10	Gull
6CC6 – 1	East Kalamalka Intake	14-Dec-10	15-Dec-10	Black Bear
6CC6 – 2	East Kalamalka Intake	14-Dec-10	15-Dec-10	Dog

For each sample, two duplicates of 100-mL water were filtered through a sterile 0.45 µm gridded membrane filter. Filter membrane was placed on m-coliBlue absorbent pad in petri dish. Samples were incubated at 37°C for 24 hours before bacteria enumeration.

For sample 6D65, 5 CFU/ 100 mL were confirmed positive as *E.coli*.

For sample 6CC6, 2 CFU/ 100 mL were confirmed positive as *E.coli*.

### **BST REPORT-KALAMALKA: Batch # 22 (December-22-2010)**

Bacterial Source Tracking (SPSS Discriminant Function Analysis) - Fresh Water Samples  
(KALAMALKA)

<b>Sample ID / Colony #</b>	<b>Sample Location</b>	<b>Date of Collection</b>	<b>Date of Analysis</b>	<b>Probable Source</b>
6D65 – 1	North Kalamalka Intake	22-Dec-10	27-Dec-10	Horse

For each sample, two duplicates of 100-mL water were filtered through a sterile 0.45 µm gridded membrane filter. Filter membrane was placed on m-coliBlue absorbent pad in petri dish. Samples were incubated at 37°C for 24 hours before bacteria enumeration.

For sample 6D65, 1 CFU/ 100 mL were confirmed positive as *E.coli*.



### **BST REPORT-KALAMALKA: Batch # 23 (January-4-2011)**

Bacterial Source Tracking (SPSS Discriminant Function Analysis) - Fresh Water Samples  
(KALAMALKA)

<b>Sample ID / Colony #</b>	<b>Sample Location</b>	<b>Date of Collection</b>	<b>Date of Analysis</b>	<b>Probable Source</b>
6D65 – 1	North Kalamalka Intake	4-Jan-11	5-Jan-11	Black Bear
6D65 – 2	North Kalamalka Intake	4-Jan-11	5-Jan-11	Gull
6D65 – 3	North Kalamalka Intake	4-Jan-11	5-Jan-11	Gull
6D65 – 4	North Kalamalka Intake	4-Jan-11	5-Jan-11	Gull
6D65 – 8	North Kalamalka Intake	4-Jan-11	5-Jan-11	Dog

For each sample, two duplicates of 100-mL water were filtered through a sterile 0.45 µm gridded membrane filter. Filter membrane was placed on m-coliBlue absorbent pad in petri dish. Samples were incubated at 37°C for 24 hours before bacteria enumeration.

For sample 6D65, 5 CFU/ 100 mL were confirmed positive as *E.coli*.

### **BST REPORT-KALAMALKA: Batch # 24 (January-11-2011)**

Bacterial Source Tracking (SPSS Discriminant Function Analysis) - Fresh Water Samples  
(KALAMALKA)

<b>Sample ID / Colony #</b>	<b>Sample Location</b>	<b>Date of Collection</b>	<b>Date of Analysis</b>	<b>Probable Source</b>
6CC6 – 1	East Kalamalka Intake	11-Jan-11	12-Jan-11	Gull

For each sample, two duplicates of 100-mL water were filtered through a sterile 0.45 µm gridded membrane filter. Filter membrane was placed on m-coliBlue absorbent pad in petri dish. Samples were incubated at 37°C for 24 hours before bacteria enumeration.

For sample 6CC6, 1 CFU/ 100 mL were confirmed positive as *E.coli*.

### **BST REPORT-KALAMALKA: Batch # 25 (January-18-2011)**

Bacterial Source Tracking (SPSS Discriminant Function Analysis) - Fresh Water Samples  
(KALAMALKA)

<b>Sample ID / Colony #</b>	<b>Sample Location</b>	<b>Date of Collection</b>	<b>Date of Analysis</b>	<b>Probable Source</b>
6D65 – 4	North Kalamalka Intake	18-Jan-11	19-Jan-11	Human
6D65 – 5	North Kalamalka Intake	18-Jan-11	19-Jan-11	Gull
6D65 – 6	North Kalamalka Intake	18-Jan-11	19-Jan-11	Black Bear
6D65 – 7	North Kalamalka Intake	18-Jan-11	19-Jan-11	Black Bear
6D65 – 8	North Kalamalka Intake	18-Jan-11	19-Jan-11	Gull
6D65 – 9	North Kalamalka Intake	18-Jan-11	19-Jan-11	Black Bear

For each sample, two duplicates of 100-mL water were filtered through a sterile 0.45 µm gridded membrane filter. Filter membrane was placed on m-coliBlue absorbent pad in petri dish. Samples were incubated at 37°C for 24 hours before bacteria enumeration.

For sample 6D65, 6 CFU/ 100 mL were confirmed positive as *E.coli*.

### **BST REPORT-KALAMALKA: Batch # 26 (January-25-2011)**

Bacterial Source Tracking (SPSS Discriminant Function Analysis) - Fresh Water Samples  
(KALAMALKA)

<b>Sample ID / Colony #</b>	<b>Sample Location</b>	<b>Date of Collection</b>	<b>Date of Analysis</b>	<b>Probable Source</b>
6D65 – 1	North Kalamalka Intake	25-Jan-11	26-Jan-11	Horse
6D65 – 2	North Kalamalka Intake	25-Jan-11	26-Jan-11	Horse
6D65 – 8	North Kalamalka Intake	25-Jan-11	26-Jan-11	Black Bear

For each sample, two duplicates of 100-mL water were filtered through a sterile 0.45 µm gridded membrane filter. Filter membrane was placed on m-coliBlue absorbent pad in petri dish. Samples were incubated at 37°C for 24 hours before bacteria enumeration.

For sample 6D65, 3 CFU/ 100 mL were confirmed positive as *E.coli*.

## BST REPORT-KALAMALKA: Batch # 27 (February-01-2011)

Bacterial Source Tracking (SPSS Discriminant Function Analysis) - Fresh Water Samples  
(KALAMALKA)

Sample ID / Colony #	Sample Location	Date of Collection	Date of Analysis	Probable Source
6D65 – 1	North Kalamalka Intake	01-Feb-11	02-Feb-11	Gull
6D65 – 2	North Kalamalka Intake	01-Feb-11	02-Feb-11	Raccoon
6D65 – 3	North Kalamalka Intake	01-Feb-11	02-Feb-11	Gull
6D65 – 4	North Kalamalka Intake	01-Feb-11	02-Feb-11	Gull
6D65 – 5	North Kalamalka Intake	01-Feb-11	02-Feb-11	Cow
6D65 – 6	North Kalamalka Intake	01-Feb-11	02-Feb-11	Gull
6D65 – 7	North Kalamalka Intake	01-Feb-11	02-Feb-11	Black Bear
6D65 – 8	North Kalamalka Intake	01-Feb-11	02-Feb-11	<i>Unknown</i>
6D65 – 9	North Kalamalka Intake	01-Feb-11	02-Feb-11	Horse

For each sample, two duplicates of 100-mL water were filtered through a sterile 0.45 µm gridded membrane filter. Filter membrane was placed on m-coliBlue absorbent pad in petri dish. Samples were incubated at 37°C for 24 hours before bacteria enumeration.

For sample 6D65, 9 CFU/ 100 mL were confirmed positive as *E.coli*.

## BST REPORT-KALAMALKA: Batch # 28 (Feburary-08-2011)

Bacterial Source Tracking (SPSS Discriminant Function Analysis) - Fresh Water Samples  
(KALAMALKA)

Sample ID / Colony #	Sample Location	Date of Collection	Date of Analysis	Probable Source
6CC6 – 1	North Kalamalka Intake	01-Feb-11	02-Feb-11	Dog
6CC6 – 2	North Kalamalka Intake	01-Feb-11	02-Feb-11	Horse
6CC6 – 3	North Kalamalka Intake	01-Feb-11	02-Feb-11	Horse
6CC6 – 4	North Kalamalka Intake	01-Feb-11	02-Feb-11	Cow
6CC6 – 5	North Kalamalka Intake	01-Feb-11	02-Feb-11	Mule Deer
6CC6 – 6	North Kalamalka Intake	01-Feb-11	02-Feb-11	Cow
6CC6 – 7	North Kalamalka Intake	01-Feb-11	02-Feb-11	Cow
6CC6 – 9	North Kalamalka Intake	01-Feb-11	02-Feb-11	Horse
6D65 – 1	East Kalamalka Intake	01-Feb-11	02-Feb-11	Cow
6D65 – 3	East Kalamalka Intake	01-Feb-11	02-Feb-11	Black Bear
6D65 – 7	East Kalamalka Intake	01-Feb-11	02-Feb-11	Mule Deer

For each sample, two duplicates of 100-mL water were filtered through a sterile 0.45 µm gridded membrane filter. Filter membrane was placed on m-coliBlue absorbent pad in petri dish. Samples were incubated at 37°C for 24 hours before bacteria enumeration.

For sample 6CC6, 8 CFU/ 100 mL were confirmed positive as *E.coli*.  
For sample 6D65, 3 CFU/ 100 mL were confirmed positive as *E.coli*.

### **BST REPORT-KALAMALKA: Batch # 29 (February-15-2011)**

Bacterial Source Tracking (SPSS Discriminant Function Analysis) - Fresh Water Samples  
(KALAMALKA)

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<b>Sample ID / Colony #</b>	<b>Sample Location</b>	<b>Date of Collection</b>	<b>Date of Analysis</b>	<b>Probable Source</b>
6D65 – 1	North Kalamalka Intake	15-Feb-11	16-Feb-11	Cow

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For each sample, two duplicates of 100-mL water were filtered through a sterile 0.45 µm gridded membrane filter. Filter membrane was placed on m-coliBlue absorbent pad in petri dish. Samples were incubated at 37°C for 24 hours before bacteria enumeration.

For sample 6D65, 1 CFU/ 100 mL were confirmed positive as *E.coli*.

### **BST REPORT-KALAMALKA: Batch # 30 (February-22-2011)**

Bacterial Source Tracking (SPSS Discriminant Function Analysis) - Fresh Water Samples  
(KALAMALKA)

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<b>Sample ID / Colony #</b>	<b>Sample Location</b>	<b>Date of Collection</b>	<b>Date of Analysis</b>	<b>Probable Source</b>
6D65 – 8	North Kalamalka Intake	22-Feb-11	24-Feb-11	Horse

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For each sample, two duplicates of 100-mL water were filtered through a sterile 0.45 µm gridded membrane filter. Filter membrane was placed on m-coliBlue absorbent pad in petri dish. Samples were incubated at 37°C for 24 hours before bacteria enumeration.

For sample 6D65, 1 CFU/ 100 mL were confirmed positive as *E.coli*.

### **BST REPORT-KALAMALKA: Batch # 31 (March-1-2011)**

Bacterial Source Tracking (SPSS Discriminant Function Analysis) - Fresh Water Samples  
(KALAMALKA)

<b>Sample ID / Colony #</b>	<b>Sample Location</b>	<b>Date of Collection</b>	<b>Date of Analysis</b>	<b>Probable Source</b>
6D65 – 5	North Kalamalka Intake	1-Mar-11	2-Mar-11	Dog
6D65 – 9	North Kalamalka Intake	1-Mar-11	2-Mar-11	Human

For each sample, two duplicates of 100-mL water were filtered through a sterile 0.45 µm gridded membrane filter. Filter membrane was placed on m-coliBlue absorbent pad in petri dish. Samples were incubated at 37°C for 24 hours before bacteria enumeration.

For sample 6D65, 2 CFU/ 100 mL were confirmed positive as *E.coli*.

### **BST REPORT-KALAMALKA: Batch # 32 (March-9-2011)**

Bacterial Source Tracking (SPSS Discriminant Function Analysis) - Fresh Water Samples  
(KALAMALKA)

<b>Sample ID / Colony #</b>	<b>Sample Location</b>	<b>Date of Collection</b>	<b>Date of Analysis</b>	<b>Probable Source</b>
6D65 – 2	North Kalamalka Intake	9-Mar-11	10-Mar-11	Human
6D65 – 4	North Kalamalka Intake	9-Mar-11	10-Mar-11	Black Bear
6D65 – 9	North Kalamalka Intake	9-Mar-11	10-Mar-11	Gull

For each sample, two duplicates of 100-mL water were filtered through a sterile 0.45 µm gridded membrane filter. Filter membrane was placed on m-coliBlue absorbent pad in petri dish. Samples were incubated at 37°C for 24 hours before bacteria enumeration.

For sample 6D65, 3 CFU/ 100 mL were confirmed positive as *E.coli*.



### **BST REPORT-KALAMALKA: Batch # 33 (March-15-2011)**

Bacterial Source Tracking (SPSS Discriminant Function Analysis) - Fresh Water Samples  
(KALAMALKA)

<b>Sample ID / Colony #</b>	<b>Sample Location</b>	<b>Date of Collection</b>	<b>Date of Analysis</b>	<b>Probable Source</b>
6CC6 – 1	North Kalamalka Intake	15-Mar-11	17-Mar-11	Horse
6D65 – 2	North Kalamalka Intake	15-Mar-11	17-Mar-11	unknown

For each sample, two duplicates of 100-mL water were filtered through a sterile 0.45 µm gridded membrane filter. Filter membrane was placed on m-coliBlue absorbent pad in petri dish. Samples were incubated at 37°C for 24 hours before bacteria enumeration.

For sample 6CC6, 1 CFU/ 100 mL were confirmed positive as *E.coli*.

For sample 6D65, 1 CFU/ 100 mL were confirmed positive as *E.coli*.

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### **BST REPORT-KALAMALKA: Batch # 34 (March-22-2011)**

Bacterial Source Tracking (SPSS Discriminant Function Analysis) - Fresh Water Samples  
(KALAMALKA)

<b>Sample ID / Colony #</b>	<b>Sample Location</b>	<b>Date of Collection</b>	<b>Date of Analysis</b>	<b>Probable Source</b>
6D65 – 1	North Kalamalka Intake	22-Mar-11	23-Mar-11	Cow

For each sample, two duplicates of 100-mL water were filtered through a sterile 0.45 µm gridded membrane filter. Filter membrane was placed on m-coliBlue absorbent pad in petri dish. Samples were incubated at 37°C for 24 hours before bacteria enumeration.

For sample 6D65, 1 CFU/ 100 mL were confirmed positive as *E.coli*.

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### **BST REPORT-KALAMALKA: Batch # 35 (March-29-2011)**

Bacterial Source Tracking (SPSS Discriminant Function Analysis) - Fresh Water Samples  
(KALAMALKA)

<b>Sample ID / Colony #</b>	<b>Sample Location</b>	<b>Date of Collection</b>	<b>Date of Analysis</b>	<b>Probable Source</b>
6D65 – 1	North Kalamalka Intake	29-Mar-11	31-Mar-11	Human
6D65 – 2	North Kalamalka Intake	29-Mar-11	31-Mar-11	Cow
6D65 – 3	North Kalamalka Intake	29-Mar-11	31-Mar-11	Unknown

For each sample, two duplicates of 100-mL water were filtered through a sterile 0.45 µm gridded membrane filter. Filter membrane was placed on m-coliBlue absorbent pad in petri dish. Samples were incubated at 37°C for 24 hours before bacteria enumeration.

For sample 6D65, 3 CFU/ 100 mL were confirmed positive as *E.coli*.

### **BST REPORT-KALAMALKA: Batch # 36 (April-05-2011)**

Bacterial Source Tracking (SPSS Discriminant Function Analysis) - Fresh Water Samples  
(KALAMALKA)

<b>Sample ID / Colony #</b>	<b>Sample Location</b>	<b>Date of Collection</b>	<b>Date of Analysis</b>	<b>Probable Source</b>
6D65 – 1	North Kalamalka Intake	05-Apr-11	07-Apr-11	Marmot

For each sample, two duplicates of 100-mL water were filtered through a sterile 0.45 µm gridded membrane filter. Filter membrane was placed on m-coliBlue absorbent pad in petri dish. Samples were incubated at 37°C for 24 hours before bacteria enumeration.

For sample 6D65, 1 CFU/ 100 mL were confirmed positive as *E.coli*.

### **BST REPORT-KALAMALKA: Batch # 37 (April-12-2011)**

Bacterial Source Tracking (SPSS Discriminant Function Analysis) - Fresh Water Samples  
(KALAMALKA)

<b>Sample ID / Colony #</b>	<b>Sample Location</b>	<b>Date of Collection</b>	<b>Date of Analysis</b>	<b>Probable Source</b>
No E.coli		12-Apr-11	14-Apr-11	

No E.coli grown.

### **BST REPORT-KALAMALKA: Batch # 38 (April-19-2011)**

Bacterial Source Tracking (SPSS Discriminant Function Analysis) - Fresh Water Samples  
(KALAMALKA)

<b>Sample ID / Colony #</b>	<b>Sample Location</b>	<b>Date of Collection</b>	<b>Date of Analysis</b>	<b>Probable Source</b>
6D65 – 1	North Kalamalka Intake	19-Apr-11	20-Apr-11	Horse
6D65 – 2	North Kalamalka Intake	19-Apr-11	20-Apr-11	Horse
6D65 – 4	North Kalamalka Intake	19-Apr-11	20-Apr-11	Unknown
6D65 – 6	North Kalamalka Intake	19-Apr-11	20-Apr-11	Horse
6D65 – 7	North Kalamalka Intake	19-Apr-11	20-Apr-11	Horse
6D65 – 8	North Kalamalka Intake	19-Apr-11	20-Apr-11	Coyote
6D65 – 9	North Kalamalka Intake	19-Apr-11	20-Apr-11	Cow

For each sample, two duplicates of 100-mL water were filtered through a sterile 0.45 µm gridded membrane filter. Filter membrane was placed on m-coliBlue absorbent pad in petri dish. Samples were incubated at 37°C for 24 hours before bacteria enumeration.

For sample 6D65, 7 CFU/ 100 mL were confirmed positive as *E.coli*.



### **BST REPORT-KALAMALKA: Batch # 39 (April-26-2011)**

Bacterial Source Tracking (SPSS Discriminant Function Analysis) - Fresh Water Samples  
(KALAMALKA)

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<b>Sample ID / Colony #</b>	<b>Sample Location</b>	<b>Date of Collection</b>	<b>Date of Analysis</b>	<b>Probable Source</b>
6D65 – 1	North Kalamalka Intake	26-Apr-11	27-Apr-11	Human

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For each sample, two duplicates of 100-mL water were filtered through a sterile 0.45 µm gridded membrane filter. Filter membrane was placed on m-coliBlue absorbent pad in petri dish. Samples were incubated at 37°C for 24 hours before bacteria enumeration.

For sample 6D65, 1 CFU/ 100 mL were confirmed positive as *E.coli*.

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### **BST REPORT-KALAMALKA: Batch # 40 (May-3-2011)**

Bacterial Source Tracking (SPSS Discriminant Function Analysis) - Fresh Water Samples  
(KALAMALKA)

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<b>Sample ID / Colony #</b>	<b>Sample Location</b>	<b>Date of Collection</b>	<b>Date of Analysis</b>	<b>Probable Source</b>
6D65 – 1	North Kalamalka Intake	3-May-11	4-May-11	Black Bear

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For each sample, two duplicates of 100-mL water were filtered through a sterile 0.45 µm gridded membrane filter. Filter membrane was placed on m-coliBlue absorbent pad in petri dish. Samples were incubated at 37°C for 24 hours before bacteria enumeration.

For sample 6D65, 1 CFU/ 100 mL were confirmed positive as *E.coli*.

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### **BST REPORT-KALAMALKA: Batch # 41 (May-10-2011)**

Bacterial Source Tracking (SPSS Discriminant Function Analysis) - Fresh Water Samples  
(KALAMALKA)

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<b>Sample ID / Colony #</b>	<b>Sample Location</b>	<b>Date of Collection</b>	<b>Date of Analysis</b>	<b>Probable Source</b>
6D65 – 1	North Kalamalka Intake	10-May-11	11-May-11	Human

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For each sample, two duplicates of 100-mL water were filtered through a sterile 0.45 µm gridded membrane filter. Filter membrane was placed on m-coliBlue absorbent pad in petri dish. Samples were incubated at 37°C for 24 hours before bacteria enumeration.

For sample 6D65, 1 CFU/ 100 mL were confirmed positive as *E.coli*.

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### **BST REPORT-KALAMALKA: Batch # 42 (May-17-2011)**

Bacterial Source Tracking (SPSS Discriminant Function Analysis) - Fresh Water Samples  
(KALAMALKA)

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<b>Sample ID / Colony #</b>	<b>Sample Location</b>	<b>Date of Collection</b>	<b>Date of Analysis</b>	<b>Probable Source</b>
6D65 – 1	North Kalamalka Intake	17-May-11	18-May-11	Human

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For each sample, two duplicates of 100-mL water were filtered through a sterile 0.45 µm gridded membrane filter. Filter membrane was placed on m-coliBlue absorbent pad in petri dish. Samples were incubated at 37°C for 24 hours before bacteria enumeration.

For sample 6D65, 1 CFU/ 100 mL were confirmed positive as *E.coli*.

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### **BST REPORT-KALAMALKA: Batch # 43 (May-24-2011)**

Bacterial Source Tracking (SPSS Discriminant Function Analysis) - Fresh Water Samples  
(KALAMALKA)

<b>Sample ID / Colony #</b>	<b>Sample Location</b>	<b>Date of Collection</b>	<b>Date of Analysis</b>	<b>Probable Source</b>
6D65 – 1	North Kalamalka Intake	24-May-11	25-May-11	NI
6D65 – 2	North Kalamalka Intake	24-May-11	25-May-11	Horse
6D65 – 3	North Kalamalka Intake	24-May-11	25-May-11	Human
6D65 – 4	North Kalamalka Intake	24-May-11	25-May-11	Human
6D65 – 5	North Kalamalka Intake	24-May-11	25-May-11	Wolf

For each sample, two duplicates of 100-mL water were filtered through a sterile 0.45 µm gridded membrane filter. Filter membrane was placed on m-coliBlue absorbent pad in petri dish. Samples were incubated at 37°C for 24 hours before bacteria enumeration.

For sample 6D65, 5 CFU/ 100 mL were confirmed positive as *E.coli*.

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NI = Not Identified

### **BST REPORT-KALAMALKA: Batch # 45 (June-6-2011)**

Bacterial Source Tracking (SPSS Discriminant Function Analysis) - Fresh Water Samples  
(KALAMALKA)

<b>Sample ID / Colony #</b>	<b>Sample Location</b>	<b>Date of Collection</b>	<b>Date of Analysis</b>	<b>Probable Source</b>
6D65 – 1	North Kalamalka Intake	6-Jun-11	7-Jun-11	Mule Deer

For each sample, two duplicates of 100-mL water were filtered through a sterile 0.45 µm gridded membrane filter. Filter membrane was placed on m-coliBlue absorbent pad in petri dish. Samples were incubated at 37°C for 24 hours before bacteria enumeration.

For sample 6D65, 1 CFU/ 100 mL were confirmed positive as *E.coli*.

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### **BST REPORT-KALAMALKA: Batch # 46 (June-14-2011)**

Bacterial Source Tracking (SPSS Discriminant Function Analysis) - Fresh Water Samples  
(KALAMALKA)

<b>Sample ID / Colony #</b>	<b>Sample Location</b>	<b>Date of Collection</b>	<b>Date of Analysis</b>	<b>Probable Source</b>
6D65 – 1	North Kalamalka Intake	14-Jun-11	15-Jun-11	Human
6D65 – 2	North Kalamalka Intake	14-Jun-11	15-Jun-11	Horse

For each sample, two duplicates of 100-mL water were filtered through a sterile 0.45 µm gridded membrane filter. Filter membrane was placed on m-coliBlue absorbent pad in petri dish. Samples were incubated at 37°C for 24 hours before bacteria enumeration.

For sample 6D65, 2 CFU/ 100 mL were confirmed positive as *E.coli*.

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### **BST REPORT-KALAMALKA: Batch # 47 (June-21-2011)**

Bacterial Source Tracking (SPSS Discriminant Function Analysis) - Fresh Water Samples  
(KALAMALKA)

<b>Sample ID / Colony #</b>	<b>Sample Location</b>	<b>Date of Collection</b>	<b>Date of Analysis</b>	<b>Probable Source</b>
6D65 – 1	North Kalamalka Intake	21-Jun-11	22-Jun-11	Horse
6D65 – 2	North Kalamalka Intake	21-Jun-11	22-Jun-11	Gull
6D65 – 3	North Kalamalka Intake	21-Jun-11	22-Jun-11	Black bear
6D65 – 4	North Kalamalka Intake	21-Jun-11	22-Jun-11	Dog
6D65 – 5	North Kalamalka Intake	21-Jun-11	22-Jun-11	Gull

For each sample, two duplicates of 100-mL water were filtered through a sterile 0.45 µm gridded membrane filter. Filter membrane was placed on m-coliBlue absorbent pad in petri dish. Samples were incubated at 37°C for 24 hours before bacteria enumeration.

For sample 6D65, 5 CFU/ 100 mL were confirmed positive as *E.coli*.

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### **BST REPORT-KALAMALKA: Batch # 48 (June-28-2011)**

Bacterial Source Tracking (SPSS Discriminant Function Analysis) - Fresh Water Samples  
(KALAMALKA)

<b>Sample ID / Colony #</b>	<b>Sample Location</b>	<b>Date of Collection</b>	<b>Date of Analysis</b>	<b>Probable Source</b>
6D65 – 1	North Kalamalka Intake	28-Jun-11	29-Jun-11	Horse
6D65 – 2	North Kalamalka Intake	28-Jun-11	29-Jun-11	Mule deer
6D65 – 3	North Kalamalka Intake	28-Jun-11	29-Jun-11	Coyote

For each sample, two duplicates of 100-mL water were filtered through a sterile 0.45 µm gridded membrane filter. Filter membrane was placed on m-coliBlue absorbent pad in petri dish. Samples were incubated at 37°C for 24 hours before bacteria enumeration.

For sample 6D65, 3 CFU/ 100 mL were confirmed positive as *E.coli*.

### **BST REPORT-KALAMALKA: Batch # 49 (July-12-2011)**

Bacterial Source Tracking (SPSS Discriminant Function Analysis) - Fresh Water Samples  
(KALAMALKA)

<b>Sample ID / Colony #</b>	<b>Sample Location</b>	<b>Date of Collection</b>	<b>Date of Analysis</b>	<b>Probable Source</b>
6D65 – 1	North Kalamalka Intake	12-Jul-11	13-Jul-11	NI

For each sample, two duplicates of 100-mL water were filtered through a sterile 0.45 µm gridded membrane filter. Filter membrane was placed on m-coliBlue absorbent pad in petri dish. Samples were incubated at 37°C for 24 hours before bacteria enumeration.

For sample 6D65, 1 CFU/ 100 mL were confirmed positive as *E.coli*.

**BST REPORT-KALAMALKA: Batch # 50 (July-26-2011) # 51 (August-9-2011)  
 # 52 (August-18-2011) # 53 (August-23-2011)  
 # 54 (August-30-2011) # 55 (September-13-2011)**

Bacterial Source Tracking (SPSS Discriminant Function Analysis) - Fresh Water Samples  
 (KALAMALKA)

Sample ID	Colony No.	Sample Location	Date of Sampling	Date of Analysis	Probable Source
6D65 260711	1	North Kal Intake	26-Jul-11	27-Jul-11	Dog
	2	North Kal Intake	26-Jul-11	27-Jul-11	Gull
	3	North Kal Intake	26-Jul-11	27-Jul-11	Gull
	4	North Kal Intake	26-Jul-11	27-Jul-11	Human
6D65 090811	1	North Kal Intake	09-Aug-11	10-Aug-11	Dog
6D65 180811	1	North Kal Intake	18-Aug-11	19-Aug-11	Gull
	2	North Kal Intake	18-Aug-11	19-Aug-11	Gull
	3	North Kal Intake	18-Aug-11	19-Aug-11	Cow
6D65 230811	1	North Kal Intake	23-Aug-11	24-Aug-11	Gull
	2	North Kal Intake	23-Aug-11	24-Aug-11	Gull
	3	North Kal Intake	23-Aug-11	24-Aug-11	Human
	4	North Kal Intake	23-Aug-11	24-Aug-11	Horse
	5	North Kal Intake	23-Aug-11	24-Aug-11	Marmot
	6	North Kal Intake	23-Aug-11	24-Aug-11	Gull
	7	North Kal Intake	23-Aug-11	24-Aug-11	Human
	8	North Kal Intake	23-Aug-11	24-Aug-11	Dog
6D65 300811	1	North Kal Intake	30-Aug-11	31-Aug-11	Coyote
	2	North Kal Intake	30-Aug-11	31-Aug-11	Human
	3	North Kal Intake	30-Aug-11	31-Aug-11	NI
	4	North Kal Intake	30-Aug-11	31-Aug-11	Black bear
	5	North Kal Intake	30-Aug-11	31-Aug-11	Black bear
	6	North Kal Intake	30-Aug-11	31-Aug-11	Black bear
	7	North Kal Intake	30-Aug-11	31-Aug-11	NI
	8	North Kal Intake	30-Aug-11	31-Aug-11	NI

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Bacterial Source Tracking (SPSS Discriminant Function Analysis) - Fresh Water Samples  
(KALAMALKA)

Sample ID	Colony No.	Sample Location	Data of Sampling	Date of Analysis	Probable Source
6D65 130911	3	North Kal Intake	13-Sep-11	14-Sep-11	NI
	4	North Kal Intake	13-Sep-11	14-Sep-11	Dog
	5	North Kal Intake	13-Sep-11	14-Sep-11	Mule deer
	7	North Kal Intake	13-Sep-11	14-Sep-11	Human
	9	North Kal Intake	13-Sep-11	14-Sep-11	Dog
	10	North Kal Intake	13-Sep-11	14-Sep-11	Mule deer

Page 2 of 2

For each sample, two duplicates of 100-mL water were filtered through a sterile 0.45 µm gridded membrane filter. Filter membrane was placed on m-coliBlue absorbent pad in petri dish. Samples were incubated at 37°C for 24 hours before bacteria enumeration.

For sample 6D65 260711, 4 CFU/ 100 mL were confirmed positive as *E.coli*.

For sample 6D65 090811, 1 CFU/ 100 mL were confirmed positive as *E.coli*.

For sample 6D65 180811, 3 CFU/ 100 mL were confirmed positive as *E.coli*.

For sample 6D65 230811, 8 CFU/ 100 mL were confirmed positive as *E.coli*.

For sample 6D65 300811, 8 CFU/ 100 mL were confirmed positive as *E.coli*.

For sample 6D65 130911, 6 CFU/ 100 mL were confirmed positive as *E.coli*.

**BST REPORT-KALAMALKA:**    **Batch # 56**    **September 27, 2011**  
    **Batch # 57**    **October 4, 2011**  
    **Batch # 58**    **October 11, 2011**  
    **Batch # 59**    **October 17, 2011**

Bacterial Source Tracking (SPSS Discriminant Function Analysis) - Fresh Water Samples  
 (KALAMALKA)

Sample ID	Colony No.	Sample Location	Date of Sampling	Date of Analysis	Probable Source	
6D65 270911	1	North Kal Intake	27-Sep-11	28-Sep-11	Gull	
	2	North Kal Intake	27-Sep-11	28-Sep-11	Gull	
	3	North Kal Intake	27-Sep-11	28-Sep-11	NI	
	5	North Kal Intake	27-Sep-11	28-Sep-11	Cow	
	6	North Kal Intake	27-Sep-11	28-Sep-11	Horse	
	8	North Kal Intake	27-Sep-11	28-Sep-11	Horse	
	9	North Kal Intake	27-Sep-11	28-Sep-11	Gull	
	10	North Kal Intake	27-Sep-11	28-Sep-11	Gull	
	6D65 041011	1	North Kal Intake	04-Oct-11	05-Oct-11	Horse
		2	North Kal Intake	04-Oct-11	05-Oct-11	Horse
3		North Kal Intake	04-Oct-11	05-Oct-11	Marmot	
4		North Kal Intake	04-Oct-11	05-Oct-11	Horse	
5		North Kal Intake	04-Oct-11	05-Oct-11	Horse	
6		North Kal Intake	04-Oct-11	05-Oct-11	Horse	
7		North Kal Intake	04-Oct-11	05-Oct-11	Horse	
8		North Kal Intake	04-Oct-11	05-Oct-11	Horse	
9		North Kal Intake	04-Oct-11	05-Oct-11	Wolf	
10		North Kal Intake	04-Oct-11	05-Oct-11	NI	
6D65 111011	1	North Kal Intake	11-Oct-11	12-Oct-11	NI	
	2	North Kal Intake	11-Oct-11	12-Oct-11	Coyote	
	3	North Kal Intake	11-Oct-11	12-Oct-11	NI	
	4	North Kal Intake	11-Oct-11	12-Oct-11	Mule deer	
	6	North Kal Intake	11-Oct-11	12-Oct-11	Mule deer	
	7	North Kal Intake	11-Oct-11	12-Oct-11	Black bear	
	8	North Kal Intake	11-Oct-11	12-Oct-11	Elk	
	9	North Kal Intake	11-Oct-11	12-Oct-11	Coyote	
	10	North Kal Intake	11-Oct-11	12-Oct-11	Human	

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Bacterial Source Tracking (SPSS Discriminant Function Analysis) - Fresh Water Samples  
(KALAMALKA)

Sample ID	Colony No.	Sample Location	Date of Sampling	Date of Analysis	Probable Source
6D65 171011	1	North Kal Intake	17-Oct-11	18-Oct-11	Marmot
	2	North Kal Intake	17-Oct-11	18-Oct-11	Black bear
	3	North Kal Intake	17-Oct-11	18-Oct-11	Horse
	4	North Kal Intake	17-Oct-11	18-Oct-11	Marmot
	5	North Kal Intake	17-Oct-11	18-Oct-11	Black bear
	8	North Kal Intake	17-Oct-11	18-Oct-11	Gull
	10	North Kal Intake	17-Oct-11	18-Oct-11	Dog

Page 2 of 2

For each sample, two duplicates of 100-mL water were filtered through a sterile 0.45 µm gridded membrane filter. Filter membrane was placed on m-coliBlue absorbent pad in petri dish. Samples were incubated at 37°C for 24 hours before bacteria enumeration.

For sample 6D65 270911, 8 CFU/ 100 mL were confirmed positive as *E.coli*.

For sample 6D65 041011, 10 CFU/ 100 mL were confirmed positive as *E.coli*.

For sample 6D65 111011, 9 CFU/ 100 mL were confirmed positive as *E.coli*.

For sample 6D65 171011, 7 CFU/ 100 mL were confirmed positive as *E.coli*.

Client Project ID : Kalamalka # 60 251011  
 Kalamalka # 61 011111  
 Kalamalka # 62 081111  
 Kalamalka # 63 151111  
 Water Type : Fresh Water

## Bacterial Source Tracking

### Report

#### SPSS Discriminant Function Analysis

Sample ID/ Project Ref No.	Colony No.	Sample Location	Date of Sampling	Date of Analysis	Probable Source
6D65 251011	1	North Kal Intake	25-Oct-11	26-Oct-11	Cow
	2	North Kal Intake	25-Oct-11	26-Oct-11	NI
	3	North Kal Intake	25-Oct-11	26-Oct-11	Human
	4	North Kal Intake	25-Oct-11	26-Oct-11	Cow
	5	North Kal Intake	25-Oct-11	26-Oct-11	Black bear
	6	North Kal Intake	25-Oct-11	26-Oct-11	Coyote
	7	North Kal Intake	25-Oct-11	26-Oct-11	Human
	9	North Kal Intake	25-Oct-11	26-Oct-11	Cow
	10	North Kal Intake	25-Oct-11	26-Oct-11	Marmot
	6D65 011111	1	North Kal Intake	03-Nov-11	03-Nov-11
2		North Kal Intake	03-Nov-11	03-Nov-11	Black bear
4		North Kal Intake	03-Nov-11	03-Nov-11	Black bear
5		North Kal Intake	03-Nov-11	03-Nov-11	Black bear
6D65 081111	1	North Kal Intake	08-Nov-11	09-Nov-11	Black bear
	2	North Kal Intake	08-Nov-11	09-Nov-11	Black bear
	3	North Kal Intake	08-Nov-11	09-Nov-11	NI
	4	North Kal	08-Nov-11	09-Nov-11	Black bear
6D65 151111	1	North Kal Intake	15-Nov-11	16-Nov-11	NI
	2	North Kal Intake	15-Nov-11	16-Nov-11	NI
	4	North Kal Intake	15-Nov-11	16-Nov-11	Black bear
	5	North Kal Intake	15-Nov-11	16-Nov-11	Human
	6	North Kal Intake	15-Nov-11	16-Nov-11	Human
	8	North Kal Intake	15-Nov-11	16-Nov-11	Elk
	9	North Kal Intake	15-Nov-11	16-Nov-11	NI
	10	North Kal Intake	15-Nov-11	16-Nov-11	Black bear

For each sample, two duplicates of 100 mL water were filtered through a sterile 0.45 µm gridded membrane filter. Filter membrane was placed on m-coliBlue absorbent pad in petri dish. Samples were incubated at 37°C for 24 hours before bacteria enumeration.

For sample 6D65 251011, 9 CFU/ 100 mL were confirmed positive as *E.coli*.

For sample 6D65 011111, 4 CFU/ 100 mL were confirmed positive as *E.coli*.

For sample 6D65 081111, 4 CFU/ 100 mL were confirmed positive as *E.coli*.

For sample 6D65 151111, 8 CFU/ 100 mL were confirmed positive as *E.coli*.

Client Project ID : Kalamalka # 64 221111  
 Kalamalka # 65 291111  
 Kalamalka # 66 061211

Water Type : Fresh Water

NI = Not Identified

## Bacterial Source Tracking

### Report

#### SPSS Discriminant Function Analysis

Sample ID/ Project Ref No.	Colony No.	Sample Location	Date of Sampling	Date of Analysis	Probable Source
6D65 221111	1	North Kal Intake	22-Nov-11	24-Nov-11	Black bear
	2	North Kal Intake	22-Nov-11	24-Nov-11	Black bear
	3	North Kal Intake	22-Nov-11	24-Nov-11	Black bear
6D65 291111	1	North Kal Intake	29-Nov-11	30-Nov-11	Black bear
	2	North Kal Intake	29-Nov-11	30-Nov-11	Black bear
	3	North Kal Intake	29-Nov-11	30-Nov-11	Black bear
	4	North Kal Intake	29-Nov-11	30-Nov-11	Black bear
	5	North Kal Intake	29-Nov-11	30-Nov-11	Horse
	6	North Kal Intake	29-Nov-11	30-Nov-11	Human
	7	North Kal Intake	29-Nov-11	30-Nov-11	Black bear
	8	North Kal Intake	29-Nov-11	30-Nov-11	Human
	9	North Kal Intake	29-Nov-11	30-Nov-11	Black bear
	10	North Kal Intake	29-Nov-11	30-Nov-11	Raccoon
6D65 061211	2	North Kal Intake	06-Dec-11	07-Dec-11	Coyote
	3	North Kal Intake	06-Dec-11	07-Dec-11	Horse
	4	North Kal Intake	06-Dec-11	07-Dec-11	Coyote
	6	North Kal Intake	06-Dec-11	07-Dec-11	Black bear
	7	North Kal Intake	06-Dec-11	07-Dec-11	NI
	8	North Kal Intake	06-Dec-11	07-Dec-11	Coyote
	10	North Kal Intake	06-Dec-11	07-Dec-11	NI

For each sample, two duplicates of 100 mL water were filtered through a sterile 0.45 µm gridded membrane filter. Filter membrane was placed on m-coliBlue absorbent pad in petri dish. Samples were incubated at 37°C for 24 hours before bacteria enumeration.

For sample 6D65 221111, 3 CFU/ 100 mL were confirmed positive as *E.coli*.

For sample 6D65 291111, 10 CFU/ 100 mL were confirmed positive as *E.coli*.

For sample 6D65 061211, 7 CFU/ 100 mL were confirmed positive as *E.coli*.

NI = Not Identified

Client Project ID : Kalamalka # 64 221111  
 Kalamalka # 65 291111  
 Kalamalka # 66 061211

Water Type : Fresh Water

## Bacterial Source Tracking Report

### SPSS Discriminant Function Analysis

Sample ID/ Project Ref No.	Colony No.	Sample Location	Date of Sampling	Date of Analysis	Probable Source
6D65 221111	1	North Kal Intake	22-Nov-11	24-Nov-11	Black bear
	2	North Kal Intake	22-Nov-11	24-Nov-11	Black bear
	3	North Kal Intake	22-Nov-11	24-Nov-11	Black bear
6D65 291111	1	North Kal Intake	29-Nov-11	30-Nov-11	Black bear
	2	North Kal Intake	29-Nov-11	30-Nov-11	Black bear
	3	North Kal Intake	29-Nov-11	30-Nov-11	Black bear
	4	North Kal Intake	29-Nov-11	30-Nov-11	Black bear
	5	North Kal Intake	29-Nov-11	30-Nov-11	Horse
	6	North Kal Intake	29-Nov-11	30-Nov-11	Human
	7	North Kal Intake	29-Nov-11	30-Nov-11	Black bear
	8	North Kal Intake	29-Nov-11	30-Nov-11	Human
	9	North Kal Intake	29-Nov-11	30-Nov-11	Black bear
	10	North Kal Intake	29-Nov-11	30-Nov-11	Raccoon
6D65 061211	2	North Kal Intake	06-Dec-11	07-Dec-11	Coyote
	3	North Kal Intake	06-Dec-11	07-Dec-11	Horse
	4	North Kal Intake	06-Dec-11	07-Dec-11	Coyote
	6	North Kal Intake	06-Dec-11	07-Dec-11	Black bear
	7	North Kal Intake	06-Dec-11	07-Dec-11	NI
	8	North Kal Intake	06-Dec-11	07-Dec-11	Coyote
	10	North Kal Intake	06-Dec-11	07-Dec-11	NI

For each sample, two duplicates of 100 mL water were filtered through a sterile 0.45  $\mu$ m gridded membrane filter. Filter membrane was placed on m-coliBlue absorbent pad in petri dish. Samples were incubated at 37°C for 24 hours before bacteria enumeration.

For sample 6D65 221111, 3 CFU/ 100 mL were confirmed positive as *E.coli*.

For sample 6D65 291111, 10 CFU/ 100 mL were confirmed positive as *E.coli*.

For sample 6D65 061211, 7 CFU/ 100 mL were confirmed positive as *E.coli*.

NI = Not Identified

**Client Project ID :** Kalamalka # 70 100112  
 Kalamalka # 71 170112  
 Kalamalka # 72 240112  
 Kalamalka # 72 250112  
 Kalamalka # 73 310112  
 Kalamalka # 74 010212

## Bacterial Source Tracking

### Report

**Water Type :** Fresh Water

#### SPSS Discriminant Function Analysis

Sample ID/ Project Ref No.	Colony No.	Sample Location	Date of Sampling	Date of Analysis	Probable Source
6D65 100112	2	North Kal Intake	10-Jan-12	11-Jan-12	NI
	3	North Kal Intake	10-Jan-12	11-Jan-12	Horse
	4	North Kal Intake	10-Jan-12	11-Jan-12	NI
	5	North Kal Intake	10-Jan-12	11-Jan-12	Elk
	6	North Kal Intake	10-Jan-12	11-Jan-12	Black bear
	7	North Kal Intake	10-Jan-12	11-Jan-12	Black bear
	8	North Kal Intake	10-Jan-12	11-Jan-12	NI
	9	North Kal Intake	10-Jan-12	11-Jan-12	Human
	10	North Kal Intake	10-Jan-12	11-Jan-12	NI
	6D65 170112	1	North Kal Intake	17-Jan-12	18-Jan-12
2		North Kal Intake	17-Jan-12	18-Jan-12	Black bear
4		North Kal Intake	17-Jan-12	18-Jan-12	Raccoon
5		North Kal Intake	17-Jan-12	18-Jan-12	Human
6		North Kal Intake	17-Jan-12	18-Jan-12	NI
7		North Kal Intake	17-Jan-12	18-Jan-12	NI
8		North Kal Intake	17-Jan-12	18-Jan-12	Raccoon
9		North Kal Intake	17-Jan-12	18-Jan-12	Mule deer
10		North Kal Intake	17-Jan-12	18-Jan-12	Horse
6D65 240112		1	North Kal Intake	24-Jan-12	25-Jan-12
	2	North Kal Intake	24-Jan-12	25-Jan-12	NI
	3	North Kal Intake	24-Jan-12	25-Jan-12	Black bear
	4	North Kal Intake	24-Jan-12	25-Jan-12	Horse
	5	North Kal Intake	24-Jan-12	25-Jan-12	Horse
	6	North Kal Intake	24-Jan-12	25-Jan-12	Gull
	7	North Kal Intake	24-Jan-12	25-Jan-12	Horse
	8	North Kal Intake	24-Jan-12	25-Jan-12	Horse
	9	North Kal Intake	24-Jan-12	25-Jan-12	Coyote
	10	North Kal Intake	24-Jan-12	25-Jan-12	Black bear
Site D 250112	1	Site D	25-Jan-12	26-Jan-12	Gull

2	Site D	25-Jan-12	26-Jan-12	Human
3	Site D	25-Jan-12	26-Jan-12	Human
4	Site D	25-Jan-12	26-Jan-12	Black bear

Client Project ID : Kalamalka # 70 100112  
 Kalamalka # 71 170112  
 Kalamalka # 72 240112  
 Kalamalka # 72 250112  
 Kalamalka # 73 310112  
 Kalamalka # 74 010212

<h2>Bacterial Source Tracking</h2> <h3>Report</h3>
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Water Type : Fresh Water

#### SPSS Discriminant Function Analysis

Sample ID/ Project Ref No.	Colony No.	Sample Location	Date of Sampling	Date of Analysis	Probable Source
Site D 250112	5	Site D	25-Jan-12	26-Jan-12	Black bear
	6	Site D	25-Jan-12	26-Jan-12	Human
	7	Site D	25-Jan-12	26-Jan-12	Human
	8	Site D	25-Jan-12	26-Jan-12	Human
	9	Site D	25-Jan-12	26-Jan-12	Black bear
Site E 250112	1	Site E	25-Jan-12	26-Jan-12	NI
6D65 310112	1	North Kal Intake	31-Jan-12	01-Feb-12	Black bear
	2	North Kal Intake	31-Jan-12	01-Feb-12	Horse
	3	North Kal Intake	31-Jan-12	01-Feb-12	Horse
	4	North Kal Intake	31-Jan-12	01-Feb-12	NI
	5	North Kal Intake	31-Jan-12	01-Feb-12	Raccoon
	6	North Kal Intake	31-Jan-12	01-Feb-12	NI
	7	North Kal Intake	31-Jan-12	01-Feb-12	Black bear
	8	North Kal Intake	31-Jan-12	01-Feb-12	Human
	9	North Kal Intake	31-Jan-12	01-Feb-12	Black bear
	10	North Kal Intake	31-Jan-12	01-Feb-12	Human
Site D 010212	1	Site D	01-Feb-12	02-Feb-12	Human

For each sample, two duplicates of 100 mL water were filtered through a sterile 0.45 µm gridded membrane filter. Filter membrane was placed on m-coliBlue absorbent pad in petri dish. Samples were incubated at 37°C for 24 hours before bacteria enumeration.

For sample 6D65 100112, 9 CFU/ 100 mL were confirmed positive as *E.coli*.

For sample 6D65 170112, 9 CFU/ 100 mL were confirmed positive as *E.coli*.

For sample 6D65 240112, 10 CFU/ 100 mL were confirmed positive as *E.coli*.

For sample Site D 250112, 9 CFU/ 100 mL were confirmed positive as *E.coli*.

For sample Site E 250112, 1 CFU/ 100 mL were confirmed positive as *E.coli*.  
For sample 6D65 310112, 10 CFU/ 100 mL were confirmed positive as *E.coli*.  
For sample Site D 010212, 1 CFU/ 100 mL were confirmed positive as *E.coli*.

*NI = Not Identified*