

Investigating the effects of combined sewage overflows in the Halls Creek Watershed

by: Mathieu D'Astous
Halls Creek Rehabilitation Project



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Overview

Raw sewage is routinely discharged into several brooks located within the Halls Creek watershed. The release of untreated wastewater into these waterways is a threat to both human health and aquatic life. The Halls Creek Rehabilitation Project undertook a sampling campaign during the summer and fall of 2002 in order to confirm potential sources of contamination and also to determine the extent of contamination by E.coli.

Sewage is discharged through structures called Combined Sewage Overflows (CSO). These are present in those areas where the flow of sanitary sewage and stormwater are combined into a single conduit. This outdated system efficiently transports wastewater to the sewage treatment plant during dry weather conditions. However, following heavy rains or excessive snowmelt, the system is surcharged with water and wastewater overflows into local brooks through CSOs. Although most of Moncton's sewage system has been refurbished, some areas are still cross-connected.

Sampling Stations

In the Halls Creek Watershed, several CSOs are located along Rabbit Brook, Humphreys Brook and West Branch Halls Creek. These were located during several field surveys conducted in the years 2000 and 2001 by both PWMG and Halls Creek field technicians. Other unidentified CSOs may also be present in other areas throughout the Halls Creek watershed. Evidence of sewage discharge includes the presence of toilet paper, sanitary napkins and foul odors. Previous water quality tests conducted by the Petitcodiac Watershed Monitoring Group (PWMG) also contributed to the localization of CSOs.

A total of eleven sampling stations were established within the watershed (see attachment 1). Ten of these were established to monitor E.coli bacteria, which is associated to the feces of warm blooded animals and that is indicative of sewage discharge (please see attachment 2 for total coliform counts). An additional station was established in order to sample the deleterious substance that was coincidentally seen being discharged from the Tandem Textile manufacturing plant while field technicians were sampling station number 7. Results from this sample were given to Environment Canada, which has opened an investigation on this issue.

The first sampling run was conducted in dry conditions as to give an indication of potential leaks in the sewage system in the absence of a surcharge caused by excessive precipitations. The second sampling date was conducted during heavy precipitations as to give an indication of the amount of wastewater discharged through CSOs during these conditions. Samples collected during the dry run were limited to the stations where water discharge occurred. The

following is a list of the eleven stations as well as their location.

Stations	Location (at confluence with brooks)
<i>Rabbit Brook</i>	
1.	Behind Moncton Chrysler Dodge Dealership
2.	Karen Drive
3.	Cedar St.
4.	Northview St.
5.	Upstream from Wheeler Boulevard
<i>Humphreys Brook</i>	
6.	TRB upstream from Mill Rd. dam
7.	TLB downstream from Mill Rd. Dam
8.	Tandem Fabrics discharge pipe (sampled on dry run only)
9.	Seamans brook outflow
10.	TRB downstream from Seamans Brook
<i>West Branch</i>	
11.	TLB 200 feet upstream from Connaught

Materials

- 500ml bottles supplied by the Beauséjour Medical Research Institute
- Field thermometers
- Graded bucket
- Latex gloves
- Rubber boots or waders
- Cooler with ice
- Clip Board, field log sheets, pencils
- Anti bacterial soap
- GPS (Global Positioning System)
- Camera
- Stopwatch
- Easy wipes
- Masking Tape and marker

Methodology

Sampling was conducted by two teams, each composed of two field technicians. The first technician filled the sampling bottles and measured several parameters (discharge rate, temperature, observations) while the other took notes onto the log sheets. Field technicians for the first sampling run on August 28th were

Georges Brun, Michelle Landry, Mathieu D'Astous and Eric Arseneau. Field technicians for the second sampling run on November 13th were Daniel Leblanc, Georges Brun, Mathieu D'Astous and Eric Arseneau.

Upon arrival at the designated sites, the 500ml bottles were filled up to $\frac{3}{4}$ full for bacterial analysis (E.coli and total coliform). In areas where samples were taken from pipe effluent, the 500ml bottles were filled and the cap was rinsed off with the effluent water in order to assure that no other sources of contamination entered the sample. In areas where sampling occurred in a pool, the bottles were submerged bottom down up to 25cm below the surface before being opened as to avoid contamination from the surface bio-film (pers com., Bernard Richard, Environment Canada). Once full, the bottles were immediately sealed and placed into the cooler, which was stored in a locked vehicle.

Several other parameters were also measured. Water temperature was measured with a field thermometer placed directly into the stream of effluent or pool for approximately one minute. The discharge rate in (lsec) was also calculated with a bucket and a stopwatch. The graded 10 l bucket was filled up by the first technician while the other timed the process with a stopwatch. Other qualitative observations such as the color or the odor of the effluent were also noted (please see attachment 3 for log sheet sample).

Samples were taken to the Beauséjour Medical Research Institute (BMRI) for E.coli screening within one hour following the completion of the sampling run. All samples were analyzed by the BMRI with the exception of the sample taken at the Tandem Fabrics factory during the first sampling run. The latter was sent by the BMRI to RPC Laboratories in Fredericton for heavy metals analysis.

Results

Sampling Date – August 27th 2002					
Conditions: Sunny, Air temp approx 18 degrees Celsius					
Sampling period: between 9:00 and 11:30 am					
Station	Location	Temp	Discharge l/s	E.coli MPN** /100ml	Comments
Rabbit Bk.					
1.	Moncton Chrysler	13	(pool)	500	Little flow, grey water, banks in poor shape (construction)
2.	Karen Drive	13.5	0.027	111	Misc. garbage, toilet paper on grill
3.	Cedar St.				No flow, lots of algae
4.	Northview St.	15.5	0.033	Too high*	Sour gas smell, lots of algae
5.	TRB 60m upstream from Wheeler Blvd.	No flow	No flow		No flow
Humphreys Bk					
6.	TRB upstream from Mill Rd. dam	No flow	No flow		No flow
7.	TLB downstream from Mill Rd. dam	No flow	No flow		No flow
8.	Tandem Fabrics discharge pipe	22	0.24	Heavy metals Analyzed only	Black colored effluent discharged
9.	Seamans brook outflow	No flow	No flow		No flow
10.	TRB downstream from Seamans Bk.	20	4.44	300	Heavy flow, toilet paper in pool, oil present
West Branch					
11.	TLB 50m upstream from Connaught	No flow	No flow		No flow

*Too high for an adequate count
 **MPN is the most probable number
 ***TRB is true right bank
 ****TLB is true left bank

Sampling Date – November 12 2002

Conditions: Rain, Air temp approx 7 degrees Celsius. Total Rainfall on Nov.13 was 44.2mm

Sampling period: between 9:00 and 11:30 am

Station	Location	Temp	Discharge l/s	E.coli MPN /100ml	Comments
	Rabbit Bk.				
1.	Moncton Chrysler	8.3	Too high	250	Very brown color of water. Discharge from new pipe on TLB very high wt. lots of sedi.
2.	Karen Drive	10.6	2.67	50	Sanitary napkins next to outflow. Toilet paper on pipe grill. Water is grey. Rabbit Bk. Very brown.
3.	Cedar St.	7.9	Too high	200	Very brown in color
4.	Northview St.	9.5	High	250	Sewage and gas smell
5.	TRB 60m upstream from Wheeler Blvd.	No flow	No flow	No flow	
	Humphreys Bk				
6.	TRB upstream from Mill Rd. dam	7	1.01	14,250	Oily slick on surface
7.	TLB downstream from Mill Rd. dam	No flow	No flow	No flow	
8.	Tandem Fabrics discharge pipe	No flow	No flow		Water level of Humphreys Brook covered 3/4 of pipe
9.	Seamans brook outflow	7	Too high	30,000	A second pipe is discharging in this area on the TLB. Lint type fabric was dumped long the bank of the brook.
10.	TRB downstream from Seamans Bk.	11.5	7.55	75,000	Sewage Smell. Oily slick on surface.
	West Branch				
11.	TLB 50m upstream from Connaught	No flow	No flow	No flow	

Discussion

As expected, most sites visited during the first sampling run had very little or no flow. High counts of E.coli were observed at sites 1 (behind Moncton Chrysler) and 10 (TRB downstream from Seamans brook). Both of these exceeded the Canadian Environmental Quality Guidelines whose recreational limit is set at 200 MPN/100ml.

With a temperature of 13 C, and the constant flow in spite of dry conditions it is improbable that the high counts of E.coli observed at the station behind Moncton Chrysler was due to stagnant water. Several pipes that are connected to the underground section of Rabbit Brook are most likely cross connected to the sewage system.

The high counts of E.coli observed at station 10, downstream from Seamans brook suggests that this conduit is cross connected. This is also supported by other evidence such as the presence of toilet paper on the water surface as well as the oil discharge from this pipe that occurred in June 2002. The oil originated from the recycling plant where it overflowed from the main treatment system into the sewage system.

The equipment at the Beausejour Medical Research Institute lab was not calibrated to handle the high turbidity of the sample collected at site number 4. However, the sour gas smell discharged from this pipe suggests that it may be a combined sewage overflow. The methods and equipment was calibrated before analyzing the second round of samples in November.

Excessive counts of E.coli were measured on the second sampling run. The highest counts were measured along Humphreys brook. Station number 10 had the highest count with an MPN of 75 000/100ml and a flow of approximately 7.55l/sec. High counts were also measured at station 6 (MPN 14 250/100ml, at 1.01l/sec) and 9 (MPN 30 000/100ml, flow too high to measure). All three of these stations are located within a kilometer stretch of Humphreys Brook.

E.coli counts measured on Rabbit Brook were significantly lower than those measured on Humphreys Brook. Nonetheless, E.coli levels measured at the stations 1, 3 and 4 were equal to or slightly higher than the recreational limit set by the Canadian Environmental Quality Guidelines.

Conclusion

Field sampling carried out in the months of August and November 2002 demonstrate that the discharge of raw sewage into the Halls Creek watershed is an ongoing problem both during dry conditions and rain events.

With E.coli levels reaching a MPN of 75 000/100ml in some areas, this discharge is a threat to human health. These outfalls, such as that located at station 10, can be easily accessed by children playing in and around these areas. The discharge of human waste in local waterways can also contribute to the excessive nitrification of water quality and thus be toxic to aquatic life.

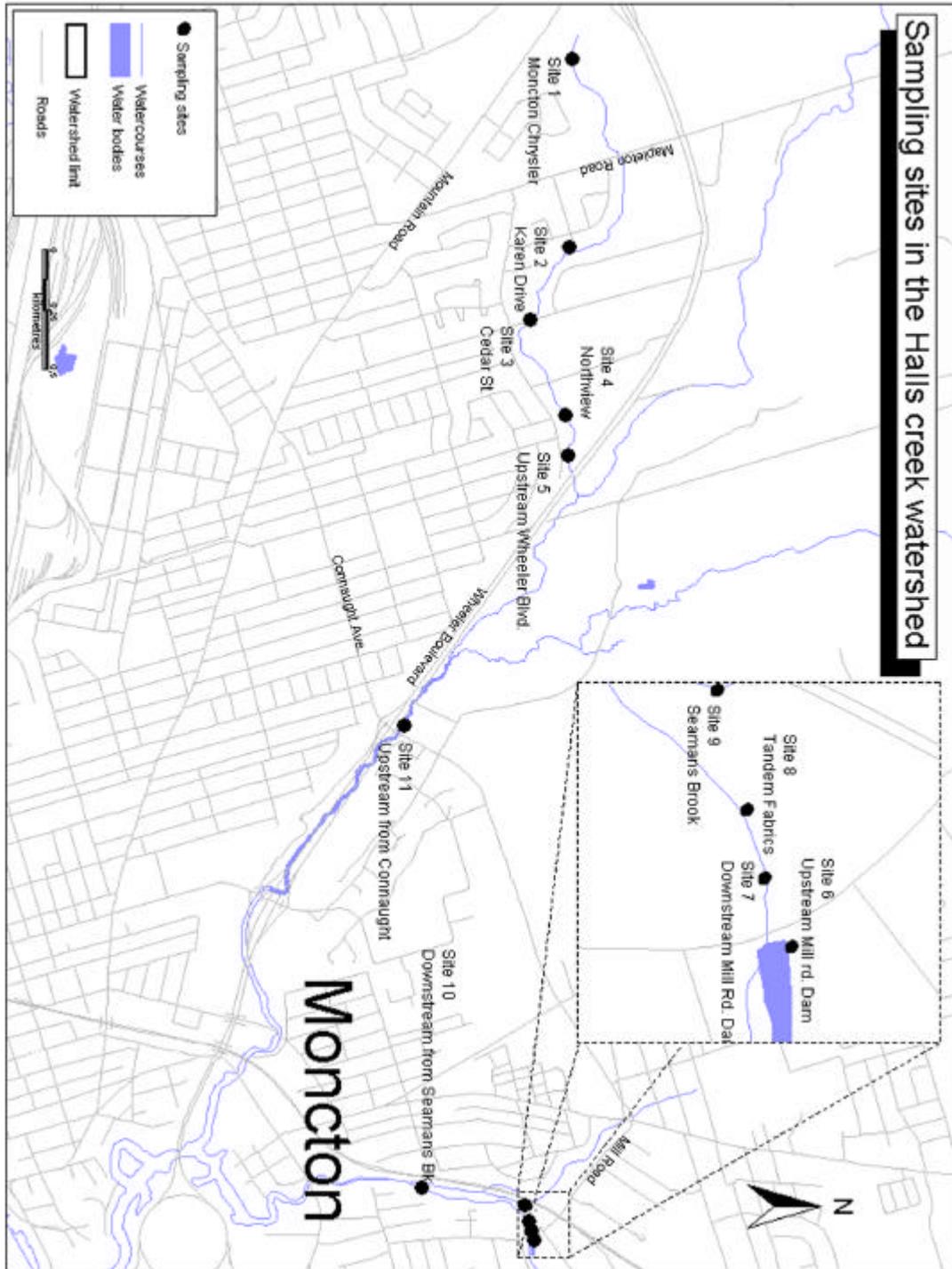
In addition to human waste, municipal sewage can contain a variety of residential or industrial contaminants that are dumped into the system. The oil spill that occurred on Humphreys Brook in June exemplifies the diversity of contaminants that can be released into the watershed through combined sewage overflows.

Throughout the watershed, Humphreys Brook is the most impacted by CSOs. Three significant sources of contamination have been identified in the Mill rd. area. Field observations suggest that other stations, such as station number 7, may also discharge raw sewage during higher precipitations than those occurring

on November 13 (44.2mm). However, the problematic stations located on Rabbit Brook should not be dismissed.

The City of Moncton has the responsibility to assure that its sewage system is upgraded as to eliminate the ongoing discharge of wastewater in the Halls Creek watershed both during dry conditions and rain events. This problem is a threat to human health and aquatic life as well as an infraction to the New Brunswick Clean Water Act and DFOs Fisheries Act.

Attachment 1



Attachment 2: Total Coliform Counts					
Station	Location	Date	Total Coliforms MPN/100ml	Date	Total Coliforms MPN/100ml
	Rabbit Bk.		>1000		
1.	Moncton Chrysler	28/08	Too high for count	13/11	7 200
2.	Karen Drive	28/08	>2 000	13/11	5 200
3.	Cedar St.	28/08	No flow	13/11	4 850
4.	Northview St.	28/08	No flow	13/11	4 250
5.	TRB 60m upstream from Wheeler Blvd.	28/08	No flow	13/11	No flow
	Humphreys Bk				
6.	TRB upstream from Mill Rd. dam	28/08	No flow	13/11	18 000
7.	TLB downstream from Mill Rd. dam	28/08	No flow	13/11	No flow
8.	Tandem Fabrics discharge pipe	28/08	Heavy metals only	13/11	No flow
9.	Seamans brook outflow	28/08	No flow	13/11	16 400
10.	TRB downstream from Seamans Bk.	28/08	>5 000	13/11	50 000
	West Branch				
11.	TLB 50m upstream from Connaught	28/08	No flow	13/11	No flow

Attachment 2

Field Log

Station # _____ Location: _____ WPT# _____

Investigator's name: _____

Date: _____

Time: _____

Air temperature: _____

Water temperature: _____

Size of bucket used (flow): _____

Time to fill bucket: _____

Weather: sunny raining cold mild
 cloudy snowing hot damp

Names of everyone attending site, affiliation, and role(s) in investigation:

If you answer "yes" to any of the following questions, be sure to include details in your notes below.

Were there any signs of wildlife at the site?	
Did the site have a noticeable odour or smell?	
Was there a sheen or oily slick on the surface of the water?	
Were there any pipes discharging into the water? (include diameter)	
Was there any liquid discharging directly into the water (e.g. seeping from the riverbank)?	
Were there signs of remediation (i.e., booms, absorbent material, etc.)?	
Did you take samples?	
Did you take pictures?	
Did you take video footage?	
When was the last rain/snowfall?	
Was the ground wet or dry?	