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## **Petrie Island Beach Study – Reflections from the Riverkeeper**

The City of Ottawa has four swimming beaches that are monitored for bacteria on a daily basis during the swimming season (mid June to end of August). In 2006, the beach at Petrie Island was closed to swimming for 45 days (>60% of the swimming season) due to high bacterial counts in the water samples.

Given that the beach is downstream of 2 major wastewater treatment plants and numerous combined sewer outlets, this data was not too surprising to some, but very concerning for the public who want to swim in the river without risking illness.

Given the poor water quality in 2006, the City of Ottawa funded the National Water Research Institute (Environment Canada) to study the water quality data from the vicinity and investigate the source(s) of fecal pollution responsible for the poor water quality. This investigation utilized microbial source tracking to determine the likely source of the *E. Coli* (birds, human, dogs, cows, etc.).

The full report is available on the City of Ottawa's website: [An Investigation of the Sources of Fecal Contamination at Petrie Island Beach on the Ottawa River in 2007.](#)

In 2007 the water quality at the site improved and there were only 6 no-swimming advisory days at Petrie Island. There was very little rainfall during the summer of 2007 which likely accounted for some of the improved results.

Before I comment on the findings of the report, I would like to remind folks of a few important facts:

- The cities of Ottawa and Gatineau have combined sewers and we only need 4-5 mm of rain before raw, untreated sewage flows into the river
- Petrie Island is downstream of 2 major wastewater treatment plants for the cities of Ottawa and Gatineau, each releasing significant volumes of treated effluent
- The City of Ottawa chlorinates the effluent from the wastewater treatment plant during the months of June-September (this kills bacteria and viruses)
- The City of Gatineau does not chlorinate their effluent (due to Provincial Policy given that chlorine is a toxic substance and has a detrimental impact on aquatic ecosystems)

- The City of Gatineau had several large bypass events last summer where they released large volumes of untreated sewage directly into the Ottawa River – these events are typical after significant rainfall
- Petrie Island beach is not the only beach with water quality issues in the City of Ottawa – Westboro Beach is closed most often and Mooney's Bay and Britannia have been “manipulated” with bandaid solutions/techniques to reduce bacterial counts at the beaches
- The presence of human fecal matter presents human health risks from the occurrence of waterborne pathogens like *Cryptosporidium* and *Giardia* and enteric viruses that are likely to occur in untreated human sewage. The occurrence of these non-bacterial pathogens may not be entirely predictable using the indicator *E. Coli*, particularly downstream from fecal pollution sources like chlorinated wastewater effluents.

## Regulations

In 1994, Ontario's Ministry of the Environment introduced a new provincial standard for water quality protection in our cities: Levels of Treatment for Municipal and Private Sewage Treatment Works Discharging to Surface Waters, or “F-5” for short. Following the introduction of F-5, the unassuming “Procedure F-5-5” was launched. **It requires municipalities with combined sewer systems to prevent sewage from entering our waterways, to protect water quality and ensure all beaches remain open 95% of the swimming season.**

F-5-5 is innovative: its purpose is to protect both human health and aquatic life. Its water quality objectives are some of the best in the world (*E. Coli*: 100 cfu/100 mL). F-5-5 also requires municipalities to develop pollution prevention strategies as well as “end-of-pipe” solutions. If followed, the practices set out in F-5-5 would make any city's waterways cleaner, reopen its beaches, and improve habitat for fish, birds, and plant life.

## Important findings from the report:

- Human fecal pollution was evident by observations of floatables found on the beach during the data collection stage
- Fecal pollution at the beach is attributed to both humans and birds
- The sand acts as a reservoir for *E. Coli* and concentrations in the sand tend to increase throughout the summer
- Both *E. Coli* concentrations and the occurrence of the human *Bacteroides* DNA marker were more numerous at the beach after rain events
- Bilberry Creek, a small tributary that enters into the Ottawa River upstream of Petrie Island has high *E. Coli* concentrations that originate from humans. During rain events detection of human fecal matter is higher in the creek.
- *E. Coli* and human *Bacteroides* concentrations were lowest at the Ottawa River transect above the City of Ottawa and City of Gatineau municipal wastewater treatment outfalls

### Interesting Notables:

- The *E. Coli* and *Bacteroides* concentrations were for the most part more numerous on the Quebec side of the river than on the Ontario side, but the cluster analysis suggests that the human fecal pollution is more closely related to fecal sources on the Ontario side.
- This is likely because Ottawa is a bigger city and releases higher volumes of wastewater effluent and stormwater than the City of Gatineau – however, flow dynamics or the river likely have an impact as well
- Note that *E. Coli* from Ottawa's WWTP are dead (from chlorine) as opposed to that from Gatineau
- The *E. Coli* concentrations were highest in the sand pore water, yet the human *Bacteroides* DNA marker was less commonly found in the sand pore water

### Methods Critique:

- Time of sampling: Waterkeepers from around the world are finding that water quality results vary according to when the samples are taken – there is typically variation around time of day, number of swimmers, weekend vs. weekday as the *E. Coli* gets suspended in the water column and counts are higher. The samples for summer beach monitoring are always taken first thing in the morning when there are no swimmers and conditions are typically calm.
- It would be good to determine the relative contribution of bacterial indicators under varying environmental conditions
- There was no discussion in the report of other potential sources of *E. Coli* such as failing septic systems and illegal dumping of wastewater

### Concerns and Recommendations:

- **Investigate Bilberry Creek ASAP** – likely there are houses directly connected to the storm sewer instead of sanitary sewer (these mistakes happen!) or illicit discharges to the storm sewer. Maybe there are combined sewers in that area, but not that I know of. Bottom line is, don't wait to do more water quality monitoring at the creek outlet, get out there and investigate where the fecal contamination is originating.
- We should **focus on all City Beaches** and water quality in general, not just on Petrie Island. Westboro Beach has the highest numbers of beach closures. Britannia and Mooney's Bay are swimmable only because of band-aid solutions to reduce *E. Coli* concentrations at the sites.
- I have concerns that the City of Ottawa is **acting too slowly** on these water quality issues. For example, they have been collecting data at Westboro beach for many years and are well aware of the problems at that beach. Currently they are sitting on the Baird Report (a report prepared by consultants) and have not released it to the public despite an eager audience for it. For the Petrie Island problem, the City is taking a year to come up with recommendations for actions. This seems like a stall tactic – we already know what the problems are, let's get to fixing them!

- I recommend the City **implement a no swimming rainfall rule immediately** for Petrie Island instead of taking a year to come up with a formula to use. We know we have combined sewer overflows when we get as little as 5mm of rain, so why not start there as a minimum to protect human health and act cautiously.
- When working on a model to predict relationship between rainfall and bacterial levels for Petrie, the City should also take other factors into consideration: water levels, river currents, waves
- Solutions must come from Ottawa and Gatineau and both cities should be working together and sharing data
- Map areas adjacent to the river and its tributaries that are on septic (both sides of the river)
- Use Best Management Practices to target primary sources of bacteria - there are progressive solutions that incorporate natural vegetation at stormwater outlets as well as practices to reduce the amount of *E. Coli* in beach sands. Let's learn from progressive cities who have success stories.
- Stormwater is a big problem and we must treat it! Note the Province of Ontario's "Procedure F-5-5": **It requires municipalities with combined sewer systems to prevent sewage from entering our waterways, to protect water quality and ensure all beaches remain open 95% of the swimming season.**
- We need improved communication with the public – people are part of the solution and they need to be better informed.

In Summary, this report is an excellent first step using science to help determine the sources of contamination that are being found at Petrie Island Beach. I urge the City of Ottawa to work quickly to implement actions that will allow all of us to swim safely in the Ottawa River.