

Hamilton Public Health Services 2015 Beach Monitoring Report

This is an annual update regarding Hamilton Public Health Services (PHS) recreational water quality monitoring at Hamilton's public beaches and the activities undertaken by stakeholders to improve the water quality at these beaches.

Hamilton Harbour Beach Management Group meets at least twice per year to share research and discuss issues, projects and activities being done in and around Hamilton Harbour to improve the recreational water quality at the harbour beaches. Members of the group include staff from PHS, Hamilton Harbour Remedial Action Plan (RAP), Environment Canada, City of Hamilton Public Works Department, Parks Section and the Landscape Architectural Services Section, and the Bay Area Restoration Council (BARC).

The percentage of days that public beaches are open during the swimming season is an indicator of the recreational quality of the water at Hamilton's public beaches. The City of Hamilton's Vision 2020 Plan and the draft Hamilton Community Vision place an importance on improving water quality in Hamilton Harbour to allow safe swimming and recreational use of public beaches and other aquatic activities. Hamilton Harbour remains on the Great Lakes Areas of Concern (AOC) List. As a result, stakeholders have developed a Remedial Action Plan (RAP) for Hamilton Harbour in order to identify the challenges in the harbour and how they may be addressed. One criterion that needs to be satisfied in order to remove Hamilton Harbour from the AOC List is the harbour beaches must be open for swimming 80% of the time.

Background

The Ontario Public Health Standards (OPHS) specify the public health programs and services Boards of Health must provide. Program and topic-specific protocols under the OPHS further define the minimum responsibilities every Board of Health is accountable to provide.

As reported in BOH Report BOH15004, in 2014 the Ministry of Health and Long-Term Care (MOHLTC) replaced the Recreational Water Protocol (2008) and the Beach Management Protocol (2008) with the Recreational Water Protocol (2014), the Beach Management Protocol (2014) and the Beach Management Guidance Document (2014). The protocols and guidance document direct Boards of Health on the delivery of local recreational water public health programs to assist in the prevention and reduction of water-borne illness and injury related to recreational water use at a public beach. A public beach is a public bathing area owned/operated by a municipality to which the general public has access, and where there is reason to believe that there is recreational use of the water.

Hamilton PHS conducts routine beach surveillance at three public beaches on Lake Ontario, two beaches in the Hamilton Harbour, and three at local conservation areas. Beach surveillance includes the inspection of public beaches after operations commence, at least

once per week during the period of operation or use, to monitor the safety of the public bathing areas and establish strategies for management of health hazards.

PHS monitors the safety of the public beaches by collecting and testing the beach water for *E.coli* at least once per week during the swimming season, which typically begins after Victoria Day in May and ends on Labour Day in September. *E. coli* are naturally found in the intestines of humans and warm-blooded animals. High numbers of *E. coli* in the water at public beaches indicate the presence of faecal contamination and the potential presence of other harmful microorganisms in the water. The recreational water quality guideline in Ontario is 100 *E. coli* Colony Forming Units (CFU's) per 100 ml of water. *E. coli* concentrations at or above this level could represent an increased risk of infection to swimmers.

The Beach Management Guidance Document (2014) states that a minimum of five samples must be collected at each beach and the geometric mean (GM) of *E. coli* concentrations must be used to assess recreational water quality and guide public health action. When the GM of *E. coli* concentrations are at or above 100 CFU's per 100 ml of water, warning signs are posted at the affected beach to advise potential bathers that the water may pose a health risk and the beach is deemed as unsafe for swimming. Additionally, PHS updates the City of Hamilton's Beach Water Quality Website (www.hamilton.ca/beaches) and the Safe Water Information Line outgoing phone message (905-546-2189) to reflect the current beach water quality status.

Blue-Green Algae

Blue-green algae (BGA) are cyanobacteria which occur naturally in aquatic environments. BGA flourish in slow-moving or still waters with high nutrient levels and sufficient sunlight. Some BGA produce microcystin toxins which are the most commonly produced toxin of the cyanobacterial toxins. Microcystin toxins are tasteless, colourless and odourless and are toxic to both humans and animals. Typical exposure routes are through ingestion or inhalation from spray or steam from the contaminated water.

PHS monitors public beaches for the presence of BGA throughout the swimming season. The Canadian Recreational Water Guideline for microcystin concentrations in recreational water is 20 parts per billion (ppb). When potential toxin-producing BGA blooms are observed at a public beach PHS uses Abraxis™ microcystin test strips to measure the concentration of microcystin toxins in water samples collected from the beach. When high concentrations of microcystin toxins are measured the beach is closed and a swimming advisory issued. PHS posts beach closure signs and issues a media release. The City of Hamilton's Beach Water Quality website (www.hamilton.ca/beaches) and the Safe Water Information Line (905-546-2189) are updated. PHS does not monitor beach water quality for *E. coli* concentrations when toxin-producing BGA blooms are present.

2015 Beach Sampling Results

In 2015 the public beach monitoring program took place over a 16-week period, beginning the week of May 19 and ending the week of September 01. Table 1 summarizes the data for the 2015 swimming season at eight public beaches in Hamilton. The percentage of days the beaches were open in Hamilton Harbour was much lower than Lake Ontario and conservation area beaches. Bayfront Beach was open for 22% of the swimming season while Pier 4 Beach was open 46% of the time. Conservation area beaches were open between 78 and 94%, while Lake Ontario beaches were open almost 100% of the swimming season with only a two-day posting at Confederation Park Beach.

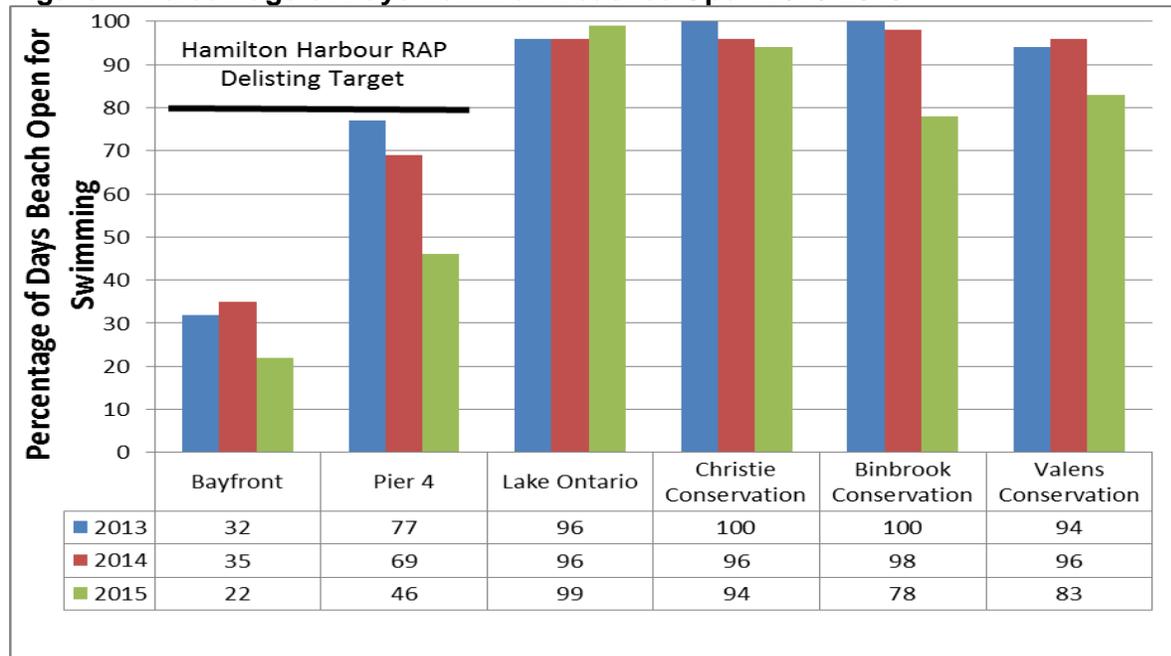
Table 1: Beach Monitoring Program Summary

Name of Beach	Water Body	Total # of Days in Bathing Season	# of Days Beach Closed due to <i>E. coli</i> *	# of Days Beach Closed due to BGA	Total # of Days Beach Closed	Total # of Days Beach Open	% of Days Beach Open
Bayfront Beach	Hamilton Harbour	109	30	55	85	24	22
Pier 4 Beach	Hamilton Harbour	109	34	23	57	52	46
Beach Boulevard	Lake Ontario	109	0	0	0	109	100
Van Wagner's	Lake Ontario	109	0	0	0	109	100
Confederation Park	Lake Ontario	109	2	0	2	107	98
Christie Conservation	Christie Reservoir	109	7	0	7	102	94
Binbrook Conservation	Lake Niapenco	109	24	0	24	85	78
Valens Conservation	Valens Reservoir	109	18	0	18	91	83

*PHS does not monitor for *E. coli* when BGA is present

The public beaches on Lake Ontario and at the conservation areas have consistently had acceptable *E. coli* concentrations during the 2013 to 2015 swimming seasons (Figure 1). During this same time Bayfront and Pier 4 Beaches have experienced significant decreases in percentage of days open for swimming. They both remain very distant from meeting the Remedial Action Plan (RAP) delisting criteria of 80%. Pier 4 had shown signs of improvement since the implementation of bird exclusion barriers in August 2005, however the water quality remains well below the delisting criteria and since 2013 the water quality at Pier 4 Beach has been decreasing. In 2015 BGA toxins were responsible for closing Bayfront Beach for 50% of the swimming season and Pier 4 for 21%. PHS continued to monitor for the presence of microcystin toxins until November 2015.

Figure 1: Percentage of Days Hamilton Beaches Open 2013-2015

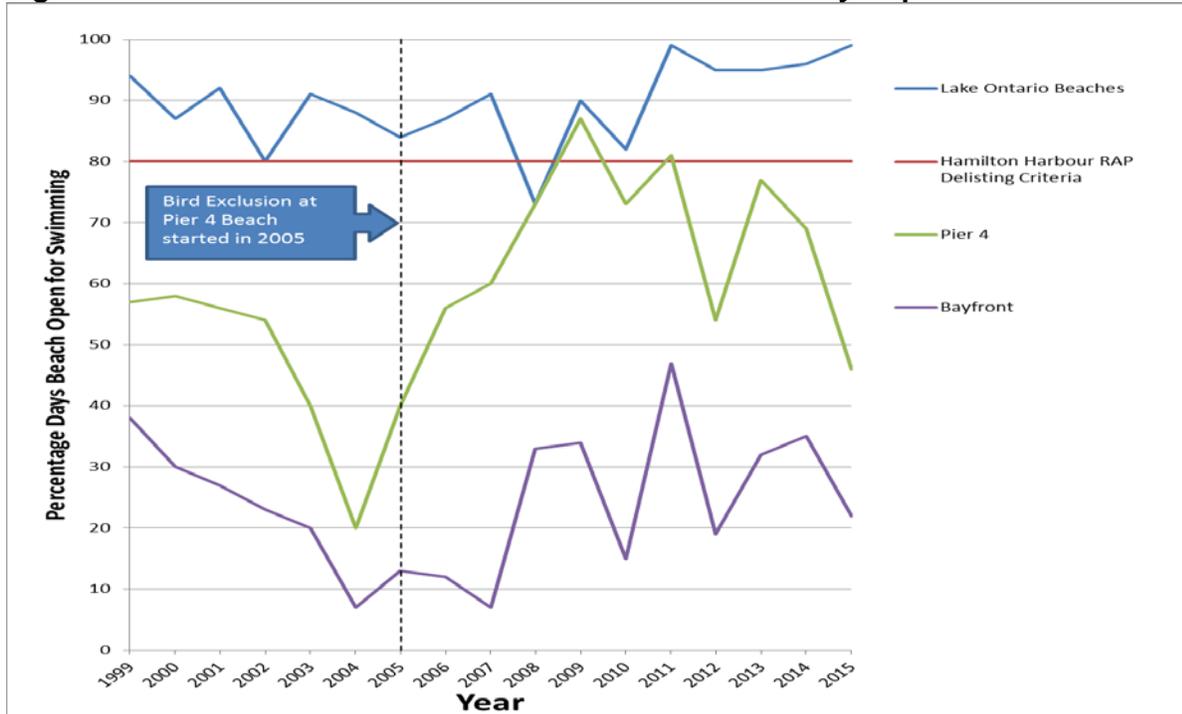


Hamilton Harbour Beaches

In 2015 Bayfront Beach was open 22% of the time while Pier 4 Beach was open 46%. Both harbour beaches experienced a drop in the number of days that they were open for swimming in 2015 over the previous year (Figure 1). In 2015 elevated microcystin toxins were detected approximately 6 weeks earlier than in 2014. In 2015 Bayfront Beach was closed for 55 days, and Pier 4 Beach was closed for 23 days due to BGA. In comparison, microcystin toxins accounted for only eight days of the 2014 season closures at both beaches.

Bird deterrent measures and enhanced beach maintenance procedures have been in place at Pier 4 Beach since August 2005 and have appeared to have improved the water quality at that beach. Similar measures taken at Bayfront Beach do not appear to have improved the water quality over the past decade.

Figure 2: Hamilton Harbour and Lake Ontario Beaches % Days Open



Bayfront Beach

The percentage of days Bayfront Beach was open for swimming decreased from 35% in 2014 to 22% in 2015. One of the Hamilton Harbour RAP’s delisting criteria is for the water quality at Bayfront Beach to be open for swimming 80% of the time during the season. Bayfront Park Beach has not been able to come close to meeting this target.

Excessive *E. coli* concentrations continue to be an ongoing concern. Research has indicated waterfowl faecal matter is likely to be a large contributor to the concentration of *E. coli* in the water at Bayfront Beach. Waterfowl leave fecal matter on the beach sand, grassy slopes and paved surfaces of the park. During periods of rainfall this faecal matter can be washed onto the beach and contaminate the water. The Toward Safe Harbours 2008 report by the Bay Area Restoration Council (BARC) cites research supporting the theory that the main source of *E. coli* in the water at the harbour beaches are the presence of a large number of Canada geese, ring-billed gulls and other waterfowl. This report can be accessed online at <http://www.hamiltonharbour.ca/resources/documents/TSH-Report,2008.pdf>

On July 13, 2015 microcystin concentrations were detected and exceeded warning levels of 10 ppb at Bayfront Beach and at the Bayfront Park boat launch. PHS does not monitor for *E. coli* levels once toxin-producing BGA blooms are observed and microcystin concentrations are confirmed. Prior to the arrival of BGA, Bayfront Beach had been posted as unsafe for swimming for 56% of the time due to high levels of *E. coli* (Table 2). Public Health Services issued a media release to inform the public and stakeholders of the presence of microcystins toxins and beach closed signs were posted at the sites. In 2015 the presence of BGA was responsible for closing Bayfront Beach for 50% of the entire swimming season.

Table 2: 2015 *E. coli* Levels in Hamilton Harbour Beaches Prior to BGA Arrival

	Total # of Days Beach Sampled for <i>E. coli</i>	# of Days Beach Closed due to <i>E. coli</i>	% of Days Beach Closed due to <i>E. coli</i>
Bayfront Beach	54	30	56
Pier 4 Beach	86	34	40

Since August 2010 a buoy line system has been installed seasonally at Bayfront Beach. This buoy system is an attempt to deter Canada geese from swimming into the Bayfront swimming area during the six-week period when the geese do not fly due to feather moulting. In April 2011 shrubs were planted to act as a barrier to surface water run-off and eventually act as a line-of-sight obstacle for Canada geese. Increased canine harassment, beach grooming measures and the goose egg oiling program will continue in 2016.

Pier 4 Beach

The percentage of days Pier 4 Beach was open for swimming decreased from 69% in 2014 to 46% in 2015. One of the Hamilton Harbour RAP's delisting criteria is for the water quality at Pier 4 Beach to be open for swimming 80% of the time during the season. Pier 4 Beach has met or exceeded the 80% Hamilton RAP delisting criteria twice; once in 2009 and again during the 2011 swimming season. In recent years however, the water quality at Pier 4 has declined. In 2013 the beach was open for 77% of the sampling season which decreased to 46% in 2015 (Figure 1). Prior to the arrival of BGA in 2015 the beach was closed 40% of the time due to high *E. coli* concentrations.

On August 14, 2015 microcystin concentrations were detected and exceeded warning levels at Pier 4 Beach and at the Bayfront Park boat launch. PHS does not monitor for *E. coli* levels once toxin-producing BGA blooms are observed and microcystin concentrations are confirmed. Prior to the arrival of BGA, Pier 4 Beach had been posted as unsafe for swimming for 40% of the time due to high levels of *E. coli* (Table 2). Public Health Services issued a media release to inform the public and stakeholders of the presence of microcystins toxins and beach closed signs were posted at the sites. In 2015 the presence of BGA was responsible for closing Pier 4 Beach for 21% of the entire swimming season.

Similar to Bayfront Beach, bird deterrent measures and enhanced beach grooming activities have been in place at Pier 4 Beach since 2005. These measures have included diverting rainfall drainage and providing beach landscape enhancements. The measures appeared to have improved the bacteriological water quality at Pier 4 Beach.