Niagara Community Observatory

Policy Brief 15
By Sophia Papastavrou & Doug Hagar

Niagara's Beaches: Hidden Gems

Introduction

On a hot summer day, Niagara residents have access to a wealth of public beaches along Lake Erie and Lake Ontario. The soft sand and clean water at Bay (Crystal) Beach, draws more than 2,000 visitors per day including some from south of the border (The Standard, 2012). Niagara Region Public Health ensures that public beaches are clean and the water remains safe for recreational use by monitoring these beaches weekly. Beaches in Niagara have gone through many transitions over the last 100 years from community hubs such as Crystal Beach complete with dance halls and an amusement park and Lakeside Park in St. Catharines that housed a waterslide. People swam and boated in the waters of Lake Ontario and Lake Erie in the same way that residents travel to northern Ontario cottages today. Over the years, Niagara residents have watched their beaches evolve as environmental impacts have threatened beach use. The Niagara Region's remedial action plans have significantly reduced pollution through extensive environmental surveys, inventory of public beaches, historical and epidemiological data, as well as routine beach surveillance (OPHS, 2008).

Public beaches are beaches that are owned and/or operated by a municipality. Niagara Region Public Health does not monitor water quality for private beaches, but it can test water in any area that the public has access to and where there is reason to believe there is a water-borne illness or injury risk to the public (Beach Management Protocol, Ontario Public Health, 2008). Beaches that pose potential health risks to swimmers based on current water conditions are 'posted' and signs are placed on the beaches to inform the public about the risks to health and safety. Information about posted beaches is available on the Niagara Region's website.

The purpose of this brief is to discuss the factors that affect beach water quality, the beach quality monitoring program used by Niagara Region Public Health, the limitations of the monitoring process, and to present information on the quality of Niagara's beaches.

A glimpse of history

After the turn of the 20th century, beaches in Niagara were in a cultural renaissance. Amusement parks, swimming, dance halls and boating drew tourists from Canada and the United States. Ships accommodating up to 3,500 passengers including the Americana and the Canadiana shuttled tourists to Crystal Beach, to the hotel, bathhouse and Crystal Beach Amusement Park. Ship passengers could enjoy themselves on board with dance floors and entertainment and once at Crystal Beach, they could experience the rollercoasters and dozens of rides at the park.

Grimsby Beach (Niagara Falls Public Library)

Other beach areas in Niagara offered similar attractions. Erie Beach amusement park, also known as Snake Hill Grove, offered a number of attractions, rollercoasters and the Erie Beach Casino. Grimsby Beach also had a rollercoaster and sports competitions. At Lakeside Park, entertainment included bands, orchestras and stage shows at the dance hall and bandstand as well as baseball and lacrosse matches in the field. By 1945 Lakeside Park had a funhouse, rides, several refreshment stands, a ballroom, mini-golf, and bicycle and paddle boat rentals.

A variety of challenges impacted the parks and beaches in Niagara after the 1970s. Increased pollution of the lakes reduced the number of people visiting the beaches. Financial challenges posed by competition with new amusement parks at Darien Lake and Canada's Wonderland caused the beach-side amusement parks to eventually close.[1]

Despite the closure of most of the amusement parks and attractions, the sandy beaches still remain. Reduced pollution in the lakes means that the beaches around Niagara can be enjoyed again for recreation and swimming.

Lakeside Park (Niagara Falls Public Library)

Crystal Beach (Niagara Region)

[1] For more information on Niagara's past amusement parks or for more information on Lakeside Park, Crystal Beach amusement park or Erie Beach, see Closed Canadian Parks http://cec.chebucto.org/ClosPark/

Niagara's Beaches

Niagara Region's Beaches (http://maps.niagararegion.ca/beachmonitoring)

Niagara beaches are rated 'A' to 'C' based on bacteriological sampling history, susceptibility to faecal contamination, and past bather load. The classification of beaches is not permanent, and changes with new information and conditions. Beaches are classified:

Classification of Beach	Monitoring regularity
Class A = High Concern	Monitored 5-7 days per week
Class B = Medium Concern	Monitored 2-3 days per week
Class C = Low Concern	Monitored 1-2 days per week

What impacts beach water quality?

The Ministry of Health and Long-Term Care and Niagara Region Public Health make the importance of clean, safe recreational water a priority. Keeping recreational water safe for swimming requires specific protocols and careful maintenance of the water quality at the beach. The quality of water is important because of the potential for water-borne illness and injury such as bacteria or visible debris in the water (Ontario Public Health, 2010). Water quality is determined by the level of Escherichia coli (E.coli) bacteria (Niagara Region Public Health, 2010). Water quality is also impacted by environmental factors such as rainfall, air temperatures, the behaviour of waves or pollution and beach wildlife. Other factors that

affect beach water quality include sewage spills or overflows, waste from pets or other animals, septic tank seepage, boating waste, oil spills, and agricultural manure (Niagara Region, 2012). Information about environmental conditions, routine beach surveillance, and the collection of daily water sampling allow the Region to monitor bacterial levels that might pose a threat to the public (Ontario Public Health, 2010).

When high nutrient or light levels are present, there is an increased risk for algal blooms forming in the Great Lakes. Algal blooms are various types of algae (most commonly blue-green algae) and some contain toxins that produce harmful conditions to marine life and humans (Niagara Region, 2012). Different types of algal blooms exhibit various risks and are becoming more common due to global warming. While northern waters used to be too cold for algae to grow, the lakes are now getting warmer, creating better conditions for algal growth. So-called 'blue-green' algal blooms can be blue, bright green, brown, yellow, or red and may look like paint floating in the water. The blooms can look like foam or scum.

When there is an abundance of algal blooms in recreational water, beach closures are necessary. Most algal blooms are relatively harmless, but blue-green algal blooms produce a wide variety of toxins that include neurotoxins, liver toxins, cell toxins and skin irritants. The neural toxins, in large concentrations, can result in muscle cramps, twitching, paralysis, and cardiac or respiratory failure. The toxins can also cause nausea, vomiting, acute liver failure, skin irritations and rashes.

A large Blue-Green Algal Bloom, Lake Erie (NASA 2011)

Blue-Green Algal Bloom, Catawaba Island, Lake Erie (NOAA 2009)

Beach Testing Process

The provincial government developed the Beach Management Protocol (2008) to outline minimum program guidelines for beach monitoring by Ontario public health units. Twenty-six beaches are monitored by Niagara Region Public Health on at least a weekly basis from May to September. Beaches are sampled based on classification. The regional website and a hotline on the beaches provide up-to-date beach quality information and beaches

that are posted are marked with clear signs at the beach or shoreline.

Public health staff sample the water 15-30 cm below the surface where the depth of the water is 0.75 to 1 metre (less than waist deep) to test for E. coli bacteria. Five samples are taken at each beach and a geometric mean is calculated from the five samples in order to reduce bias or sampling error from a single water sample. Field staff also record the air temperature, water temperature, rainfall, rain intensity, sky conditions, wind speed/direction, water clarity/turbidity (presence of small particles), wave height and other pollution sources.

In addition to closure of the beach due to high E.coli bacterial counts, the beaches may also be closed due to algal blooms, heavy algae growth, fish or wildlife die-off, visible debris or sharp objects in the water, high bacterial counts, wastewater treatment plant bypasses, historically high bacterial counts, and other situations.

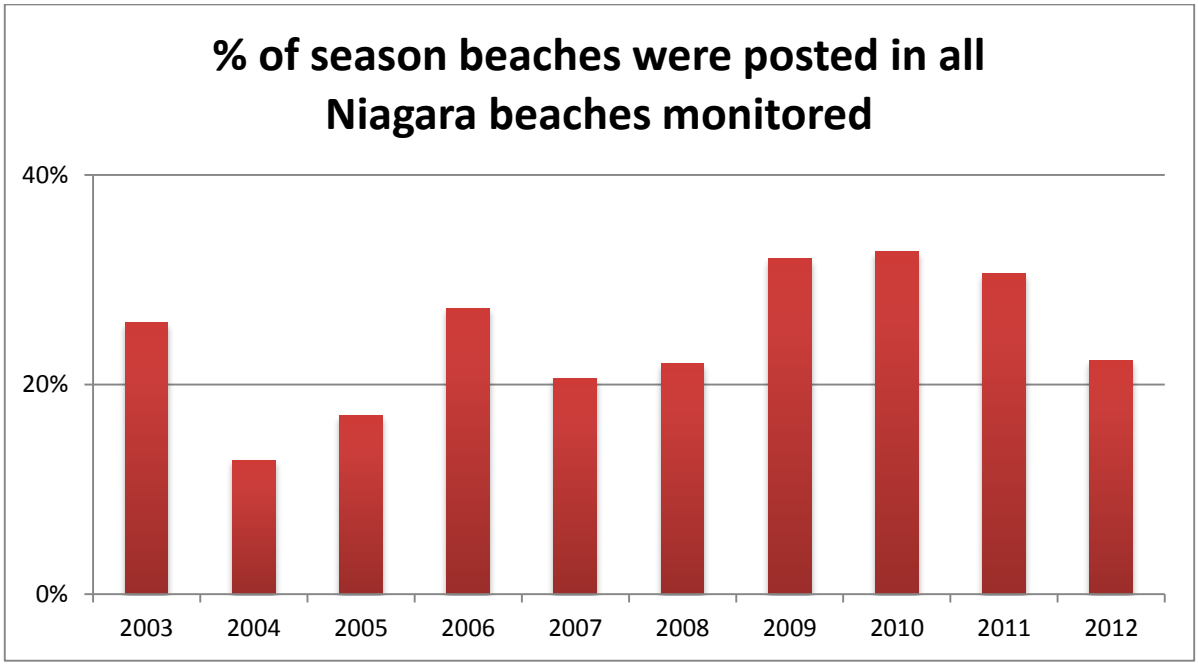
Predictive modelling

Predictive modelling was adopted as a pilot project by Niagara Region Public Health in 2009 for Bay (Crystal) Beach, Nickel Beach and Lakeside Beach and ensures more accurate notifications of beach closures. Predictive modelling is the use of current weather conditions and past beach data to predict E. coli levels and to estimate beach water quality. A mathematical formula is used to more accurately estimate the current beach conditions. Predictive modelling is useful due to the length of time it typically takes to process water samples (18-24 hours) as well as day-to-day changes in weather conditions. Conditions on beaches that are sampled once or twice per week may change and therefore predictive modelling helps to estimate risk levels more accurately between sample periods. For areas that only rely upon samples, it means that the posting of beach quality results are a day old and might have changed. Using predictive modelling ensures a more up-to-date calculation of the current beach conditions.

The use of predictive modelling is one of Niagara's strengths since many other areas do not use predictive modelling or water sampling timelines that are beyond provincial standards. More regular sampling of popular beaches and the use of predictive modelling mean that beach-goers are safer as a result of a more comprehensive testing process. The monitoring of beaches will continue to become more accurate with the adoption of weather stations at several popular 'A' beaches rather than relying upon weather monitoring at stations not in close physical proximity to the beaches. Niagara Region Public Health has also begun the installation of environmental data buoys at a selection of beaches to obtain water temperature, wave height and other information at more regular intervals that can be sent electronically to the department for more accurate reporting.

Niagara Beach Postings

The number of posted beach days varies by beach as a result of varying physical and environmental conditions and fluctuates from one year to the next. It appears that the percentage of the season that beaches are posted in Niagara has generally increased since 2003. This may be explained by increased lake temperatures (since bacteria persist in higher water temperatures), changes in the number of beaches monitored (a decrease from 50 beaches in 2003 to 26 beaches in 2012) as well as improvements in water quality monitoring. The sudden drop in 2012 postings from the previous three years is an exception due to a hot, dry summer (lack of rainfall) that year with plenty of sunshine.



One of the most significant factors affecting E.coli counts at Great Lakes beaches is rainfall. Rain water can carry E.coli and other microorganisms over land and into surface water, thus impacting beaches.

The difference in the number of postings of Lake Ontario and Lake Erie beaches was small in 2012. There is a large variation in the number of days posted per season for each beach. Beaches that are more secluded are more likely to have longer periods of high bacterial levels due to shelter from currents, waves and wind that would cycle the water from the beach. Jones Beach is a relatively sheltered beach with the Welland Canal entrance sheltering the beach from wind and waves from the west and is one of the reasons for a higher number of beach postings. Jones Beach, Long Beach Conservation East, and Ryerson Park had the highest rate of postings and were closed more than 50% of the season in 2012.

Jones Beach, Lake Ontario

'A' Beaches (2012)	% of days posted	'B' Beaches (2012)	% of days posted
Jones Beach	83.3	Crescent Beach	30.6
Long Beach Conservation East	57.4	Queen's Royal	30.6
Charles Daly West	32.4	Fifty Point Conservation	12.0
Charles Daly East	25.0	Bernard Avenue	8.3
Long Beach Conservation West	23.1	Total	20.4%
Wainfleet Lake Erie Public Access	22.2	**'C' Beaches (2012)**	**% of days posted**
Nickel Beach	19.4	Ryerson Park	69.4
Long Beach	19.4	Humberstone Centennial Park	19.4
Sherkston Wyldewood	16.7	Waverly Beach	19.4
Garden City (Municipal) Beach	15.7	Nelles Beach	18.5
Lakeside Beach	13.9	Belleview Beach	13.0
Bay (Crystal) Beach	13.0	Grimsby Beach	0.0
Sherkston Elco	13.0	Chippawa Conservation Area	0.0
Sherkston Quarry	3.7	Windmill Point Park Quarry	0.0
Total	25.6%	Total	17.5%

What Can Be Done to Improve Beach Water Quality?

As was already mentioned, beach quality is affected by a variety of environmental, physical and human factors. There are a number of factors that can help reduce the risk of E.coli and other bacteria growth in our rivers and lakes. First, continued reduction of phosphates in soaps and detergents would help reduce algal growth. Restricting the phosphates in laundry detergents in the 1970s successfully reduced the algal blooms in Lake Erie.

Consumers can also choose phosphate-free and organic detergents to help improve water quality.

Continuing to restrict agricultural and residential fertilizers from entering the water systems will also improve beach and water quality. Residential fertilizers typically contain nitrogen and phosphorous and when used correctly, can promote plant growth without harming the environment. But when misused, fertilizers can seep into storm sewers and enter local water sources resulting in too many nutrients in the water and contributing to algal growth. Making sure to use fertilizers according to recommendations and applying fertilizers on areas that have enough organic material to act as a filter can help. Additionally, tackling storm-water runoff by identifying problem areas and developing "buffer zones" made up of grass or trees to slow and filter the runoff can help improve water quality.

Another way to improve water quality is the continued separation of storm water and household sewage systems to reduce the propensity for wastewater system overloads during heavy rainfall periods. Older neighbourhoods were built with storm sewer and household sewage systems combined. During heavy rainfalls, the sewage systems can become overloaded and result in flooded basements or combined sewer overflows that expel untreated water into rivers and lakes. Assuring that communities have adequate wastewater treatment capacity and continuing to replace older combined sewers will help reduce the amount of untreated waste entering local water sources. Reducing water consumption during heavy rainfalls can help reduce overflows.

Conclusion

Niagara's sandy beaches are a unique feature that is often overlooked. Historically, people travelled from across Canada and the United States to come to Niagara's beach areas and enjoy themselves with the diversity of recreational opportunities offered. People still regularly use Niagara's beaches and some still travel from New York State to enjoy themselves on our beaches. Industrial, residential and agricultural pollutants and rising water temperatures have affected beach quality in the past and there have been continuing efforts to increase water quality in the Great Lakes. The risks are monitored by a team of public health staff who ensure the most accurate beach quality reporting possible in an effort to keep swimmers and beach-goers safe.

Water outfall, Lake Erie, 2012