



Beach Advisories

Formerly Indicator # 4200

Overall Assessment

Status: Mixed

Trend: Unchanging

Rationale: The percentage of monitored Great Lakes beaches that were open and safe for swimming during 2008 - 2010 is an average of 93%. This standard differs from the last SOLEC in that the focus of lake summary information in the U.S. is now exclusively on monitored beaches. The percentage of monitored Great Lakes beaches that were open and safe for swimming during 2008-2010 is an average of 79%. Differences in the percentage of open and posted beaches between the U.S. and Canada may reflect differing posting criteria. Please note that for consistency, all 2006 and 2007 results for Canadian beaches have been recalculated and reassessed based on the new beach indicator reporting method.

Lake-by-Lake Assessment

Lake Superior

Status: Good

Trend: U.S.: Unchanging; Canada: Deteriorating

Rationale: During 2008 through 2010, on average, 97% of monitored Lake Superior beaches were open and safe for swimming in the U.S. In addition, efforts to identify and remediate sources of contamination are being conducted at several Lake Superior beaches. In Canada, during 2008 through 2010, 88% of Lake Superior beaches were open and safe for swimming during the swimming season. The trend shows deteriorating conditions, from 96% in 2006-2007; however, there was an increase in 30% more beaches being monitored from the last reporting cycle.

Lake Michigan

Status: Good

Trend: Unchanging

Rationale: During 2008 through 2010, on average, 93% of monitored Lake Michigan beaches were open and safe for swimming. In addition, efforts to identify and remediate sources of contamination are being conducted at several Lake Michigan beaches.

Lake Huron

Status: Good

Trend: U.S.: Unchanging; Canada: Deteriorating

Rationale: During 2008 through 2010, on average, 98% of U.S. monitored Lake Huron beaches were open and safe for swimming. In addition, efforts to identify and remediate sources of contamination are being conducted at several Lake Huron beaches. In Canada, during 2008 through 2010, 83% of Lake Huron beaches were open and safe for swimming. The trend appears to be deteriorating from 94% in 2006-2007.

Lake Erie

Status: Fair

Trend: Deteriorating

Rationale: During 2008 through 2010, on average, 86% of U.S. monitored Lake Erie beaches were open and safe for swimming. While there has been an annual 2% decline in the percentage of Lake Erie beaches that are open and

safe for swimming since 2008, efforts are being conducted to identify sources of contamination so measures can be taken to mitigate the contamination. In Canada, during 2008 through 2010, 78% of Lake Erie beaches were open and safe for swimming. The trend appears to be deteriorating from 87% in 2006-2007.

Lake Ontario

Status: Good

Trend: U.S.: Improving; Canada: Unchanging

Rationale: During 2008 through 2010, on average, 93% of U.S. monitored Lake Ontario beaches were open and safe for swimming. Although the trend is improving, efforts continue to be conducted to identify sources of contamination so measures can be taken to mitigate the contamination. In Canada, during 2008 through 2010, 75% of Lake Ontario beaches were open and safe for swimming during the swimming season. The trend appears to be slightly deteriorating from 79% in 2006 – 2007.

Purpose

- To assess the number of days that Great Lakes beaches are open and safe for swimming by assessing the health-related swimming posting (advisories or closings) days for recreational areas (beaches).
- To infer potential harm from pathogens to human health through body contact with nearshore recreational waters.

Ecosystem Objective

Waters should be safe for recreational use. Waters used for recreational activities involving body contact should be substantially free from pathogens, including bacteria, parasites, and viruses, that may harm human health. This indicator supports Annexes 1, 2, and 13 of the GLWQA.

Ecological Condition

Measure

The percentage of days in the beach season that monitored Great Lakes beaches are open and safe for swimming. The beach season is generally from the Memorial Day/Victoria Day weekend to Labor Day; however, all beach days that are reported on by counties and health units will be used.

Endpoint

For each lake basin, and for the entire Great Lakes basin, the status will be considered good if 80% or more of the beach season monitored Great Lakes beaches are open and safe for swimming.

Background

Beach monitoring is conducted primarily to detect bacteria that indicate the possible presence of disease-causing microbes (pathogens) from fecal pollution. People swimming in water contaminated with pathogens can contract diseases of the gastrointestinal tract, eyes, ears, skin, and upper respiratory tract. When monitoring results reveal elevated levels of indicator bacteria, the state or local government/health units issue a beach advisory or closure notice until further sampling shows that the water quality is meeting the applicable water quality standards.

A health-related posting day is one that is based upon elevated levels of *E. coli*, or other indicator organisms, as reported by county health departments (U.S.), Public Health Units (Ontario), or municipal health departments in the Great Lakes basin. *E. coli*, Enterococci, and other bacterial organisms are measured in beach water samples because they act as indicators for the potential presence of pathogens which can potentially harm human health through body contact with nearshore recreational waters

The Ontario provincial standard is 100 *E. coli* colony forming units (cfu) per 100 mL, based on the geometric mean (GM) of a minimum of one sample per week from each of at least 5 sampling sites per beach (Ontario Ministry of Health and Long-Term Care, 2008). The Beach Management Protocol states that beaches of 1000 meters of length or greater require one sampling site per 200 meters, with a minimum of 5 samples taken at each site. In some cases local Health Units in Ontario have implemented a more frequent sampling procedure than is outlined by the provincial government. When *E. coli* levels exceed the standard, beach waters are posted as unsafe for the health of bathers until further sampling shows that the water quality is meeting the applicable water quality standards. The average swimming season in Ontario begins at the end of May and continues until the first weekend in September, but some health units may have a longer or shorter season than the norm. The difference in the swimming season length, the number of beaches sampled each season, as well as the frequency of sampling are all factors that may skew the final result of the percent of beaches open and safe for swimming throughout the season.

In the U.S., the water quality criteria for bacteria for fresh coastal recreation waters are a single sample maximum (SSM) value of 235 *E. coli* colony forming units (cfu) per 100 ml of water (State of Michigan uses 300 cfu per 100 ml), and an SSM of 61 Enterococci cfu per 100 ml (Federal Register 2004). When levels of these indicator organisms exceed water quality standards, swimming at beaches is prohibited or advisories are issued to inform beachgoers that swimming may be unsafe. The swimming season starts Memorial Day weekend and ends on Labor Day. The U.S. Environmental Protection Agency (U.S. EPA) annually publishes a summary report and data about beach closings and advisories for the previous year's swimming season statistics. The report is based on beach monitoring and notification data submitted each year by the states to U.S. EPA.

The Beaches Environmental Assessment and Coastal Health (BEACH) Act amended the Clean Water Act in 2000 and authorizes U.S. EPA to award grants to coastal and Great Lakes states, territories and eligible tribes to help local authorities monitor their coastal and Great Lakes beaches and notify the public of water quality conditions that may be unsafe for swimming. Great Lakes beach managers are now able to regularly monitor beach water quality and advise bathers of potential risks to human health when water quality standards for bacteria are exceeded. The BEACH Act also requires states that have coastal recreation waters, including the Great Lakes, to adopt bacteriological criteria as protective as EPA's recommended criteria (under Section 304(a) of the Clean Water Act) at their coastal waters.

Status of Great Lakes Beach Postings

Since the last reporting period, the percentage of U.S. Great Lakes beaches open and safe for swimming has remained about the same (Figure 1). Overall, the percentage of monitored Great Lakes beaches that were open and safe for swimming during 2007 – 2010 was an average of 94% (percent of beach days not under an action).

The percentage of U.S. beaches open the entire swimming season (100% of the time) from 2007 to 2009 decreased for Lakes Erie, Huron, and Ontario (Figure 3). From 2009 to 2010, while there appears to be a significant decrease in the percentage of beaches open the entire swimming season, it is because only monitored beaches are included in the assessment. The previous SOLEC beach postings reports (and the 2007-2009 data in Figure 3) also included non-monitored beaches. The non-monitored beaches were listed as open and safe for swimming for 100% of the beach season because the lack of monitoring resulted in no postings. It is important to include only the beaches for which we have data in order to get an accurate assessment of Great Lakes beach water quality.

There are a number of activities being conducted in the U.S. to make the Great Lakes cleaner and safer for swimming. In 2010, the Great Lakes Restoration Initiative (GLRI) provided funding to numerous Great Lakes

entities to conduct sanitary surveys at 521 Great Lakes beaches to identify sources of contamination affecting beach water quality. Identification of pollution sources at beaches is a critical first step to enabling beach managers to reduce pollution and increase the time that beaches are safe for recreation. GLRI funds have also been issued to implement projects to reduce or eliminate contamination sources that have been identified through the use of sanitary surveys.

Identification of pollution sources affecting beach water quality followed by the implementation of actions to reduce or eliminate the pollution will help reduce the presence of bacteria, viruses and pathogens to levels in which water quality standards can be met, one of the long term goals of the *Great Lakes Restoration Initiative Action Plan*. This goal is addressed by two *Action Plan* objectives, “By 2014, 50% of high priority Great Lakes beaches will have been assessed using a standardized sanitary survey tool to identify sources of contamination” and “By 2014, 20% of high priority Great Lakes beaches will have begun to implement measures to control, manage or remediate pollution sources identified through the use of sanitary surveys.” It is important for the source identification and remediation work to continue in order to improve water quality, better protect public health, and increase the opportunities for safe recreation at Great Lakes beaches.

In Canada, overall the percentage of Great Lakes beaches open and safe to swim during 2008-2010 was 79%. The trend appears to be slightly deteriorating from 82% in 2006-2007 (Figure 2). This analysis is based on the number of days within a swimming season that beaches are open and safe to swim. Please note that this analysis differs from past SOLEC reports, which focused on the number of postings within each swimming season. The last reporting cycle was based on the U.S. standard that beaches should be open 95% or more of the entire swimming season. The proposed new Ontario Public Health standard (Ministry of Health *in draft*, 2008) indicates that beaches should be open 80% or more of the swimming season. This standard better reflects the difference in beach posting standards between the U.S. and Canada. The number of beach postings within each swimming season was calculated based on this new standard to provide a consistent analysis with the past SOLEC report. All 2006 and 2007 results have been recalculated and reassessed based on the Ontario Public Health standards used in this report to provide consistency. The original data set included only those beaches monitored throughout the beach season; therefore there has been no change in the type of reporting for Canadian beaches.

The percentage of Canadian beaches open the entire (100%) swimming season slightly improved from 26% during 2006 to 2007 to 30% during 2008 to 2010 (Figure 4). The percentage of Canadian Great Lakes beaches open 80% or more of the swimming season during 2008 – 2010 was 64%. This shows a deteriorating trend from 80% during the 2006 – 2007 reporting cycle. It is also evident that between 2008 to 2010, the percentage of Canadian Great Lakes beaches that were open 80% or more of the swimming season also deteriorated. In 2008, the percentage of beaches open more than 80% or more of the swimming season was 69%, in 2009, the percentage of beaches open more than 80% or more of the swimming season was 62%, and in 2010 the percentage of beaches open more than 80% or more of the swimming season was 60%. Within 3 years, the percentage of beaches open more than 80% or more of the swimming season decreased by 9%. However, from 2006 to 2007, the percentage of beaches open more than 80% or more of the swimming season increased from 74% in 2006 to 85% in 2007. Annual variability in weather may affect the variability in bacterial counts between each swimming season.

Comparisons of the frequency of beach closings between Canada and the U.S. will be limited due to use of different water quality criteria in the Great Lakes. The change in the Canadian standard, indicating that beaches should be open 80% or more of the swimming season, rather than 95% or more of the beach season, provides a slightly improved comparison of beach postings in the Great Lakes.

Management Challenges/Opportunities

Annual variability in the data may result from the variability in monitoring frequencies among beach management entities and variations in reporting, and may not be solely attributable to actual increases or decreases in levels of bacterial indicators. In addition, annual variability of weather may affect the variability in bacterial counts.

Additional point and non-point source pollution at coastal areas due to population growth and increased land use may result in additional beach postings, particularly during wet weather conditions. Unless contaminant sources are reduced or removed (or new sources introduced), Great Lakes beach sample results generally contain similar bacteria levels after events with similar meteorological conditions (primarily wind direction and the volume and duration of rainfall). If episodes of poor recreational water quality can be associated with specific events (such as meteorological events of a certain threshold), then forecasting for episodes of elevated bacterial counts may become more accurate.

There may be new indicators and new detection methods available through current research efforts occurring bi-nationally in both public and private sectors and academia. Although currently a concern in recreational waters, viruses and parasites are difficult to isolate and quantify, and feasible measurement techniques have yet to be implemented. Viruses and parasites, although a concern in recreational waters, are difficult to isolate and quantify at present, and feasible measurement techniques have yet to be developed. Although considered reliable indicators of potential harm to human health, the presence of *E. coli* and/or Enterococcus may not necessarily be related to fecal contamination.

Many Ontario health units are participating in beach management programs to monitor public bathing beaches and to improve public awareness. Although each health unit differs slightly, most improve recreational water quality by participating in assisting in enhanced beach grooming; in-water and land debris clean-up; waterfowl and gull deterrent; and public campaigns to encourage people to dispose of food scraps rather than feeding the birds which further pollutes the recreational water (City of Toronto, 2006). The Blue Flag program is becoming a well known program and an effective way of promoting clean beaches in Canada. It is an eco-label that is internationally recognized and only awarded to beaches that achieve high standards in areas such as water quality, education, environmental management and safety (Environmental Defense, 2010). In 2010, Ontario already had 9 awarded Blue Flag beaches on the Great Lakes.

In Ontario, the first Great Lakes beach data depository, the Seasonal Water Monitoring and Reporting System (SWMRS) has recently launched this summer. This web-based application, partnered by Environment Canada and the Ontario Ministry of Health and Long-Term Care, provides local Health Units with a tool to manage beach sampling data. Health Unit beach data from the past decade is currently being entered into the system and should be completed within the next year. In the near future, it will also provide a link to the meteorological data archives of Environment Canada. The result will be a system that can potentially have predictive modeling capability, as well as improve the interface for public use. The system will help identify areas of chronic beach postings and, as a result, will aid in improved targeting of programs to address the sources of bacterial contamination.

Linkages

Beach postings may be the result of pressures including bacterial loadings from tributaries and extreme precipitation events. Improved wastewater treatment in response to these pressures may limit the number of beach postings. Implementation of best management practices and green infrastructure to reduce the volume of storm water runoff may also limit the number of beach postings.

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Comments from the author(s)

This indicator was updated in 2011 to more closely reflect the impacts to human health and the national metric used in the U.S. Non-monitored beaches will no longer be included in the measure for this indicator as they had been in the U.S. in the past. Non-monitored beaches are entered into U.S. databases as open and safe for swimming for 100% of the beach season because the lack of monitoring resulted in no postings. This assumption that non-monitored beaches were always safe for swimming may have resulted in an overstatement of the safety of Great Lakes beaches.

The new Great Lakes beach metric is “Percent of days of the beach season that the Great Lakes beaches monitored by state beach safety programs are open and safe for swimming.” This metric is consistent with EPA’s Office of Water National Program Guidance beach measure (SP-9) and with the language proposed to be revised in the GLRI Action Plan. This change in reporting structure and status justification poses challenges to establish a basin-wide trend and to compare current status with that previously reported through SOLEC. The use of both monitored and non-monitored (U.S.) beaches in past SOLEC reports also complicates comparisons between previous and current status situations.

Assessing Data Quality

Insert “x” under the statement that best corresponds with each data characteristic

Data Characteristics	Strongly Agree	Agree	Neutral or Unknown	Disagree	Strongly Disagree	Not Applicable
1. Data are documented, validated, or quality-assured by a recognized agency or organization	X					
2. Data are traceable to original sources	X					
3. The source of the data is a known, reliable and respected generator of data	X					
4. Geographic coverage and scale of data are appropriate to the Great Lakes basin	X					
5. Data obtained from sources within the U.S. are comparable to those from Canada		X				
6. Uncertainty and variability in the data are documented and within acceptable limits for this indicator report		X				
Clarifying Notes:						

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Information Sources

Great Lakes beach data provided by U.S. EPA

http://water.epa.gov/type/oceb/beaches/seasons_2010_index.cfm

Canadian Great Lakes Beach data provided by the following Ontario Health Units with beaches residing along the Great Lakes: Algoma; Chatham Kent; Durham Region; Elgin St. Thomas; Grey Bruce; Haldimand Norfolk; Haliburton Kawartha Pine Ridge District; Halton Region; Hamilton; Hastings and Prince Edward Counties; Huron County; Lambton County; Niagara Region; North Bay Parry Sound District; Peel Region; Simcoe Muskoka District; Sudbury & District; Thunder Bay District; Toronto; Windsor-Essex County

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Figure 3: Overview of U.S. Beach Postings 2007 - 2010 within each Lake Basin Swimming Season

Figure 4: Overview of Canadian Beach Postings 2006 - 2010 within each Lake Basin Swimming Season

Last Updated

State of the Lakes Ecosystem Conference (SOLEC) 2011

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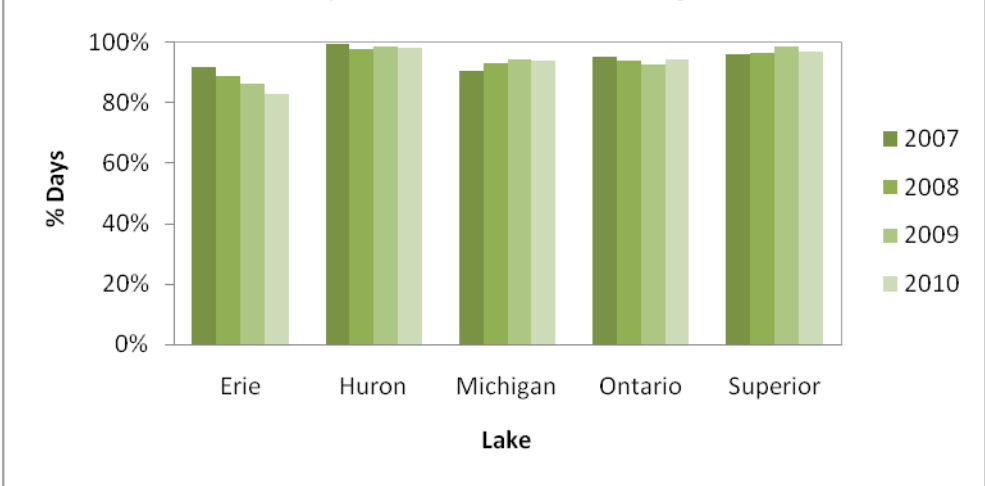


Figure 1. Percentage of Beach Days that U.S. Great Lakes Beaches are Open and Safe for Swimming.
Source:

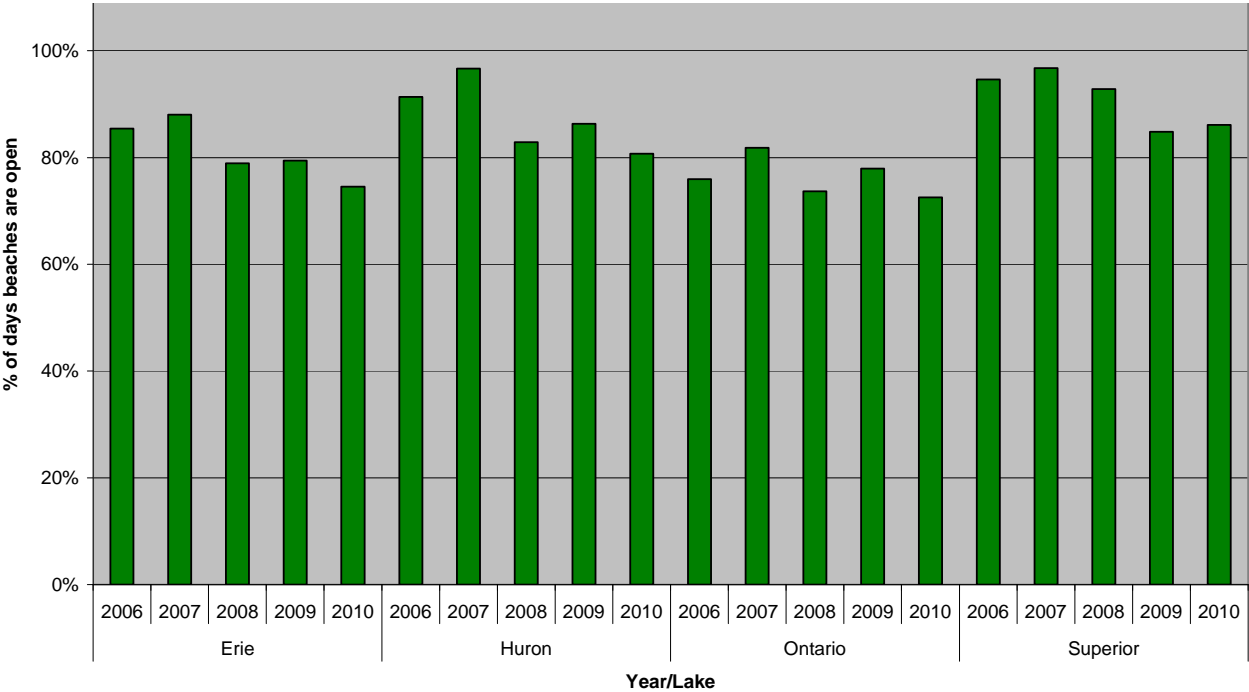


Figure 2. Percentage of Beach Days that Canadian Great Lakes Beaches are Open and Safe for Swimming.
Source:

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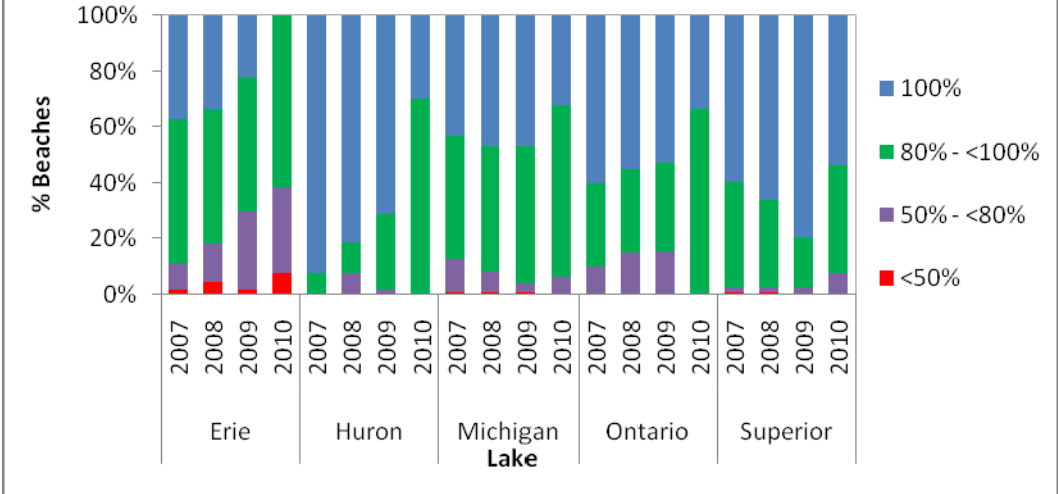


Figure 3. Overview of U.S. Beach Postings 2007 – 2010 within each Lake Basin Swimming Season (2010 data includes only monitored beaches).
Source:

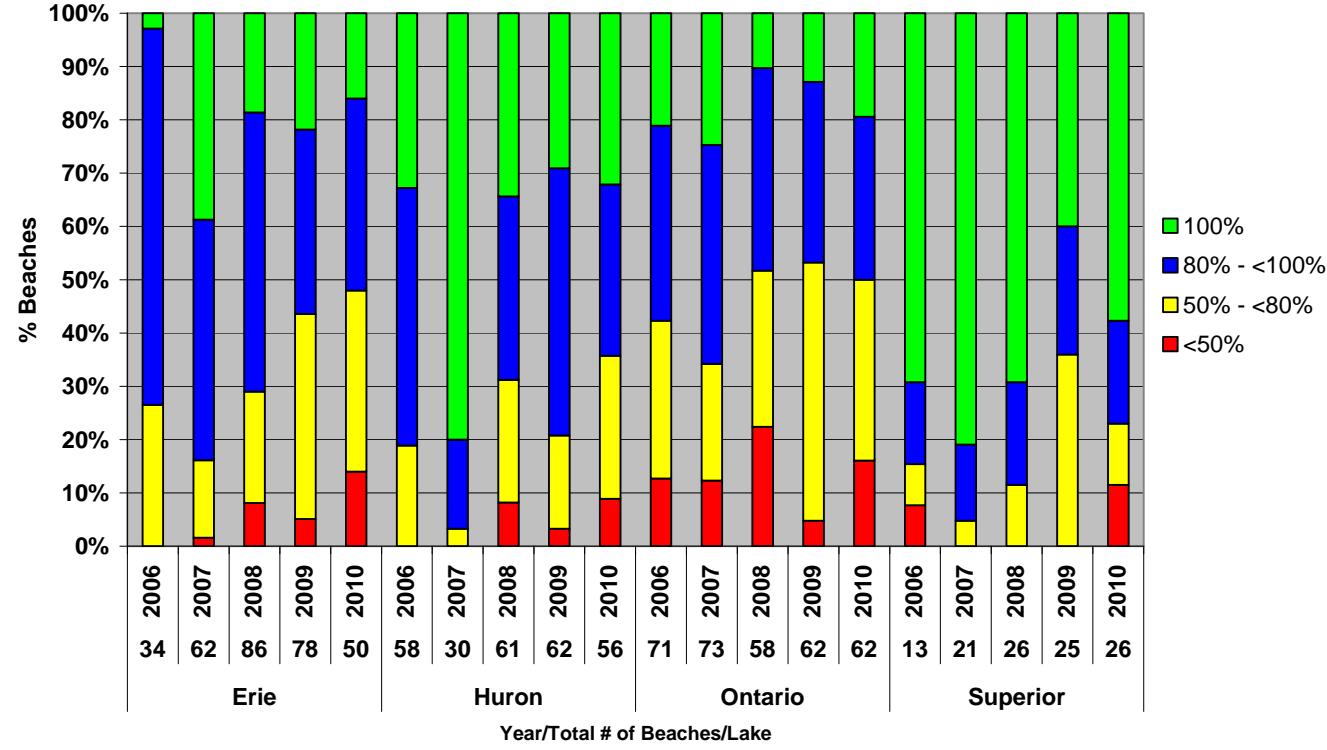


Figure 4. Overview of Canadian Beach Postings 2006 – 2010 within each Lake Basin Swimming Season.
Source: