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Flushing Out the Truth: Sewage Dumping in Ontario

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Researched and written by Ecojustice Senior Scientist Dr. Elaine MacDonald and Staff Scientist Liat Podolsky with assistance from Communications Director Jode Roberts and Acting Communications Director Kori Brus.

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TORONTO OFFICE

30 St Patrick Street, Suite 900, Toronto, ON M5T 3A3
Phone (416) 368-7533 Fax (416) 363-2746
Email: Toronto@ecojustice.ca

VANCOUVER OFFICE

131 Water Street, Suite 214, Vancouver, BC V6B 4M3
Phone (604) 685 5618 Fax (604) 685 7813
Email: info@ecojustice.ca

UNIVERSITY OF OTTAWA-ECOJUSTICE ENVIRONMENTAL LAW CLINIC

University of Ottawa, Faculty of Law, 35 Copernicus Street, Office 107, Ottawa, ON K1N 6N5
Phone (613) 562-5800 ext.3382 Fax (613) 562-5319
Email: Ottawa@ecojustice.ca

ALBERTA OFFICE

5th Avenue SW, Suite 715, Calgary, AB T2P 2X6
Phone (403) 830-2032 Fax (403) 264-8399
E-mail: brobinson@ecojustice.ca

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Sewage Dumping in Ontario - An Ecojustice Investigation

Each year billions of litres of sewage are dumped into the Great Lakes and Ontario's waterways. This occurs when sewage is either bypassed from municipal sewage treatment plants or directly released into the environment from antiquated combined sewer systems, which carry sewage and stormwater in the same pipes and are prone to overflowing during wet weather.

The Ontario Ministry of the Environment (MOE) estimates that the total volume of sewage dumped from sewage treatment plant bypasses was approximately 18 billion litres in 2006 and 8 billion litres in 2007, with at least seven municipalities releasing more than a billion litres during that period. Despite being the largest single source of water pollution into Ontario waterbodies including the Great Lakes, this information is rarely presented for public consumption, instead being buried in arcane provincial government databases. Further, the data collected does not provide an accurate picture of all sewage bypasses in Ontario, as the province does not even collect data for 215 sewage treatment facilities that are operated by the Ontario Clean Water Agency (OCWA), one of the province's own agencies.

Despite being an equally serious pollution source, information on Combined Sewer Overflows (CSOs) is even scarcer. While the province can estimate amounts of bypasses, it is simply not able to accurately estimate the total volume of sewage dumped because the volume and frequency of CSO events are not routinely measured, estimated or consistently reported. However, it is fair to assume that the volume of pollution from CSOs in Ontario is massive. Ecojustice's 2006 survey of 20 American and Canadian cities in the Great Lakes Basin found that they dumped more than 90 billion litres of raw sewage mixed with stormwater in one year through CSOs.

Thus, the findings of this report demonstrate that the province simply does not know how much sewage is escaping proper treatment and being dumped in Ontario's waterways. Based on our analysis of available information, it is clear that sewage dumping is a problem that is unlikely to improve without serious investment, particularly as climate change leads to more frequent storms that overwhelm combined sewers systems.

This report uses the government's own data to underscore the need for better data collection, public reporting and an investment in solutions to mitigate this enormous source of pollution to Ontario's water bodies.

Introduction

It is no secret that sewage is regularly dumped into Ontario's lakes and rivers. The dirty secret is how often it happens and how much sewage is being dumped. This is because no information on sewage releases is publicly reported and as our investigation uncovered, even if it was, the data collected on this issue is incomplete and inconsistent at best.

Ecojustice has attempted to draw attention to this critical issue by surveying municipalities on their sewage management practices, the results of which have been published in two previous

Ecojustice reports: the 2006 *Great Lakes Sewage Report Card* and the 2008 *Green Cities, Great Lakes*. As shocking as our findings were, those reports failed to give a complete picture because they were based on a small sample of municipalities in the Great Lakes Basin that provided information to us on a voluntary basis.

This brief report is our latest attempt to provide information to the public on sewage dumping, and it is not a pretty story. Our investigation has uncovered poor and inconsistent data collection on the part of the province and alarming amounts of sewage being routinely dumped by Ontario municipalities.

Although this report includes information on sewage dumping throughout Ontario, a vast majority of the sewage is being dumped into the Great Lakes Basin, where the majority of Ontario's population lives. In order to understand the impact of these practices, we must first understand the importance of the Great Lakes Basin as both a regional and global ecosystem.

The Great Lakes Basin

The Great Lakes Basin is the largest freshwater ecosystem on earth and holds one fifth of the world's surface fresh water. The Great Lakes include Lake Superior, Lake Huron, Lake Michigan, Lake Erie and Lake Ontario, all of which are interconnected by rivers, channels and smaller lakes. The Great Lakes ecosystem contains a wealth of biodiversity; it is home to 3,500 plant and animal species including 46 species that are found nowhere else in the world and nearly 280 species that are considered "globally rare."

Although the Great Lakes are often thought of as an open system that eventually flows to the sea, only 1% of the water in the Great Lakes leaves the basin each year, flowing to the Atlantic Ocean via the St. Lawrence River. About the same amount is replenished each year, while the rest is a one-time gift from nature - the remains of melted glaciers from the last ice age.

With all its natural riches, the Great Lakes region has seen tremendous economic growth in the past century. Currently, 42 million people live in the Great Lakes Basin, including 98% of Ontarians, with almost half drawing their drinking water directly from the Great Lakes. Sprawling cities, major industries, mining and manufacturing all place heavy burdens on the Great Lakes' delicate ecosystems, and serious threats to the health of the Great Lakes include toxic contamination from various sources in both Canada and the U.S.

Pollution enters the Great Lakes via many different routes: point source effluent discharges like sewage treatment plants and industrial wastewater; nonpoint sources like stormwater runoff from cities and agricultural lands; and deposition of pollutants from the air.

This report is a follow up to an Ecojustice report released in September 2008 titled "Green Cities, Great Lakes: Using Green Infrastructure to Reduce Combined Sewer Overflows" which provided an overview of the issue and contained detailed solutions and recommendations for the use of green infrastructure in mitigating CSOs and stormwater impacts. Please go to www.ecojustice.ca to download a copy of the report.

The Problem: Combined Sewer Overflows and Bypasses

What is a Combined Sewer Overflow?

Combined sewers are an antiquated system that transports both sanitary sewage and stormwater in the same pipes. During wet weather events like rainstorms, the volume of flow commonly exceeds the capacity of the sewer system. When this happens, untreated raw sewage mixed with stormwater is released directly into the local water bodies from outfalls referred to as combined sewer outfalls. The release of sewage from such outfalls is referred to as a combined sewer overflow (CSO).

In some cities, stormwater and sanitary sewer systems are connected by 'cross connections', which allow stormwater and sanitary sewage to mix. Cross connections can be either accidental or intentional and can lead to overflow problems.

An **overflow event**, as defined by the Ontario government¹, occurs when there are one or more CSOs from a combined sewer system resulting from a precipitation event. An intervening time of 12 hours or more separating a CSO from a prior CSO at the same location is considered to separate one event from another.

What is a Sewage Bypass?

During wet weather such as heavy rainstorms or spring snowmelt, sewage treatment plants also commonly have bypasses and spills. Bypasses occur when the treatment facility is overloaded; too much sewage is flowing into the treatment plant. To alleviate the situation and prevent possible upstream problems like basement flooding, some of the sewage flow is deliberately redirected and discharged into local water bodies with little or no treatment. Bypasses may also occur during routine maintenance activities when the treatment plant is temporarily out of operation and during power failures.

It is not overtly illegal to dump sewage via a bypass or overflow under Ontario law, particularly if it is done during wet weather to alleviate high flow volumes. There are provincial government guidelines² in place that municipalities can follow, however the guidelines are not enforceable and merely encourage but do not require reductions in sewage dumping. It is worth noting that Ontario has stated they will not approve any new sewage works or extensions of sewage works that may increase CSOs.

Without further mitigation, CSOs and bypasses will worsen as population density continues to increase in older neighbourhoods that have combined sewers, and climate change increases the frequency of storms and heavy precipitation.

¹ Procedure F5-5. *Determination of Treatment Requirements for Municipal and Private Combined and Partially Separated Sewage Systems*. Available at <<http://www.ene.gov.on.ca/envision/gp/F5-5.pdf>>

² There are several sewage related guidelines. The most relevant to this issue are Procedure F5-5, cited in footnote 1, and Procedure F5-1. *Determination of Treatment Requirements for Municipal and Private Sewage Treatment Works Discharging to Surface Waters*. Available at <<http://www.ene.gov.on.ca/envision/gp/F5-1.pdf>>

Impacts from Sewage and Urban Stormwater

The antiquated sewer systems found in many Ontario cities continue to regularly release huge quantities of partially treated or untreated sewage directly into the lakes and rivers through sewage spills, bypasses and CSOs.

Typical municipal sewage is a foul cocktail of water, human waste, micro-organisms, disease-causing pathogens and hundreds of toxic chemicals. The principal pollutants found in sewage include pathogenic bacteria and viruses, oxygen depleting substances (measured by Biological Oxygen Demand or BOD), various suspended solids and nutrient pollutants like phosphates – each of which carry a heavy ecological toll when released into a fragile ecosystem.

Large concentrations of toxic chemicals, such as oil, polycyclic aromatic hydrocarbons (PAHs) and heavy metals, tend to wash from the urban environment into the sewer system when it rains or when snow melts. Toxic metals such as cadmium, lead, mercury, silver, zinc and synthetic organic chemicals such as brominated flame retardants and PCBs are commonly found in sewage and pose serious dangers to human health and the environment.

Fecal coliforms levels in CSO effluent can be in the order of 100,000 to 10,000,000 coliform units per 100 millilitres of water. A beach in Ontario is not considered safe for swimming if the water exceeds 100 fecal coliform per 100 ml.

How Big is the Problem?

The Great Lakes Sewage Report Card released by Ecojustice (then Sierra Legal) in 2006 identified CSOs as a significant source of pollution in the Great Lakes. The report was based on a survey of American and Canadian cities in the Great Lakes Basin and found that 92 billion litres of raw sewage mixed with stormwater was released into the Great Lakes in one year by those cities alone via CSOs.

Public Reporting and Community Right-to-Know

There is no information on CSOs and sewage plant bypasses incidents publicly reported in Ontario by the provincial government, so the full extent of the problem remains unknown. To help improve our understanding of sewage dumping, we asked the provincial government for information on CSOs and sewage bypasses.

The Ontario Ministry of the Environment (MOE) collects information from municipalities on sewage bypasses on a monthly basis, but the collection of sewer system overflow information appears to be sporadic. Based on the information we obtained from the province, reports of sewage releases to the MOE, particularly CSOs, are often incomplete without any volume estimates. Furthermore, given the nature of the CSO problem, we suspect many CSOs are not detected and thus never reported.

Although municipal sewage treatment plants are required to report sewage spills and bypasses to the provincial MOE, these reports often do not include the volume of sewage dumped. In addition, the provincial government indicated they do not receive information from treatment plants managed by the Ontario Clean Water Agency (OCWA) although the OCWA indicated they send information to the Ontario government. OCWA manages approximately 215 sewage treatment plants in Ontario representing about 23% of the total sewage flow.

Findings of our Investigation

According to information obtained from the province of Ontario there are 107 combined sewer systems in eighty-nine different Ontario communities. In 2006 and 2007 there were 1,544 and 1,243 releases of raw or partially treated sewage reported to the provincial government respectively, although this information does not include all of the sewage treatment plants in Ontario.³

Of the incidents reported (see Table 1 below), we broke the data down according to ones reported to be caused by wet weather as well as incidents that included CSOs and bypasses. A review of the reports indicates that if a sewage collection system is overflowing at several locations, each location may be counted as a separate incident. In most cases the duration of the bypass or overflow was unknown, but for the incidents in which the duration was provided, they varied from less than one hour to several days. The average length of incidents that were recorded was seven hours in 2007.

TABLE 1: QUANTITY OF SEWAGE BYPASSES AND COMBINED SEWER OVERFLOWS IN 2006-2007 AS PROVIDED BY THE ONTARIO MINISTRY OF THE ENVIRONMENT

Sewage releases	2006	2007
Total reported sewage releases	1,544	1,243
Total releases reported to be due to wet weather	1,256	849
Releases reported to include combined sewer overflows	376	701
Releases that included bypasses	1,061	1,089

Table 2 provides a summary of the bypasses by major watershed and breaks the bypass information down into primary⁴ and secondary⁵ treatment bypasses at a sewage treatment plant.

³ There are 215 sewage systems operated by the Ontario Clean Water Agency (OCWA), a provincial crown agency, managing about 415,590,593.00 m³ of sewage per year, which is about 23% of the province's sewage flow. However, the provincial government claims not to collect information from OCWA regarding overflows or bypasses from plants they operate. Once we learnt this we sent a request into OCWA for information on bypasses and CSOs but no information was received prior to completing this report. Thus the numbers represented below do not include CSOs and bypasses from OCWA.

⁴ A primary bypass means the sewage bypassed primary treatment therefore is more or less untreated but it may or may not have been screened for large debris (floatables) and treated with chlorine to reduce pathogens.

As illustrated in Table 2, when broken down by watershed area, the provincial government estimates that there were 18 and 8 billion litres of sewage bypassing full treatment in Ontario, in 2006 and 2007 respectively, for treatment plant bypasses alone. The Lake Erie and Lake Ontario Basins are receiving the most untreated or undertreated sewage due to sewage treatment plant bypasses, which is not surprising given the large populations in those basins. Unfortunately, no similar summary information is available on CSO volumes.

TABLE 2: VOLUME OF SEWAGE BYPASSES IN 2006-2007 AS PROVIDED BY THE BY THE ONTARIO MINISTRY OF THE ENVIRONMENT

Watershed	Total Primary By-pass (Litres)	Total Secondary By-pass (Litres)	Total Sewage Bypasses (Litres) ⁶	Total Sewage Flow (Litres)
2006 Bypasses				
Lake Huron	1,313,048,000	168,765,000	1,536,366,000	166,644,113,000
Lake Erie	3,700,941,000	1,136,131,000	4,837,072,000	244,561,923,000
Lake Ontario	5,436,818,000	6,089,267,000	11,526,450,000	1,009,788,541,000
Lake Superior	346,000	57,511,000	57,857,000	23,716,153,000
St. Lawrence River	14,861,000	0	25,071,000	62,284,041,000
Ottawa River	4,817,000	75,263,000	81,235,000	180,238,612,000
Nelson River/Hudson Bay/James Bay ⁷	311,969,000	1,089,000	373,880,000	110,538,079,000
Total	10,782,800,000	7,528,026,000	18,437,931,000	1,797,771,462,000
2007 Bypasses				
Lake Huron	394,813,000	134,050,000	536,698,000	135,444,622,000
Lake Erie	3,106,146,000	211,654,000	3,317,800,000	183,779,635,000
Lake Ontario	977,821,000	2,337,513,000	3,315,334,000	767,885,268,000
Lake Superior	0	231,466,000	231,466,000	22,239,380,000
St. Lawrence River	0	0	700,000	54,268,990,000
Ottawa River	3,574,000	549,252,000	552,826,000	161,119,933,000
Nelson River /Hudson Bay/ James Bay	408,711,000	0	408,711,000	20,970,689,000
Total	4,891,065,000	3,463,935,000	8,363,535,000	1,345,708,517,000

In addition to the bypass information summarized in Table 2 above, our investigation also examined two other forms of information: (1) a database of "Incident Reports" reported to the

⁵ A secondary bypass means the sewage bypassed secondary treatment but received primary treatment.

⁶ A small number of bypasses in certain municipalities are from lagoon systems. These are included in the figure for Total Sewage Bypasses, but not listed in a dedicated own column category.

⁷ This includes watersheds north and west of the Great lakes/St. Lawrence watershed.

provincial Spills Action Centre; and (2) a database of information on sewage by-passes provided by the MOE.

TABLE 3: FREQUENCY AND 'KNOWN VOLUME' OF UNTREATED AND UNDER-TREATED SEWAGE⁸ (BYPASSES AND COMBINED SEWER OVERFLOWS) RELEASED IN 2006-2007, AS PROVIDED IN INCIDENT REPORTS TO THE ONTARIO SPILLS ACTION CENTRE

Municipality	Sewage release incidents reported in 2006	Volume of sewage releases from incident reports in 2006 (Litres)	Sewage release incidents reported in 2007	Volume of sewage releases from incident reports in 2007 (Litres)
Great Lakes Basin				
Amherstburg	39	4,381,014,000	44	49,149,000
Burlington	46	178,298,300	17	57,705,900
Fort Erie	27	9,428,000	18	9,458,000
Grimsby	27	58,191,000	16	60,128,000
Haldimand	12	6,177,200	13	19,954,900
Hamilton	35	unknown	23	unknown
Kincardine	5	23,780	2	unknown
Leamington	1	1,680,000	77	620,863,000
London	136	684,568,700	56	51,702,000
Mississauga	13	unknown	0	0
Niagara Falls	183	7,078,681	112	242,246,000
Norfolk/Port Dover	30	34,334,800	19	16,538,200
Oakville	24	59,470,000	11	975,000
Owen Sound	6	5,647,000	7	11,012,000
Sarnia	8	83,779,000	25	102,592,000
Sault Ste. Marie	5	5,250,800	26	26,886,000
Greater St. Catharines	81	316,459,330	52	329,447,000
Greater Sudbury	13	240,590,000	7	18,000,000
Toronto	33	284,027,000	28	54,487,500
Welland	73	2,314,158,000	48	1,449,375,000
West Nipissing	42	1,299,700	27	661,800
Ottawa River Basin				
Ottawa	2	162,700,000	1	unknown
Renfrew	37	80,350,800,	10	28,312,000
St. Lawrence River Basin				
Cornwall	9	169,700,00	1	87,000,000
Kingston	32	140,678,900	79	90,497,580
Smith Falls	28	40,225,000	23	35,031,000

⁸ In some cases, if the release is due to a CSO the sewage may be diluted by mixing with stormwater.

<i>James Bay Basin</i>				
Greenstone	31	7,723,390	94	24,017,000
Kapuskasing	12	unknown	21	6,501,000
Timmins	20	56,184,000	16	1,211,000

Table 3 (above) summarizes data from individual incident reports that are submitted to the province by municipalities or sewage plant operators for each sewage bypass and CSO that occurs. According to the data we received, **many incident reports did not include information on the volume of sewage discharged**. Therefore the volumes listed below are simply totals from incidents for which volume information was included and the **actual total volumes are likely much greater**.

Table 4 (below) provides a summary of data regarding only sewage bypasses (not CSOs) based on information compiled by the MOE. In many cases the volume numbers in Table 3 and Table 4 do not correlate. This is in large part due to the province's woefully inconsistent reporting requirements. For example, when a municipality files an incident report with the Spills Action Centre, it may or may not include information on the volume of sewage released. In addition, the province also maintains a separate database (Table 4) with information only about bypasses (not including CSOs).

As already noted, these two inconsistent databases do not even include data on the 215 sewage systems operated by the Ontario Clean Water Agency, a provincial crown agency, that manages almost a quarter of Ontario's sewage by volume.

Thus, the way the province collects information is incomplete and inconsistent at best and fails to provide the public with a clear impression of how much sewage is actually being dumped into the waterways in these communities.

TABLE 4: VOLUME OF SEWAGE BYPASSES IN 2006-2007 AS PROVIDED BY MUNICIPALITIES IN MONTHLY REPORTS TO THE MINISTRY OF THE ENVIRONMENT

Municipality	Total 2006 bypasses reported by municipality (Litres)	Total 2007 bypasses reported by municipality (Litres)
<i>Great Lakes Basin</i>		
Acton	12,600,000	9,200,000
Bracebridge	0	6,064,000
Burlington	217,613,000	58,605,000
Durham	Unknown	142,000,000
Grimbsy	64,085,000	48,684,000
Hamilton	4,624,947,000	466,730,000
Hanover	Unknown	202,000,000
Kincardine	30,690,000	250,000
Kingston west	35,000,000	5,000,000
Leamington	348,038,000	653,467,000
London	1,035,255,000	805,144,000

Midland	712,000	22,150,000
Napanee	144,898,000	115,879,000
Niagara Falls	478,327,000	326,278,590
Norfolk/Port Dover	282,903,000	290,000
Oshawa	131,608,000	3,447,000
Owen Sound	0	6,605,000
Picton	360,000	120,000,000
Sarnia	45,613,000	Unknown
Sault Ste. Marie	4,989,000	28,546,000
Greater St. Catharines	432,344,000	291,697,000
Greater Sudbury	2,583,560 000	120,170,000
Thamesford	0	124,000,000
Toronto	2,358,900,000	353,100,000
Thunder Bay	57,511,000	231,466,000
Whitby	477,630,000	344,000
Welland	2,330,093,000	1,610,801,000
Windsor	2,651,591,000	1,734, 899,000
<i>Ottawa River Basin</i>		
Arnprior	16,197,000	9,441,000
Cobden	3,005,000	3,450,000
Smith Falls	60,597,000	538,079,000
<i>St. Lawrence River Basin</i>		
Cornwall ⁹	0	0
Kingston	35,000,000	5,000,000
<i>James Bay Basin</i>		
Cochrane	350,000	4,750,000
Moosonee	57,638,000	0
<i>Nelson River, MN Basin</i>		
Cochrane	350,000	4,750,000
Dryden	258,249,000	4,995,000
Fort Frances	1,370,000	0
Madsen	52,000,000	399,000,000

Aside from discrepancies between the two sources of information and missing data for almost a quarter of all sewage created in the province, the data clearly demonstrates that some municipalities have more frequent sewage dumping incidents and larger amounts of sewage dumped via bypasses and CSOs.

⁹ We were provided with data collected through MOE inspections. The inspection data was not included in our analysis to avoid double counting given that most of the inspection data likely overlaps with the data in the other databases. However the 2007-08 inspection database reports that the City of Cornwall discharged 4,609,000,000 cubic meters of raw sewage due to 18 overflow events. This data does not show up in the other databases.

From our analysis, the municipalities with the highest number of reported sewage release incidents during 2006-2007 include: Niagara Falls (295), London (192); St Catharines (133); Welland (121); Greenstone (125); and Kingston (111).

Determining the municipalities with the greatest volume of sewage discharged depend on which information source is used. Using the bypass reports (Table 4), Hamilton released over 5 billion litres of untreated or undertreated sewage in 2006-07. Other cities with more than a billion litres of sewage released during 2006-7 include: Windsor (4.3 billion); Welland (3.9), Toronto (2.7 billion); Sudbury/Greater Sudbury (2.6 billion); London (1.8 billion); and Leamington (1 billion).

It is important to note that it is expected that larger and older cities are likely to have more sewage and antiquated sewer and stormwater systems and thus greater amounts of sewage released than smaller and newer cities.

Conclusions

The release of sewage into Ontario's waterways including the Great Lakes is an enormous problem that is not going to improve unless urgently needed investment is made from all levels of government in sewage infrastructure – including green infrastructure - to improve how we manage our sewage and reduce the amount of stormwater that enters the sewage system and causes CSOs and bypasses.

Inadequately treated sewage causes human health and environmental impacts that go far beyond beach closures. In both 2006 and 2007, raw or undertreated sewage was dumped more than 1,000 times by Ontario municipalities. The quantities are staggering, with billions of litres escaping full treatment each year.

Unfortunately Ontario does not publish information on sewage bypasses or combined sewer overflows, leaving most Ontarians in the dark over the extent of this colossal problem and their local community's contribution.

Recommendations

Public Reporting and Community Right to Know

Municipalities and sewage treatment system operators should report all releases of inadequately treated sewage to the public as they occur so the public can take steps to ensure their health and the health of their community are protected from potential exposure to sewage contaminated water.

All municipalities and sewage treatment system operators should report all sewage releases to the MOE. These reports should include the cause, volume, duration and location of the sewage releases and the information collected should be summarized and made publically available.

Public reports should be regularly updated and include information on volumes and frequency of CSOs, bypasses and other sewage related events. These annual reports should then be used to track trends in sewage releases and progress over time.

Sewage and Green Infrastructure Investment

Sewage dumping through CSOs and bypasses, without further mitigation, is expected to increase as climate change causes increased wet weather and storm events in Ontario. In order to mitigate these impacts and adapt to climate change, immediate investment in sewage infrastructure is needed to improve treatment and increase the capacity of Ontario's sewage systems and decrease the frequency and volume of CSO and bypass events.

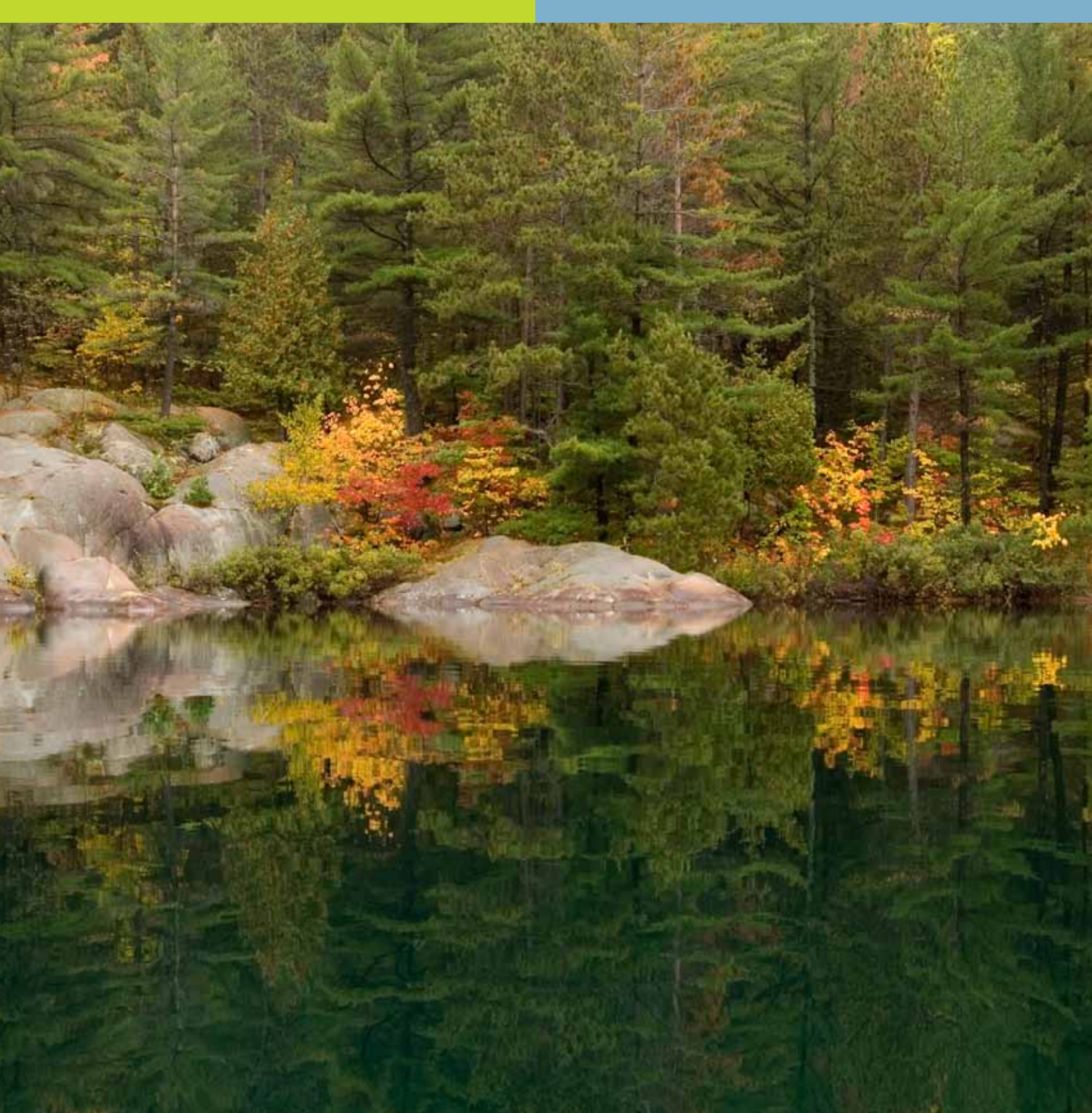
Ontario should create a Great Lakes Green Infrastructure Fund to reduce the billion litres of raw sewage that Ontario releases into the Great Lakes every year. For more information on how to achieve these goals using green infrastructure techniques, please refer to the 2008 Ecojustice report titled *Green Cities, Great Lakes*.

Regulatory and Policy Reform

In late 2009 it is expected that the federal government will introduce a regulation regarding the management of sewage under the *Fisheries Act*. The standards set in the new regulation will likely require some sewage treatment plants to improve treatment but is unlikely to have much of an effect on sewage dumping through CSOs and bypasses.

In Ontario there are guidelines pertaining to CSOs and bypasses, but no specific regulations or legally binding requirements. Thus, Ontario should supplement the federal regulation with strong provincial requirements regarding CSOs and bypasses which set out reporting requirements and reduction targets for CSOs and bypasses.

Furthermore, requirements for public reporting and reductions in CSOs and bypasses should be negotiated into a strengthened and updated Canada-U.S. Great Lakes Water Quality Agreement and the related Canada-Ontario Agreement Respecting the Great Lakes Basin Ecosystem with guaranteed funding to get the job done.



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