



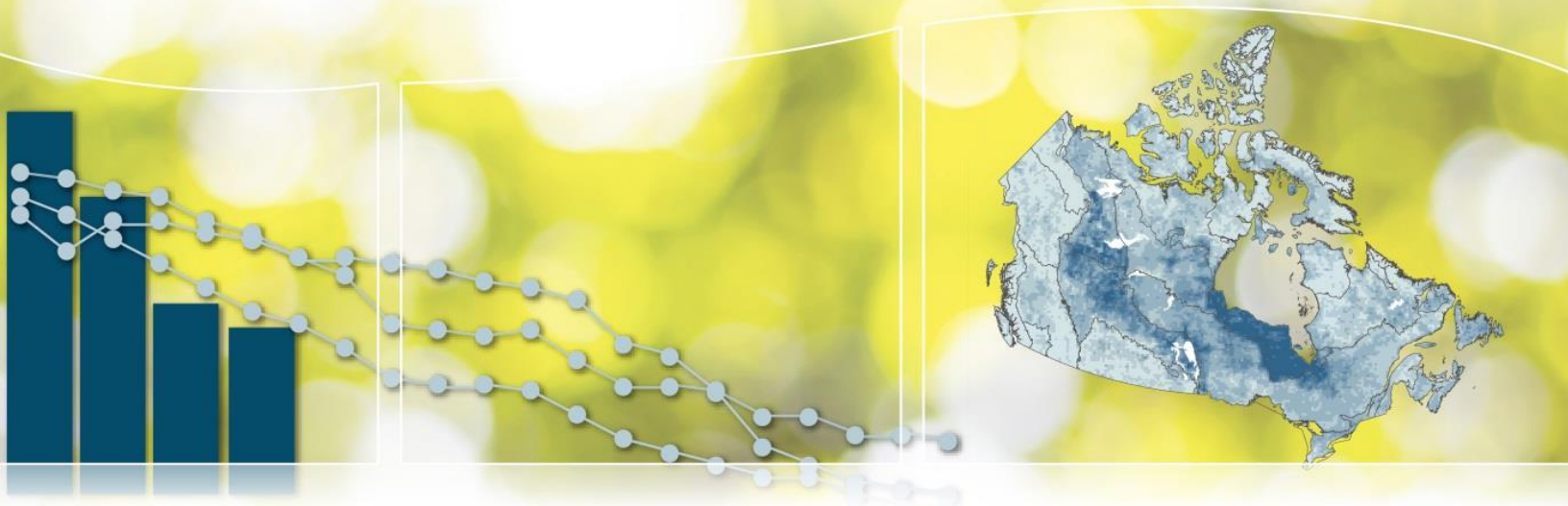
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Canadian Environmental Sustainability Indicators

Reducing Phosphorus Loads to Lake Simcoe and South-eastern Georgian Bay



Canada 

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November 2016

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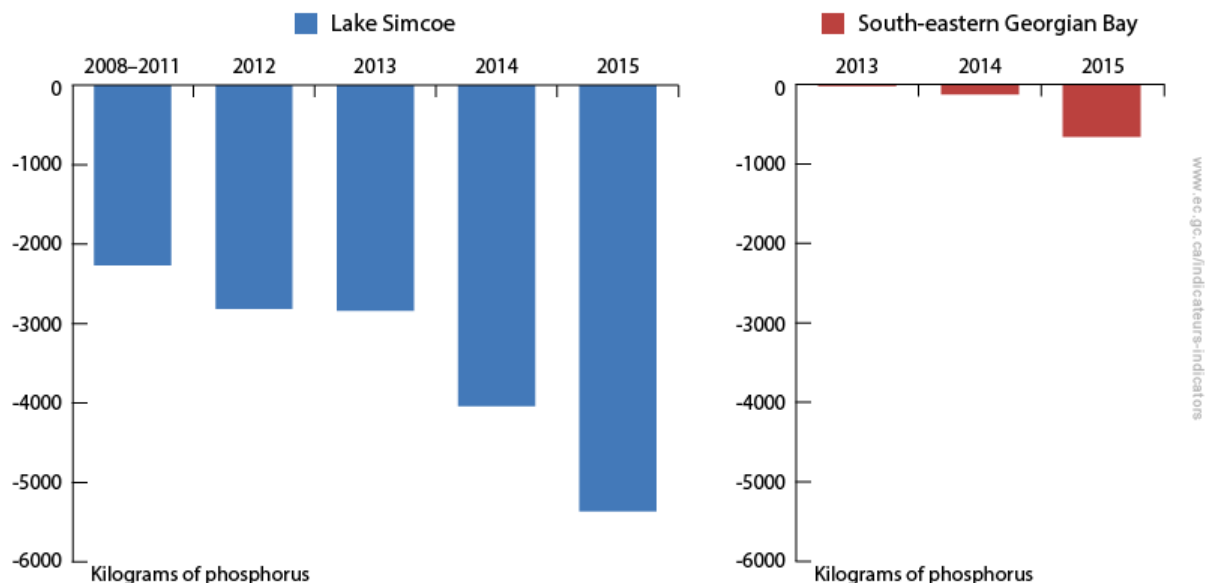
Part 1. Reducing Phosphorus Loads to Lake Simcoe and South-eastern Georgian Bay Indicator

As of March 2016, stewardship projects supported by the Lake Simcoe and South-eastern Georgian Bay Clean-Up Fund since 2008 were preventing an estimated 5365 kilograms of phosphorus from reaching Lake Simcoe and its tributary rivers.

Similarly, stewardship projects were preventing an estimated 658 kilograms of phosphorus from reaching South-eastern Georgian Bay and its tributary rivers.

Both Lake Simcoe and South-eastern Georgian Bay have targets for a reduction of 2000 kilograms of phosphorus per year by 2017.

Figure 1. Cumulative, estimated reduction in the amount of phosphorus reaching Lake Simcoe, 2008 to 2015 and South-eastern Georgian Bay, 2013 to 2015 due to stewardship projects



[Data for Figure 1](#)

Note: The estimate of reduced phosphorus load represents projects with final reports submitted by March 2016. Figures for each project type are rounded and then summed to give the total.

Source: Environment and Climate Change Canada (2016) [Lake Simcoe / South-eastern Georgian Bay Clean-Up Fund Office](#).

Lake Simcoe is the largest lake in southern Ontario outside of the Great Lakes. Located north of Toronto, the lake is a major recreational and agricultural area, and supplies drinking water to eight municipalities. Rapidly increasing population growth, urban development, and fewer, but larger, farms with more crops and livestock has resulted in elevated phosphorus levels in the lake. Phosphorus is a key nutrient for plant growth in lakes, and an oversupply of phosphorus can cause nuisance aquatic plants and algae to grow to levels resulting in changes to the types of fish living in the lake. Excess phosphorus in Lake Simcoe is causing oxygen levels in the lake to drop to levels that are affecting fish and wildlife populations and overall water quality. Scientists estimate the annual phosphorus load going into the lake has

more than doubled to 77 tonnes of phosphorus per year¹ since the major settlement and land clearing that took place around Lake Simcoe in the 1800s.

Similar to Lake Simcoe, water quality and ecosystem health in sections of South-eastern Georgian Bay are under threat from shoreline development introducing excessive inputs of phosphorus into the bay. These stresses range from agriculture in the Nottawasaga Valley watershed to inputs from the coastal communities of Collingwood and Wasaga Beach to the Severn Sound watershed, which encompasses a combination of small urban and rural areas with a permanent population of approximately 110 000 people and a summer population of 300 000 people. South-eastern Georgian Bay encompasses the United Nations Educational, Scientific and Cultural Organization (UNESCO)-designated Georgian Bay Biosphere Reserve.

The [Lake Simcoe / South-eastern Georgian Bay Clean-Up Fund](#) was created to provide financial and technical support to help accomplish projects designed to reduce phosphorus inputs into the lakes. Phosphorus-reduction projects funded include stream bank erosion control measures, stewardship programs, stopping livestock from directly accessing water courses, manure storage, planting trees and plants along river corridors, containing milk-house washwater, stormwater pond retrofits, and creating/restoring wetlands.

The work to reduce phosphorus loads to Lake Simcoe is being led by the Province of Ontario, working with partners such as the Lake Simcoe Region Conservation Authority, local stakeholders, municipalities and other partners. Environment and Climate Change Canada's Lake Simcoe / South-eastern Georgian Bay Clean-Up Fund contributes to Ontario's overall goals for the lake by providing funding for priority clean-up projects at the community, lake-wide or watershed-wide level.



Pristine lakes and rivers

This indicator supports the measurement of progress towards the long-term goal of the [2016–2019 Federal Sustainable Development Strategy](#): Clean and healthy lakes and rivers support economic prosperity and the well-being of Canadians.

¹ Ontario Ministry of the Environment (2010) [Lake Simcoe Phosphorus Reduction Strategy](#). Retrieved on June 22, 2016.

Part 2. Data Sources and Methods for the Reducing Phosphorus Loads to Lake Simcoe and South-eastern Georgian Bay Indicator

Introduction

The [Reducing Phosphorus Loads to Lake Simcoe and South-eastern Georgian Bay](#) indicator is part of the [Canadian Environmental Sustainability Indicators](#) (CESI) program, which provides data and information to track Canada's performance on key environmental sustainability issues. This indicator is also used to report and measure progress towards the goals of the [2016–2019 Federal Sustainable Development Strategy](#).

Description and rationale of the Reducing Phosphorus Loads to Lake Simcoe and South-eastern Georgian Bay indicator

Description

The Reducing Phosphorus Loads to Lake Simcoe and South-eastern Georgian Bay indicator summarizes estimates of the amount of phosphorus per year no longer reaching Lake Simcoe and South-eastern Georgian Bay as a result of completed beneficial management practices funded by Environment and Climate Change Canada's Lake Simcoe Clean-Up Fund (2007–2012) and its current [Lake Simcoe / South-eastern Georgian Bay Clean-Up Fund](#). The contribution of each project to phosphorus reduction in the lake was estimated using equations drawn from the scientific literature specific to the project type.

Rationale

Rapid population growth, urban development and agricultural intensification have had an impact on water quality in Lake Simcoe. Phosphorus pollution in the lake and its tributaries from this human development is causing excessive growth of aquatic plants and algae and low oxygen conditions. These changes are causing the lake's coldwater fish community, wildlife and overall water quality to deteriorate. South-eastern Georgian Bay is showing signs of water quality degradation similar to Lake Simcoe.

The Reducing Phosphorus Loads to Lake Simcoe and South-eastern Georgian Bay indicator was created to measure the contribution that the Lake Simcoe / South-eastern Georgian Bay Clean-Up Fund projects are making toward reducing the amount of phosphorus reaching Lake Simcoe and South-eastern Georgian Bay from their watersheds. The fund's goals are to accelerate the adoption of beneficial management practices intended to reduce phosphorus loads from urban and rural sources in the Lake Simcoe and South-eastern Georgian watersheds, thereby allowing for the restoration of the lakes' ecological integrity and restoration of a self-sustaining coldwater fishery.

Recent changes to the indicator

Data for 2015 have been added to both Lake Simcoe and South-eastern Georgian Bay.

Data

Data source

Performance measurement data were used to calculate this indicator. These data were provided to the fund in the final reports of all projects receiving funding.

Spatial coverage

This indicator focuses on estimated phosphorus reductions from beneficial management practices projects completed in the Lake Simcoe and South-eastern Georgian Bay watersheds.

Temporal coverage

This indicator reports on the results of beneficial management practices implemented from December 2008 to March 2016. It includes data for all projects that completed and submitted their final reports by March 2016. The year associated with a project reflects the year that the final report was submitted to the program, not the year that the work was done.

Data completeness

The data for this indicator rely on information provided by project partners.

The [Lake Simcoe / South-eastern Georgian Bay Clean-Up Fund](#) currently funds three projects that have a direct impact on phosphorus loading through point-source phosphorus removal and 28 projects having an indirect impact through non-point source phosphorus removal and/or aquatic habitat restoration or creation (Table 1). This indicator only reports on those projects that resulted in phosphorus reductions to Lake Simcoe and South-eastern Georgian Bay.

Table 1. Number of phosphorus remediation projects funded by the Lake Simcoe / South-eastern Georgian Bay Clean-Up Fund

Year	Lake Simcoe		Georgian Bay		Both watersheds	
	Point-source reduction	Non-point source phosphorus removal / habitat restoration	Point-source reduction	Non-point source phosphorus removal / habitat restoration	Point-source reduction	Non-point source phosphorus removal / habitat restoration
2007–2012	74	64	not applicable	not applicable	not applicable	not applicable
2013	1	9	1	4	0	2
2014	1	8	0	4	0	1
2015	2	8	0	4	0	1
Total	78	89	1	12	0	4

Source: Environment and Climate Change Canada (2016) [Lake Simcoe / South-eastern Georgian Bay Clean-Up Fund Office](#).

Data timeliness

This indicator reports data up to March 2016, the most recent year available.

Methods

Estimates of phosphorus loading reductions to Lake Simcoe and South-eastern Georgian Bay resulting from the implementation of beneficial management practices were calculated by either the [Lake Simcoe / South-eastern Georgian Bay Clean-Up Fund](#) program or its partners.² These estimates were generated using performance measurement data provided in the final reports of all projects receiving funding. These data were then applied to phosphorus-loading equations taken from the scientific literature. These equations are used by other water management agencies in Ontario to estimate the amount of phosphorus removed through management practices. Projects were grouped into three source types: research and monitoring, non-point source phosphorus removal/habitat restoration and point-source reduction. Research and monitoring projects do not result in phosphorus reductions and is not included in reporting.

In general, the amount of phosphorus reaching a watercourse is based on factors including sediment load, form and chemical nature of the phosphorus compounds, soil pH, soil texture, soil type and aerobic conditions. Beneficial management practices to reduce phosphorus inputs include projects limiting livestock access to streams through fencing, provide alternate watering sources, reduce/control run-off from fields, decrease storm water run-off from parking lots and other hard surfaces, control erosion in ditches, or restore wetlands to buffer storm water flows.

Once a stewardship project has been completed, its impact of removing phosphorus from water running off the landscape is expected to continue into the future. As such, the reduction associated with the project will be accounted for yearly from the year of the project's completion. Loading reductions from beneficial management practices completed in 2015 will add to projects finalized since 2008 in the Lake Simcoe basin and 2013 in the South-eastern Georgian Bay basin. In this way, the reduction of phosphorus runoff due to stewardship projects accumulates on the landscape.

Given that the results are estimates, the figures for the total of each project type were rounded and these rounded figures were summed to produce the final number.

Caveats and limitations

The [Lake Simcoe / South-eastern Georgian Bay Clean-Up Fund](#) program relies on the most appropriate, current and accepted equations to predict phosphorus loading reductions resulting from the implementation of beneficial management practices. Despite the rigour behind them, uncertainty exists when using these equations.

The indicator does not compare project results to data on measured annual releases of phosphorus.

The estimates of phosphorus reduction assumes each management project completed through the Lake Simcoe / South-eastern Georgian Bay Clean-Up Fund results in a permanent reduction in phosphorus flows to surface waters.

The Lake Simcoe Protection Plan to reduce phosphorus loads to Lake Simcoe is led by the Province of Ontario, working with partners such as the Lake Simcoe Region Conservation Authority, local stakeholders, municipalities and other partners, such as Environment and

² Sealock L (2011) Lake Simcoe Clean-Up Fund: Phosphorous Reduction Calculation Report. Great Lakes Management and Reporting Section, Environment Canada.

Climate Change Canada. Environment and Climate Change Canada's Lake Simcoe / South-eastern Georgian Bay Clean-Up Fund contributes to Ontario's overall goals for the lake by providing funding for priority clean-up projects at the community, lake-wide or watershed-wide level.

Part 3. Annexes

Annex A. Data tables for the figures presented in this document

Table A.1. Data for Figure 1. Cumulative, estimated reduction in the amount of phosphorus reaching Lake Simcoe, 2008 to 2015 and South-eastern Georgian Bay, 2013 to 2015 due to stewardship projects

Lake	Year	Non-point source phosphorus removal / habitat restoration (kilograms of phosphorus)	Point-source reduction (kilograms of phosphorus)	Estimated phosphorus removal over all years (kilograms of phosphorus)
Lake Simcoe	2008–2011	-1105	-1162	-2267
	2012	-550	>0	-2817
	2013	-23	0	-2840
	2014	-1201	0	-4041
	2015	-1324	0	-5365
South-eastern Georgian Bay	2013	-21	0	-21
	2014	-99	-5	-125
	2015	-524	0	-658

Note: Numbers may not sum due to rounding. The estimate of reduced phosphorus load represents projects with final reports submitted by March 2016. Figures for each project type are rounded and then summed to give the total.

Source: Environment and Climate Change Canada (2016) [Lake Simcoe / South-eastern Georgian Bay Clean-Up Fund Office](#).

Annex B. References and additional information

References and further reading

Environment and Climate Change Canada (2015) [Lake Simcoe / South-eastern Georgian Bay Clean-Up Fund](#). Retrieved on June 22, 2016.

Ontario Ministry of the Environment (2010) [Lake Simcoe Phosphorus Reduction Strategy](#). Retrieved on June 22, 2016.

Sealock L (2011) Lake Simcoe Clean-Up Fund: Phosphorous Reduction Calculation Report. Great Lakes Management and Reporting Section, Environment Canada.

Related information

[Nutrients in Lake Winnipeg](#)

[Nutrients in the St. Lawrence River](#)

[Phosphorus Levels in the Great Lakes](#)

www.ec.gc.ca

Additional information can be obtained at:

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