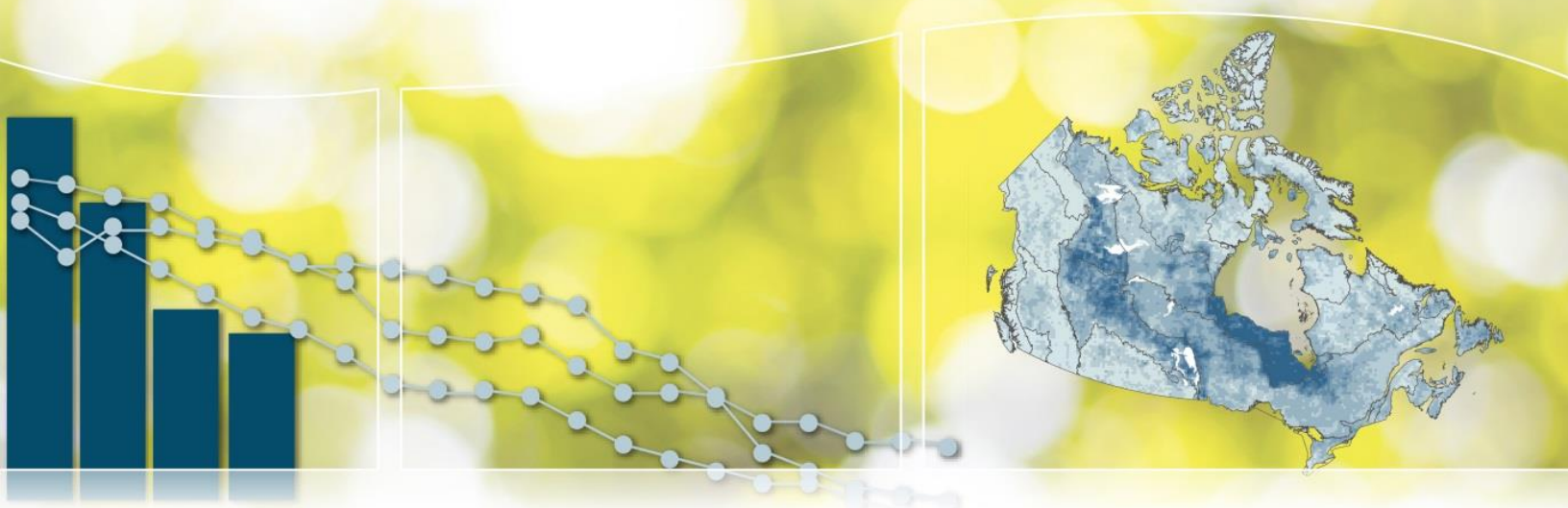




Canadian Environmental Sustainability Indicators

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



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Environment and Climate Change Canada
Public Inquiries Centre
7th floor, Fontaine Building
200 Sacré-Coeur boul.
Gatineau QC K1A 0H3
Telephone: 819-938-3860
Toll Free: 1-800-668-6767 (in Canada only)
Fax: 819-994-1412
TTY: 819-994-0736
Email: ec.enviroinfo.ec@canada.ca

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February 2016

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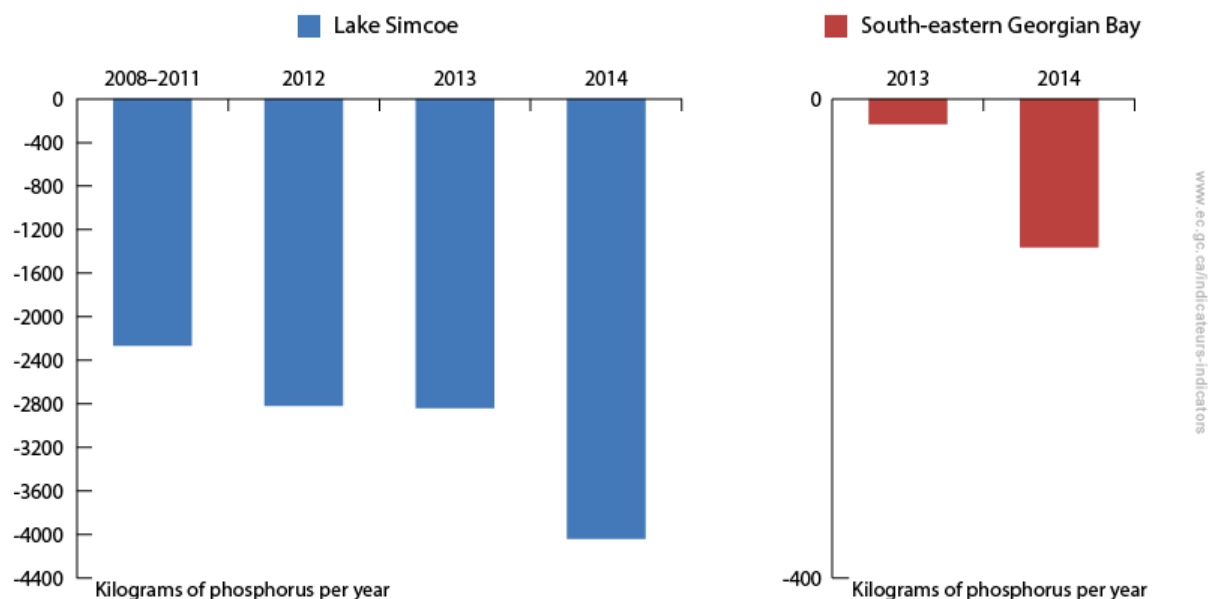
Part 1. Reducing Phosphorus Loads to Lake Simcoe and South-eastern Georgian Bay Indicator

As of March 2015, stewardship projects supported by the Lake Simcoe and South-eastern Georgian Bay Clean-Up Fund were preventing an estimated 4040 kilograms of phosphorus per year from reaching Lake Simcoe and its tributary rivers.

Similarly, stewardship projects were preventing an estimated 124 kilograms of phosphorus per year 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 and South-eastern Georgian Bay, 2008 to 2014



[Data for Figure 1](#)

Note: The estimate of reduced phosphorus load represents projects with final reports submitted by March 2015. Figures for each project type are rounded and then summed to give the total.

Source: Environment and Climate Change Canada (2015) [Lake Simcoe / South-eastern Georgian Bay Clean-Up Fund](#).

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.



This indicator is used to measure progress toward [Target 3.6: Lake Simcoe and South-eastern Georgian Bay – Reduce an estimated 2000 kg of phosphorus loadings to Lake Simcoe by 2017, which will support the Province of Ontario's target to reduce phosphorus inputs into Lake Simcoe to 44 000 kg/year by 2045. Reduce an estimated 2000 kg of phosphorus loadings to south-eastern Georgian Bay watersheds by 2017](#) of the [Federal Sustainable Development Strategy 2013–2016](#).

¹ Ontario Ministry of the Environment (2014) [Lake Simcoe Phosphorus Reduction Strategy](#). Retrieved on 22 April, 2015.

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 measure progress towards the goals and targets of the [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 Best Management Practices (BMPs) funded by Environment and Climate Change Canada's Lake Simcoe Clean-Up Fund (2008–2012) 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 BMPs 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

The Lake Simcoe Clean-Up Fund program ran from 2007 to 2012, and was replaced by the [Lake Simcoe / South-eastern Georgian Bay Clean-Up Fund](#). This expanded program has allowed estimated phosphorus loading reduction data for South-eastern Georgian Bay stewardship projects to be added to the indicator.

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 Best Management Practices (BMPs) projects completed in the Lake Simcoe and South-eastern Georgian Bay watersheds.

Temporal coverage

This indicator reports on the results of BMPs implemented from December 2008 to March 2015. It includes data for all projects that completed and submitted their final reports by March 2015. 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 (P) 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 P removal / habitat restoration	Point-source reduction	Non-point source P removal / habitat restoration	Point-source reduction	Non-point source P removal / habitat restoration
2007-2012	74	64	-	-	-	-
2013	1	9	1	4	0	2
2014	1	8	0	4	0	1
Total	76	81	1	8	0	3

Data timeliness

This indicator reports data up to March 2015, the most recent data available.

Methods

Estimates of phosphorus loading reductions to Lake Simcoe and South-eastern Georgian Bay resulting from the implementation of Best Management Practices (BMPs) were calculated by either the [Lake Simcoe / South-eastern Georgian Bay Clean-Up Fund](#) program or partners.² These estimates were generated using performance measurement data provided in the final reports of all projects receiving funding and phosphorus-loading equations were 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 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. BMPs 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.

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

Caveats and limitations

The [Lake Simcoe / South-eastern Georgian Bay Clean-Up Fund](#) program relied 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 formulae.

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 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.

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

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 and South-eastern Georgian Bay, 2008 to 2014

Lake	Year	Non-point source phosphorus removal / habitat restoration (kilograms of phosphorus per year)	Point-source reduction (kilograms of phosphorus per year)	Estimated cumulative total (kilograms of phosphorus per year)
Lake Simcoe	2008–2011	-1105	-1162	-2267
	2012	-550	>0	-2817
	2013	-23	0	-2840
	2014	-1200	0	-4040
South-eastern Georgian Bay	2013	-21	0	-21
	2014	-99	-5	-124

Note: The estimate of reduced phosphorus load represents projects with final reports submitted by March 2015. Figures for each project type are rounded and then summed to give the total.

Source: Environment and Climate Change Canada (2015) [Lake Simcoe / South-eastern Georgian Bay Clean-Up Fund](#).

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 22 April, 2015.

Ontario Ministry of the Environment (2014) [Lake Simcoe Phosphorus Reduction Strategy](#). Retrieved on 22 April, 2015

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

www.ec.gc.ca

Additional information can be obtained at:

Environment and Climate Change Canada

Public Inquiries Centre

7th floor, Fontaine Building

200 Sacré-Coeur boul.

Gatineau, QC K1A 0H3

Telephone: 1-800-668-6767 (in Canada only) or 819-938-3860

Fax: 819-994-1412

TTY: 819-994-0736

Email: ec.enviroinfo.ec@canada.ca