

# Monitoring the State of the ST. LAWRENCE RIVER

WATER

SEDIMENTS

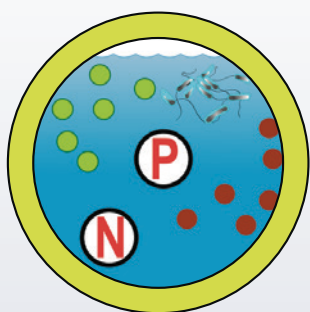
SHORELINES

BIOLOGICAL  
RESOURCES

USES

## Water quality in the Fluvial section

Physicochemical and bacteriological parameters – 4<sup>th</sup> edition



2012-2014

Current status: Intermediate–good  
Little change since 2000

For the 2012-2014 period, the water quality of the St. Lawrence River was considered intermediate to good: samples collected from 52% of the 27 monitoring sites were found to be of good quality. There was little change between 2000 and 2014: water quality was found to be good or fair at around 81% of the monitoring sites, while the percentage of sites with poor or very poor water quality fell from 13% on average between 2000 and 2007 to 8% on average between 2008 and 2014.

### Methodology

The current status of the indicator is based on the percentage of sites with good water quality among the 27 sites monitored:

Poor	Intermediate-Poor	Intermediate	Intermediate-Good	Good
< 20%	20% to 29%	30% to 39%	40% to 65%	66% and +

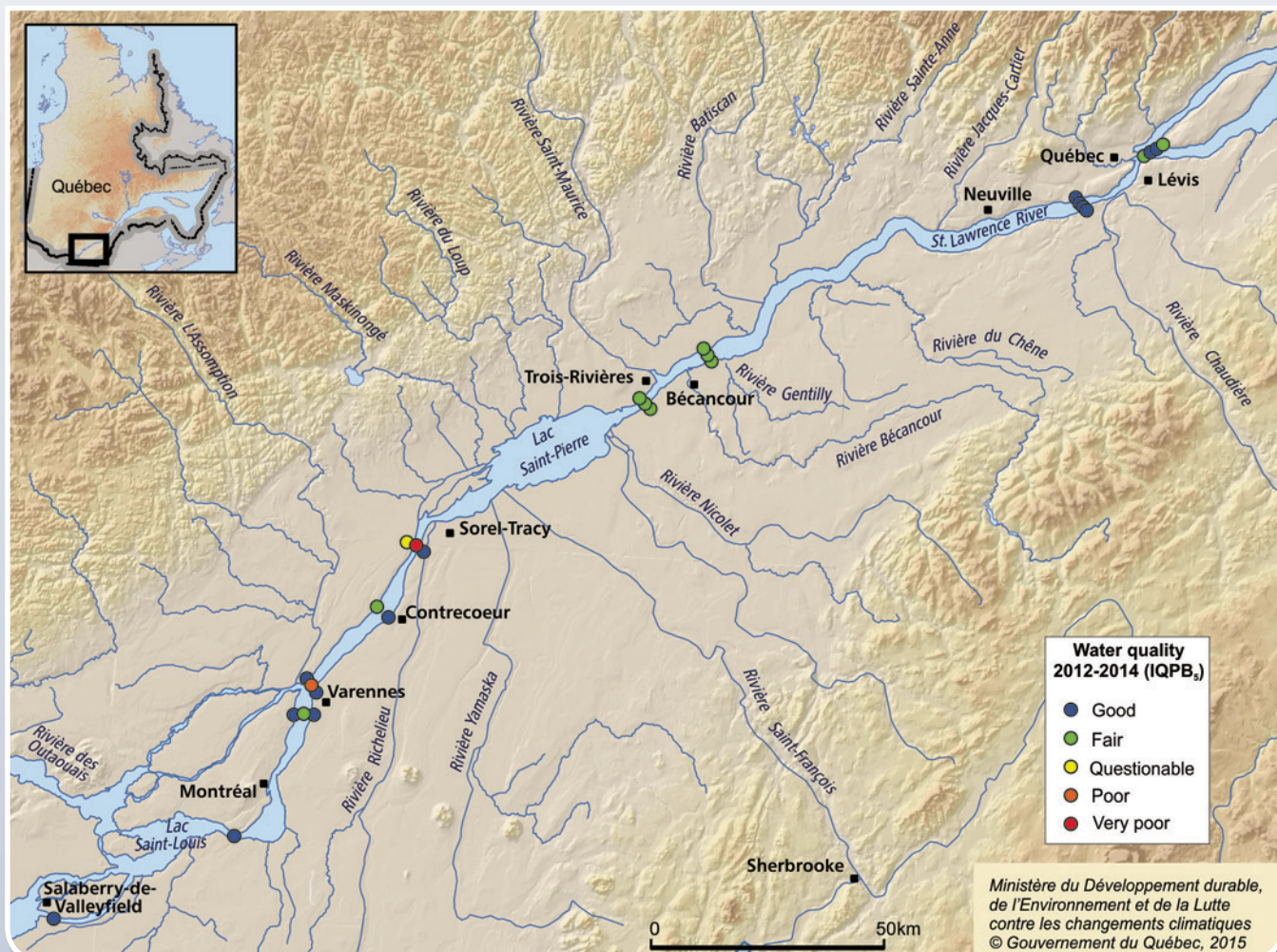
Water quality of a site is assessed by using the Index of Bacteriological and Physicochemical Quality ([IQBP<sub>s</sub>](#)) based on five parameters (total phosphorus, fecal coliforms, ammonia nitrogen, nitrites/nitrates and chlorophyll *a*). It defines five classes of water quality: good, fair, questionable, poor and very poor. Water quality in the St. Lawrence was previously assessed using IQBP<sub>6</sub>, which also took into account suspended solids. A mass balance demonstrated that suspended solids in the Quebec City area are primarily the result of riverbed and shoreline erosion, so this parameter is no longer included in the index.

## Overview of the current situation

Water quality in the St. Lawrence was assessed from monthly samples taken between May and October during the summers of 2012 to 2014 (Figure 1). Water quality in the St. Lawrence is considered to be intermediate to good, with 52% of the 27 monitoring sites showing good quality water. Upstream of Montreal, water quality is good, but deteriorates significantly downstream between Varennes and Sorel, in the shipping channel and in the water mass immediately north of it, that is, in the water masses affected by discharges from the Montreal, Longueuil and Repentigny wastewater treatment plants. This deterioration is caused

by bacteriological contamination from these municipalities, which do not disinfect their wastewater before discharging it to the St. Lawrence. Bacteriological quality improves in Lake St. Pierre, becoming fair downstream. The water mass flowing south of the shipping channel is of good or fair quality throughout the river corridor, with the shipping channel acting as a barrier to the spread of bacteriological contamination. In the Quebec City area, the water at all the sampling stations is of good quality or bordering on good.

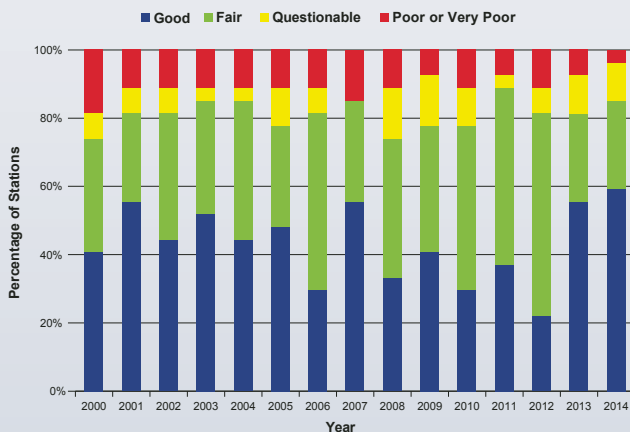
**Figure 1 Water Quality in the St. Lawrence River During the Summers of 2012 to 2014**



## Changes From 2000 to 2014

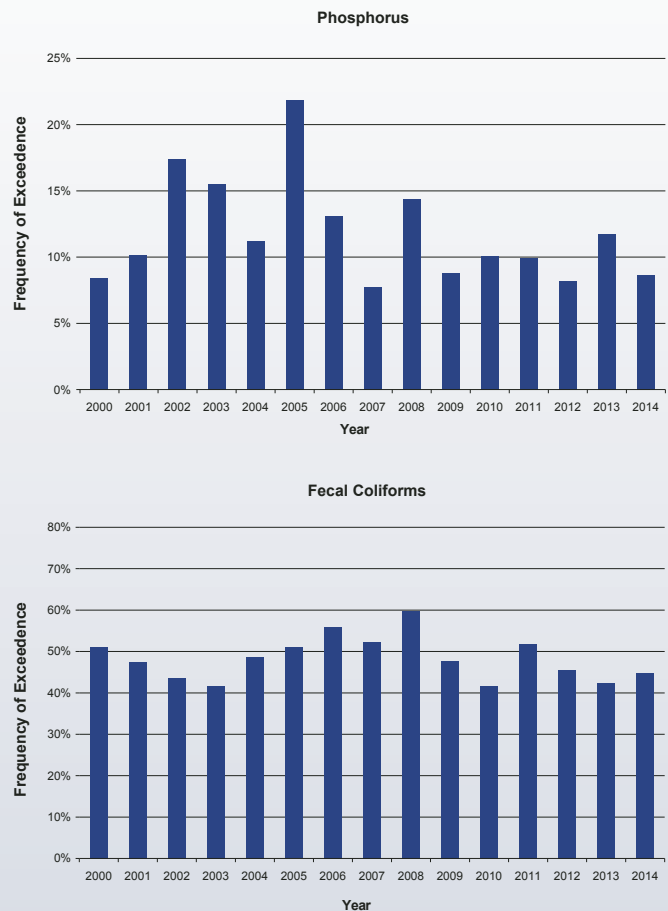
Although there were some interannual fluctuations, no significant trend was detected in the percentage of stations reporting good or fair water quality (regression of the percentage of stations as a function of time, slope not statistically different from 0;  $P = 0.402$ ), which was 81% on average throughout the period (Figure 2). The annual percentage of stations reporting good or fair water quality is quite variable, with several stations presenting an IQBP bordering on the two classes. However, the annual percentage of stations with poor or very poor water quality decreased over the period (regression of the percentage of stations as a function of time, slope statistically different from 0;  $P = 0.004$ ), falling from 13% on average between 2000 and 2007 to 8% on average between 2008 and 2014.

**Figure 2 Annual Change in the Percentage of Stations by Quality Class (IQBP<sub>5</sub>) from 2000 to 2014**



Between 2000 and 2014, no significant trend was detected in the exceedance frequencies of the water quality criteria relating to phosphorus and eutrophication (0.30 mg/l) and swimming (200 CFU/100 ml). Exceedances were calculated using data from all stations collected between May and October (regressions of exceedance frequencies over time show slope not significantly different from 0;  $P = 0.214$  for phosphorus and  $P = 0.609$  for coliforms). Interannual fluctuations are mainly related to the variability of precipitation and St. Lawrence discharge, the amount of agricultural runoff, and the frequency and intensity of municipal sewer overflows.

**Figure 3 Changes in the Frequency of Exceedance of Water Quality Criteria for Phosphorus and Fecal Coliforms for All Stations Between 2000 and 2014 (May to October)**

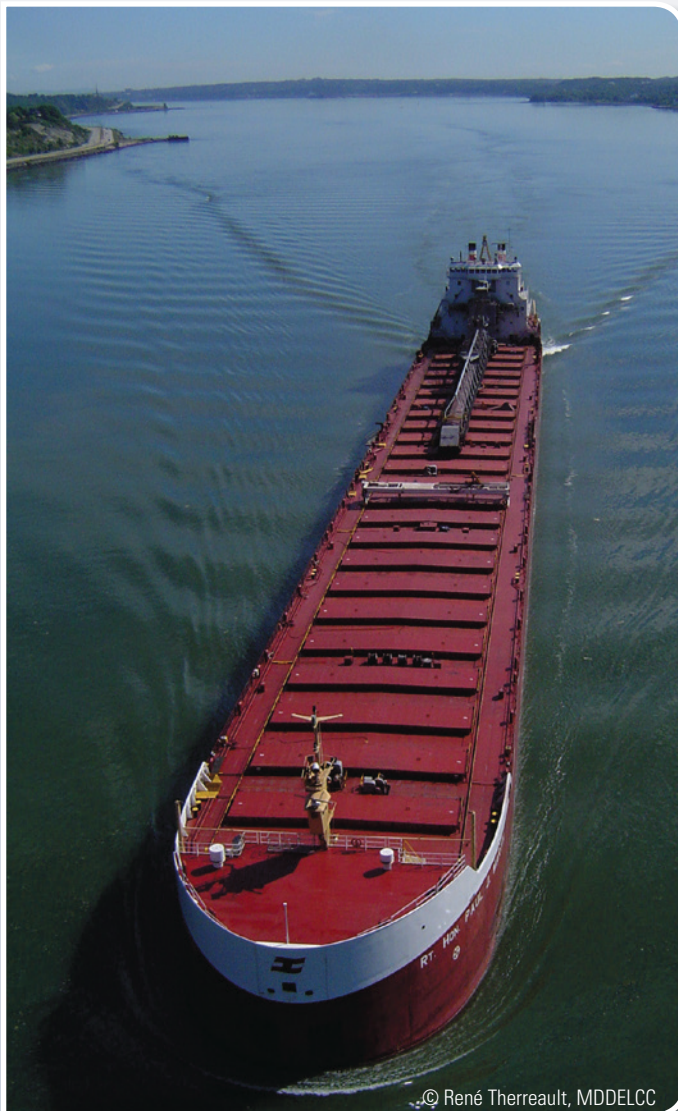


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## Outlook

The state of health of the St. Lawrence River reached a critical level in the early 1970s. Initiatives undertaken in the late 1980s and early 1990s as part of the municipal wastewater clean-up program have led to significant improvements in water quality. Nowadays, the St. Lawrence compares favourably with other large North American and European rivers. However, there have been few changes since 2000, and any new improvements will first require the implementation of major initiatives, such as the disinfection of Montreal wastewater and the construction of additional retention basins to reduce the frequency of sewer overflows during rainfall events.



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## State of the St. Lawrence Monitoring Program

Five government partners—Environment and Climate Change Canada, Fisheries and Oceans Canada, Parks Canada, the Ministère du Développement durable, de l'Environnement et de la Lutte contre les changements climatiques du Québec and the Ministère des Forêts, de la Faune et des Parcs du Québec—and Stratégies Saint-Laurent, a non-governmental organization that works actively with riverside communities, are pooling their expertise and efforts to provide Canadians with information on the state of the St. Lawrence and long-term water-quality changes.



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### Source of data and writing

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