



WATER

SEDIMENTS

SHORELINES

BIOLOGICAL RESOURCES

USES

2nd edition

# SAFETY OF POTENTIAL FRESHWATER SWIMMING SITES

## Background

Roughly 6 out of 10 people in Quebec live along the shores of the St. Lawrence between Cornwall, Ontario, and Quebec City. The population in towns bordering the river has grown by 300 000 since 1990, reaching 3 300 000

people in 2001. There are now more than 30-odd wastewater treatment plants on its shores, but some still do not disinfect the treated effluents they discharge to the St. Lawrence. Sewer overflows during heavy rainfall events are another major contributing factor to the degradation of the water quality,



Photo: MIDDEP



Photo: MIDDEP

and discharges of urban effluents and farming activities are linked to the significant bacteriological contamination at the mouths of some rivers. Nonetheless, the various cleanup initiatives taken over the past 25 years have led to substantial improvements in the bacteriological quality of the water. Although one of the greatest wishes of riverside residents is to swim in the river, people believe, often mistakenly, that once-popular beaches are still too polluted for this activity due to the suspected poor bacteriological water quality.

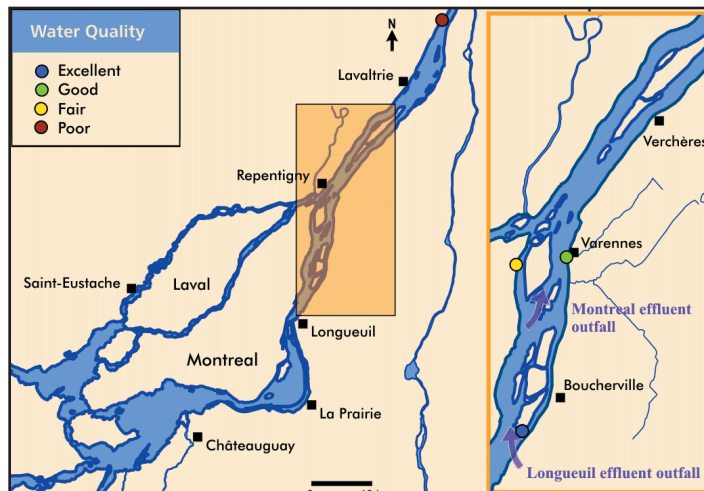
## Overview of the Situation

From 1999 to 2002 the Ministère du Développement durable, de l'Environnement et des Parcs undertook a study of the bacteriological quality of the water at 48 different sites between Montreal and île d'Orléans. The sites were chosen based on the following criteria: historic beaches, beaches formerly monitored under the Environnement-Plage program, sites currently being used, presence of public access, aesthetic quality, and overall potential. Contamination levels at close to half of these sites generally (more than 70% of the time) respected the quality criterion of 200 fecal coliforms (200 *E. coli*/100 mL) for swimming water, making them potentially of interest for this activity. Since 2003, 16 sites have been selected as sentinel swimming sites and are being monitored weekly from the end of June to late August.

### Present-day Situation

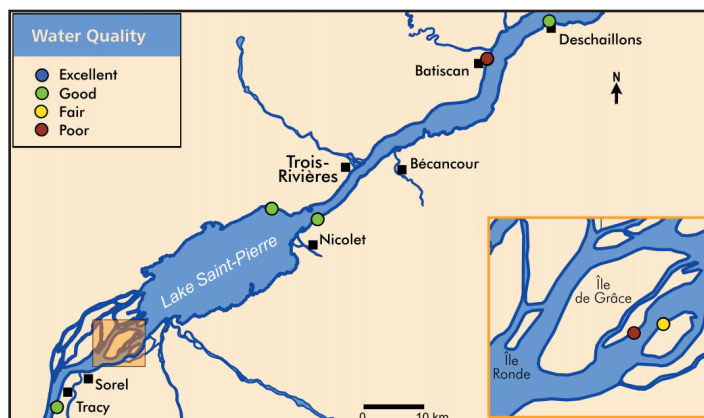
Undisinfected effluent discharges from the wastewater treatment plants of Montreal, Longueuil and Repentigny compromise recreational use in a large section of the river in the Montreal region — basically the shipping channel and the area immediately north of it. This contamination extends as far as Lake Saint-Pierre. However, there exist several enclaves where the bacteriological water quality is good, even excellent. At certain sites, when swimming is compromised due to bacteriological contamination, the pollution is often correlated with precipitation events recorded a day or two prior to sampling. Caution is therefore advised when comparing the bacteriological quality

Figure 1. Bacteriological water quality along the shoreline in the Montreal area, summer 2005



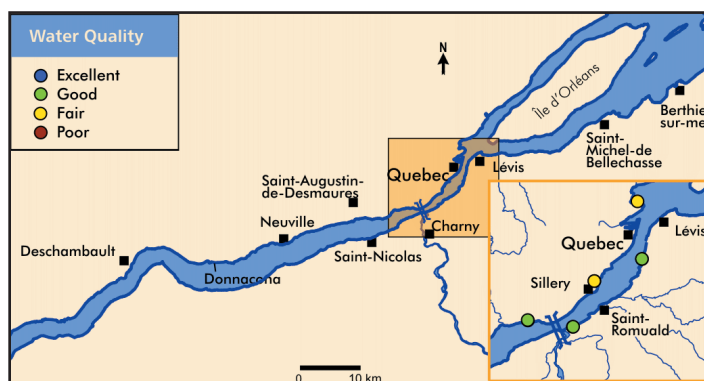
Source: © Government of Quebec, 2006

Figure 2. Bacteriological water quality along the shoreline in the Lake Saint-Pierre area, summer 2005



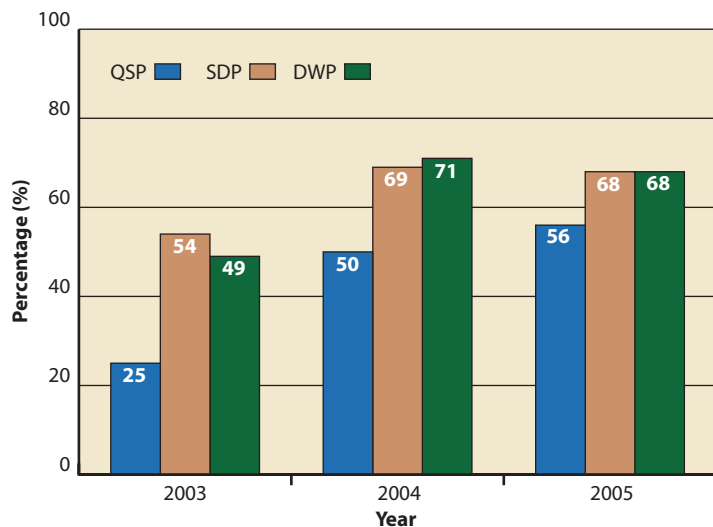
Source: © Government of Quebec, 2006

Figure 3. Bacteriological water quality along the shoreline in the Quebec City area, summer 2005



Source: © Government of Quebec, 2006

**Figure 4. Changes in the quality-sites percentage (QSP), swimmable-days percentage (SDP) and dry-weather percentage (DWP)**



Source: © Government of Quebec, 2006

of a site between years or even when comparing interannual percentages of sites with good bacteriological quality.

**Indicators of bacteriological quality along the shore: QSP and SDP**

The quality-sites percentage (QSP) refers to the percentage of sites, of a total of sixteen, having good or excellent bacteriological quality (seasonal geometric mean under 100 *E. coli*/100 mL). The swimmable-days percentage (SDP) corresponds to the percentage of days, out of a maximum of 160 (16 sites x 10 visits), for which the quality criterion related to swimming (200 *E. coli*/100 mL)

is respected. The dry-weather percentage (DWP) aids in interpreting the two previous indicators: it represents the percentage of visits, all sites combined, for which less than 5 mm of precipitation fell one day or two days prior to sampling.

The improved bacteriological quality of the water along the shores of the St. Lawrence between 2003 and 2005 is not likely the result of better control of wastewater overflows during periods of rain. In fact, 68% of sampling visits took place during dry weather in 2005 compared to only 49% in 2003.



Photo: MDDEP

**KEY VARIABLES**

The bacteriological quality of a freshwater site is assessed by calculating the geometric mean of the concentration of *E. coli* in all the samples taken at this site. Each site is visited ten times throughout the summer and four samples are drawn each time. The classification system hereunder is then applied:

- Class A (excellent quality): 0 to 20 *E. coli*/100 mL
- Class B (good quality): 21 to 100 *E. coli*/100 mL
- Class C (fair quality): 101 to 200 *E. coli*/100 mL
- Class D (poor quality): more than 200 *E. coli*/100 mL

Changes in the QSP (percentage of sites of good or excellent quality) or the SDP (swimmable-days percentage) indicate if the bacteriological quality of St. Lawrence water is improving or deteriorating. These indicators must be interpreted using the DWP (percentage of visits during dry weather).



Photo: Ville de Trois-Rivières

## Outlook

Precipitation-related factors being dominant, any action that reduces the frequency of untreated wastewater overflow events into the St. Lawrence should translate into better bacteriological water quality at the local level and thus increase the potential recreational use of the water. However, the introduction of disinfection equipment is critical to remedying the situation in areas downstream of Montreal. From the perspective of sustainable development, the social and possibly economic benefits of improving the bacteriological quality of the water are likely to compensate in the long term for any costs associated with such cleanup measures.

## To Know More

HÉBERT, S. 2000. *Évaluation de la qualité bactériologique de sites potentiels de baignade dans le Saint-Laurent, été 1999*. Direction du suivi de l'état de l'environnement, Ministère de l'Environnement, Québec. 11 pp., 4 appendices.

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de l'Environnement et des Parcs

## State of the St. Lawrence Monitoring Program

Six government partners — Environment Canada, Fisheries and Oceans Canada, the Canadian Space Agency, Parks Canada Agency, the Ministère du Développement durable, de l'Environnement et des Parcs du Québec, the Ministère des Ressources naturelles et de la Faune du Québec — and Stratégies Saint-Laurent, a nongovernmental 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 trends affecting it.

To this end, environmental indicators have been developed on the basis of data collected as part of each organization's ongoing environmental monitoring activities. These activities cover the main components of the environment, namely water, sediments, biological resources, uses and shorelines.

For more information on the State of the St. Lawrence Monitoring Program, please visit our Web site at [www.planstlaurent.qc.ca](http://www.planstlaurent.qc.ca) or contact our offices at the following address:

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