

# Monitoring the State of the ST. LAURENCE RIVER

WATER

SEDIMENTS

SHORELINES

BIOLOGICAL RESOURCES

USES

## Marine Water Quality Monitoring in Shellfish Areas



### Background

The primary role of Environment Canada's Marine Water Quality Monitoring (MWQM) program is to assess the sanitary conditions in bivalve molluscan shellfish harvesting areas. This is accomplished by conducting sanitary shoreline surveys and measuring levels of fecal coliform bacteria in overlay growing waters in support of the Canadian Shellfish Sanitation Program (CSSP).

When a shellfish bed is contaminated by fecal coliform bacteria, the bivalve molluscs living there absorb and concentrate these contaminants. Fecal coliform bacteria have no effect on shellfish survival or growth, but they can render them unfit for human consumption given the close association with pathogenic viruses and bacteria found in sewage. The classification of shellfish growing areas according to their sanitary conditions ensures that the health of consumers is protected. Fecal coliform bacteria are indicator organisms used to determine the presence of sewage or fecal matter and thus serve as indicators of unsanitary conditions in the aquatic environment. Consequently, the information collated by the MWQM unit can also be used

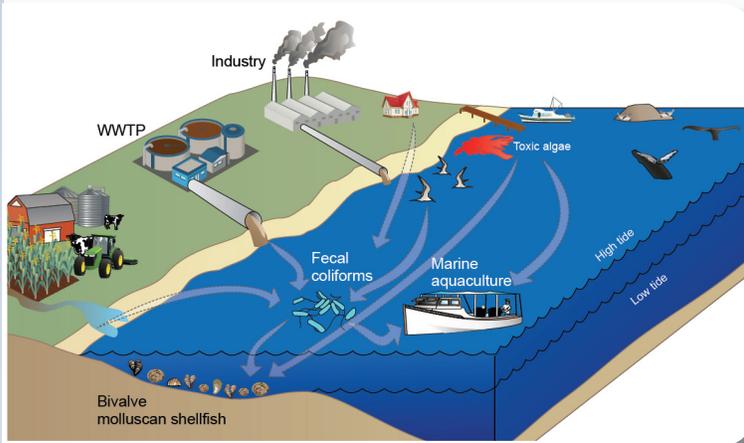
to track trends in the sanitary quality of the waters along the shores of the Estuary and Gulf of St. Lawrence.

This includes such information as the location of shellfish beds, fecal coliform concentrations in water and pollution sources. The main pollution sources found near shellfish areas and marine aquaculture facilities can be point or nonpoint.



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**Figure 1: Diagram showing the main pollution sources that can affect the quality of bivalve molluscan shellfish growing waters.**



Point sources include municipal wastewater treatment plant (WWTP) outfalls and pumping station overflow points, storm sewer discharge and industrial discharge. Nonpoint

sources include isolated homes with outdated septic systems, runoff from agricultural fields and livestock farms, marinas, fishing harbours, boating activities, bird colonies, and marine mammals (seals, whales, etc.) (Figure 1).

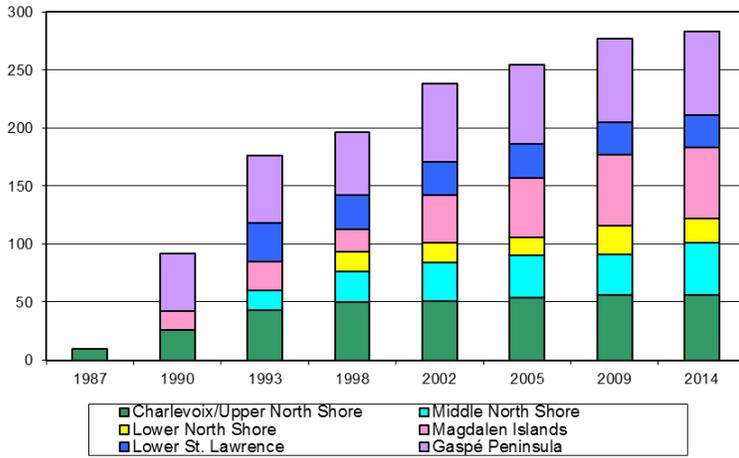
In Quebec, the monitoring activities under the CSSP take place in the following coastal areas (Figure 2):

- Charlevoix and Upper North Shore, from Cap Basque on Baie Sainte-Catherine to Pointe des Monts on Baie Trinité
- Middle North Shore, from Pointe des Monts on Baie Trinité to Pointe Parent (Natashquan)
- Lower North Shore, from Kégaska to Blanc-Sablon
- Lower St. Lawrence, from Notre-Dame-du-Portage to Cap Gaspé
- Gaspé Region, from Cap Gaspé to Pointe aux Corbeaux, near Miguasha
- Magdalen Islands

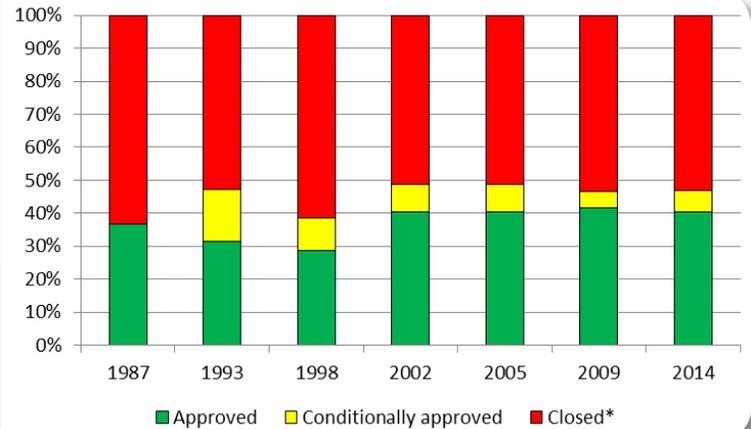
**Figure 2: Marine area covered by the MWQM program in Quebec.**



**Figure 3: Number of MWQM-classified shellfish areas in Quebec, 1987 to 2014.**



**Figure 4: Percentage of sectors classified as approved, conditionally approved or closed from 1987 to 2014.**



\*Includes the recommended classifications Restricted and Prohibited.

### Overview of the Situation

The number of shellfish areas assessed by the MWQM unit in Quebec has grown over the past 27 years, jumping from 10 areas in 1987 to 283 areas in 2014 (Figure 3). Of this number, 133 areas are open to shellfish harvesting, 114 of them are permanently open, with the remaining 19 being open part of the year. However, 150 areas have remained closed<sup>1</sup> year-round due to persistent bacterial contamination.

Between 2009 and 2014, the number of shellfish areas assessed under the program grew from 277 to 283 as shown in Figure 3. Although the number of classified shellfish areas increased, the proportion of approved, conditionally approved or closed areas in the territory covered by the program remained stable (Figure 4).

<sup>1</sup> Includes the recommended classification Restricted and Prohibited.

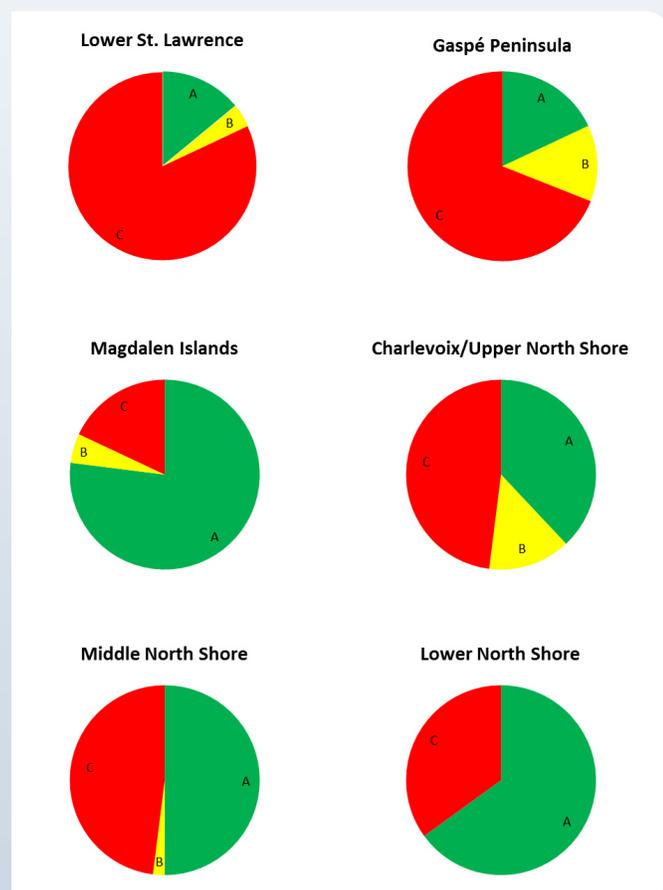


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In order to paint an overall picture of the current situation, a rating (A, B or C) was given to each of the sectors for various sub-regions based on the results obtained during their last evaluation<sup>2</sup> (Figure 5).

The A rating was given to sectors that met the criteria for an “approved” sector. The B rating was given to sectors that met the criteria for a “conditionally approved” sector. The C rating was given to sectors that did not meet the criteria for either of these two categories during their last evaluation.

**Figure 5: Evaluation of water quality in sectors of regions covered by the MWQM in 2014.**



<sup>2</sup> It is worth noting that these groupings do not reflect Environment Canada's official classification recommendations and can only be used in the context of the State of the St. Lawrence Monitoring Program. In fact, certain sectors were grouped into categories A and B respectively, since their water quality met the criteria for an approved or conditionally approved sector during their last evaluation, despite a recommendation to be prohibited from harvesting for resource conservation reasons or because of a lack of monitoring by Environment Canada.

The water quality and proportion of sectors that met the criteria of an approved or conditionally approved sector varies according to the regions. Based on the results shown in Figure 5, we can see that the water quality is excellent in the Magdalen Islands and along the Lower North Shore, and that much of the bacterial contamination is observed in the other regions.

In the Magdalen Islands, more than three quarters of the sectors evaluated meet the criteria for an approved or conditionally approved sector, and most of those meet the criteria for an approved sector. On the Lower North Shore, close to two thirds of the sectors evaluated meet the criteria for an approved sector. This region has a large proportion of coast not defined in sectors, but where the anticipated quality of water appears to be excellent, given the absence of nearby sources of contamination. Overall, the water quality in both of these regions is excellent. In the regions of the Charlevoix/Upper North Shore and Middle North Shore, about half of the sectors evaluated meet the criteria for an approved or conditionally approved sector. In the Gaspé Peninsula, about a third of the sectors evaluated meet the criteria for an approved or conditionally approved sector. Two thirds of the sectors evaluated do not meet these two criteria. In the Lower St. Lawrence, more than three quarters of the sectors evaluated do not meet the criteria for an approved or conditionally approved sector.

The coastal waters are highly vulnerable to the impact of human activities. Anthropogenic bacterial contamination is still causing the loss of use, such as gathering softshell clams and mussels. This problem remains more serious in the Gaspé Peninsula and the Lower St. Lawrence than in the Magdalen Islands and along the North Shore. The closure of these sectors is largely due to municipalities that do not possess adequate treatment systems for their wastewater or for which the sewer network has numerous overflow points, habitations along the shores that are equipped with poorly maintained or disused septic tanks or sumps, and agricultural activities.

Since 1992, the staff of the MWQM has worked in cooperation with local and government partners to revitalize access to some 53 closed and potentially resource-rich shellfish areas (Figure 6). These areas were selected as indicators to measure changes in water quality along the shoreline of the Estuary and Gulf of St. Lawrence. Of these 53 areas, 23 are located in the Gaspé–Lower St. Lawrence region, 23 are on the North Shore and 7 are in the Magdalen Islands.

Since 1992, wastewater treatment plants were constructed or improved in 15 shoreline municipalities, which had the effect of greatly improving the water quality in nearby priority sectors. These efforts aside, only one shellfish area, located on the North Shore, was reopened to harvesting in 2004 due to improved water quality. Water quality has probably improved in two sectors of the North Shore following the construction and commissioning of a

wastewater treatment plant (secondary treatment) in Portneuf-sur-Mer in 2011. In Gaspé Bay, ongoing efforts have been made to improve the existing wastewater treatment plant. However, two shellfish areas in the Magdalen Islands were reopened in 2005 and 2007 following the remediation of private wastewater treatment systems. Municipal wastewater overflows and contaminant loads from neglected septic systems on isolated properties continue to be sources of contamination that limit shellfish harvesting opportunities along the Quebec coast. Over the long term, an improvement could be seen in water quality with the implementation of the provincial *Regulation respecting municipal wastewater treatment works* under the *Environment Quality Act* and the federal *Wastewater Systems Effluent Regulations* under the *Fisheries Act*, which favours the implementation and improvement of wastewater treatment plants.

**Figure 6: Location map of 53 closed shellfish areas deemed a priority for reopening to shellfish harvesting.**



## Outlook

The CSSP is a federal program, led by the Canadian Food Inspection Agency with support from Fisheries and Oceans Canada and Environment Canada, whose purpose is to provide reasonable assurance that shellfish harvested for consumption is safe.

The Canadian Food Inspection Agency ([www.inspection.gc.ca](http://www.inspection.gc.ca)) is the lead agency for overall CSSP coordination and liaison with foreign governments on matters relevant to shellfish sanitation. The agency controls the quality of shellfish destined for export or import. It also monitors marine biotoxins that are present in the flesh of shellfish and recommends the opening or closure of shellfish sectors to Fisheries and Oceans Canada.

The role of Environment Canada ([www.ec.gc.ca](http://www.ec.gc.ca)) is to conduct sanitary surveys to evaluate pollution sources and assess the bacterial water quality in shellfish harvesting areas. Environment Canada recommends the opening or closure of these areas to Fisheries and Oceans Canada.

Fisheries and Oceans Canada ([www.dfo-mpo.gc.ca](http://www.dfo-mpo.gc.ca)) has the legal authority to open or close shellfish growing areas under the authority of the *Fisheries Act* and also conducts surveillance monitoring of closed areas.

In a bid to better disseminate the information generated by the CSSP, a website ([www.mollusca.gc.ca](http://www.mollusca.gc.ca)) was launched in 2004 featuring an interactive map that provides real-time data on the classification of shellfish growing areas in Quebec.

## Key Variables

Shellfish growing areas may be classified as Approved, Conditionally Approved, Restricted, Conditionally Restricted and Prohibited by Environment Canada on the basis of bacteriological water quality and the presence of actual or potential pollution sources. In order to be classified as Approved for harvesting, a shellfish area must meet all of the following requirements:

- a) the area must not be contaminated with fecal matter or deleterious or poisonous substances to the extent that consumption of shellfish might be a health hazard
- b) the median value at each sampling station may not exceed 14 fecal coliforms per 100 ml of water
- c) no more than 10% of the samples at each sampling station exceed 43 fecal coliforms per 100 ml

When these standards are not respected, an area is classified as Restricted or Prohibited. Some areas are closed to harvesting only during specific periods, when pollution levels are known to increase (during heavy rainfall events or during the summer, near campgrounds, small farms, cattle ranches, etc.); the area is thus classified as Conditionally Approved or Conditionally Restricted, depending on the level of contamination.



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## To Know More

CANADIAN FOOD INSPECTION AGENCY. 2014. Website of the Canadian Shellfish Sanitation Program: [www.inspection.gc.ca/english/fssa/fispoi/csspccsme.shtml](http://www.inspection.gc.ca/english/fssa/fispoi/csspccsme.shtml)

ENVIRONMENT CANADA. 2014. Website of the Marine Water Quality Monitoring program: [www.ec.gc.ca/marine/default.asp?lang=En](http://www.ec.gc.ca/marine/default.asp?lang=En)

GOVERNMENT OF CANADA. 2012. Website of the Canadian Shellfish Sanitation Program serving the general public: [www.mollusca.gc.ca](http://www.mollusca.gc.ca)

GOVERNMENT OF CANADA. 2004. Harvesting Shellfish in Quebec. Fact sheet. Fisheries and Oceans Canada, Environment Canada, and Canadian Food Inspection Agency.

SÉNÉCHAL, J. 2011. Monitoring Marine Water Quality in Shellfish Areas. A report under the Monitoring the State of the St. Lawrence River Program. [http://planstlaurent.qc.ca/fileadmin/site\\_documents/documents/PDFs\\_accessible/eaux\\_coquill\\_2011\\_e\\_FINAL\\_v1.1.pdf](http://planstlaurent.qc.ca/fileadmin/site_documents/documents/PDFs_accessible/eaux_coquill_2011_e_FINAL_v1.1.pdf)

## State of the St. Lawrence Monitoring Program

Five government partners—Environment Canada, Fisheries and Oceans Canada, Parks Canada, Quebec’s Ministère du Développement durable, de l’Environnement et de la Lutte contre les changements climatiques and the Ministère des Forêts, de la Faune et des Parcs—in collaboration with 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 its long-term changes.

To this end, environmental indicators have been developed on the basis of data collected as part of each organization’s ongoing environmental monitoring activities over the years. 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](#), please visit our website.

Prepared by: Jacques Sénéchal  
Marine Water Quality Monitoring  
Water Quality Monitoring and Surveillance  
Water Science and Technology  
Science and Technology Branch  
Environment Canada

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