

2014 Environmental Assessment Report

# PORTRAIT OF THE QUALITY OF MONTRÉAL'S WATER BODIES

Service de l'environnement

# Highlights

The *Réseau de suivi du milieu aquatique* (RSMA) in 2014 pursued its sampling program of water bodies and stormwater sewer systems on the territory of the agglomeration of Montréal.

## **QUALO:** despite a tardy season, a positive assessment in terms of water uses

The 2014 season, which began in June and ended in October, owing to a late spring freshet, was comparable to the average of QUALO stations since 1999, 61% of sampling sites lending themselves to direct contact water uses.

## **RUISSO:** ongoing improvements

An analysis of the results, in terms of the RUISSO index (RI), revealed a slight improvement in the water quality of 10 of the 24 streams and inland waters sampled. Only three water bodies posted a deterioration in their quality. The number of stations rated "excellent, good or fair" increased from 19 in 2013 to 20 in 2014. The number of stations qualifying as "polluted" decreased from 17 to 13, while the number of "poor" quality stations increased from 10 to 13.

## **COURDO:** the spatial influence of the WWTP discharges better documented

Only the spatial influence of discharges of the Jean-R. Marcotte wastewater treatment plant (WWTP) was the subject of sampling activities this year in order to document their impact on the St. Lawrence River. A gradual decline in the bacterial counts was observed due to the River's strong powers of dilution. The spatial influence is limited to the center of the River, for the first 10 km, and is then concentrated in the center of the northern channel of the River. Based on the features of the water masses, the spatial influence had not reached the River's northshore.

## **PLUVIO:** a nearly complete portrait of the territory's stormwater sewer networks

The year 2014 marked the beginning of the inspection and approval phases of the stormwater sewer networks that had already been corrected. Of the 24 networks that were assessed in 2014, 10 had problem areas, 10 were free of any illicit connections (lc) and the RSMA confirmed that four had been completely corrected.



For further information on the RSMA's programs, the reader is invited to refer to the [rsma.qc.ca](http://rsma.qc.ca) Website.

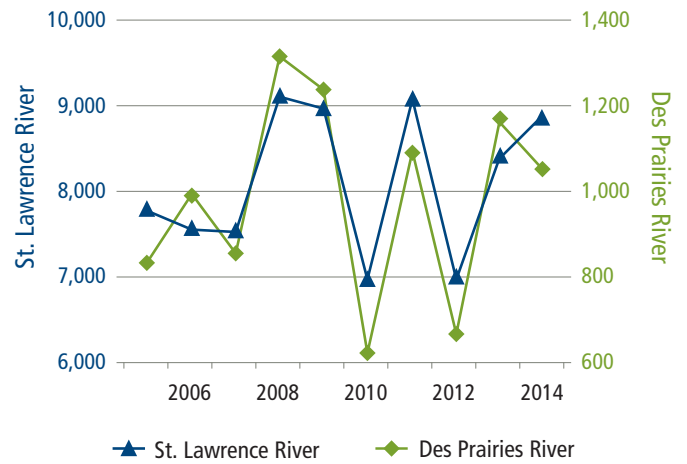
# A never-ending spring freshet and slightly lower precipitation levels

In 2014, Montréal recorded just 4 days of extremely hot temperatures, whereas the normal is usually of 12. Total precipitations (rain and the equivalent in melting snow) were generally average in southern and western Québec. The spring season was characterized by cool temperatures and more rain than usual, with 231 mm of rainfalls, whereas the average for the past 10 years was 132 mm. In fact, the spring of 2014 was the rainiest in the past 15 years.

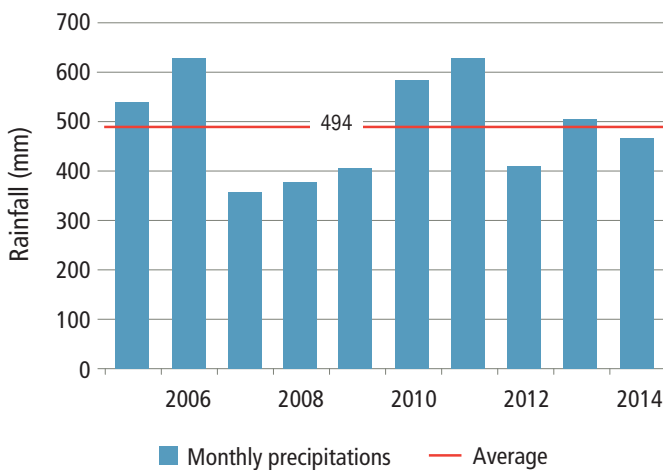
In terms of precipitations, the summer of 2014 was near average, despite a distribution that showed important variations on a monthly basis. Indeed, the first three summer months were rainier than normal (333 mm vs. 280 mm). When compared to 2013, precipitations were greater in June and August 2014, but lower in July and September. Given the late spring freshet that delayed the beginning of the sampling season, total precipitations, in 2014, were established for the June to October period and amounted to 470 mm, slightly lower than the average for the past 10 years, namely 494 mm (510 mm in 2013).

Water levels remained very high at the beginning of the season and dry weather flows were less pronounced than in past years. Consequently, the St. Lawrence River's flow rates exceeded 8,000 m<sup>3</sup>/s throughout the sampling period, which is exceptional.

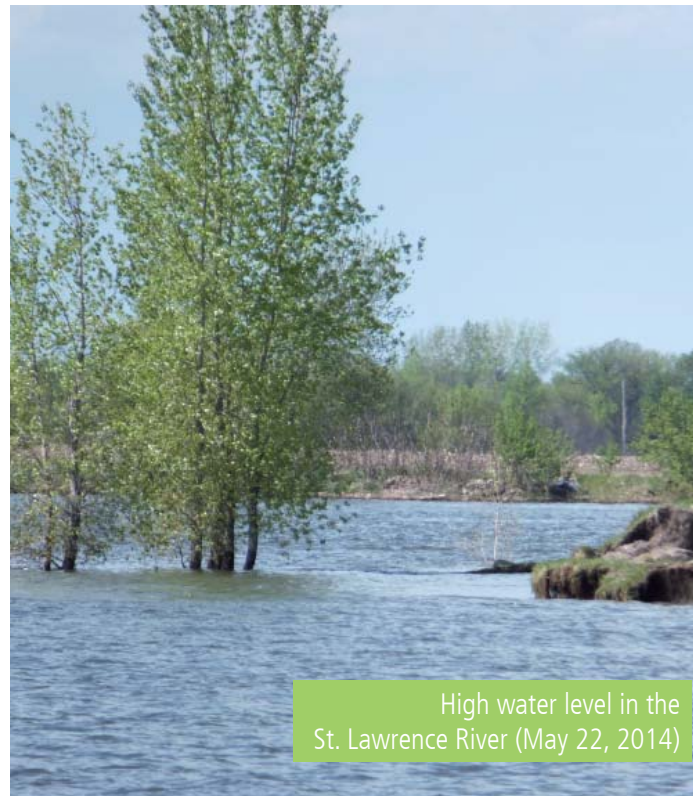
**Average summer water flows from May to September (m<sup>3</sup>/s)**



**Total precipitations for the sampling season (mm)**



It is worthwhile mentioning that there were more sampling tours performed in dry weather and during light showers and fewer tours during rainfalls greater than 8 mm (27 tours in 2014 against 34 in 2013). The summer of 2014 boasted far fewer thunderstorms than normal, with only six thunderstorms in Montréal, the normal being 17.

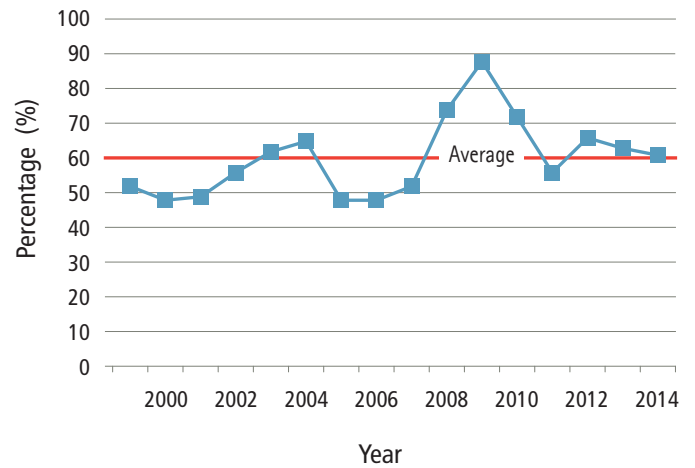


# QUALO: a stable situation

In 2014, the number of stations and the geographic coverage of the QUALO program were unchanged from those in 2013. The distribution of the stations was the following: Des Prairies River (34), Lake Saint-Louis (25), La Prairie Basin (14), St. Lawrence River (15) and Île Bizard (8). The 79 sampling days were performed randomly, from Monday to Wednesday, except for Île Bizard visited on Thursday mornings. Given the late spring freshet, the 2014 seasonal program was conducted from June 2<sup>nd</sup> to October 17<sup>th</sup> (20 weeks), even though it usually begins in May.

59 of the 96 stations earned the QUALO certification. 61% of the sites were deemed fit for direct contact water activities. This proportion is similar to the 60% average of QUALO stations since 1999. Moreover, 76% of the 1,916 samples analysed, on the basis of one sample per station during each of the tours, were inferior to the 200 COLI threshold, whereas 8% exceeded 1000 COLI. The distribution of the results of the 37 non-QUALO certified stations was as follows: 15 stations were sometimes poor, 16 were poor, 4 were polluted and 2 unsanitary. Considering that the percentage of QUALO stations has been in the 50-70 % range in the past 15 years, one should not place too much emphasis on a variation of a few percentages from one year to another.

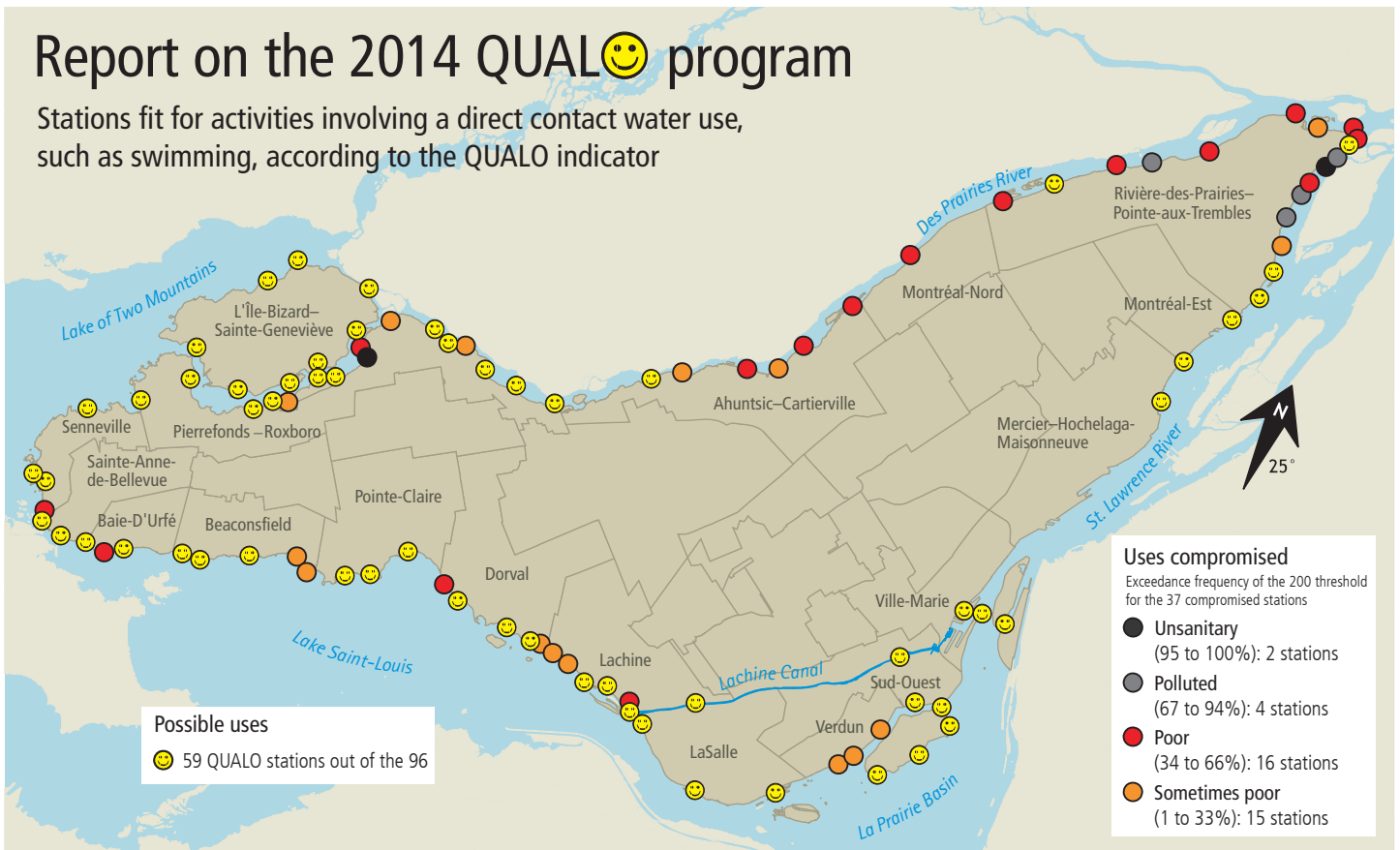
Evolution of the total percentage of QUALO stations since the beginning of the program in 1999



Although 2014 is marked by a slight decline in the quality of shoreline waters, it seems that the improvement observed over the past 10 years is ongoing, as evidenced by the fact that 34 stations, i.e. 35% of all stations, have been QUALO certified for at least the past five consecutive years, of which 21 have been for 10 consecutive years or more.

## Report on the 2014 QUALO 😊 program

Stations fit for activities involving a direct contact water use, such as swimming, according to the QUALO indicator



## Report by water body

### Des Prairies River: 47% QVALO

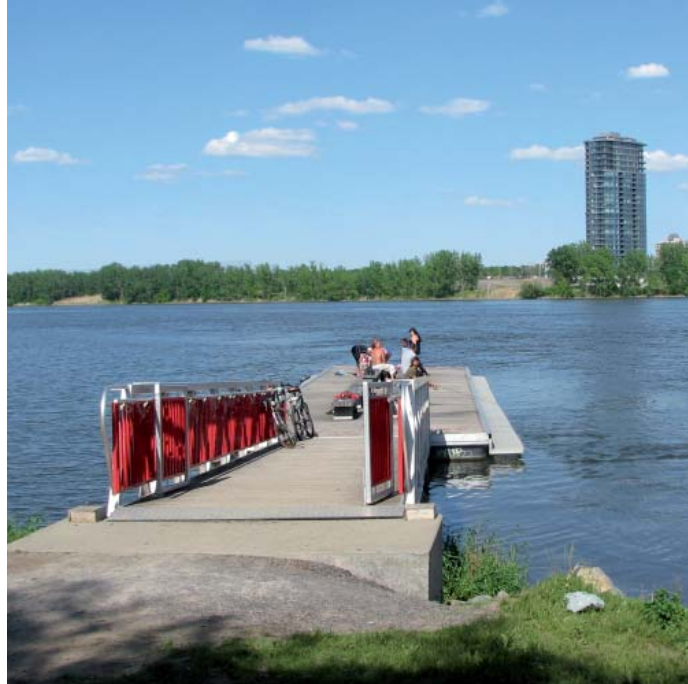
The number of QVALO stations declined from 19 in 2013 to 16 out of a total of 34 in 2014, near the average of the past decade (45%). Seven stations changed status: three became QVALO while four others were declassified. The stations located upstream from the Lachapelle Bridge (Ahuntsic-Cartierville) posted better results than those located downstream. With their respective percentages of 100% and 80% in terms of exceedance of the 200 COLI threshold, the parks of the Rive-Boisée (Pierrefonds-Roxboro) and Cheval-Blanc (Rivière-des-Prairies–Pointe-aux-Trembles) had the worst results for the Des Prairies River, owing to the poor quality of the flows carried by the stormwater networks.

### Lake Saint-Louis: 64% QVALO

In 2014, of the 25 stations located on Lake Saint-Louis, 16 compared to 17 in 2013 were QVALO. The new QVALO stations include the one located at the end of Dorval Street (near the ferry to Dorval Island) as well as those in Pinebeach (Dorval) and Lakeview (Beaconsfield) Parks. After 10 consecutive years of good results, the stations located at Monk Park (Lachine) and the Beaconsfield Yacht Club lost their QVALO rating, for no specific reason. The samples measured at the Saint-James (Beaconsfield) and Bertold (Baie-D'Urfé) Park stations also exceeded 400 COLI on three occasions. Exceedances of more than 50% of the 200 COLI threshold were obtained at the Godin Park (Sainte-Anne-de-Bellevue) and Baie-de-Valois Park (Dorval) stations.

### La Prairie Basin: 79% QVALO

As was the case in 2013, 11 stations out of 14 were QVALO approved this year. Three non-QVALO stations in 2013 were QVALO certified this year, namely those of the Canal-de-Lachine and West-Vancouver (Nuns' Island) Parks as well as the station located at Champlain Bridge (Sud-Ouest). The "surprise" improvement observed in the latter, located downstream from three stations having lost their certification, is perhaps explained by the fact that sampling, this year, was not conducted the same day at these stations. Indeed, sampling at the Champlain Bridge station was performed at the same time as those located on the River, which received fewer precipitations. Overall, the sector's water quality is rather good (geometric mean < 100 COLI at all stations) despite 14 exceedances of the 1000 COLI threshold during rainfalls.



#### QVALO indicator

This indicator designates a bacterial quality at a specific station allowing for direct contact water uses, even though a few exceedances of the 200 COLI threshold (faecal coliforms per 100 mL) may be tolerated. To be QVALO certified, a site must satisfy two conditions: first, for a given year, its geometric mean must not exceed 200 COLI and second, no more than two samples (i.e. 10% of the 20 weeks of sampling) may exceed the value of 400 COLI.

### St. Lawrence River: 53% QVALO

This sector, with its 15 stations, experienced a slight improvement in its water quality, the number of QVALO stations having increased from 7 in 2013 to 8 in 2014. Two of the eight stations, namely those at the Pointe-aux-Trembles Marina and the one located upstream of the Bout-de-l'Île Park, near 94<sup>th</sup> Avenue, gained their QVALO certification, despite frequent but slight exceedances of the 200 COLI threshold. The only station that lost its QVALO approval in 2014 was the one located at the Bout-de-l'Île Park (downstream). Moreover, the frequent exceedances of the 200 COLI threshold (more than 40% of the time) observed at six stations indicate that the quality of the sector's waters remains problematic, due to the presence of overflow facilities and the many contaminated stormwater outfalls.

### Île Bizard: 100% QVALO

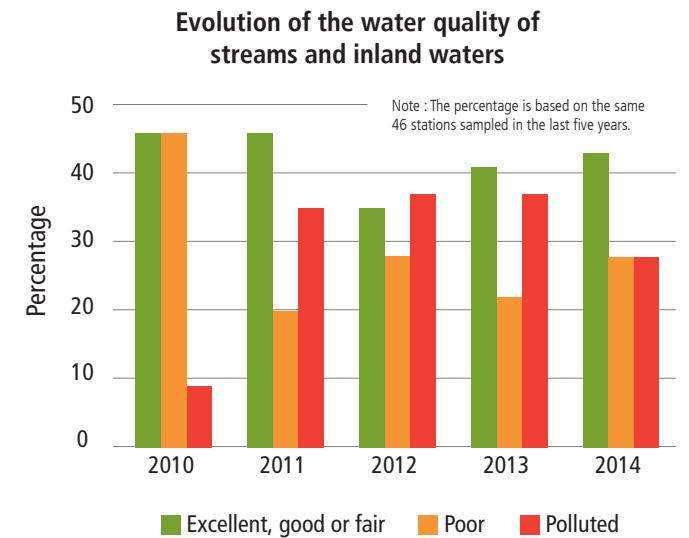
The eight stations in Île Bizard all earned their QVALO certification in 2014, a first since 2006 and 2009. Exceedance frequencies of less than 20% of the 200 COLI threshold were obtained at all stations in the sector, with the exception of the one located in the Terrasse-Martin Park (30%). Of the 156 samples taken, only two exceeded the 1000 COLI threshold.

# RUISSO: slight improvements

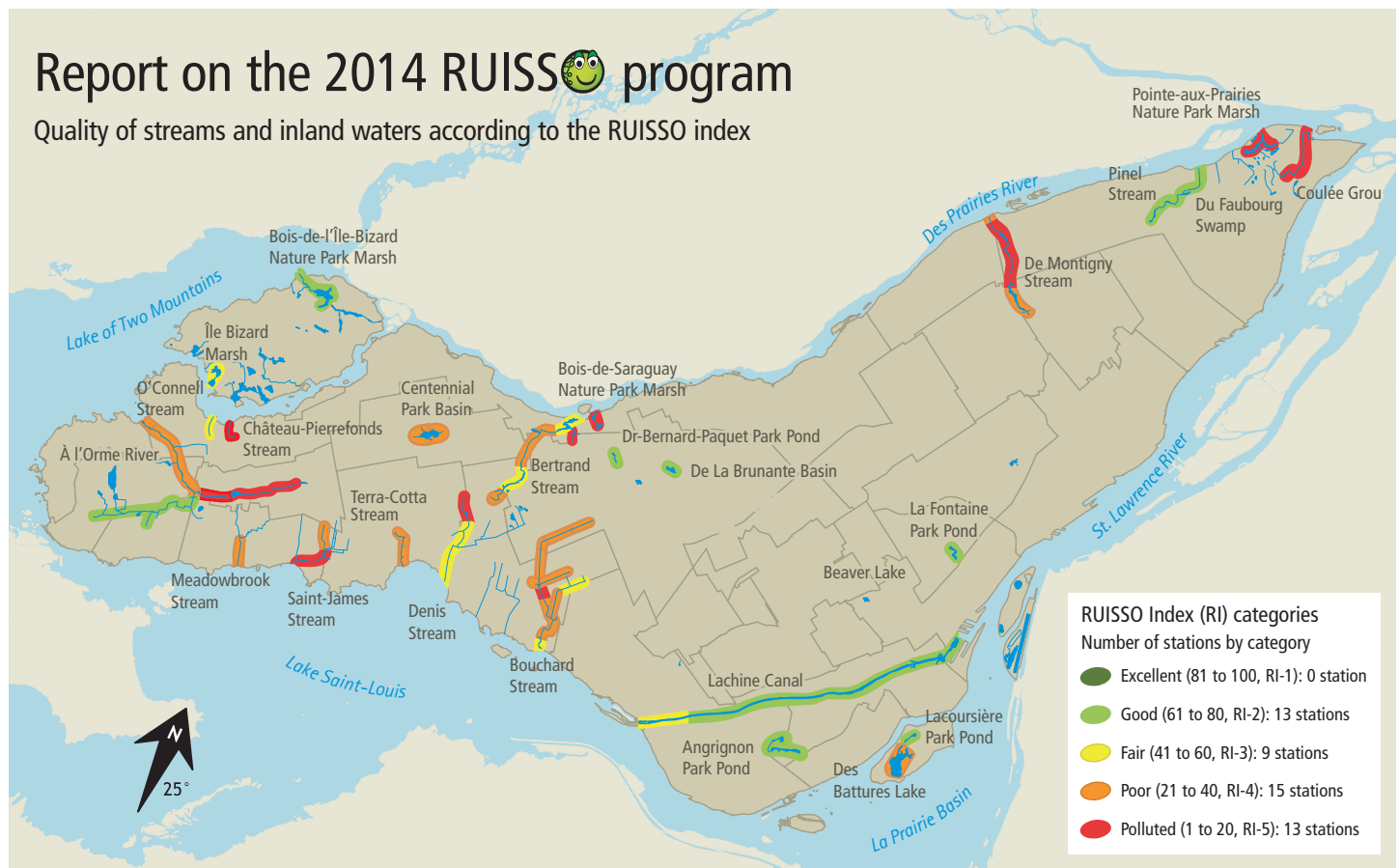
In 2014, the RUISSO program focused on 24 streams and inland waters, for a total of 50 stations, four fewer than in 2013, all of which were the subject of sampling on seven occasions between May and September. All together, some 335 water samples were taken and 8,375 analysis results were used to calculate the RUISSO index (RI).

Based on the results of the index calculated for each of the 50 stations in 2014, the water quality improved at 22% of stations, remained stable at 62% of them and deteriorated at the remaining 16%. Of the same 46 stations that were sampled in each of the past five years, the number of stations rated "excellent, good or fair" grew from 19 in 2013 to 20 in 2014. And the number of stations deemed "polluted" declined from 17 to 13, while the "poor" stations increased from 10 to 13.

In addition to its regular program, the RSMA collected some samples, during the spring thaw, at some of the stations included in the program. High values of copper, ammoniacal nitrogen, suspended matter and total phosphorus were observed in most water bodies,



the result of the leaching of urban areas and snow melt waters. Although significant, it must be said that this pollution is particularly difficult to sample, as the phenomenon is of short duration.



As anticipated, the bodies of water supplied by an aqueduct system, artesian wells or by the waters of the St. Lawrence River are generally of good quality. This explains why the Angrignon Park and Dr-Bernard-Paquet Park Ponds earned the highest RUISSO Index (RI) in 2014 (IR-78). The Pinel Stream, the Lachine Canal and urban ponds, located in parks, followed with a category 2 RI (superior to 60). The Île Bizard Marshes are also found in this category.

The O'Connell Stream and À l'Orme River followed with a "fair" rated water quality (category 3). The stream's quality improved slightly owing to a decrease in phosphorus levels. Although the overall quality of the À l'Orme River remained stable compared to 2013, there was a marked deterioration at the two stations located on each side of Highway 40, undoubtedly because of the major ongoing work in that area. Finally, the poor results obtained at one of the stations located downstream of Kirkland residential sectors are likely due to the persistence of illicit connections.

Streams and inland waters of "poor" quality (category 4) are generally affected by pollution problems. Consequently, their RIs are more or less stable on a yearly basis. Illicit connections are present in many of the main sewers that supply them. This is the case of the Bertrand, Denis, De Montigny and Saint-James streams as well as of the William Cosgrove Centennial Park Basin. The overall water quality of the Bouchard Stream has remained the same in comparison with last year. High values of suspended matter (>200 mg/L measured following heavy rainfalls) and ammoniacal nitrogen (> 700 µg/L in the spring) were sometimes recorded at the stations in the vicinity of the airport. Despite some slight improvements at certain of the monitoring stations of the Denis and De Montigny Streams, these were not sufficient to alter their overall results; thus, their quality remained poor. Among others, the De Montigny Stream station supplied by the drain waters of the D'Anjou industrial sector is particularly poor (COLI, copper, lead and total phosphorus).

Certain category 5 water bodies, classified as "polluted", suffer from a chronic or occasional deficiency of their water supply. This is the case, among others, of the Coulée Grou, which posted its worst results since 2008, the Pointe-aux-Prairies Nature Park Marsh and the Bois-de-Saraguay Nature Park Marsh. As regards the waters of the Château-Pierrefonds Stream, they rank last due to illicit connection issues, the negative influence of the runoffs of the melting snow of the Pierrefonds-Roxboro snow dump and the many ongoing works in the neighbourhood.

The following table reveals an improvement of more than five points (Evolution: +) of the RI in 10 of the 24 streams and inland waters. Only three of them showed a deterioration of more than 5 points of their RI (Evolution: -).

### Evolution of the categorization of streams and inland waters according to the RUISSO\* Index

Streams and inland waters	Deficiency in water	2014 Cat.	2013 Cat.	Evolution **
Angrignon Park Pond		2	2	+
Dr-Bernard-Paquet Park Pond		2	3	+
Pinel Stream	Occasional	2	2	+
La Fontaine Park Pond		2	2	+
Lacoursière Park Pond		2	2	=
Lachine Canal		2	2	=
Bois-de-l'Île-Bizard Nature Park Marsh		2	3	+
De La Brunante Basin		2	2	=
Île Bizard Marsh	Chronic	3	2	=
O'Connell Stream		3	3	+
À l'Orme River		3	3	=
Bertrand Stream		3	4	+
Centennial Park Basin		4	4	=
Des Battures Lake		4	4	=
Bouchard Stream		4	4	+
Terra-Cotta Stream		4	5	+
Denis Stream		4	5	+
De Montigny Stream		4	4	=
Saint-James Stream		4	4	=
Meadowbrook Stream		5	5	=
Bois-de-Saraguay Nature Park Marsh	Chronic	5	4	-
Château-Pierrefonds Stream	Occasional	5	5	=
Pointe-aux-Prairies Nature Park Marsh	Occasional	5	4	-
Coulée Grou	Chronic	5	5	-

\* Taking into account all parameters, the RI determines the water quality category of each of the stations. The category of a water body is determined by calculating the average of the RIs obtained at all of its stations.

\*\* The evolution was characterized as stable (Evolution: =) when the reading of the RI from one year to another revealed a variance of less than 5 points. Consequently, a body of water can remain in the same RI category (20 points by category) even though it may have evolved by more than five points, as was the case for the Coulée Grou.

# COURDO: a better documented spatial influence

Only the spatial influence of discharges of the Jean-R. Marcotte wastewater treatment plant (WWTP) was the subject of sampling activities this year in order to document their impact on the St. Lawrence River. The COURDO program is comprised of some 25 stations, of which most are part of historic programs; the measures were taken on seven occasions, between June 27<sup>th</sup> and October 23<sup>rd</sup>.

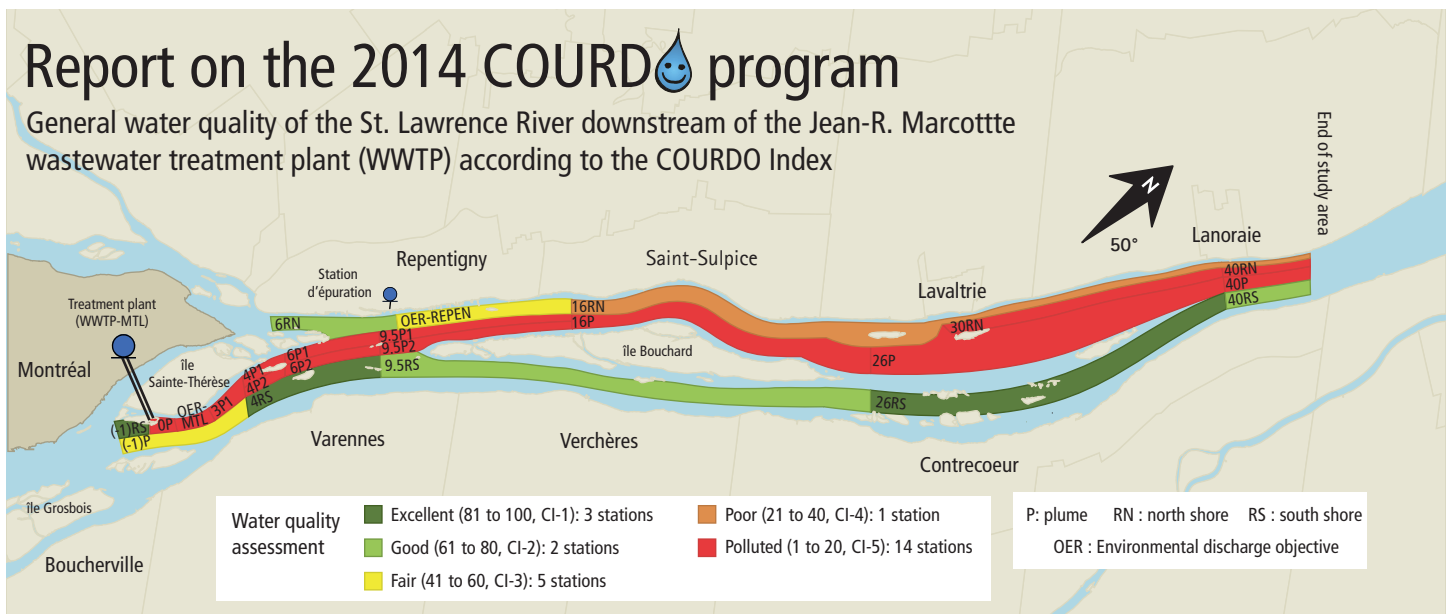
The studies performed from 1977 until 1997, and then in 2004, 2011, 2012 and 2014 have allowed us to establish that the dispersion plume remained quite similar to the one determined by Laboratoire d'Hydraulique LaSalle in 1983 in the first 10 kilometers and, since 2011, to establish its route up to km 40. For information purposes, the distances have been calculated from the outlet of the treated wastewaters of the WWTP, located downstream of km 0, Île aux Vaches.

The highest COLI values were obtained at the station located at the outlet. These high values are partly explained by the very low influence of the physico-chemical treatment on the COLI measures, by the absence of disinfection and by the shallow waters of the WWTP's outlet. Further downstream of the outlet, a gradual decrease in bacterial values is observed due to the dilution of the waters of the St. Lawrence. Indeed, the medians of the measures decline from 330,000 COLI at the outlet to 60,000 at km 4, and from 30,000 to 21,000 from km 9 to km 16, and then to 13,000 at km 40. Despite these declining values, water uses remain compromised in the plume's spatial influence, in the center of the St. Lawrence's northern channel, and this, until the very last station, the one located in Contrecoeur (EMIS-40P).

The values obtained at stations identified by a "P", located in the dispersion plume of the treated wastewaters are generally greater than those obtained at the north shore stations (RN) and, more so even, to those located on the south shore (RS). Based on the characteristics of the water masses and the analyses conducted, the spatial influence of the WWTP does not reach the north shore of the St. Lawrence River. It is essentially limited to the center of the St. Lawrence for the first 10 km, and then goes on to the northern side of the Verchères Islands. An analysis of the metal contents of the 292 samples taken indicates that none of the 22 metals analysed can be used as an indicator of the plume's presence. The content values are either too low (near the detection limit), or equal to those measured outside the WWTP's plume.

Although total phosphorus contents are greater in the spatial influence of the wastewaters' outlet (up to 2 times the 30 µg/L criteria relative to the protection of the natural environment) compared to the St. Lawrence's waters, the physico-chemical treatment process results in a substantial decrease in total phosphorus concentrations in the treated wastewater discharged into the St. Lawrence River. The dilution reduces their contents to the level of the threshold at 3 or 4 km from the outlet. As far as ammoniacal nitrogen is concerned, one has to reach km 6 for the threshold to be complied with once again.

The 2014 assessment revealed by the COURDO Index has changed very little from that performed in 2011, save for some slight improvements in some of the stations located on the north shore (6, 16 and 40RN).





# PLUVIO: a pivotal year

Whereas the majority, actually two thirds, of the territory of the agglomeration of Montréal is served by a combined sewer network, which directs the stormwaters and sanitary waters toward the Jean-R. Marcotte wastewater treatment plant (WWTP), the remainder of the territory (mainly at the Island of Montréal's two extremities, as well as Île des Sœurs and Île Bizard), is served by two networks. The stormwater network evacuates the stormwaters directly into inland water bodies (streams or basins) or toward adjacent water bodies encircling the Montréal archipelago. The sanitary system catches and directs the waste waters from homes, businesses and industries toward the WWTP. Illicit connections (Ic) are located in the sectors served by separate sewer systems.

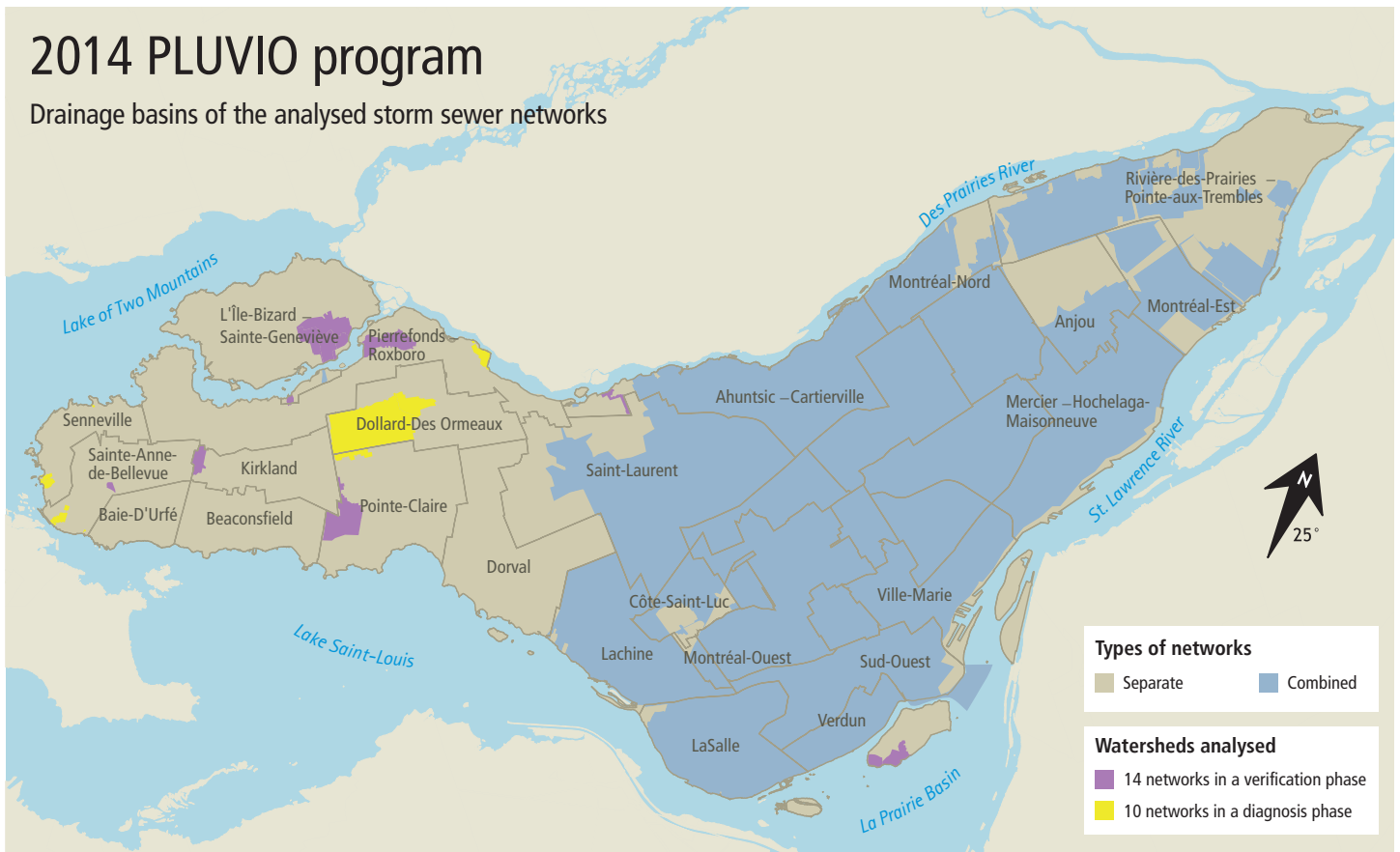
The PLUVIO program was implemented in 2007 in order to identify and locate illicit connection problems for them to be remedied. The territory under study within the program covers an area of approximately 107 km<sup>2</sup> and the stormwater networks studied serve some 71,000 civic addresses. On the basis of the studies performed by the RSMA, there are about 588 stormwater systems on the territory of the agglomeration, excluding the port area. Of these 588 networks, 182, or about a third, are contaminated by fecal coliforms at their outlet.



Up until now, about 495 problem sectors, i.e. street segments liable to be affected by illicit connections have been identified by the RSMA within these contaminated networks. Since the beginning of the 2000s, the boroughs and reconstituted municipalities have verified almost 13,000 civic addresses.

## 2014 PLUVIO program

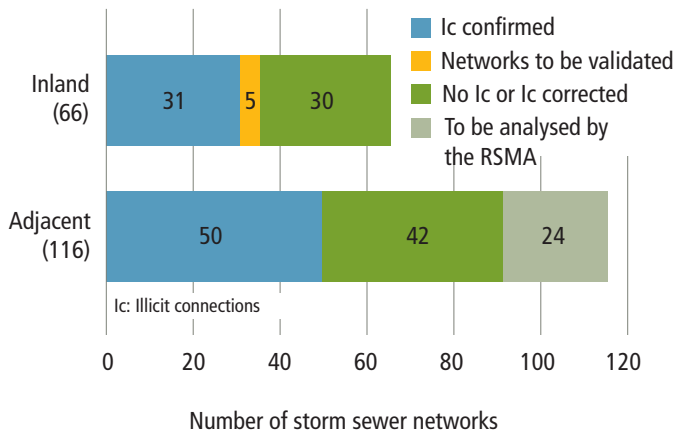
Drainage basins of the analysed storm sewer networks



## Toward a first portrait of all the territory's stormwater sewer networks

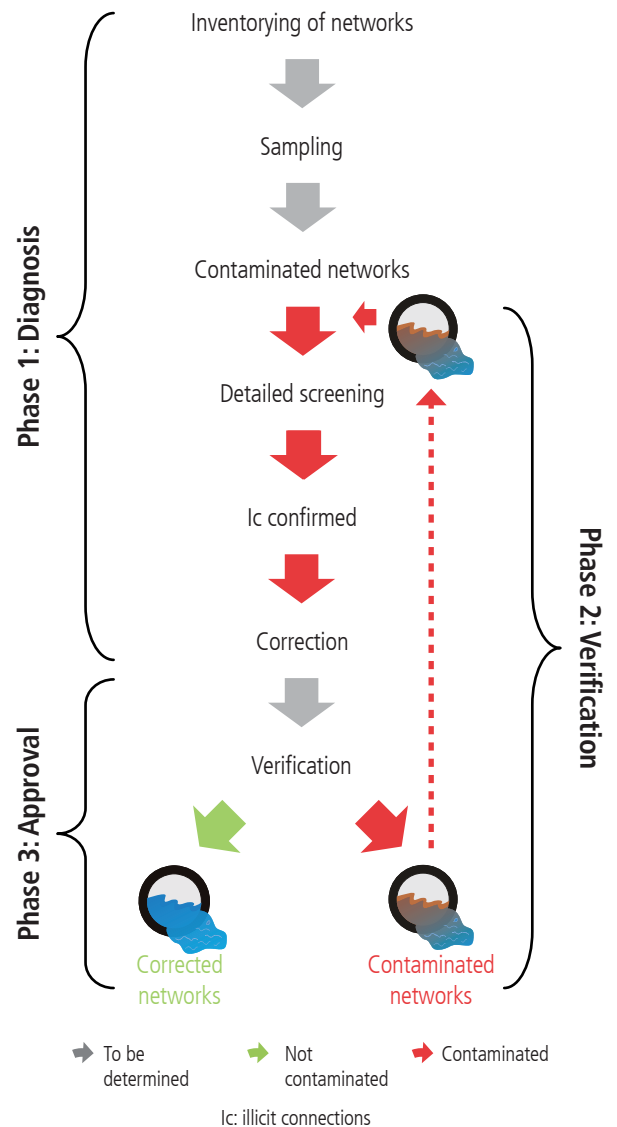
The graph below shows the degree of advancement of the studies performed by the RSMA on 182 contaminated storm water networks. Of the 66 contaminated networks discharging into inland waters, 31 are problematic (likely presence of illicit connections), 5 need to be validated in order to verify the absence of any Ic in those networks that have already been corrected and 30 networks showed no Ic or were corrected (contamination from other sources). All collectors were studied a first time. As for the 116 contaminated networks discharging into adjacent water bodies, 50 are problematic, none need to be validated at the present time, 42 revealed themselves to be free of any Ic or were corrected and 24 still need to be studied in 2015.

**Progress of the analysis of the 182 contaminated storm sewer networks discharging into waterbodies**



Once the last 24 stormwater networks, generally smaller scale networks, will have been studied, a first complete assessment of the PLUVIO program will be prepared. Also, the year 2014 marked the beginning of the verification and approval phases of the stormwater systems that were corrected, to make sure that they have been completely rehabilitated or to detect any subsisting issues in the problem areas.

## The PLUVIO program process



During the first inspection and sampling phase of the PLUVIO program, the RSMA identified the problem sectors with one or many civic addresses liable to be affected by illicit connections. The boroughs and reconstituted cities, in collaboration with Montréal's Service de l'eau and the RSMA, then identified the civic addresses that had illicit connections requiring a correction. However, their presence upstream of a stormwater network can mask the existence of improperly connected civic addresses downstream of the contaminated sewer. Once the illicit connections have been corrected upstream, a second verification phase is necessary to ensure that there remain no illicit connections downstream of those already discovered.

## Phase 1: 2014 Diagnosis

### 10 networks studied

The 2014 PLUVIO program allowed for the completion of the study of the major inland water bodies, namely the basin of the William Cosgrove Centennial Park located in the city of Dollard Des-Ormeaux. Two of the four networks that supply its waters were studied in detail. Furthermore, eight other contaminated networks discharging their waters in adjacent water bodies were also studied in the cities of Sainte-Anne-de-Bellevue and Senneville as well as in the borough of Pierrefonds-Roxboro.

Of the 10 contaminated networks, six did not have any illicit connections. Two of the four other problematic networks are located on territories served by septic tanks. Because of this situation, the problems observed in these two networks do not constitute, strictly speaking, illicit connections. However, since a septic installation must be adequately designed, installed, used and maintained to protect the environment, it is only appropriate within the parameters of the PLUVIO program to try to eliminate all contamination sources of shore waters. Therefore, no efforts should be spared to improve the performance of septic installations that result in environmental issues.

## Phases 2 and 3:

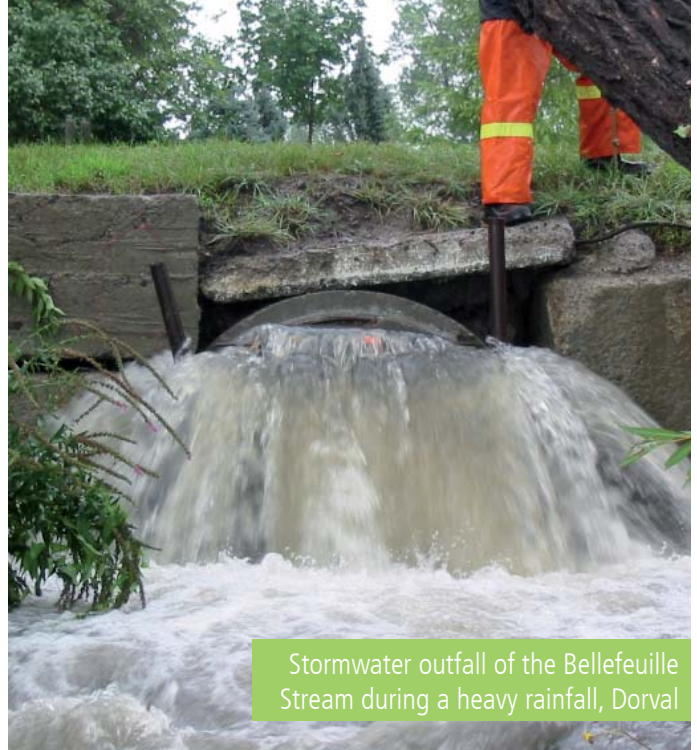
### 2014 verification and approval

#### 14 networks studied

Certain stormwater networks that had been corrected, in whole or in part, were subjected to a further verification. 14 networks were thus sampled a second time to verify whether they held any illicit connections. The results showed that four of them could now be considered as being completely corrected. In the 10 remaining networks, more than 30 problem areas were checked and 10 areas were identified as being likely affected by illicit connections.

#### Illicit connection

An illicit connection is a connection or defect in a piece of equipment that allows sanitary wastewaters to seep elsewhere than in a domestic or separate sewer network, for instance in a storm sewer network, on the ground, in a ditch or in a water body, with the exception of septic tanks. The PLUVIO program identifies problem areas, namely segments of the stormwater network that include buildings liable to be affected by illicit connections.



Stormwater outfall of the Bellefeuille Stream during a heavy rainfall, Dorval

## Summary of PLUVIO 2014

In the end, of the 24 networks studied in 2014, 10 included problem areas, 10 were exempt of any illicit connections and the RSMA confirmed that 4 had been completely corrected. In the case of the contaminated networks, but exempt of any illicit connections, bacterial contamination from an animal source or diffuse contamination revealed itself, once again, to be a determining factor of the contamination of stormwater networks observed in dry weather. The detailed results indicate that illicit connections are present in around 55 sectors comprising more than 500 civic addresses distributed among 14 stormwater networks. Only further screening can allow an identification of the buildings that are illegally connected.

## Intensify our efforts to correct illicit connections

Although the RSMA is on the point of completing a first phase, i.e. the study of the 182 contaminated networks identified to date, many detection and correction efforts will be required to solve all illicit connection issues. Of the 13,000 civic addresses detected over the years, about 12,400 had no illicit connection problem, whereas an illicit connection was confirmed in 600 of these addresses. A little more than half of these have been corrected. However, some 4,000 addresses are still waiting for an in-depth study by local authorities and half of these addresses are located in boroughs.



## An unexpected surprise on our shores

Like it or not, the Asian ladybird beetle (ladybug) is here to stay. It is now found in the Abitibi and Lac-Saint-Jean regions. A native of Asia, the Asian ladybird beetle was imported to the United States on many occasions starting in 1916 with the aim of biologically controlling aphids. In the 1970s and 1980s, they were frequently released to control the presence of aphids in almond trees. The Asian ladybird beetle then migrated northward. It was first observed in Québec in 1994. According to the RSMA's observations, this was the first year that they were present in such great numbers on our shorelines.

The Asian ladybird beetle resembles its cousin, the seven-spotted lady beetle, also foreign in origin and the best known among the population. In the picture above, three types of lady beetles can be distinguished. The first, the pink-spotted lady beetle, is an indigenous species to Québec. The second, the fourteen-spotted lady beetle is yellow and much smaller. The third and last is the Asian ladybird beetle which comes in various colours, for instance in a black robe with red spots, a red robe with black spots or, as depicted in the picture, an all orange robe or one with black points.

Please don't hesitate to share your observations with the members of the RSMA team and to ask them your questions. By doing so, you'll be helping us in targeting certain local issues in addition to orienting some of our actions or initiatives.

[ville.montreal.qc.ca/rsma](http://ville.montreal.qc.ca/rsma)

### VILLE DE MONTRÉAL

#### PRODUCTION

Service de l'environnement  
Division du contrôle des  
rejets industriels  
Réseau de suivi du milieu  
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