

# Environmental Observatory for the bay of Sept-Îles WATER QUALITY

	FINDINGS
Metal and metalloids	Each sample was analyzed for thirty-two metals and metalloids (132 data points for each metal), fourteen of which were subject to surface water quality criteria and/or Canadian water quality guidelines. The criteria were exceeded for silver, boron, cadmium, copper, mercury, nickel, lead, thallium, and zinc. This occurred mainly at PT1 and PT4. It should be noted that only 15 water samples were taken at PT4, mainly in 2017, which is half the number of samples taken at PT1, PT2, PT3, and PT5-1.
Polycyclic aromatic hydrocarbons (PAH)	Most PAH concentrations were below the detection limits. Only two concentrations exceeded the detection limits, and they met the quality criteria. All PAHs with individual criteria or guidelines appear to be in compliance. However in the case of PAHs subject to collective criteria, i.e., total carcinogenic PAHs, the detection limits were too high (method detection limit or MDL at 0.0001 mg/L) to determine whether the quality criteria were met.
Phosphorus	There is no quality criterion or guideline for phosphorus in marine environments. But excess phosphorus lowers dissolved oxygen concentrations. The dissolved oxygen data collected during the three sampling phases indicates that the water in the bay is well oxygenated. All (100%) of the values were above 8.0 mg/L, and therefore in compliance with Canadian guidelines.
Phosphates	Phosphate concentrations varied from 0.1 to 1 mg/L. There is no criterion or guideline for phosphates.
Ammoniacal nitrogen	Ammoniacal nitrogen concentrations at all stations (192 data points: 100%) were in line with the quality criteria for the protection of aquatic life.
Nitrites et nitrates	Nitrites and nitrates were measured together and all values were below 2 mg/L for the representative periods corresponding to the sampling campaigns, which is in line with water quality criteria for the protection of marine life (chronic effect) and Canadian water quality guidelines for nitrates. There is no quality criterion for nitrites.
Chlorophyll a	Although MDDELCC and the Canadian Council of Ministers of the Environment (CCME) have not established criteria or guidelines for chlorophyll, some countries such as the United States have proposed threshold values as a way of evaluating eutrophication in coastal areas or estuaries (Daniel and Le Goff, 2002). Based on these values, eutrophication would be low at chlorophyll levels below 5 µg/L. It should be noted that due to the paucity of available data, it is difficult to establish a trend. But given the dissolved oxygen concentrations and low chlorophyll concentrations measured, eutrophication in the study area should be minimal.
Bacteria (total coliforms, fecal coliforms, E. coli, facultative aerobic and anaerobic bacteria, bacterial species)	Total coliform concentrations were highest at PT1 and PT3, most often in the spring. Fecal coliform concentrations were also highest in the spring. Three fecal coliform values (at PT1, PT3, and PT5-2) and two <i>E. Coli</i> concentrations (at PT3 and PT5-2) exceeded the surface water quality criterion for the prevention of contamination of aquatic organisms. The aerobic and anaerobic heterotrophic bacteria (AAHB) count, a gauge of organic pollution, indicated that the highest concentrations were found at PT2 and at PT1, near the municipal wastewater outlet. Bacterial identification showed that PT1 and PT3 had the greatest variety of bacterial species.

## RECOMMENDATIONS

1. It is recommended that temperature, dissolved oxygen, and salinity be measured on an ongoing basis at different depths in the bay and at municipal and industrial wastewater outlets (PT1, PT4, and PT5) to determine anthropogenic variations in salinity, as per the Canadian water quality guidelines regarding estuarine and marine waters.
2. To ensure that surface water quality criteria for estuarine and marine waters and Canadian guidelines for the protection of aquatic life are met, it is recommended that turbidity and suspended and dissolved solids be measured on an ongoing basis at different depths in the bay, specifically at PT1, PT4, and PT5.
3. It is recommended that chemical oxygen demand (COD) and biochemical oxygen demand (BOD5) be monitored in collaboration with the City of Sept-Îles and marine product processing companies, given that municipal and fish plant wastewater data is already collected for the Bay of Sept-Îles.
4. It is recommended that total oils and fats, petroleum hydrocarbons, and biological parameters continue to be monitored in collaboration with the City of Sept-Îles and local industries given that municipal and industrial wastewater and stormwater effluent data is already collected.
5. Given the issues raised by the detection limit for certain marine water analysis criteria and the Canadian guidelines on long-term exposure, it is recommended that analysis methods for certain metals, metalloids, and PAHs be reviewed with Centre d'expertise en analyses environnementales du Québec in order to develop an effective monitoring method.
6. It is also recommended that the concentrations for substances such as metals and PAHs be reviewed with provincial and federal government authorities to ensure they are representative of the natural conditions in the area.
7. Monitoring of iron and manganese levels and other parameters subject to quality criteria should be continued at PT1, PT3, PT4, and PT5 and in watercourses flowing into the bay.
8. It is recommended that sampling be continued at PT4 for two reasons: 1) less data has been collected at PT4 than at others, which prevents proper inter-station comparisons; and 2) this station has the highest observed exceedance of quality criteria and/or Canadian guidelines.
9. For values with detection limits exceeding the criteria or guidelines, further sampling should be done so that this data can be included in the calculation of water quality indices.

FINANCIAL  
PARTNERS

