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WATER QUALITY IN CANADIAN RIVERS

CANADIAN ENVIRONMENTAL SUSTAINABILITY INDICATORS

Canada

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CANADIAN ENVIRONMENTAL SUSTAINABILITY INDICATORS

WATER QUALITY IN CANADIAN RIVERS

February 2025

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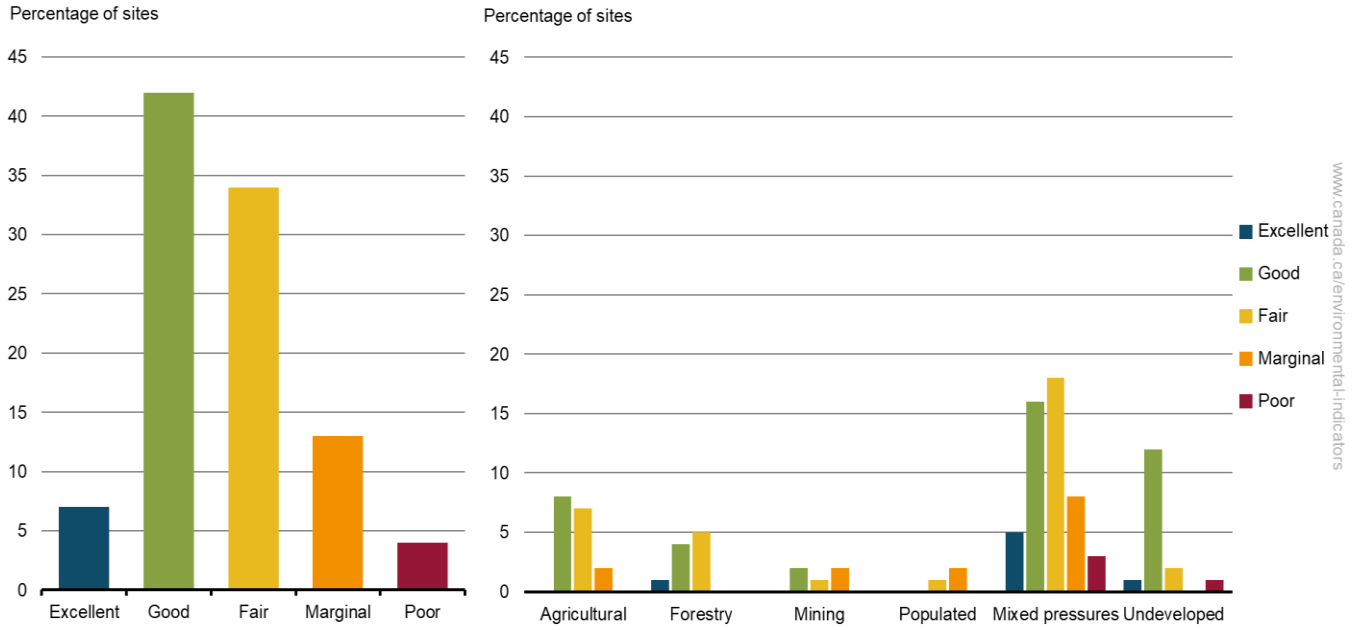
Water quality in Canadian rivers

Clean freshwater is essential for healthy river ecosystems to support aquatic plant and animal biodiversity. The quality of water and the health of rivers may be impacted by how people develop and use the surrounding land. The water quality indicators provide information on the status of surface water quality. These indicators classify the water quality of Canadian rivers into 5 categories, from poor to excellent[1], to give an indication of their ability to support the plants and animals that live in or use the water.

Key results[2]

- For the 2021 to 2023 period, water quality in Canadian rivers was rated fair to excellent at 83% of the monitored sites
- Land development through agriculture, forestry, mining, high population density or a combination of these (mixed pressures) tends to have a negative impact on water quality

Figure 1. National water quality in Canadian rivers by land use category, 2021 to 2023 period



Data for Figure 1

Note: Water quality was evaluated at 165 sites across southern Canada using the Canadian Council of Ministers of the Environment's water quality index. For more information on water quality categories, land use classification and monitoring sites selection, consult the Data sources and methods section.
Source: Data assembled by Environment and Climate Change Canada from federal, provincial and joint water quality monitoring programs. Population, forestry, mining and land cover statistics for each site's drainage area were provided by Statistics Canada, Natural Resources Canada, Environment and Climate Change Canada, Agriculture and Agri-Food Canada, the Government of Alberta and the University of Maryland.

[1] For more information on categories, consult the Data sources and methods section
[2] Due to health measures related to COVID-19, some sampling activities and laboratory analysis were cancelled in 2021. As a result, the method related to the calculation of the water quality indicator for the 2021-2023 period was adjusted at some sites. For this reason, the comparison of results between years and sites should be interpreted as indicative. For more information, consult the Data sources and methods section

By world standards, Canada has abundant, clean freshwater resources. The water in Canada's rivers varies naturally across the country based on the rocks and soil in the area and the climate. For example, water that flows through the rocky landscape of northern Ontario and Quebec is naturally different from water flowing through the deep soils of the Prairies. Depending on their composition, some soils may act as a filter while others may contribute elements to the water. However, it is human activities on the land around the lakes and rivers that have the major impact on the water quality at each site.

For the 2021 to 2023 period, water quality at 165 monitoring sites in southern Canadian rivers[3] was rated:

- excellent or good at 49% of monitoring sites
- fair at 34% of sites
- marginal at 13% of sites
- poor at 4% of sites

Water quality is generally good or excellent in undeveloped areas where native plants, trees and soils purify the water before it reaches the river. Changes in land cover due to development such as manufacturing and urbanization put pressure on the landscape and can increases the amount of chemicals being released into rivers. As well, many contaminants can be deposited in rivers after being released into the air. Fertilizers, pesticides and manure from livestock, used to help crops grow, can wash into nearby rivers or seep into groundwater, impacting water quality in those areas. Some forestry activities, such as the removal of the trees and other vegetation as well as urban development that creates impervious surfaces, would affect the normal flow of surface water and increase the run-off of nutrients and contaminants into rivers. Development can impact the water quality in rivers placing the organisms that live and depend on these water bodies under stress.

[3]The indicators focus on the regions in Canada where human activity is more prevalent, as this is usually the main factor for water quality deterioration. Northern Canada is underrepresented; this is due partly to the challenges related to sampling in these remote locations. For more information on site selection, consult the Data sources and methods section.

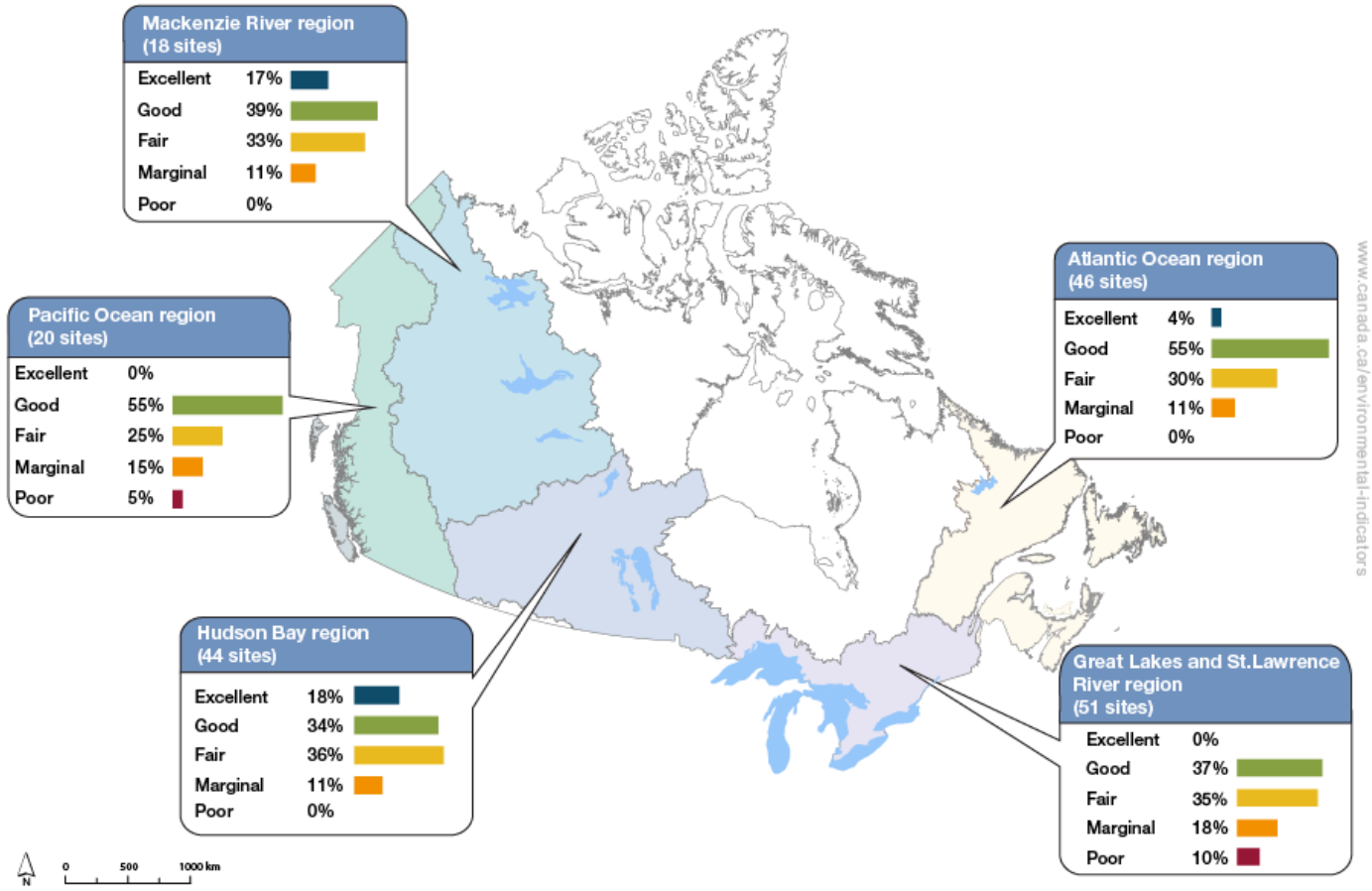
Regional water quality in Canadian rivers

The regional water quality indicator was assessed at 179 sites across Canada, including 14 additional monitoring sites in the northern portions of the Mackenzie River.

Key results

- Rivers in the Atlantic Ocean and the Mackenzie River regions had the highest proportion of sites with good or excellent water quality (59% and 56%, respectively)
- Rivers in the Great Lakes and St. Lawrence River, and the Pacific Ocean regions had the highest proportion of sites with marginal or poor water quality (28% and 20% respectively)

Figure 2. Regional water quality, Canada, 2021 to 2023 period



Data for Figure 2

Note: For the Regional water quality in Canadian rivers indicator, water quality was assessed at 179 sites across Canada using the Canadian Council of Ministers of the Environment's water quality index Compared to the national indicator, the Regional water quality in Canadian rivers indicator uses 14 additional monitoring sites in the northern portions of the Mackenzie River.
Source: Data assembled by Environment and Climate Change Canada from federal, provincial, territorial and joint water quality monitoring programs.

Water quality varies widely across Canada. For the 2021 to 2023 period:

- the highest proportion of sites rated good or excellent was found in areas where there was very little human development upstream or in the least populated areas
- the highest proportion of sites rated marginal or poor was found in the most populated areas, in particular where agriculture, or a combination of agricultural and forestry activities were also present

Atlantic Ocean region

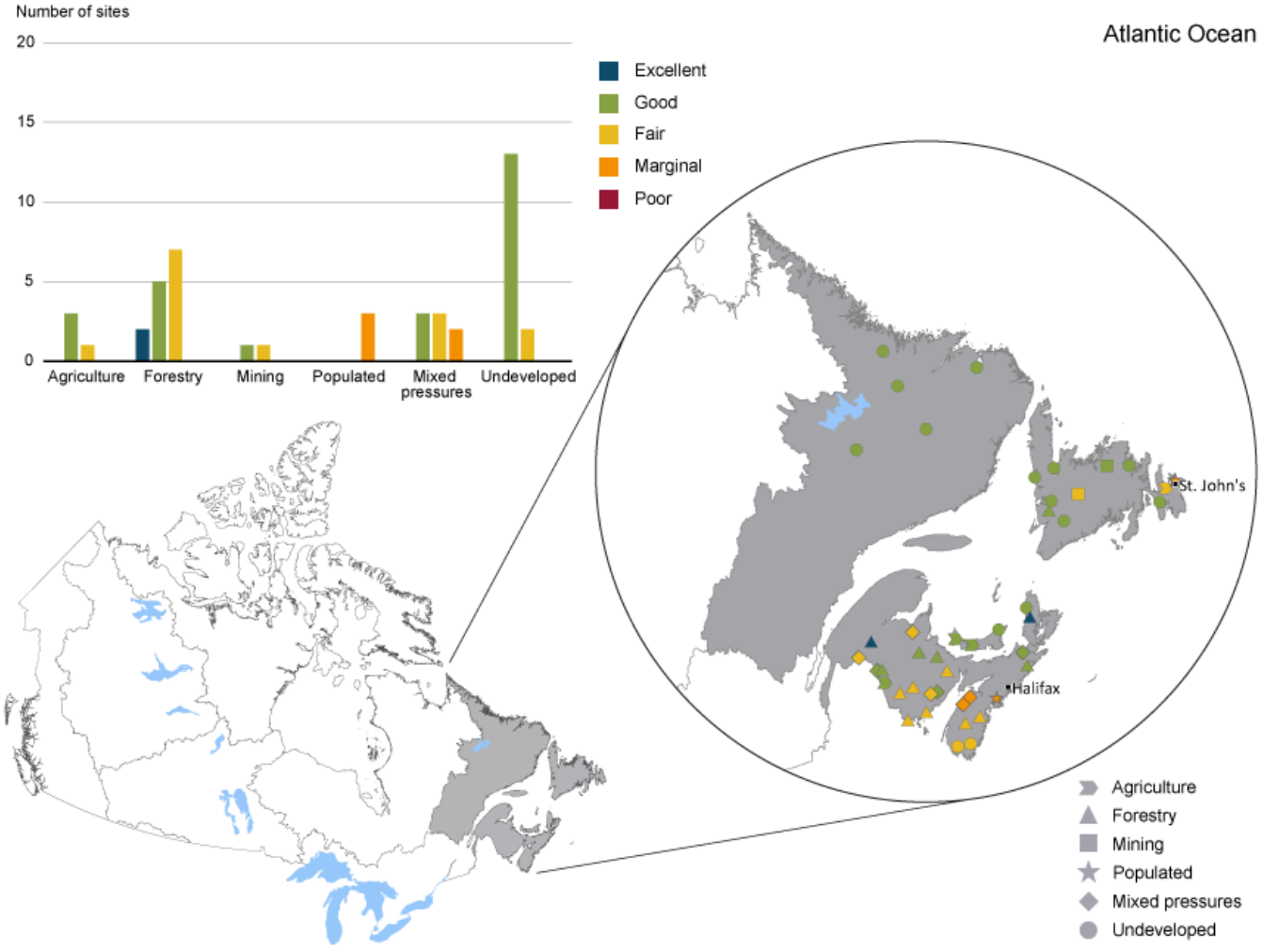
Along the east coast of Canada, all rivers drain into the Atlantic Ocean. This region includes Nova Scotia, New Brunswick, Prince Edward Island, Newfoundland and Labrador, along with part of eastern Quebec.

Key results

For the 2021 to 2023 period:

- most sites in the Atlantic Ocean region
  - are in areas with forestry or in undeveloped areas
  - have fair to excellent water quality
- monitoring sites in high population density areas and with mixed pressures usually have worse water quality

Figure 3. Water quality by land use category, Atlantic Ocean region, 2021 to 2023 period



Data for Figure 3

Note: Water quality was assessed at 46 sites on rivers draining into the Atlantic Ocean using the Canadian Council of Ministers of the Environment's water quality index. For more information on land use classification, consult Table 1 of the Data sources and methods section.
Source: Water quality data were assembled by Environment and Climate Change Canada from existing federal, provincial and joint water quality monitoring programs. Population, forestry, mining and land cover statistics for each site's drainage area were provided by Statistics Canada, Natural Resources Canada, Environment and Climate Change Canada, Agriculture and Agri-Food Canada, the Government of Alberta and the University of Maryland.

This region is home to approximately 2.3 million people, or 7% of Canada's population. The majority live in Nova Scotia, New Brunswick and the island of Newfoundland, Labrador and Prince Edward Island aren’t highly populated.

Agriculture is mainly found in Prince Edward Island, Nova Scotia's Annapolis Valley and New Brunswick where the soil and climate are suitable.

Mining and forestry are two of the region's largest sectors in Newfoundland and Labrador where iron, ore, nickel, copper, cobalt and gold are mined. New Brunswick and Nova Scotia have also many active aggregate, limestone, gypsum, coal and gold mines. Forestry, the largest industry in New Brunswick, is composed of solid wood and pulp production. Water withdrawals and discharges from mining and pulp and paper industries effluent are regulated, but local impacts on water quality can be observed where limited releases to rivers and leaching from tailings and waste rock enclosures occur. Closed or abandoned metal mines have the potential to release harmful substances to the water. Also, the local geology in mining areas often has naturally higher levels of metals in soil and water and this needs to be considered.

For the 2021 to 2023 period, water quality for 46 sites on rivers draining into the Atlantic Ocean was rated:

- excellent or good at 59% of monitoring sites
- fair at 30% of sites
- marginal at 11% of sites

Great Lakes and St. Lawrence River region

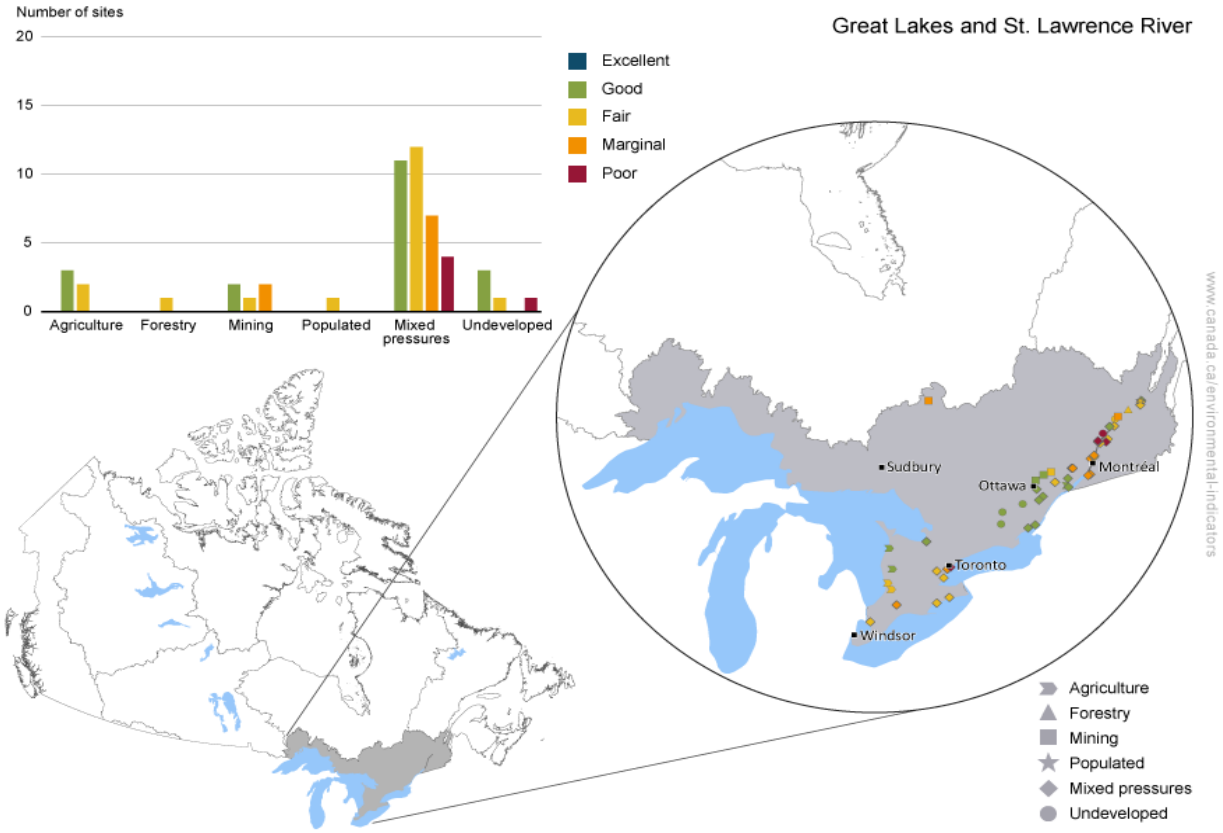
This region includes western Quebec, southern Ontario and the section of northern Ontario that boarders Lake Superior. Rivers in this region drain into the Great Lakes and the St. Lawrence River.

Key results

For the 2021 to 2023 period:

- water quality in rivers in the Great Lakes and St. Lawrence River region is generally
    - fair to poor in southwestern Ontario and along the St. Lawrence River between Montreal and Quebec City
    - good in eastern Ontario
- monitoring sites in areas where there are mixed pressures tend to have worse water quality

Figure 4. Water quality by land use category, Great Lakes and St. Lawrence River region, 2021 to 2023 period



Data for Figure 4

Note: Water quality was assessed at 51 sites on rivers draining into the Great Lakes or St. Lawrence River using the Canadian Council of Ministers of the Environment's water quality index. For more information on land use classification, consult Table1 of the Data sources and methods section.
Source: Water quality data were assembled by Environment and Climate Change Canada from existing federal, provincial and joint water quality monitoring programs. Population, forestry, mining and land cover statistics for each site's drainage area were provided by Statistics Canada, Natural Resources Canada, Environment and Climate Change Canada, Agriculture and Agri-Food Canada, the Government of Alberta and the University of Maryland.

Home to almost 60% of Canadians, close to 20 million people, the Great Lakes and St. Lawrence River region contains 6 of the country's 10 largest cities: Toronto, Montreal, Ottawa, Mississauga, Brampton and Hamilton. Most human activity in this area is associated with urbanization and agriculture. The impact of increasing population density can be seen in the diminished water quality at sites on these rivers.

Fertile soils and a relatively mild climate combine to create productive agricultural land in the Great Lakes and St. Lawrence River region. These agricultural lands are gradually being covered by urban development changing the stresses on water quality in the region.

Mining in the region is dominated by feldspar and quartz mines. Forestry is an important industry in Quebec and Ontario. Pulp and paper mills are mainly located near the Great Lakes and the St. Lawrence River or near their tributaries. Water pollution from mining and pulp and paper industries effluent is regulated, but limited releases to rivers and leaching from tailings and waste rock enclosures can have a local impact on water quality. Closed or abandoned metal mines may still be releasing harmful substances to the water.

For the 2021 to 2023 period, water quality for 51 sites on rivers in the Great Lakes and St. Lawrence River region was rated:

- good at 37% of monitoring sites
- fair at 35% of sites
- marginal at 18% of sites
- poor at 10% of sites

Hudson Bay region

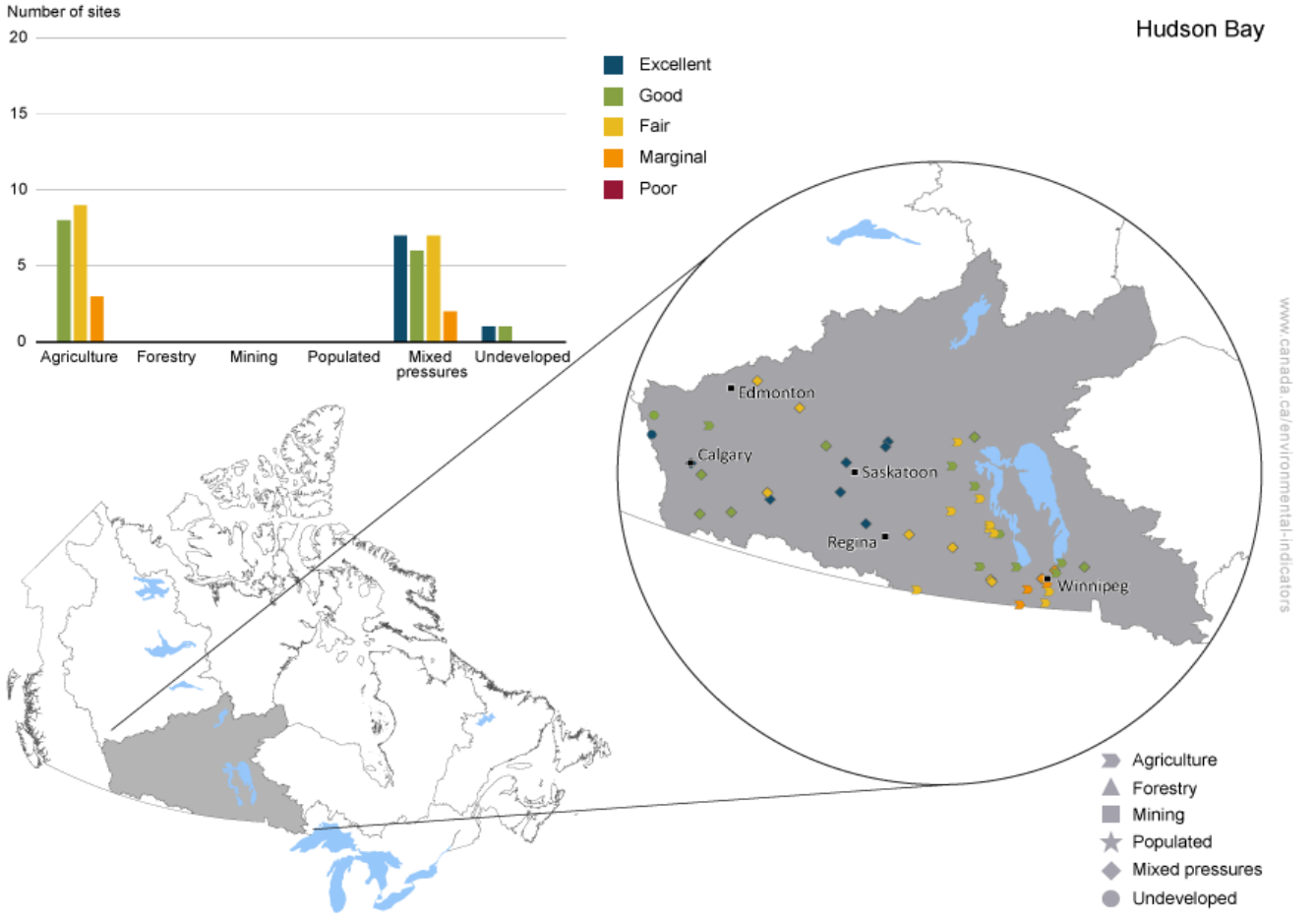
This region covers most of Manitoba, Saskatchewan, the southern half of Alberta and parts of northwestern Ontario. The Nelson River, the largest in this region, originates at the northern tip of Lake Winnipeg and flows into the south-western corner of the Hudson Bay. Its tributaries drain over 1 million km^2 of land starting in the Rocky Mountains running through the Prairies and into Lake Winnipeg.

Key results

For the 2021 to 2023 period:

- water quality in rivers close to the Rocky Mountains, in Saskatchewan, and north of Lake Winnipeg in the Hudson Bay region tends to be good or excellent. There is very little development in these areas
- water quality tends to be worse in areas where there is agriculture, or a mixture of agriculture and mining

Figure 5. Water quality by land use category, Hudson Bay region, 2021 to 2023 period



Data for Figure 5

Note: Water quality was assessed at 44 sites on rivers draining into the Hudson Bay using the Canadian Council of Ministers of the Environment's water quality index. For more information on land use classification, consult Table1 of the Data sources and methods section.
Source: Water quality data were assembled by Environment and Climate Change Canada from existing federal, provincial and joint water quality monitoring programs. Population, forestry, mining and land cover statistics for each site's drainage area were provided by Statistics Canada, Natural Resources Canada, Environment and Climate Change Canada, Agriculture and Agri-Food Canada, the Government of Alberta and the University of Maryland.

Most of the 5.5 million people (15.2% of Canada's population) in the Hudson Bay region live in its five major cities (Calgary, Edmonton, Winnipeg, Saskatoon and Regina). Water quality in this region reflects the soils found on the prairies, which have naturally higher concentrations of many metals. Agriculture covers almost all the land in the Prairies and mining is the second most important industry. In addition, hydroelectric power generation infrastructures on many of the rivers in Manitoba are extensive. As with other areas, human development can

alter this water quality. Water quality is worse for some rivers where agricultural activities are more intensive. Other factors can also play a significant role in water quality of this region, such as the natural geological characteristics of the basin, the continuum of the river and weather conditions.

For the 2021 to 2023 period, water quality for 44 sites on rivers in the Hudson Bay region was rated:

- excellent or good at 52% of monitoring sites
- fair at 36% of sites
- marginal at 11% of sites

Mackenzie River region

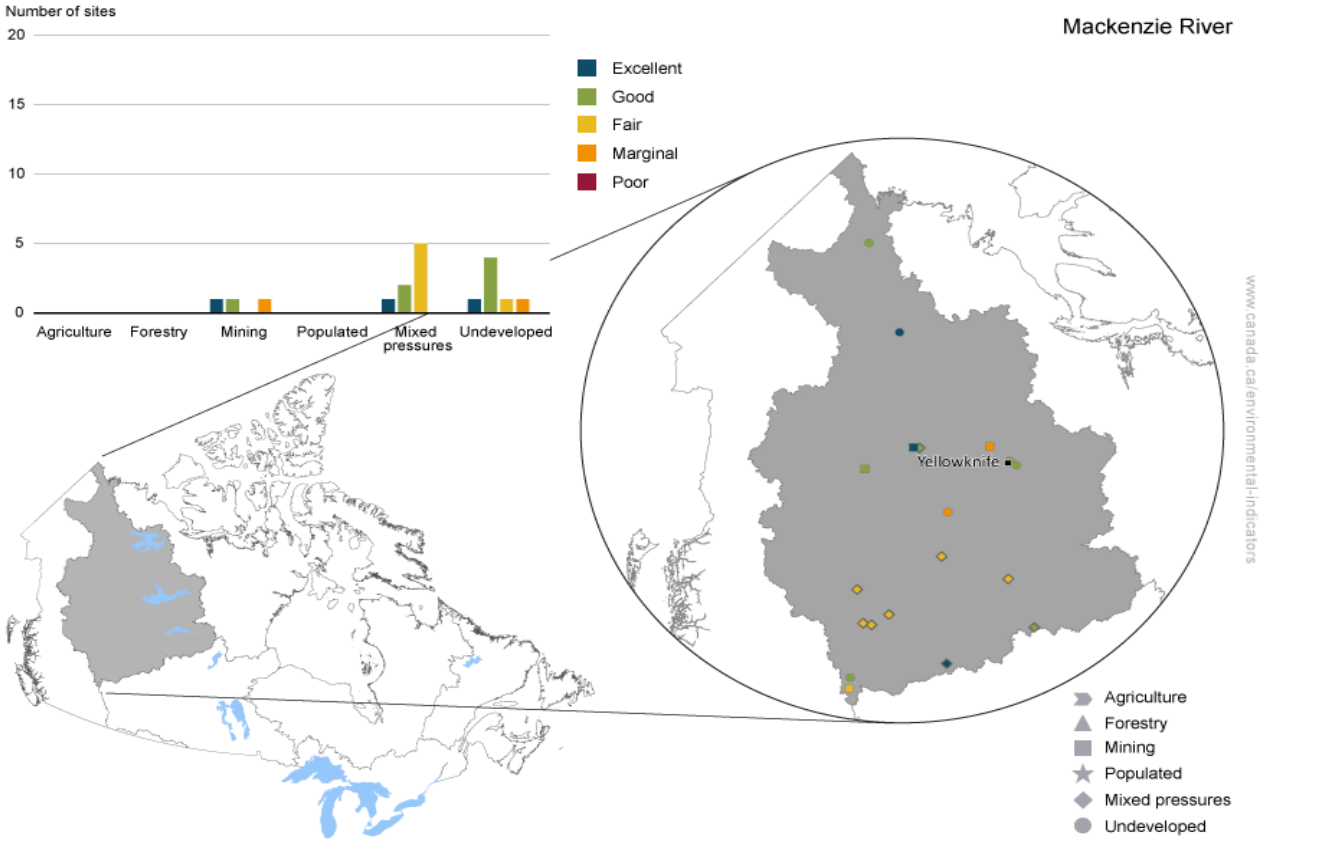
The Mackenzie River watershed is the largest in Canada, covering nearly 20% of the country and is one of the least developed. Its two largest tributaries, the Peace River and the Athabasca River, drain much of north-central Alberta and the Rocky Mountains in northern British Columbia.

Key results

For the 2021 to 2023 period:

- water quality in the Mackenzie River region is generally good to excellent in areas where there is little development
- water quality tends to be lower where there are multiple pressures, such as agriculture, mining and forestry

Figure 6. Water quality by land use category, Mackenzie River region, 2021 to 2023 period



Data for Figure 6

Note: Water quality was assessed at 18 sites on rivers draining into the Mackenzie River using the Canadian Council of Ministers of the Environment's water quality index. For more information on land use classification, consult Table1 of the Data sources and methods section.
Source: Water quality data were assembled by Environment and Climate Change Canada from existing federal, provincial, territorial and joint water quality monitoring programs. Population, forestry, mining and land cover statistics for each site's drainage area were provided by

Statistics Canada, Natural Resources Canada, Environment and Climate Change Canada, Agriculture and Agri-Food Canada, the Government of Alberta and the University of Maryland.

Much of the watershed consists of unbroken wilderness. The most intensive land use in the region is oil and gas extraction in central Alberta. This land use, along with forestry and agriculture, result in water quality in these areas being degraded relative to water in the undeveloped parts of the watershed. The majority of the 450 000 people (1.2% of Canada's population) living in the watershed live in the southern portions of the watershed.

For the 2021 to 2023 period, water quality for 18 sites on rivers draining into Mackenzie River was rated:

- excellent or good at 56% of monitoring sites
- fair at 33% of sites
- marginal at 11% of sites

Pacific Ocean region

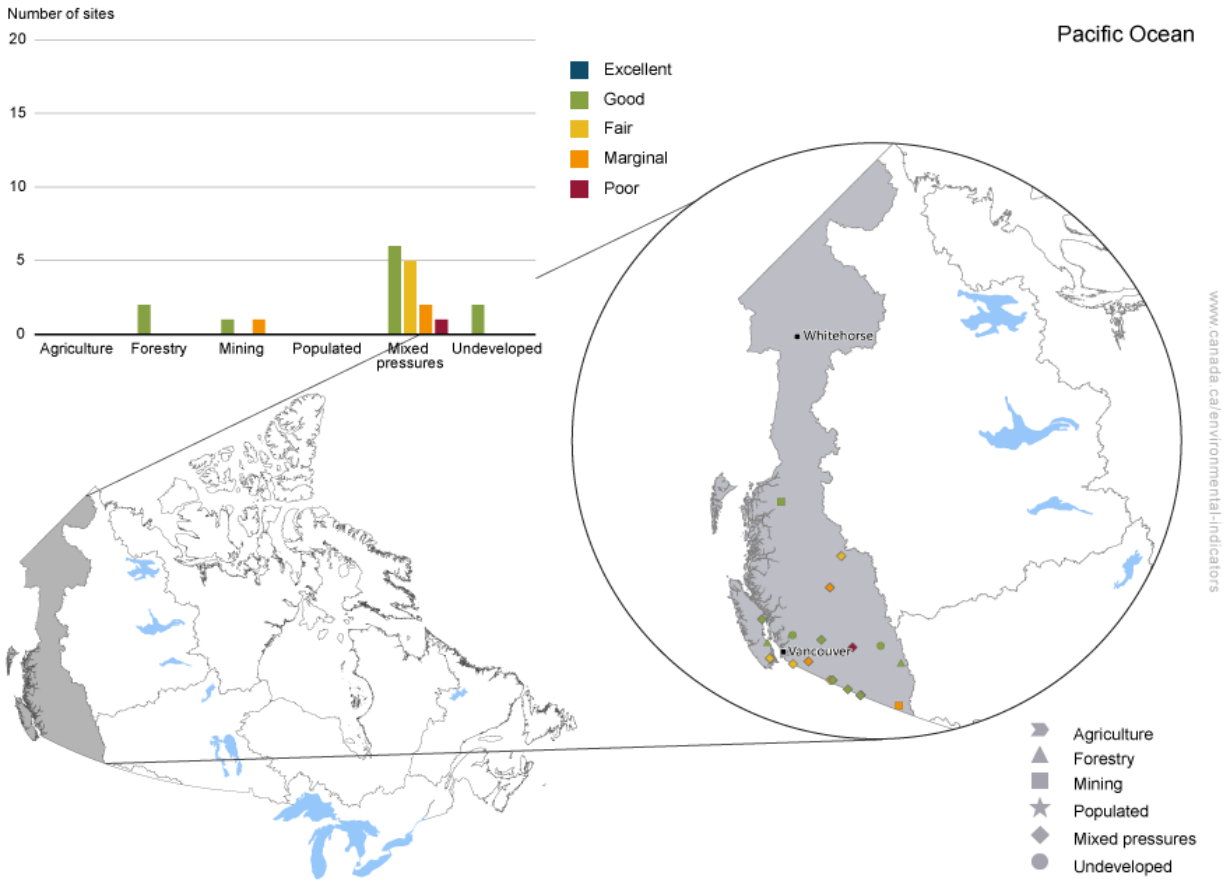
Along the west coast of Canada, rivers draining into the Pacific Ocean flow through varied landscapes, from large areas with little development to one of Canada's largest cities: Vancouver.

Key results

For the 2021 to 2023 period:

- water quality in the Pacific Ocean region is generally fair to good
- where there is mining and a combination of mining, forestry and high population density, marginal or poor water quality is found.

Figure 7. Water quality by land use category, Pacific Ocean region, 2021 to 2023 period



Data for Figure 7

Note: Water quality was assessed at 20 sites on rivers draining into the Pacific Ocean using the Canadian Council of Ministers of the Environment's water quality index. For more information on land use classification, consult Table1 of the Data sources and methods section.
Source: Water quality data were assembled by Environment and Climate Change Canada from existing federal, provincial, territorial and joint water quality monitoring programs. Population, forestry, mining and land cover statistics for each site's drainage area were provided by Statistics Canada, Natural Resources Canada, Environment and Climate Change Canada, Agriculture and Agri-Food Canada, the Government of Alberta and the University of Maryland.

The Pacific Ocean watershed is home to roughly 4.4 million people, or 16% of Canada’s population.

In the Okanagan Valley and Fraser Valley, soil conditions and climate are favourable for orchards, vineyards and cash crops. Cattle ranching is dominant throughout much of the other interior plateau and valley lands.

Mining and forestry are two of the region's largest industries. Coal, lead, zinc, copper, gold, silver, molybdenum and other precious metals are actively mined within the Pacific Ocean watershed. The forestry industry consists of pulp and paper and wood product manufacturing as well as logging. Soil erosion, water pollution from mine and pulp and paper effluent released to rivers and seepage from tailings and waste rock impoundments may have an impact on water quality. Furthermore, mines are often located in areas where mineral content in the soil and in water may be naturally high.

For the 2021 to 2023 period, water quality for 20 sites on rivers draining into the Pacific Ocean was rated:

- good at 55% of monitoring sites
- fair at 25% of sites
- marginal at 15% of sites
- poor at 5% of sites

About the indicators

What the indicators measure

These indicators provide a measure of the ability of river water across Canada to support plants and animals. At each monitoring site, specific water quality data are compared to water quality guidelines to create a rating for the site. If measured water quality remains within the guidelines, we assume that it can maintain a healthy ecosystem.

Water quality at a monitoring site is considered excellent when parameters in a river almost always meet their guidelines. Conversely, water quality is rated poor when parameters usually do not meet their guidelines, sometimes by a wide margin.

Why these indicators are important

Clean freshwater is an essential resource. It supports aquatic plant and animal biodiversity. We use it for manufacturing, energy production, irrigation, swimming, boating, fishing and for domestic use (for example, drinking and washing). Degraded water quality damages the health of all freshwater ecosystems, such as rivers, lakes, reservoirs and wetlands. It can also disrupt fisheries, tourism and agriculture and make it more expensive to treat to drinking water standards.

These indicators provide information on the state of surface water quality at national and regional scales, to support water resource management. They are used to provide information about the status in water quality for the *Canada Water Act* report and Environment and Climate Change Canada's annual departmental performance reports.

Related initiatives

These indicators support the measurement of progress towards the following 2022 to 2026 Federal Sustainable Development Strategy Goal 6: Clean water and sanitation – ensure clean and safe water for all Canadians.

In addition, the indicators contribute to the Sustainable Development Goals of the 2030 Agenda for Sustainable Development. They are linked to Goal 6, Clean water and sanitation and Target 6.3, "By 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally".

The indicators also contribute towards reporting on Target 7 of the Canada's 2030 Nature Strategy: " Reduce pollution risks and the negative impact of pollution from all sources, by 2030, to levels that are not harmful to biodiversity and ecosystem functions and services."

These indicators align with the efforts to monitor and assess Great Lakes water quality, and aquatic ecosystems under the Great Lakes Water Quality Agreement (GLWQA) signed by the governments of Canada and the United States. The State of the Great Lakes - 2022 Report presents the results of the two countries commitment on restoring and protecting Great Lakes water quality and ecosystem health.

Related indicators

The Nutrients in the St. Lawrence River, Phosphorus loading to Lake Erie, Reductions in phosphorus loads to Lake Winnipeg, and Nutrients in Lake Winnipeg indicators report the state of phosphorus and nitrogen levels and loadings in those 3 ecosystems.

The Phosphorus levels in the offshore waters of the Great Lakes indicator reports on the state of and trends in phosphorus levels in the open waters of the Canadian Great Lakes.

Data sources and methods

Data sources

Water quality data are collected by federal, provincial and territorial monitoring programs from across Canada. The complete list of data sources from Federal and Provincial monitoring networks can be found in Annex B.

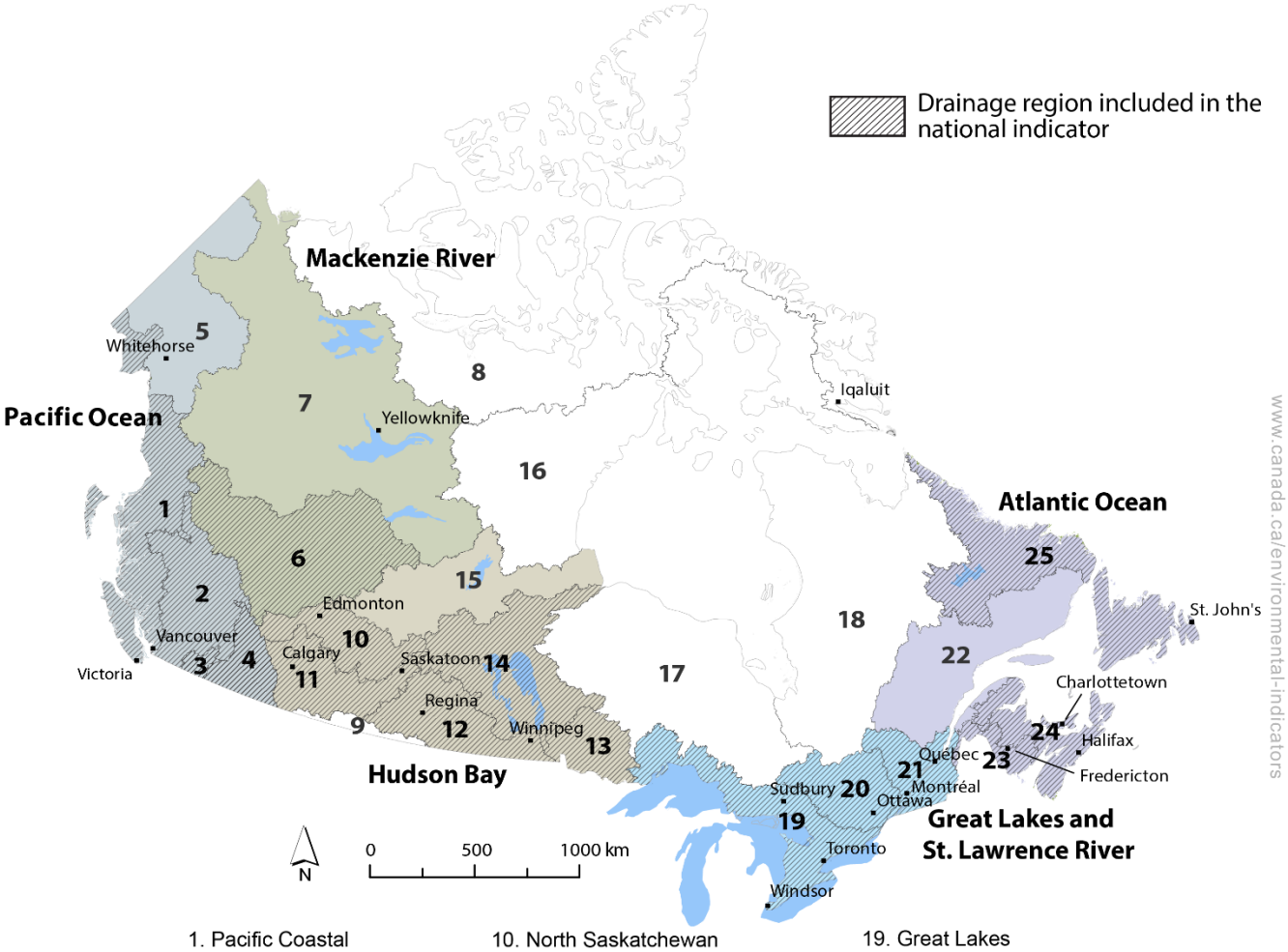
Water quality guidelines for the protection of aquatic life are used to calculate the indicators. They come from the Canadian Council of Ministers of the Environment, the United States Environmental Protection Agency and provincial and territorial government sources. Where these guidelines do not exist, other guidelines, such as irrigation guidelines, are used. A complete list of water quality guidelines used by each jurisdiction can be found in Annex C.

Additional information from Statistics Canada, Natural Resources Canada, Agriculture and Agri-Food Canada and Environment and Climate Change Canada are used to assess land use.

More information

For the 2021 to 2023 period, water quality data from 165 sites were used to compile the national indicator. These data were drawn from monitoring sites in Canada's 16 southern most drainage regions. The 16 regions were selected based on population and land use to create the water quality indicator core network for national water quality reporting.

Figure 8. Geographic extent of the 16 drainage regions selected for the national network of water quality indicators



1. Pacific Coastal
2. Fraser–Lower Mainland
3. Okanagan–Similkameen
4. Columbia
5. Yukon
6. Peace–Athabasca
7. Lower Mackenzie
8. Arctic Coast–Islands
9. Missouri
10. North Saskatchewan
11. South Saskatchewan
12. Assiniboine–Red
13. Winnipeg
14. Lower Saskatchewan–Nelson
15. Churchill
16. Keewatin–Southern Baffin
17. Northern Ontario
18. Northern Quebec
19. Great Lakes
20. Ottawa
21. St. Lawrence
22. North Shore–Gaspé
23. Saint John–St. Croix
24. Maritime Coastal
25. Newfoundland–Labrador

The regional indicator groups these 16 drainage regions into five larger drainage regions, based on the water body into which these rivers ultimately drain into:

- Atlantic Ocean region (22, 23, 24, 25)
- Great Lakes and St. Lawrence River region (19, 20, 21)
- Hudson Bay region (10, 11, 12, 13, 14, 15)
- Mackenzie River region (6, 7)
- Pacific Ocean region (1, 2, 3, 4, 5)

Parts of the Mackenzie River region fall outside of the 16 drainage regions (Figure 8). In order to ensure proper coverage in the regional indicator, 14 sites were added: 4 sites in Alberta, 1 site in Saskatchewan and 9 sites in the Northwest Territories. These additional sites were not included in the national indicator

analysis. In the Atlantic Ocean region, the North Shore-Gaspé drainage region is not included in the Freshwater Quality Monitoring and Surveillance program.

Water quality is evaluated at an additional 157 monitoring sites across Canada. Although these additional sites were not used to calculate the indicators, water quality results for all 322 sites can be explored using the interactive water quality map. These additional sites are not included in the calculations because they do not meet the minimum data requirements detailed in the section below, or because including them would over-represent the region.

Data used to calculate the indicator includes a selection from a total of around 40 water quality parameters, such as major ions, physical parameters, trace metals, nutrients and pesticides, as well as pH, temperature and hardness, required to calculate certain guidelines. Sample timing and frequency are set by monitoring programs and vary among sites.

Each data record is tagged with the site name, the date the sample was collected, the name and the chemical form of the parameter. Land use and ecological information are also collected for each site. Water quality data, along with water quality indicator scores and site information from the monitoring programs, are stored in a central water quality indicator dictionary housed within a larger database at Environment and Climate Change Canada.

Land use characterization for all monitoring sites was updated in 2019. Land use at each site was determined using:

- population density from Statistics Canada, Population 2016 by dissemination block level
- mine locations using Natural Resources Canada's 2018 Map 900A: Principal Mineral Areas, Producing Mines, and Oil and Gas fields in Canada, Sixty-Eight Edition
- advanced mineral projects locations using Natural Resources Canada’s Advances mineral projects inventory released in February 2019
- oil sands locations using data provided by Alberta Energy, Government of Alberta 2011
- pulp and paper locations using the Environment and Climate Change Canada's National Pollutant Release Inventory (NPRI): Geographic Distribution of NPRI-Reporting Facilities
- forest loss estimated by time-series analysis of 654 178 Landsat 7 ETM+ images in characterizing global forest extent and change from Global Forest Change 2000 to 2012
- agricultural activity locations using Natural Resources Canada's Land Cover 2010, Cropland class
- estimation of livestock using the "Agri-Environmental Indicator (AEI): Livestock Emissions from Agriculture" dataset estimating net emissions produced by livestock from Soil Landscapes of Canada agricultural areas for census years from 1981 to 2011
- land cover using Natural Resources Canada's Land Cover 2010

Data quality assurance and quality control

Data quality assurance/quality control is performed by each monitoring program that provides the data used to calculate the water quality indicators. Each monitoring program follows standardized methods for sample collection in the field. Chemical analyses are performed in Canadian laboratories accredited by the *Canadian Association for Laboratory Accreditation* or the Standards Council of Canada.

Environment and Climate Change Canada performs further quality assurance/quality control to ensure datasets meet minimum data requirements for the analysis and that calculation standards are respected. This process verifies the number of samples, sample timing, location of monitoring sites and calculations. It can lead to the removal of water quality data due to low sampling frequencies, erroneous measurements or where analytical detection limits are higher than the guidelines used in the calculation of the scores. Unusually high or low values in the monitoring datasets are double-checked and confirmed through consultation with the data provider.

Minimum data requirements

Calculating the water quality status for most sites requires a minimum of 4 samples per year collected over 3 years. A minimum of 3 samples per year is permitted for northern and remote sites, as access during winter months can be difficult, dangerous and costly. A sensitivity analysis found that there was no significant difference in the water quality index score when mid-winter samples were excluded.[4]

COVID-19 impact on the calculation of the indicators

Due to health measures related to the COVID-19 pandemic, some sampling activities and laboratory analysis were cancelled in 2021. The method for calculating the water quality status for the 2021-2023 period was adjusted to account for this lack of available data at some sites. Therefore, the scores reported were calculated using 2021, 2022 and 2023 data, when available. Where 2021 data were unavailable, the scores were calculated using 2022 and 2023 data only. Because of this, the comparison of results, between years and sites, should be interpreted as indicative.

Methods

Water quality is reported in these indicators by measuring a number of chemical and physical properties (parameters) of water. The measured value for each parameter is compared to its water quality guideline.[5]

The water quality is assessed by using the Water Quality Index (WQI) as endorsed by the Canadian Council of Ministers of the Environment.[6]

For each site, 5 to 15 water quality parameters are compared to their guideline value using the index calculation. An index score between 1 and 100 is calculated based on these selected parameters. Sites are assigned a water quality category based on the score. The frequency and amplitude by which a parameter does not meet its guideline negatively impacts the water quality score for a given site. The results are grouped into 5 geographical regions for presentation in the Regional water quality in Canadian rivers indicator.

Annex C contains a complete list of parameters and guidelines used in each jurisdiction. Information on water quality parameters and guidelines used at individual sites can be found in the interactive water quality map.

More information

Parameter selection

Federal, provincial and territorial water quality experts select the parameters to be assessed at each site based on their knowledge of local water quality stressors. Selected parameters typically include at least one form of the following parameter groups: nutrients (for example, phosphorus, nitrate, nitrite, total nitrogen), metals (for example, zinc, copper, lead), and physico-chemical parameters (for example, pH, turbidity), as well as 2 to 4 regionally specific parameters (for example, chloride, ammonia, dissolved oxygen, pesticides). The water quality index score is based on these selected parameters.

Water quality guideline selection

Water quality guidelines for the protection of aquatic life are recommended limits or statements for a variety of chemical substances and physical parameters, which, if exceeded, may impair aquatic life. These guidelines are based on existing knowledge of a substance's environmental fate, behaviour and chronic or, in a few cases, acute toxicity.

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[4] Statistics Canada (2007) Behaviour Study on the Water Quality Index of the Canadian Council of Ministers of the Environment. Retrieved on November 6, 2024.
[5] Water quality guidelines are thresholds designed to indicate when a chemical or physical property may become harmful to plants and animals.
[6] Canadian Council of Ministers of the Environment (2017) CCME Water Quality Index 2.0 User's Manual (PDF; 1.60 MB). Retrieved on November 6, 2024

Federal, provincial or territorial water quality experts select the guidelines to use in the calculation of the water quality indicator based on their local relevance. The Canadian Freshwater Quality Guidelines for the Protection of Aquatic Life are recommended if locally relevant. Annex C provides a complete list of guidelines used by provinces and territories and their source.

Background concentrations of naturally occurring substances and other local river characteristics can impact the measured concentration and toxicity of some substances. In these cases, site-specific guidelines may be developed using procedures based on background concentrations[7] or a rapid assessment approach. The rapid assessment approach uses long-term monitoring data and adjusts for natural events, such as high flows, which may influence results.[8]

Selection of core sites used at national indicators

Among Canada's 25 drainage regions (Figure 9), 16 were selected based on population and land use to create the water quality indicator core network for national water quality reporting. Within the 16 selected drainage regions, core sites were selected to ensure site drainage areas do not overlap and are independent of one another. The upstream drainage area of each monitoring site was delineated by Statistics Canada using the National Hydro Network.[9] Where the upstream drainage areas of monitoring sites overlapped, the site furthest downstream was retained for the core network, as the downstream site is impacted by the maximum area in the river basin and, to some degree, reflects the cumulative impact of all upstream stresses. For 14 large rivers, core sites were chosen in the upper, mid and lower portions of the main river and at the most downstream sites on each tributary, when available. Additional core sites were included on these rivers, because water travels thousands of kilometres from the source to the mouth of these rivers. Water quality changes along the way and cannot be summarized by a single downstream monitoring site. The final selection of core sites ensures monitoring sites are well distributed among provinces and drainage regions.

The number of core sites changes from year to year due to samples being missed or lost, which can lead to the site not having the minimum data required to be reported.

Classification of sites

Land use was assessed in the drainage area of core sites and classified according to the criteria presented in Table 1 using the drainage area of each monitoring site.[10] Even if a site's land use classification is Agriculture, Forestry, Mining or Populated, it does not mean that these are the only activities taking place at that site. These land use classifications were determined to be the most representative of the environmental pressures on each site's drainage area based on the data available at the time the analysis was done.

[7] Canadian Council of Ministers of the Environment (2003) Guidance on the Site-Specific Application of Water Quality Guidelines in Canada: Procedures for Deriving Numerical Water Quality Objectives (PDF; 1.25 MB). Retrieved on November 6, 2024.
[8] Government of Canada (2013) Technical Guidance Document for Water Quality Indicator Practitioners Reporting Under the Canadian Environmental Sustainability Indicators (CESI) Initiative 2008. Retrieved on November 6, 2024.
[9] Henry M et al. (2009) Canadian Environmental Sustainability Indicators: Water Quality Index Representivity Report, Statistics Canada.
[10] For more information about land cover classes, consult Natural Resources Canada (2024) Land Covers Products.

Table 1. Criteria for the classification of land use at monitoring sites

Classification	Agriculture[A]		Forestry[A]		Mining[A]		Populated
	Cropland (percentage)	Livestock intensity[B]	Forest loss (percentage)	Number of pulps, paper or sawmills	Number of mines[C]	Number of advanced mineral projects	Population density (people/km^2)
Undeveloped	<1	<0.1	<5	0	0	0	<10
Agriculture (low)	>20	>0.1	<10	0	0	0	<25
Agriculture (medium)	>35	>0.5	<10	0	0	0	<25
Agriculture (high)	>50	>1	<10	0	0	0	<25
Forestry	<1	<0.1	>5	>0	0	0	<25
Mining	<10	<0.1	<5	0	>0	>0	<25
Populated	<10	<0.1	<10	0	0	0	>25
Mixed (agriculture, forestry)	>10	>0.1	>5	>0	0	0	<25
Mixed (agriculture, mining)	>10	>0.1	<5	0	>0	>0	<25
Mixed (agriculture, forestry, mining)	>10	>0.1	>5	>0	>0	>0	<25
Mixed (mining, forestry)	<10	<0.1	>5	>0	>0	>0	<25
Mixed (populated, agriculture)	>10	>0.1	<5	0	0	0	>25
Mixed (populated, agriculture, mining)	>10	>0.1	<5	0	>0	>0	>25
Mixed (populated, forestry, mining)	<10	<0.1	>5	>0	>0	>0	>25
Mixed (populated, agriculture, forestry)	>10	>0.1	>5	>0	0	0	>25
Mixed (populated, forestry)	<10	<0.1	>5	>0	0	0	>25
Mixed (populated, mining)	<10	<0.1	<5	0	>0	>0	>25
Mixed (populated, agriculture, forestry, mining)	>10	>0.1	>5	>0	>0	>0	>25

Note: [A] Either criteria must be met. [B] Livestock intensity was calculated by proxy by dividing the total estimated emissions of greenhouse gas by the basin area. The lower value was attributed an intensity value of 0 and the highest value, an intensity value of 1. [C] Mines includes metal mines and mills, non-metal mines, quarries, coal mines and oil and gas.

Calculating water quality status

The water quality indicators are calculated using the water quality index, as endorsed by the Canadian Council of Ministers of the Environment. The water quality index calculation considers 3 factors to summarize water quality at a site: scope, frequency and amplitude (Equation 1):

- Scope (F_1) is the percentage of parameters for which the water quality guidelines are not met
- Frequency (F_2) is the percentage of samples for which the water quality guidelines are not met
- Amplitude (F_3) refers to the amount by which the water quality guidelines are not met

The score is normalized to yield a score between 1 and 100. The full set of equations for the water quality index is described in the Canadian Council of Ministers of the Environment (2017) CCME Water Quality Index 2.0 User's Manual (PDF; 1.60 MB).

Equation 1.

$$\text{Water quality index} = 100 - \sqrt{\frac{F_1^2 + F_2^2 + F_3^2}{3}}$$

Water quality scores are grouped into 5 categories following the Canadian Council of Ministers of the Environment's water quality index (Table 2).

Table 2. Score rankings for the Canadian Council of Ministers of the Environment's water quality index

Ranking	Interpretation
Excellent (95.0 to 100.0)	Water quality is protected with a virtual absence of threat of impairment; conditions are very close to pristine or natural.
Good (80.0 to 94.9)	Water quality is protected with only a minor degree of threat or impairment; conditions rarely depart from natural or desirable levels.
Fair (65.0 to 79.9)	Water quality is usually protected but occasionally threatened or impaired; conditions sometimes depart from natural or desirable levels.
Marginal (45.0 to 64.9)	Water quality is frequently threatened or impaired; conditions often depart from natural or desirable levels.
Poor (0 to 44.9)	Water quality is almost always threatened or impaired; conditions usually depart from natural or desired levels.

Except where 2021 data was not available, 3 years of data are used to calculate the indicator. This is to dampen temporal variability in the results caused by annual fluctuations in weather and hydrology, to make the water quality indicators more representative of how humans are impacting water quality in rivers.[11]

[11] Government of Canada (2013) Technical Guidance Document for Water Quality Indicator Practitioners Reporting Under the Canadian Environmental Sustainability Indicators (CESI) Initiative 2008. Retrieved on November 6, 2024.

Caveats and limitations

These indicators reflect the state of water quality in rivers in southern Canada. Northern Canada is under-represented.

An additional 14 non-core sites were included in the regional indicator to allow for coverage of the Mackenzie River region, which are not included in the national water quality indicator.

The indicators only use data for a subset of variables where guidelines exist. They do not cover all potential water quality issues in Canada.

The indicators reflect the impact on the suite of parameters analysed at each site. The station locations, sampling protocols and guidelines used are designed to assess chronic or background water quality and do not reflect the transient effects of spills or other short-term events, unless samples were taken immediately after the event or their effects on water quality are long-lasting..

More information

Water quality guidelines are derived from laboratory studies that do not consider, among other things, the impact of flow on sediment loads in a river. Although site-specific guidelines try to take into account the impact of elevated flows on parameter concentrations, elevated levels of naturally occurring substances, such as minerals, nutrients, glacier deposits and soils, can lower water quality ratings.

The water quality indicators do not directly measure biological integrity; they measure whether physical and chemical characteristics of freshwater bodies are acceptable for aquatic life. Although physical and chemical measurements provide good proxies for biological integrity, only biological information provides a direct measurement of conditions for aquatic life.

The water quality indicators only assess the quality of surface waters. Groundwater is not considered in these indicators.

It can be difficult to compare water quality index scores among sites due to variations in the selection of parameters and guidelines to reflect local and regional water quality concerns. The water quality categories assigned based on the scores, however, are comparable. A site classified as marginal has water quality guidelines that are being exceeded frequently and/or by a considerable margin, even if the parameters and guidelines used to make that classification are not exactly the same at all sites.

Only parameters for which water quality guidelines exist can be included in the indicators. The absence of a water quality guideline for a parameter does not mean the parameter is unimportant.

The water quality indicator scores are sensitive to the number of parameters and samples used in their calculation. The number of parameters used in the indicators varies from 5 to 15 depending on the monitoring site, and between 9 and 36 samples can be used for a given parameter. In general, as the number of parameters, or samples, used to calculate the index increases, the score decreases because there is a greater chance of a guideline exceedance.[12]

Water quality varies naturally with weather and hydrological cycles. Although the Water quality in Canadian rivers indicators use a 3-year average to dampen the influence of these variations on the data such as rain fall and snow melt events, care must be taken in comparing one period to another.

[12] Painter S. and Waltho J. (2004) Canadian Water Quality Index: A Sensitivity Analysis. Environment and Climate Change Canada.

Resources

References

Canadian Council of Ministers of the Environment (2017) CCME Water Quality Index 2.0 User's Manual (PDF; 1.60 MB). Retrieved on November 6, 2024.

Government of Canada (2013) Technical Guidance Document for Water Quality Indicator Practitioners Reporting Under the Canadian Environmental Sustainability Indicators (CESI) Initiative 2008. Retrieved on November 6, 2024.

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Natural Resources Canada (2022) National Hydro Network. Retrieved on November 6, 2024.

Natural Resources Canada (2024) Land Cover Products Retrieved on November 6, 2024.

Statistics Canada (2007) Behaviour Study on the Water Quality Index of the Canadian Council of Ministers of the Environment. Retrieved on November 6, 2024.

Statistics Canada (2018) Standard Drainage Area Classification (SDAC) 2003. Retrieved on November 6, 2024.

Related information

Navigate data using the interactive map

Access data files

Annexes

Annex A. Data tables for the figures presented in this document

Table A.1. Data for Figure 1. National water quality in Canadian rivers by land use category, 2021 to 2023 period

Land use category	Excellent (number of sites)	Excellent (percentage of sites)	Good (number of sites)	Good (percentage of sites)	Fair (number of sites)	Fair (percentage of sites)	Marginal (number of sites)	Marginal (percentage of sites)	Poor (number of sites)	Poor (percentage of sites)
Agriculture	0	0	14	8	12	7	3	2	0	0
Forestry	2	1	7	4	8	5	0	0	0	0
Mining	0	0	4	2	2	1	3	2	0	0
Populated	0	0	0	0	1	1	3	2	0	0
Mixed pressures	8	5	26	16	30	18	13	8	5	3
Undeveloped	1	1	19	12	3	2	0	0	1	1
Total	11	7	70	42	56	34	22	13	6	4

Note: Water quality was evaluated at 165 sites across southern Canada using the Canadian Council of Ministers of the Environment's water quality index. For more information on land use classification and monitoring sites selection, consult Table 1 of the Data sources and methods section. Percentages may not add up to 100 due to rounding.
Source: Data assembled by Environment and Climate Change Canada from federal, provincial and joint water quality monitoring programs. Population, forestry, mining and land cover statistics for each site's drainage area were provided by Statistics Canada, Natural Resources Canada, Environment and Climate Change Canada, Agriculture and Agri-Food Canada, the Government of Alberta and the University of Maryland.

Table A.2. Data for Figure 2. Regional water quality, Canada, 2021 to 2023 period

Water quality category	Atlantic Ocean (number of sites)	Atlantic Ocean (percentage of sites)	Great Lakes and St. Lawrence River (number of sites)	Great Lakes and St. Lawrence River (percentage of sites)	Hudson Bay (number of sites)	Hudson Bay (percentage of sites)	Mackenzie River (number of sites)	Mackenzie River (percentage of sites)	Pacific Ocean (number of sites)	Pacific Ocean (percentage of sites)
Excellent	2	4	0	0	8	18	3	17	0	0
Good	25	55	19	37	15	34	7	39	11	55
Fair	14	30	18	35	16	36	6	33	5	25
Marginal	5	11	9	18	5	11	2	11	3	15
Poor	0	0	5	10	0	0	0	0	1	5
Total	46	100	51	100	44	100	18	100	20	100

Note: For the Regional water quality in Canadian rivers indicator, water quality was assessed at 179 sites across Canada using the Canadian Council of Ministers of the Environment's water quality index. Compared to the national indicator, the Regional water quality in Canadian rivers indicator uses 14 additional monitoring sites and includes more sites in the northern portions of the Mackenzie River and Pacific Ocean regions. Percentages may not add up to 100 due to rounding.
Source: Data assembled by Environment and Climate Change Canada from federal, provincial, territorial and joint water quality monitoring programs.

Table A.3. Data for Figure 3. Water quality by land use category, Atlantic Ocean region, 2021 to 2023 period

Land use category	Excellent (number of sites)	Excellent (percentage of sites)	Good (number of sites)	Good (percentage of sites)	Fair (number of sites)	Fair (percentage of sites)	Marginal (number of sites)	Marginal (percentage of sites)	Poor (number of sites)	Poor (percentage of sites)
Agriculture	0	0	3	7	1	2	0	0	0	0
Forestry	2	4	5	11	7	15	0	0	0	0
Mining	0	0	1	2	1	2	0	0	0	0
Populated	0	0	0	0	0	0	3	7	0	0
Mixed pressures	0	0	3	7	3	7	2	4	0	0
Undeveloped	0	0	13	28	2	4	0	0	0	0
Total	2	4	25	55	14	30	5	11	0	0

Note: Water quality was assessed at 46 sites on rivers draining into the Atlantic Ocean using the Canadian Council of Ministers of the Environment's water quality index. For more information on land use classification, consult the Data sources and methods section. Percentages may not add up to 100 due to rounding.
Source: Water quality data were assembled by Environment and Climate Change Canada from existing federal, provincial and joint water quality monitoring programs. Population, forestry, mining and land cover statistics for each site's drainage area were provided by Statistics Canada, Natural Resources Canada, Environment and Climate Change Canada, Agriculture and Agri-Food Canada, the Government of Alberta and the University of Maryland.

Table A.4. Data for Figure 4. Water quality by land use category, Great Lakes and St. Lawrence River region, 2021 to 2023 period

Land use category	Excellent (number of sites)	Excellent (percentage of sites)	Good (number of sites)	Good (percentage of sites)	Fair (number of sites)	Fair (percentage of sites)	Marginal (number of sites)	Marginal (percentage of sites)	Poor (number of sites)	Poor (percentage of sites)
Agriculture	0	0	3	6	2	4	0	0	0	0
Forestry	0	0	0	0	1	2	0	0	0	0
Mining	0	0	2	4	1	2	2	4	0	0
Populated	0	0	0	0	1	2	0	0	0	0
Mixed pressures	0	0	11	22	12	23	7	14	4	8
Undeveloped	0	0	3	6	1	2	0	0	1	2
Total	0	0	19	37	18	35	9	18	5	10

Note: Water quality was assessed at 51 sites on rivers draining into the Great Lakes or St. Lawrence River using the Canadian Council of Ministers of the Environment's water quality index. For more information on land use classification, consult the Data sources and methods section. Percentages may not add up to 100 due to rounding.
Source: Water quality data were assembled by Environment and Climate Change Canada from existing federal, provincial and joint water quality monitoring programs. Population, forestry, mining and land cover statistics for each site's drainage area were provided by Statistics Canada, Natural Resources Canada, Environment and Climate Change Canada, Agriculture and Agri-Food Canada, the Government of Alberta and the University of Maryland.

Table A.5. Data for Figure 5. Water quality by land use category, Hudson Bay region, 2021 to 2023 period

Land use category	Excellent (number of sites)	Excellent (percentage of sites)	Good (number of sites)	Good (percentage of sites)	Fair (number of sites)	Fair (percentage of sites)	Marginal (number of sites)	Marginal (percentage of sites)	Poor (number of sites)	Poor (percentage of sites)
Agriculture	0	0	8	18	9	20	3	7	0	0
Forestry	0	0	0	0	0	0	0	0	0	0
Mining	0	0	0	0	0	0	0	0	0	0
Populated	0	0	0	0	0	0	0	0	0	0
Mixed pressures	7	16	6	14	7	16	2	4	0	0
Undeveloped	1	2	1	2	0	0	0	0	0	0
Total	8	18	15	34	16	36	5	11	0	0

Note: Water quality was assessed at 44 sites on rivers draining into the Hudson Bay using the Canadian Council of Ministers of the Environment's water quality index. For more information on land use classification, consult the Data sources and methods section. Percentages may not add up to 100 due to rounding.
Source: Water quality data were assembled by Environment and Climate Change Canada from existing federal, provincial and joint water quality monitoring programs. Population, forestry, mining and land cover statistics for each site's drainage area were provided by Statistics Canada, Natural Resources Canada, Environment and Climate Change Canada, Agriculture and Agri-Food Canada, the Government of Alberta and the University of Maryland.

Table A.6. Data for Figure 6. Water quality by land use category, Mackenzie River region, 2021 to 2023 period

Land use category	Excellent (number of sites)	Excellent (percentage of sites)	Good (number of sites)	Good (percentage of sites)	Fair (number of sites)	Fair (percentage of sites)	Marginal (number of sites)	Marginal (percentage of sites)	Poor (number of sites)	Poor (percentage of sites)
Agriculture	0	0	0	0	0	0	0	0	0	0
Forestry	0	0	0	0	0	0	0	0	0	0
Mining	1	6	1	6	0	0	1	6	0	0
Populated	0	0	0	0	0	0	0	0	0	0
Mixed pressures	1	6	2	11	5	28	0	0	0	0
Undeveloped	1	6	4	22	1	6	1	6	0	0
Total	3	17	7	39	6	33	2	11	0	0

Note: Water quality was assessed at 18 sites on rivers draining into the Mackenzie River using the Canadian Council of Ministers of the Environment's water quality index. For more information on land use classification, consult the Data sources and methods section. Percentages may not add up to 100 due to rounding.
Source: Water quality data were assembled by Environment and Climate Change Canada from existing federal, provincial, territorial and joint water quality monitoring programs. Population, forestry, mining and land cover statistics for each site's drainage area were provided by Statistics Canada, Natural Resources Canada, Environment and Climate Change Canada, Agriculture and Agri-Food Canada, the Government of Alberta and the University of Maryland.

Table A.7. Data for Figure 7. Water quality by land use category, Pacific Ocean region, 2021 to 2023 period

Land use category	Excellent (number of sites)	Excellent (percentage of sites)	Good (number of sites)	Good (percentage of sites)	Fair (number of sites)	Fair (percentage of sites)	Marginal (number of sites)	Marginal (percentage of sites)	Poor (number of sites)	Poor (percentage of sites)
Agriculture	0	0	0	0	0	0	0	0	0	0
Forestry	0	0	2	10	0	0	0	0	0	0
Mining	0	0	1	5	0	0	1	5	0	0
Populated	0	0	0	0	0	0	0	0	0	0
Mixed Pressures	0	0	6	30	5	25	2	10	1	5
Undeveloped	0	0	2	10	0	0	0	0	0	0
Total	0	0	11	55	5	25	3	15	1	5

Note: Water quality was assessed at 20 sites on rivers draining into the Pacific Ocean using the Canadian Council of Ministers of the Environment's water quality index. For more information on land use classification, consult the Data sources and methods section. Percentages may not add up to 100 due to rounding.
Source: Water quality data were assembled by Environment and Climate Change Canada from existing federal, provincial, territorial and joint water quality monitoring programs. Population, forestry, mining and land cover statistics for each site's drainage area were provided by Statistics Canada, Natural Resources Canada, Environment and Climate Change Canada, Agriculture and Agri-Food Canada, the Government of Alberta and the University of Maryland.

Annex B. Monitoring programs providing data on ambient water quality

Table B.1. Monitoring programs providing data on ambient water quality

Province/Territory	Monitoring program	Organization(s)
All Canada	Environment and Climate Change Canada's water quality monitoring network (NWT, YK, BC, AB, SK, MB, ON, QC, NS, transboundary and interprovincial monitoring sites, federal lands)	Environment and Climate Change Canada
Alberta	Long-term river network monitoring program	Alberta Environment
British Columbia	Canada–British Columbia Water Quality Monitoring Agreement	Environment and Climate Change Canada, British Columbia Ministry of Environment
Manitoba	Ambient Water Quality Monitoring Network	Manitoba Environment and Climate Change
New Brunswick	Canada–New Brunswick Water Quality Monitoring Agreement	Environment and Climate Change Canada, New Brunswick Department of Environment and Local Government
New Brunswick	Long-range Transport of Atmospheric Pollutants Program	Environment and Climate Change Canada
New Brunswick	Surface Water Monitoring Network	New Brunswick Department of Environment and Local Government
Newfoundland and Labrador	Canada–Newfoundland and Labrador Water Quality Monitoring Agreement	Environment and Climate Change Canada, Environment and Climate Change Newfoundland and Labrador Department of Environment and Conservation
Nova Scotia	Canadian Wildlife Service, Park Survey, Maritimes Long-range Transport of Atmospheric Pollutants Program	Environment and Climate Change Canada
Nova Scotia	Nova Scotia Surface Water Quality Monitoring Network	Department of Environment and Climate Change, Nova Scotia
Ontario	Ontario Provincial Water Quality Monitoring Network	Ontario Ministry of the Environment, Conservation and Parks
Prince Edward Island	Canada–Prince Edward Island Water Quality Agreement	Environment and Climate Change Canada, Prince Edward Island Department of Environment, Energy and Climate Action Prince Edward Island

Province/Territory	Monitoring program	Organization(s)
Quebec	Canada–Quebec Water Quality Agreement	Environment and Climate Change Canada, ministère de l'Environnement et de la Lutte contre les changements climatiques, de la Faune et des Parcs du Québec
Quebec	Réseau-Rivières	Ministère de l'Environnement, de la Lutte contre les changements climatiques, de la Faune et des Parcs du Québec
Saskatchewan	Surface Water Quality Monitoring Program	Water Security Agency
Northwest Territories and Nunavut	Water Quality Monitoring Network	Environment and Climate Change Canada
Northwest Territories and Nunavut	Local Rivers Water Quality Monitoring Program	Government of the Northwest Territories, Department of Environment and Climate Change.
Yukon	Canada–Yukon Water Quality & Aquatic Ecosystem Monitoring Agreement	Government of Yukon, Environment and Climate Change Canada

Annex C. Water quality parameters and guidelines used by each province and territory

Abbreviations used in the following tables:

- 2,4-dichlorophenoxyacetic acid (2,4-D)
- 2-methyl-4-chlorophenoxyacetic acid (MCPA)
- calcium carbonate ($CaCO_3$)
- hexavalent chromium (Cr (VI))
- litre (L)
- microgram (µg)
- milligram (mg)
- nanogram (ng)
- nephelometric turbidity unit (NTU)
- nitrogen (N)
- site-specific guidelines (SSG)

Table C.1. Water quality parameters and guidelines used to calculate the Alberta WQI

Parameter	Form	Guideline	Source
2,4-D[A]	n/a	4 µg/L	1
Aluminium[A]	dissolved	0.1 mg/L for pH ≥ 6.5	1
Ammonia	unfiltered	0.019 mg/L	1
Arsenic	total	5 µg/L	1
Cadmium[A]	total	$e^{1.0166*ln[hardness]-3.924}$ µg/L where hardness is measured as mg [$CaCO_3$]/L	2
Chloride[B]	dissolved	SSG	1
Copper[A]	total	7 µg/L	3
Copper[B]	total	2 µg/L for hardness < 90 mg [$CaCO_3$]/L $0.2*e^{0.8545*ln[hardness]-1.465}$ µg/L for hardness > 90 mg [$CaCO_3$]/L	4
Lead[A]	total	1 µg/L for hardness < 50 mg [$CaCO_3$]/L $e^{1.273*ln[hardness]-4.705}$ µg/L for hardness ≥ 50 mg [$CaCO_3$]/L	4
MCPA[A]	n/a	2.6 µg/L	1
Mercury[A]	total inorganic	0.013 µg/L	1
Nickel[B]	total	$e^{0.76*ln[hardness]+1.06}$ µg/L where hardness is measured as mg [$CaCO_3$]/L	5
Nitrate-Nitrite[B]	dissolved	SSG	5
Nitrogen[A]	total	1 mg /L	4
Nitrogen[B]	total	SSG	
Oxygen[A]	dissolved	6.5 mg/L	1-3
Oxygen[B]	dissolved	SSG	5
pH	n/a	lower 6.5 and upper 9	1
Phosphorus[A]	total	0.05 mg/L	5
Phosphorus[B]	total	SSG	5
Selenium[A]	total	1 µg/L	4
Zinc[A]	total	7.5 µg/L for hardness ≤ 90 mg [$CaCO_3$]/L 7.5 µg/L+ 0.75*(hardness-90) for hardness > 90 mg [$CaCO_3$]/L	4
Zinc[B]	total	SSG	5

Note: n/a = not applicable.
[A] Applies to sites monitored under provincial monitoring programs.
[B] Applies to sites monitored under federal monitoring programs, including the Prairie Provinces Water Board.
SSG : different site-specific guidelines or formulas were used at sites. Specific site information is available upon request.

Alberta Water Quality Guideline Sources:

1 Canadian Council of Ministers of the Environment (2024) Canadian Water Quality Guidelines for the Protection of Aquatic Life Summary Table. Retrieved on November 6, 2024.

2 United States Environmental Protection Agency (2001) 2001 Update of Ambient Water Quality Criteria for Cadmium. Retrieved on November 6, 2024.

3 Alberta Environment (2018) Environmental Quality Guidelines for Alberta Surface Waters (PDF; 703 kB). Retrieved on November 6, 2024.

4 Government of Canada (2008) Technical Guidance Document for Water Quality Index Practitioners Reporting Under the Canadian Environmental Sustainability Indicators (CESI) Initiative 2008. Environment and Climate Change Canada and Statistics Canada. Retrieved on November 6, 2024.
5 Prairie Provinces Water Board (1992) Schedule E: Agreement on Water Quality. Retrieved on November 6, 2024.

Table C.2. Water quality parameters and guidelines used to calculate the British Columbia WQI

Parameter	Form	Guideline	Source
Alkalinity	n/a	20 mg [$CaCO_3$]/L	1
Arsenic	total	5 µg/L	2
Cadmium	total	$10^{(0.83(\log10[\text{hardness}])-2.46)}$ µg/L for hardness > 50 mg [$CaCO_3$]/L 0.09 µg/L for hardness < 50 mg [$CaCO_3$]/L SSG	2, 3
Chloride	dissolved	120 mg/L	2
Chromium	total	SSG	2, 3, 4, 5 6, 7
Copper	total	2 µg/L for hardness < 90 mg [$CaCO_3$]/L $0.2*e^{0.8545*\ln[\text{hardness}]-1.465}$ µg/L for hardness>90 mg [$CaCO_3$]/L SSG	3, 6, 8, 9, 10
Cyanide	total	5 µg/L	2
Fluoride	total	[-51.73+92.57$\log_{10}$(hardness)] X 0.01 ug/L (BC08NM001) 0.35 mg/L (BC08NN0021)	11
Iron	total	0.3 mg/L	9
Lead	total	1 µg/L for hardness < 50 mg [$CaCO_3$]/L $e^{1.273*\ln[\text{hardness}]-4.705}$ µg/L for hardness > 50 mg [$CaCO_3$]/L SSG	3, 9, 10
Manganese	total dissolved	50 µg/L	12
Molybdenum	total	50 µg/L 73 µg/L (BC08MH0027)	2
Nickel	total	$e^{0.76*\ln[\text{hardness}]+1.06}$ µg/L where hardness is measured as mg [$CaCO_3$]/L	9
Nitrate	total dissolved	2.93 mgN/L	9
Nitrite	total	0.02 mgN/L	9
Nitrogen	total, dissolved	SSG	13, 9
Oxygen	dissolved	SSG	2, 10, 14, 15, 16
pH	n/a	SSG	2, 3, 14
Phosphorus	total, dissolved	SSG	9, 17
Selenium	total dissolved	SSG	11
Silver	total	0.05 µg/L for hardness ≤ 100 mg [$CaCO_3$]/L 1.9 µg/L for hardness > 100 mg [$CaCO_3$]/L SSG	9
Sulphate	dissolved	SSG	9
Temperature	n/a	SSG	18
Thallium	total	0.8 µg/L	2
Uranium	total	10 µg/L	1
Zinc	total	SSG	3, 4, 6, 12

Note: n/a = not applicable.
SSG : different site-specific guidelines or formulas were used at sites. For details on the derivation of site-specific guidelines, consult BCMOE (1997).

British Columbia Water Quality Guideline Sources:

1 British Columbia Ministry of Environment (2024) British Columbia Working Water Quality Guidelines: Aquatic Life, Wildlife & Agriculture (PDF; 667 kB). Retrieved on November 6, 2024.

2 Canadian Council of Ministers of the Environment (2024) Canadian Water Quality Guidelines for the Protection of Aquatic Life Summary Table. Retrieved on November 6, 2024.

3 Butcher, GA., (1992) Lower Columbia River, Hugh Keeleyside dam to Birchbank (PDF; 9.9 MB). British Columbia Ministry of the Environment, Lands and Parks.

4 British Columbia Ministry of Environment and Climate Change Strategy (2000) Ambient Water Quality Assessment and Objectives for the Lower Columbia River Birchbank to the US border (PDF; 230 kB). Retrieved on November 6, 2024.

5 Environment and Climate Change Canada (2005) Site-specific Water Quality Guidelines for the Liard River at Upper Crossing for the Purpose of National Reporting. Tri-Star Environmental Consulting.

6 Environment and Climate Change Canada (2009) Site-specific Water Quality Guidelines for the Skeena River at Usk for the Purpose of National Reporting. Tri-Star Environmental Consulting.

7 Environment and Climate Change Canada (2009) Site-specific Water Quality Guidelines for the Kootenay River at Kootenay Crossing for the Purpose of National Reporting. Tri-Star Environmental Consulting.

8 British Columbia Ministry of Environment (2019) Copper Water Quality Guideline for the Protection of Marine Aquatic Life (PDF; 591 kB). Retrieved on November 6, 2024.

9 Government of Canada (2013) Technical Guidance Document for Water Quality Index Practitioners Reporting Under the Canadian Environmental Sustainability Indicators (CESI) Initiative 2008. Environment and Climate Change Canada and Statistics Canada. Retrieved on November 6, 2024...

10 Obee N (2011) Water Quality Assessment and Objectives for the Cowichan and Koksilah Rivers: First Update. British Columbia Ministry of Environment, Environmental Protection Division and Environmental Sustainability and Strategic Policy Division. Victoria, BC. (PDF; 4.52 MB). Retrieved on November 6, 2024.

11 British Columbia Ministry of Environment and Climate Change Strategy (2024) British Columbia Approved Water Quality Guidelines: Aquatic Life, Wildlife & Agriculture (PDF; 1.13 MB). Retrieved on November 6, 2024.

12 Swain LG (1990) Ambient Water Quality Objectives for the Similkameen River Okanagan Area Overview Report. British Columbia Ministry of Environment (PDF; 245 kB). Retrieved on November 6, 2024.

13 Nordin RN and Pommen LW (2009) Water Quality Guidelines for Nitrogen (Nitrate, Nitrite, and Ammonia): Overview Report Update. British Columbia Ministry of Environment (PDF; 565 kB). Retrieved on November 6, 2024.

14 British Columbia Ministry of Water, Land and Air Protection (1998) Water Quality Assessment and Recommended Objectives for the Salmon River. (PDF; 257 kB). Retrieved on November 6, 2024.

15 Swain LG (1987) Takla-Nechako Areas, Nechako River Water Quality Assessment and Objectives. British Columbia Ministry of Environment and Parks (PDF; 1.15 MB) Retrieved on November 6, 2024.

16 Environment and Climate Change Canada (2005) Site-specific Water Quality Guidelines for the Sumas River at the International Boundary for the Purpose of National Reporting. Tri-Star Environmental Consulting.

17 Ontario Ministry of the Environment and Energy (2021) Water management: policies, guidelines, provincial water quality objectives. Retrieved on November 6, 2024.

18 British Columbia Ministry of Environment (2001) Water Quality Guidelines for Temperature: Overview Report (PDF; 221 kB). Retrieved on November 6, 2024.

Table C.3. Water quality parameters and guidelines used to calculate the Manitoba WQI

Parameter	Form	Guideline	Source
2,4-D	n/a	4 µg/L	1
Ammonia	unfiltered	0.019 mg/L	1, 4
Arsenic[A]	total	150 µg/L	5
Arsenic[B]	total	5 µg/L	5
Cadmium[A]	total	$e^{1.0166*\ln[\text{hardness}]-3.924}$ µg/L where hardness is measured as mg [$CaCO_3$]/L	6
Chloride[B]	dissolved	SSG	5
Copper[A]	total	[$e^{0.8545*\ln[\text{hardness}]-1.702}$]*(0.96) µg/L where hardness is measured as mg [$CaCO_3$]/L	2
Copper[B]	total	2 µg/L for hardness < 90 mg [$CaCO_3$]/L 0.2*[$e^{0.8545*\ln[\text{hardness}]-1.465}$] µg/L for hardness >90 mg[$CaCO_3$]/L	4
Iron[A]	total	0.3 mg /L	4
Lead[A]	total	($e^{1.273*\ln[\text{hardness}]-4.705}$)*(1.46203 - (ln[hardness]*0.145712)) µg/L where hardness is measured as mg [$CaCO_3$]/L	2
Lead[B]	total	1 µg/L for hardness < 50 mg [$CaCO_3$]/L $e^{1.273*\ln[\text{hardness}]-4.705}$ µg/L for hardness ≥ 50 mg [$CaCO_3$]/L where hardness is measured as mg [$CaCO_3$]/L	4
MCPA	n/a	2.6 µg/L	1
Nickel[A]	total	$e^{0.8460*\ln[\text{hardness}]+0.0584}$ µg/L where hardness is measured as mg [$CaCO_3$]/L	5
Nickel[B]	total	$e^{0.76*\ln[\text{hardness}]+1.06}$ µg/L where hardness is measured as mg [$CaCO_3$]/L	4
Nitrate[A]	total	2.9 mg N/L	4
Nitrate-Nitrite[B]	dissolved	SSG	5
Nitrogen[B]	total	SSG	7
Oxygen[A]	dissolved	5 mg/L	4
Oxygen[B]	dissolved	SSG	1
pH	n/a	lower 6.5 and upper 9	1
Phosphorus[A]	total	0.05 mg/L	2, 7
Phosphorus[B]	total	SSG	
Suspended sediments[A]	n/a	Maximum increase of 25 mg/L for high flow and turbid waters above background levels	4
Zinc[A]	total	$e^{(0.8473*\ln[\text{hardness}]+0.884)}$*0.986 µg/L where hardness is measured as mg [$CaCO_3$]/L	2, 6
Zinc[B]	total	7.5 µg/L for hardness ≤ 90 mg [$CaCO_3$]/L 7.5 µg/L+ 0.75*(hardness-90) for hardness > 90 mg [$CaCO_3$]/L	4
Zinc[B]	total	SSG	5

Note: n/a = not applicable.
[A] Applies to sites monitored under provincial monitoring programs.
[B] Applies to sites monitored under federal monitoring programs (Prairie Provinces Water Board).
SSG : different site-specific guidelines or formulas were used at sites. Specific site information is available upon request.

Manitoba Water Quality Guideline Sources:

1 Canadian Council of Ministers of the Environment (2024) Canadian Water Quality Guidelines for the Protection of Aquatic Life Summary Table. Retrieved on November 6, 2024.

2 Manitoba Water Stewardship (2011) Manitoba Water Quality Standards, Objectives, and Guidelines (PDF; 912 kB). Retrieved on November 6, 2024.

3 United States Environmental Protection Agency (1999) Update of Ambient Water Quality Criteria for Ammonia. Document EPA 822-R-99-014 (PDF; 1.9MB). Retrieved on November 6, 2024.

4 Government of Canada (2013) Technical Guidance Document for Water Quality Index Practitioners Reporting Under the Canadian Environmental Sustainability Indicators (CESI) Initiative 2008. Environment and Climate Change Canada and Statistics Canada. Retrieved on November 6, 2024.

5 United States Environmental Protection Agency (2024) National Recommended Water Quality Criteria – Aquatic Life Criteria Table. Retrieved on November 6, 2024.

6 United States Environmental Protection Agency (2001) 2001 Update of Ambient Water Quality Criteria for Cadmium. (PDF; 10.4MB). Retrieved on November 6, 2024.

7 Prairie Provinces Water Board (1992) Schedule E: Agreement on Water Quality. Retrieved on November 6, 2024.

Table C.4. Water quality parameters and guidelines used to calculate the New Brunswick WQI

Parameter	Form	Guideline	Source
Ammonia[A]	unfiltered	15.6 µg/L	2
Arsenic	total	5 µg/L	2
Chloride	total	120 mg/L	2
Copper	total	2 µg/L for hardness < 90 mg [$CaCO_3$]/L $0.2*e^{0.8545*ln[hardness]-1.465}$ µg/L for hardness > 90 mg [$CaCO_3$]/L	1
Iron	total	0.3 mg/L	1
Nitrate	total	2.9 mg N/L	1
Oxygen	dissolved	6.5 mg/L	2
pH	n/a	Lower 6.5 and upper 9	2
Phosphorus	total	0.03 mg/L	1
Turbidity	n/a	10 NTU	2
Zinc	total	7.5 µg/L for hardness ≤ 90 mg [$CaCO_3$]/L 7.5 µg/L+ 0.75*(hardness-90) for hardness > 90 mg [$CaCO_3$]/L	1

Note: n/a = not applicable.
[A] In New Brunswick, the CCME guideline recommended by Environment and Climate Change Canada is adjusted to address the ammonia form measured by the provincial laboratories (Ammonia as N).

New Brunswick Water Quality Guideline Sources:

1 Government of Canada (2013) Technical Guidance Document for Water Quality Index Practitioners Reporting Under the Canadian Environmental Sustainability Indicators (CESI) Initiative 2008. Environment and Climate Change Canada and Statistics Canada. Retrieved on November 6, 2024.

2 Canadian Council of Ministers of the Environment (2024) Canadian Water Quality Guidelines for the Protection of Aquatic Life Summary Table. Retrieved on November 6, 2024.

Table C.5. Water quality parameters and guidelines used to calculate the Newfoundland and Labrador WQI

Parameter	Form	Guideline	Source
Chloride	total	120 mg/L	1
Copper	total	2 µg/L for hardness < 90 mg [$CaCO_3$]/L $0.2*e^{0.8545*ln[hardness]-1.465}$ µg/L for hardness > 90 mg [$CaCO_3$]/L	2
Iron	total	SSG	2, 3
Lead	total	1 µg/L for hardness < 50 mg [$CaCO_3$]/L $e^{1.273*ln[hardness]-4.705}$ µg/L for hardness ≥ 50 mg [$CaCO_3$]/L	2
Nickel	total	$e^{0.76*ln[hardness]+1.06}$ µg/L where hardness is measured as mg [$CaCO_3$]/L	2
Nitrate	total	3 mg/L	2
Oxygen	dissolved	9.5 mg/L	1
pH	n/a	SSG	1, 3
Phosphorus	total	0.03 mg/L	2
Zinc	total	7.5 µg/L for hardness ≤ 90 mg [$CaCO_3$]/L 7.5 µg/L+ 0.75*(hardness-90) for hardness >90 mg [$CaCO_3$]/L	2

Note: n/a = not applicable.
SSG : different site-specific guidelines or formulas were used at sites. Specific site information is available upon request.

Newfoundland and Labrador Water Quality Guideline Sources:

1 Canadian Council of Ministers of the Environment (2024) Canadian Water Quality Guidelines for the Protection of Aquatic Life Summary Table. Retrieved on November 6, 2024.

2 Government of Canada (2013) Technical Guidance Document for Water Quality Index Practitioners Reporting Under the Canadian Environmental Sustainability Indicators (CESI) Initiative 2008. Environment and Climate Change Canada and Statistics Canada. Retrieved on November 6, 2024.

3 Khan, AA., et al. (2005) Application of CCME Procedures for Deriving Site-specific Water Quality Guidelines for the CCME Water Quality Index (PDF; 688 kB). Water Quality Research Journal 40(4):448-456. Retrieved on November 6, 2024.

Table C.6. Water quality parameters and guidelines used to calculate the Northwest Territories WQI

Parameter	Form	Guideline	Source
Ammonia	unfiltered, dissolved	SSG	1
Arsenic	total	SSG	2
Chloride	dissolved	Lentic-lotic sites: 150 mg/L Lotic sites: SSG	1, 2
Chromium	total	SSG	2
Copper	total	Lentic-lotic sites: 2 µg/L for hardness < 90 mg [$CaCO_3$]/L $0.2*e^{0.8545*ln[hardness]-1.465}$ µg/L for hardness > 90 mg [$CaCO_3$]/L Lotic sites: SSG	1, 3
Iron	total	Lentic-lotic sites: 0.3 mg/L Lotic sites: SSG	1, 3
Lead	total	Lentic-lotic sites: 1 µg/L for hardness < 50 mg [$CaCO_3$]/L $e^{1.273*ln[hardness]-4.705}$ µg/L for hardness ≥ 50 mg [$CaCO_3$]/L Lotic sites: SSG	1, 3
Nitrate-Nitrite	dissolved	SSG	1
Nitrogen	total dissolved	SSG	
Oxygen	dissolved	SSG	2
pH	n/a	Lentic-lotic sites: lower 6.5 and upper 9 Lotic sites: SSG	1, 2
Phosphorus	total	Lentic-lotic sites: 0.03 mg/L Lotic sites: SSG	2, 3
Zinc	total	Lentic-lotic sites: 7.5 µg/L for hardness ≤ 90 mg [$CaCO_3$]/L 7.5 µg/L+ 0.75*(hardness-90) for hardness >90 mg [$CaCO_3$]/L Lotic sites: SSG	2, 3

Note: n/a = not applicable.
SSG : different site-specific guidelines or formulas were used at sites. Specific site information is available upon request.

Northwest Territories Water Quality Guideline Sources:

1 Lumb, A., and al. (2006) Application of CCME Water Quality Index to Monitor Water Quality: A Case Study of the Mackenzie River Basin, Canada (PDF; 287 kB). Environmental Monitoring and Assessment 113:411-429. Retrieved on November 6, 2024.

2 Canadian Council of Ministers of the Environment (2024) Canadian Water Quality Guidelines for the Protection of Aquatic Life Summary Table. Retrieved on November 6, 2024.

3 Government of Canada (2013) Technical Guidance Document for Water Quality Index Practitioners Reporting Under the Canadian Environmental Sustainability Indicators (CESI) Initiative 2008. Environment and Climate Change Canada and Statistics Canada. Retrieved on November 6, 2024.

Table C.7. Water quality parameters and guidelines used to calculate the Nova Scotia WQI

Parameter	Form	Guideline	Source
Chloride	dissolved	120 mg/L	1
Copper	total	2 µg/L for hardness < 120 mg [$CaCO_3$]/L 3 µg/L for hardness 120 to 180 mg [$CaCO_3$]/L 4 µg/L for hardness > 180 mg [$CaCO_3$]/L	2
Iron	total	0.3 mg/L	2
Lead	total	1 µg/L for hardness < 60 mg [$CaCO_3$]/L 2 µg/L for hardness 60 to 120 mg [$CaCO_3$]/L 4 µg/L for hardness 120 to 180 mg [$CaCO_3$]/L 7 µg/L for hardness > 180 mg [$CaCO_3$]/L	1
Nitrate	dissolved	3 mg N/L	2
Oxygen	dissolved	6.5 mg/L	1
pH	n/a	Lower 6.5 and upper 9	1
Phosphorus	total	0.03 mg/L	2
Zinc	total	7.5 µg/L for hardness ≤ 90 mg [$CaCO_3$]/L 7.5 µg/L+ 0.75*(hardness-90) for hardness > 90 mg [$CaCO_3$]/L	2

Note: n/a = not applicable.

Nova Scotia Water Quality Guideline Sources:

1 Canadian Council of Ministers of the Environment (2024) Canadian Water Quality Guidelines for the Protection of Aquatic Life Summary Table. Retrieved on November 6, 2024.

2 Government of Canada (2013) Technical Guidance Document for Water Quality Index Practitioners Reporting Under the Canadian Environmental Sustainability Indicators (CESI) Initiative 2008. Environment and Climate Change Canada and Statistics Canada. Retrieved on November 6, 2024.

Table C.8. Water quality parameters and guidelines used to calculate the Ontario WQI

Parameter	Form	Guideline	Source
Ammonia	unfiltered	0.019 mg/L	1, 2
Chloride	total	120 mg/L	1
Chromium	total	2 µg/L (guideline for Cr (VI) adjusted to total chromium)	1
Nickel	total	$e^{0.76*\ln[\text{hardness}]+1.06}$ µg/L where hardness is measured as mg [$CaCO_3$]/L	2
Nitrate	total	2.93 mg N/L	2
Phosphorus	total	0.03 mg/L	2, 3
Zinc	total	7.5 µg/L for hardness ≤ 90 mg [$CaCO_3$]/L 7.5 µg/L+ 0.75*(hardness-90) for hardness > 90 mg [$CaCO_3$]/L	2

Ontario Water Quality Guideline Sources:

1 Canadian Council of Ministers of the Environment (2024) Canadian Water Quality Guidelines for the Protection of Aquatic Life Summary Table. Retrieved on November 6, 2024.

2 Government of Canada (2013) Technical Guidance Document for Water Quality Index Practitioners Reporting Under the Canadian Environmental Sustainability Indicators (CESI) Initiative 2008. Environment and Climate Change Canada and Statistics Canada. Retrieved on November 6, 2024.

3 Ontario Ministry of the Environment and Energy (2021) Water management: policies, guidelines, provincial water quality objectives. Retrieved on November 6, 2024.

Table C.9. Water quality parameters and guidelines used to calculate the Prince Edward Island WQI

Parameter	Form	Guideline	Source
Chloride	dissolved	120 mg/L	1
Copper	dissolved	2 µg/L for hardness < 90 mg [$CaCO_3$]/L $0.2*e^{0.8545*\ln[\text{hardness}]-1.465}$ µg/L for hardness > 90 mg [$CaCO_3$]/L	1
Nitrate	dissolved	SSG	2
Oxygen	dissolved	6.5 mg/L	1
pH	n/a	lower 6.5 and upper 9	1
Phosphorus	total	SSG	3
Suspended sediments	n/a	SSG	1
Zinc	dissolved	7.5 µg/L for hardness ≤ 90 mg [$CaCO_3$]/L 7.5 µg/L+ 0.75*(hardness-90) for hardness > 90 mg [$CaCO_3$]/L	1

Note: n/a = not applicable.
SSG : different site-specific guidelines or formulas were used at sites. Specific site information is available upon request.

Prince Edward Island Water Quality Guideline Sources:

1 Canadian Council of Ministers of the Environment (2024) Canadian Water Quality Guidelines for the Protection of Aquatic Life Summary Table. Retrieved on November 6, 2024.

2 Bugden, G., Jiang, Y., van den Heuvel, MR., Vandermeulen, H., MacQuarrie, KTB., Crane, CJ. and Raymond, BG. (2014) Nitrogen Loading Criteria For Estuaries In Prince Edward Island. Canadian Technical Report of Fisheries and Aquatic Sciences 3066 Fisheries and Oceans Canada. (PDF; 1.10 MB). Retrieved on November 6, 2024.

3 Van den Heuvel MR (2009) Site Specific Guidelines for Phosphorus in relation to the Water Quality Index Calculations for Prince Edward Island (PDF; 1.49 MB). Canadian Rivers Institute, University of Prince Edward Island. 35pp. Retrieved on November 6, 2024.

Table C.10. Water quality parameters and guidelines used to calculate the Quebec WQI

Parameter	Form	Guideline	Source
Ammonia	dissolved	19 µg/L	1, 3
Atrazine[A]	n/a	1.8 µg/L	1, 2
Bentazone[A]	n/a	0.51 mg/L	2
Chlorophyll a	n/a	4.75 mg/m^3	4
Chlorophyll a[A]	n/a	10 mg/m^3	3
Copper[A]	dissolved	SSG	3
Dicamba[A]	n/a	10 µg/L	1, 2
Mercury[A]	total	0,026 µg/L	1
Metolachlor[A]	n/a	7,8 µg/L	1
Nickel[A]	total	SSG	3
Nitrate-Nitrite	dissolved	3 mg/L	1, 3
pH	n/a	Lower 6.5 and upper 9	1, 2
Phosphorus	total	0.03 mg/L	2
Turbidity	n/a	5.2 NTU	5
Turbidity[A]	n/a	SSG	3
Zinc[A]	total	7.5 µg/L for hardness ≤ 90 mg [$CaCO_3$]/L 7.5 µg/L+ 0.75*(hardness-90) for hardness > 90 mg [$CaCO_3$]/L	3

Note: n/a = not applicable.
[A] Only applies to sites monitored under federal monitoring programs.
SSG : different site-specific guidelines or formulas were used at sites. Specific site information is available upon request

Quebec Water Quality Guideline Sources:

1 Canadian Council of Ministers of the Environment (2024) Canadian Water Quality Guidelines for the Protection of Aquatic Life Summary Table. Retrieved on November 6, 2024.

2 Ministère du Développement durable, Environnement et Lutte contre les changements climatiques (2024) Critères de la qualité de l'eau de surface (in French only). Retrieved on November 6, 2024

3 Government of Canada (2013) Technical Guidance Document for Water Quality Index Practitioners Reporting Under the Canadian Environmental Sustainability Indicators (CESI) Initiative 2008. Environment and Climate Change Canada and Statistics Canada. Retrieved on November 6, 2024.

4 Ministère de l'Environnement et de la Lutte contre les changements climatiques (2022). Guide d'interprétation de l'indice de la qualité bactériologique et physicochimique de l'eau (IQBP$_5$ et IQBP$_6$), (PDF; 1.02MB) 21p. (in
5 French only) Retrieved on November 6, 2024.
Hébert, S., (1997). Développement d'un indice de la qualité bactoriologique et physico-chimique de l'eau pour les rivières du Québec, Québec, Ministère de l'Environnement et de la Faune, Direction des écosystèmes auqatiques, envirodoq n*EN/970102, 20p., 4 annexes. Retrieved on November 6, 2024.

Table C.11. Water quality parameters and guidelines used to calculate the Saskatchewan WQI

Parameter	Form	Guideline	Source
2,4-D	n/a	4 µg/L	1
Ammonia[A]	N	15.6 µg/L	3
Ammonia[B]	Unfiltered	19 µg/L	1
Arsenic	total	5 µg/L	1
Chloride[A]	dissolved	120 mg/L	1
Chloride[B]	dissolved	SSG	3
Copper	total	2 µg/L for hardness < 82 mg/L $0.2*e^{\{0.8545[\ln(\text{hardness})]-1.465\}}$ for hardness from 82 to ≤180 mg/L 4 µg/L for hardness >180 mg/L,	1
Lead	total	1 µg/L for hardness ≤ 60 mg/L $e^{\{1.273[\ln(\text{hardness})]-4.705\}}$ for hardness from 60 to 180 mg/L 7 µg/L for hardness > 180 mg/L	1
MCPA[A]	n/a	2.6 µg/L	1
MCPA[B]	n/a	SSG	3
Nickel	total	$e^{0.76*\ln[\text{hardness}]+1.06}$ µg/L where hardness is measured as mg [$CaCO_3$]/L	2
Nitrate[A]	N	3 mg/L	3
Nitrogen[B]	total	SSG	3
Oxygen[A]	dissolved	5.5 mg/L	1
Oxygen[B]	dissolved	SSG	3
pH	n/a	Lower 6.5 and upper 9	1
Phosphorus[A]	total	Northern sites: 0.035 mg/L Southern sites: 0.1 mg/L	4
Phosphorus[B]	total	SSG	3
Zinc[A]	total	7.5 µg/L for hardness ≤ 90 mg [$CaCO_3$]/L 7.5 µg/L+ 0.75*(hardness-90) for hardness > 90 mg [$CaCO_3$]/L	2
Zinc[B]	total	30 µg/L	3

Note: n/a = not applicable.
[A] Applies to sites monitored under provincial monitoring programs.
[B] Applies to sites monitored under federal monitoring programs (Prairie Provinces Water Board).
SSG : different site-specific guidelines or formulas were used at sites. Specific site information is available upon request.

Saskatchewan Water Quality Guideline Sources:

1 Canadian Council of Ministers of the Environment (2024) Canadian Water Quality Guidelines for the Protection of Aquatic Life Summary Table. Retrieved on November 6, 2024.

2 Government of Canada (2013) Technical Guidance Document for Water Quality Index Practitioners Reporting Under the Canadian Environmental Sustainability Indicators (CESI) Initiative 2008. Environment and Climate Change Canada and Statistics Canada. Retrieved on November 6, 2024.

3 Prairie Provinces Water Board (2015). Review of the 1992 Interprovincial Water Quality Objectives and Recommendations for Change. Technical Report to the PPWB Committee on Water Quality, Report #174, Regina (PDF; 16.4 MB). Retrieved on November 6, 2024

4 Canadian Council of Ministers of the Environment (2004). Canadian Water Quality Guidelines for the Protection of Aquatic Life: Phosphorus (PDF; 542 kB). Retrieved on November 6, 2024.

Table C.12. Water quality parameters and guidelines used to calculate the Yukon WQI

Parameter	Form	Guideline	Source
Alkalinity	total	SSG	6
Arsenic	total	5 µg/L	1
Chromium	total	2.3 µg/L	2
Copper	total	2 µg/L for hardness < 90 mg [$CaCO_3$]/L $0.2*e^{0.8545*ln[hardness]-1.465}$ µg/L for hardness > 90 mg [$CaCO_3$]/L	3
Iron	dissolved	0.3 mg/L	3
Lead	total	1 µg/L for hardness < 50 mg [$CaCO_3$]/L $e^{1.273*ln[hardness]-4.705}$ µg/L for hardness > 50 mg [$CaCO_3$]/L	3
Nitrate	dissolved	2.93 mg/L	3
Nitrite	total	0.02 mg/L	4
Nitrogen	total dissolved	0.7 mg/L	3
Oxygen	dissolved	8 mg/L	5
pH	n/a	lower 6.5 and upper 9	1
Phosphorus	total, total dissolved	0.025 mg/L	3
Selenium	total	1 µg/L (YT09EA0001) 2 µg/L (YT08AB0009, YT10MA0011)	3
Silver	total	0.05 µg/L for hardness < 100 mg [$CaCO_3$]/L 1.9 µg/L for hardness > 100 mg [$CaCO_3$]/L	3
Sulfate	dissolved	SSG	4
Temperature	n/a	SSG	3
Zinc	total	7.5 µg/L for hardness ≤ 90 mg [$CaCO_3$]/L 7.5 µg/L+ 0.75*(hardness-90) for hardness > 90 mg [$CaCO_3$]/L	3

Note: n/a = not applicable.
SSG : different site-specific guidelines or formulas were used at sites. Specific site information is available upon request.

Yukon Water Quality Guideline Sources:

1 Canadian Council of Ministers of the Environment (2024) Canadian Water Quality Guidelines for the Protection of Aquatic Life Summary Table. Retrieved on November 6, 2024.

2 Environment and Climate Change Canada (2005) Site-specific Water Quality Guidelines for the Liard River at Upper Crossing for the Purpose of National Reporting. Tri-Star Environmental Consulting.

3 Government of Canada (2013) Technical Guidance Document for Water Quality Index Practitioners Reporting Under the Canadian Environmental Sustainability Indicators (CESI) Initiative 2008. Environment and Climate Change Canada and Statistics Canada. Retrieved on November 6, 2024.

4 Nordin RN and Pommen LW (2009) Water Quality Guidelines for Nitrogen (Nitrate, Nitrite, and Ammonia): Overview Report Update. British Columbia Ministry of Environment (PDF; 565 kB). Retrieved on November 6, 2024

5 British Columbia Ministry of Environment (1997) Ambient Water Quality Criteria for Dissolved Oxygen (PDF; 126 kB). British Columbia Ministry of Environment, Water Protection and Sustainability Branch. Victoria, BC. Retrieved on November 6, 2024.

6 British Columbia Ministry of Environment (2024) British Columbia Working Water Quality Guidelines: Aquatic Life, Wildlife & Agriculture (PDF; 897 kB). Retrieved on November 6, 2024.

Additional information can be obtained at:

Environment and Climate Change Canada
Public Inquiries Centre
Place Vincent Massey Building
351 Saint-Joseph Boulevard
Gatineau QC K1A 0H3
Telephone: 1-800-668-6767 (in Canada only) or 819-938-3860

Email: ec.enviroinfo.ec@ec.gc.ca