



Environment and
Climate Change Canada

Environnement et
Changement climatique Canada

RELEASES OF HARMFUL SUBSTANCES TO WATER

CANADIAN ENVIRONMENTAL
SUSTAINABILITY INDICATORS



Canada 

Suggested citation for this document: Environment and Climate Change Canada (2021) Canadian Environmental Sustainability Indicators: Releases of harmful substances to water. Consulted on *Month day, year*. Available at: www.canada.ca/en/environment-climate-change/services/environmental-indicators/releases-harmful-substances-water.html.

Cat. No.: En4-144/81-2020E-PDF
ISBN: 978-0-660-35498-9

Unless otherwise specified, you may not reproduce materials in this publication, in whole or in part, for the purposes of commercial redistribution without prior written permission from Environment and Climate Change Canada's copyright administrator. To obtain permission to reproduce Government of Canada materials for commercial purposes, apply for Crown Copyright Clearance by contacting:

Environment and Climate Change Canada
Public Inquiries Centre
12th Floor Fontaine Building
200 Sacré-Coeur Blvd
Gatineau QC K1A 0H3
Telephone: 1-800-668-6767 (in Canada only) or 819-938-3860
Fax: 819-938-3318
Email: ec.enviroinfo.ec@canada.ca

Photos: © Environment and Climate Change Canada

© Her Majesty the Queen in Right of Canada, represented by the Minister of Environment and Climate Change, 2021

Aussi disponible en français

CANADIAN ENVIRONMENTAL SUSTAINABILITY INDICATORS

RELEASES OF HARMFUL SUBSTANCES TO WATER

January 2021

Table of contents

| | |
|---|----------|
| Releases of harmful substances to water | 5 |
| Key results..... | 5 |
| Releases of mercury to water..... | 6 |
| Releases of mercury to water by province and territory..... | 7 |
| Releases of mercury to water from facilities..... | 8 |
| Releases of lead to water..... | 9 |
| Releases of lead to water by province and territory..... | 10 |
| Releases of lead to water from facilities..... | 11 |
| Releases of cadmium to water..... | 12 |
| Releases of cadmium to water by province and territory..... | 13 |
| Releases of cadmium to water from facilities..... | 14 |
| About the indicators..... | 15 |
| What the indicators measure..... | 15 |
| Why these indicators are important..... | 15 |
| Related indicators..... | 15 |
| Data sources and methods..... | 15 |
| Data sources..... | 15 |
| Methods..... | 16 |
| Recent changes..... | 18 |
| Caveats and limitations..... | 18 |
| Resources..... | 19 |
| References..... | 19 |

Related information19

Annex.....20

Annex A. Data tables for the figures presented in this document20

List of Figures

Figure 1. Releases of mercury, lead and cadmium to water, Canada, 2003 to 20185
Figure 2. Mercury releases to water by source, Canada, 2003 to 20186
Figure 3. Mercury releases to water by province and territory, Canada, 2008 and 20187
Figure 4. Releases of mercury to water by facility, Canada, 20188
Figure 5. Lead releases to water by source, Canada, 2003 to 20189
Figure 6. Lead releases to water by province and territory, Canada, 2008 and 201810
Figure 7. Releases of lead to water by facility, Canada, 201811
Figure 8. Cadmium releases to water by source, Canada, 2003 to 201812
Figure 9. Cadmium releases to water by province and territory, Canada, 2008 and 201813
Figure 10. Releases of cadmium to water by facility, Canada, 201814

List of Tables

Table 1. Alignment of sources reported in the Canadian Environmental Sustainability Indicators and the National Pollutant Release Inventory 17
Table A.1. Data for Figure 1. Releases of mercury, lead and cadmium to water, Canada, 2003 to 2018.....20
Table A.2. Data for Figure 2. Mercury releases to water by source, Canada, 2003 to 201820
Table A.3. Data for Figure 3. Mercury releases to water by province and territory, Canada, 2008 and 2018....21
Table A.4. Data for Figure 5. Lead releases to water by source, Canada, 2003 to 201822
Table A.5. Data for Figure 6. Lead releases to water by province and territory, Canada, 2008 and 2018.....22
Table A.6. Data for Figure 8. Cadmium releases to water by source, Canada, 2003 to 201823
Table A.7. Data for Figure 9. Cadmium releases to water by province and territory, Canada, 2008 and 2018 .23

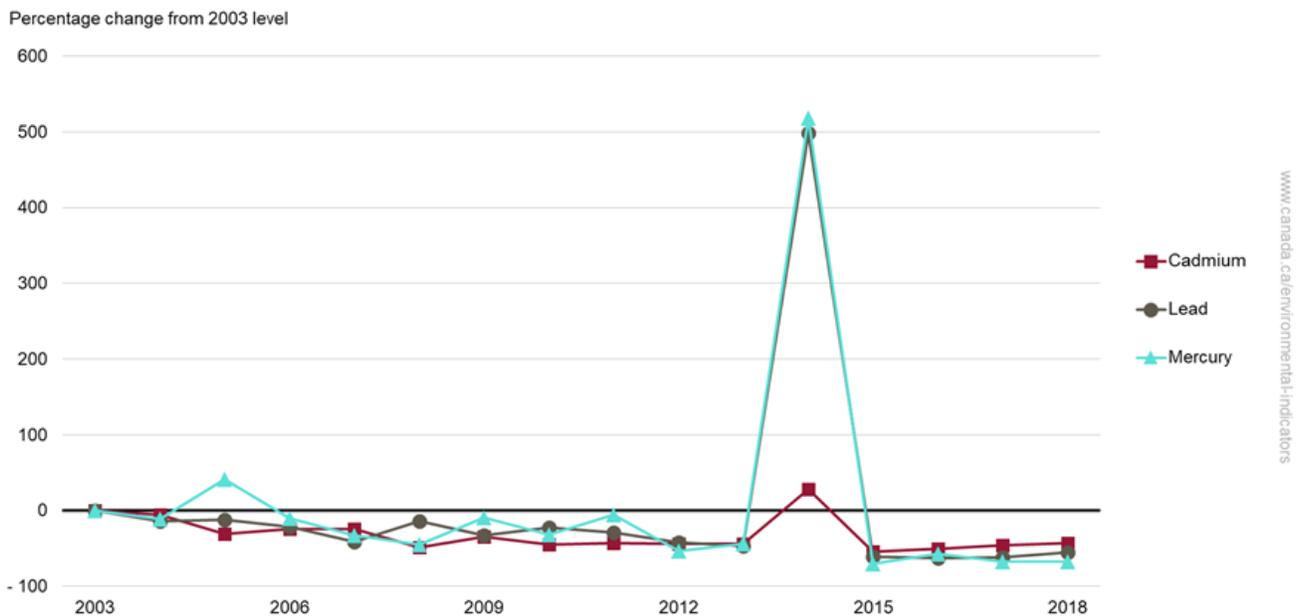
Releases of harmful substances to water

The release of some substances to the environment can harm human health, wildlife and biological diversity. Toxic metals released to water can enter the food web and accumulate in the tissues of living organisms. Exposure to these substances, even in small amounts, can be hazardous to both humans and wildlife. Mercury and its compounds, lead, and inorganic cadmium compounds are listed as toxic¹ under the *Canadian Environmental Protection Act, 1999*. The mercury, lead and cadmium releases to water indicators track facility-based releases of these substances to water.

Key results

- Releases of mercury, lead and cadmium to water were 67%, 56% and 43% lower in 2018 than in 2003, respectively
- In 2014, a significant spill² accounted for 92%, 92% and 59% of total releases of mercury, lead and cadmium, respectively

Figure 1. Releases of mercury, lead and cadmium to water, Canada, 2003 to 2018



[Data for Figure 1](#)

Note: The indicator reports facility-based releases only. This chart accounts only for the releases to water reported in the National Pollutant Release Inventory based on the inventory reporting criteria for releases of mercury, lead and cadmium and their compounds. These amounts should not be interpreted as comprehensive totals of releases to water of these pollutants in Canada.

Source: Environment and Climate Change Canada (2020) [National Pollutant Release Inventory](#).

Mercury, lead and cadmium are naturally occurring elements. Most releases of mercury, lead and cadmium to water are from wastewater and waste management effluents. Wastewater treatment plants do not generate mercury, lead or cadmium. The main source of mercury, lead and cadmium in wastewater is typically industrial discharges to sewers.

¹ Section 64 of the *Canadian Environmental Protection Act, 1999* defines a substance as toxic if it is "entering or may enter the environment in a quantity or concentration or under conditions that (a) have or may have an immediate or long-term harmful effect on the environment or its biological diversity; (b) constitute or may constitute a danger to the environment on which life depends; or (c) constitute or may constitute a danger in Canada to human life or health."

² On August 4, 2014, a dam securing a tailings pond at the Mount Polley mine in central British Columbia was breached, spilling mining waste into Polley Lake and surrounding waters.

In 2018, wastewater and waste management releases accounted for 66%, 43% and 43% of total releases of mercury, lead and cadmium, respectively.³ From 2003 to 2018, releases of mercury, lead and cadmium from this source declined by 73%, 70% and 62%, respectively.

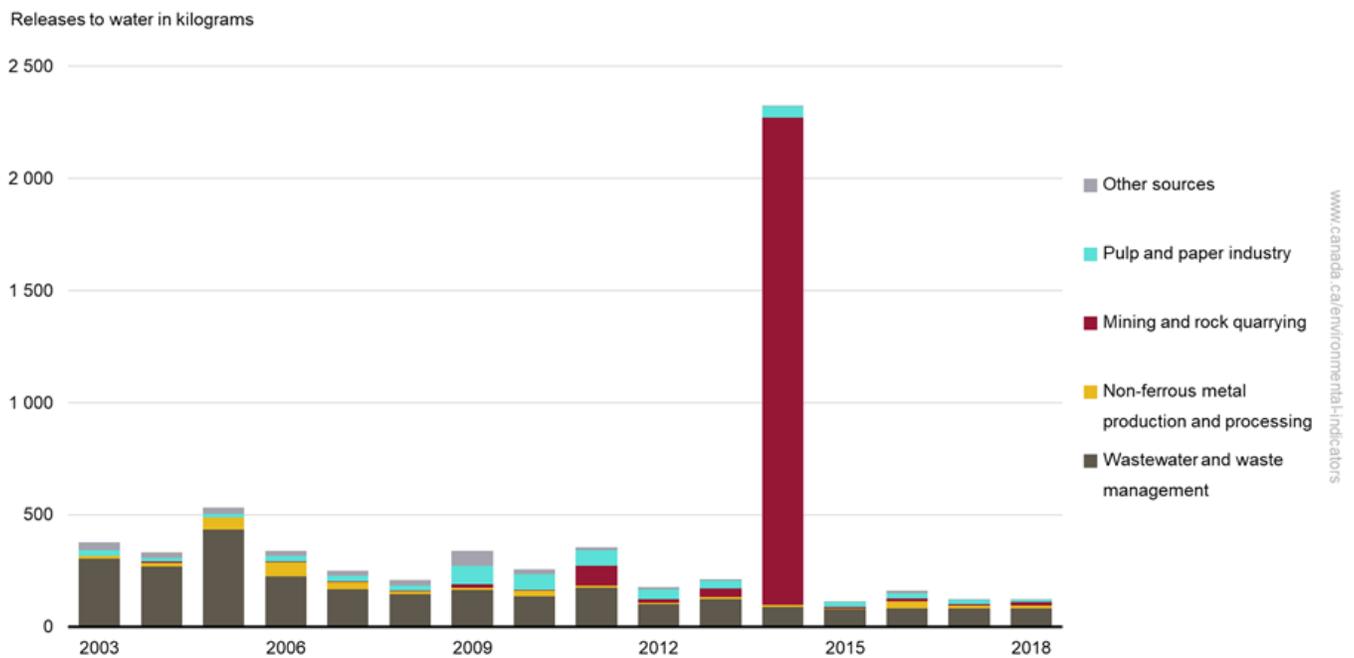
Releases of mercury to water

Mercury is released directly to water from sources such as the pulp and paper industry, mining operations and metal processing, and indirectly through wastewater treatment plants. Mercury in wastewater is usually from industrial discharges to sewers and effluent from waste landfills. Releases of mercury can also occur when a [product containing mercury](#) is manufactured, used, recycled and disposed of.⁴

Key results

- Since 2003, mercury releases to water have declined by 67% or 253 kilograms (kg)
- In 2018, national releases totalled 122 kg
 - the largest source was wastewater and waste management, representing 66% (81 kg) of the total
- In 2014, a significant spill⁵ accounted for 92% (2 143 kg) of the 2 321 kg of mercury released

Figure 2. Mercury releases to water by source, Canada, 2003 to 2018



[Data for Figure 2](#)

Note: The indicator reports facility-based releases only. The indicator includes the amount of elemental mercury and mercury in any compound, alloy or mixture reported in the National Pollutant Release Inventory based on the inventory reporting criteria. As a result, the reported mercury releases to water account for only a portion of the releases of this toxic pollutant to water in Canada. Other sources include electric utilities, manufacturing (except pulp and paper), the oil and gas industry, ore and mineral industries (except non-ferrous metal production and processing) and other miscellaneous sources. For more details on sources, please consult the [Data sources and methods](#).

Source: Environment and Climate Change Canada (2020) [National Pollutant Release Inventory](#).

³ The indicators only track facility-based releases of substances to water as reported to the National Pollutant Release Inventory.

⁴ The *Products Containing Mercury Regulations*, which came into force in November 2015, prohibit the manufacture and import of mercury or any of its compounds, with some exemptions for essential products that have no technically or economically viable alternatives (such as certain medical and research applications and dental amalgam).

⁵ On August 4, 2014, a dam securing a tailings pond at the Mount Polley mine in central British Columbia was breached, spilling mining waste into Polley Lake and surrounding waters.

In 2018, 3 sectors contributed 89% (109 kg) of total national releases⁶ of mercury to water: wastewater and waste management, non-ferrous metal production and processing, and mining and rock quarrying.

The largest reduction in mercury releases to water between 2008 and 2018 was in wastewater and waste management, with a reduction of 223 kg (73%). This decline contributed to 88% of the total decline in mercury releases to water.

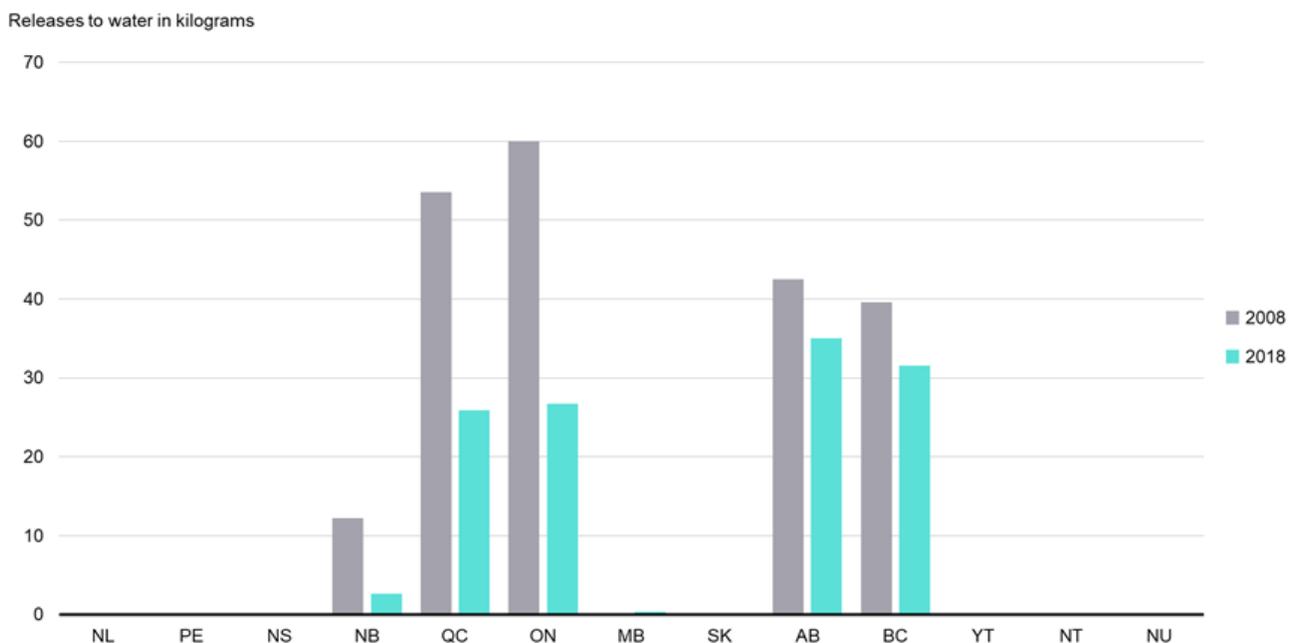
Mercury has [significant negative effects on human health](#) and the environment. It persists and accumulates in ecosystems and biota. Exposure of Canadians to mercury poses a particular risk to populations such as indigenous people who rely heavily on the consumption of predatory fish, such as freshwater trout or Arctic char, and traditional food items, including marine mammals.

Releases of mercury to water by province and territory

Key results

- In 2018, Alberta and British Columbia made up 54% (67 kg) of national mercury releases to water
- Between 2008 and 2018, the largest reduction in releases of mercury to water was from Ontario, which reduced its releases by 55% (33 kg)

Figure 3. Mercury releases to water by province and territory, Canada, 2008 and 2018



[Data for Figure 3](#)

Note: The indicator reports facility-based releases only. The indicator includes the amount of elemental mercury and mercury in any compound, alloy or mixture reported in the National Pollutant Release Inventory based on the inventory reporting criteria. As a result, the reported mercury releases to water represent only a portion of the releases of this toxic pollutant to water in Canada. Reported releases from Newfoundland and Labrador, Nova Scotia, Manitoba, Saskatchewan and the Northwest Territories are too small to see in the figure.

Source: Environment and Climate Change Canada (2020) [National Pollutant Release Inventory](#).

Mercury releases to water were highest in Alberta in 2018, accounting for 29% (35 kg) of the national total. It was most commonly released in wastewater effluents.

⁶ The indicators only track facility-based releases of substances to water as reported to the National Pollutant Release Inventory.

Ontario had the largest decline in mercury releases between 2008 and 2018. Quebec had the second largest decline in mercury releases over this period. These declines in these provinces were mostly due to mercury reductions in wastewater and waste management.

In 2018, wastewater and waste management was the main source of mercury releases to water in Alberta, Ontario, British Columbia, Manitoba and the Northwest Territories. The pulp and paper industry was the largest source in New Brunswick. In Quebec, non-ferrous metal production and processing was the main source of releases of mercury to water. In Newfoundland and Labrador, Nova Scotia and Saskatchewan, the largest source was mining and rock quarrying.

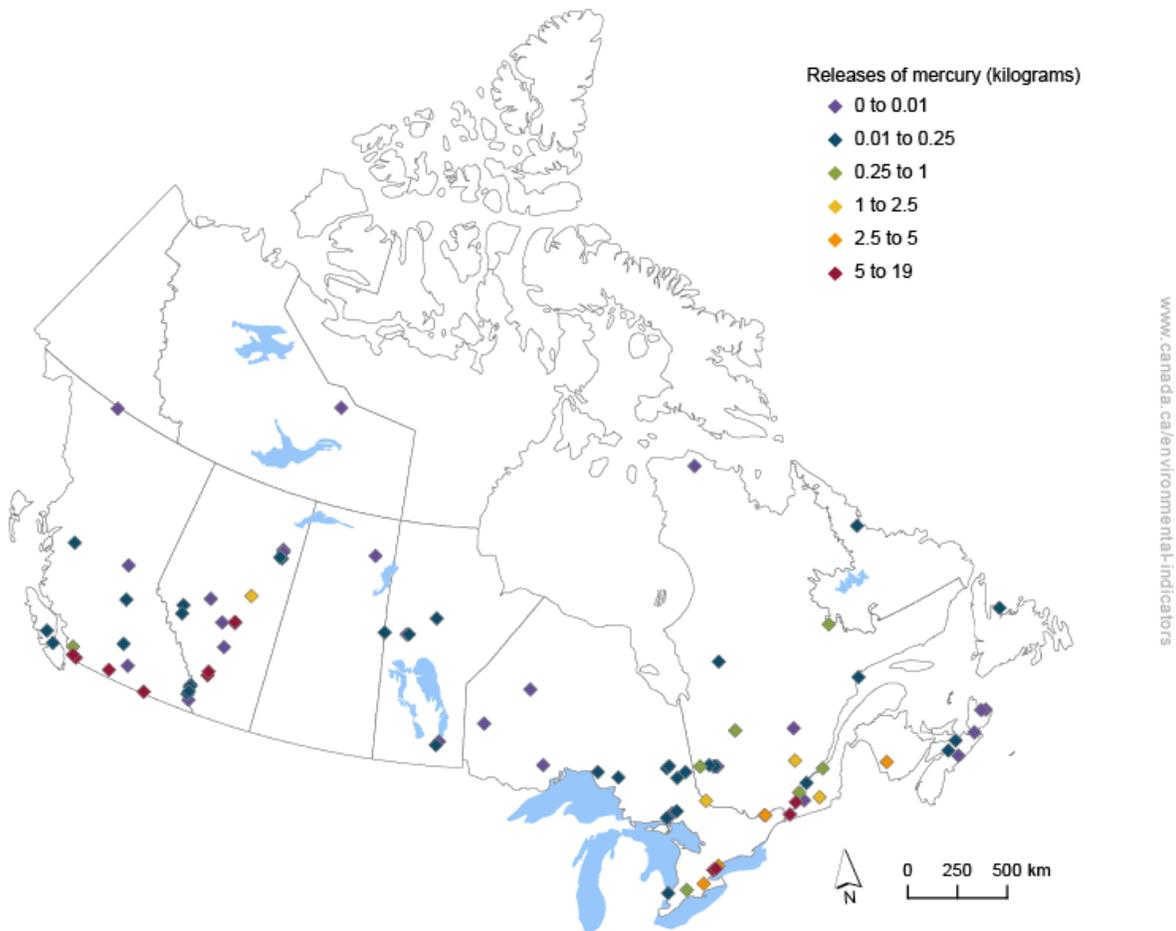
There were no reported mercury releases to water in Prince Edward Island, Yukon and Nunavut for 2008 and 2018. In 2008, Nova Scotia, Saskatchewan and the Northwest Territories had no reported releases.

Releases of mercury to water from facilities

The National Pollutant Release Inventory provides detailed information on emissions and releases from industrial and commercial facilities that meet its reporting criteria.

The Canadian Environmental Sustainability Indicators provide access to this information through an interactive map. The map allows you to explore [releases of mercury to water](#) from individual facilities.

Figure 4. Releases of mercury to water by facility, Canada, 2018



Navigate data using the [interactive map](#)

Source: Environment and Climate Change Canada (2020) [National Pollutant Release Inventory](#).

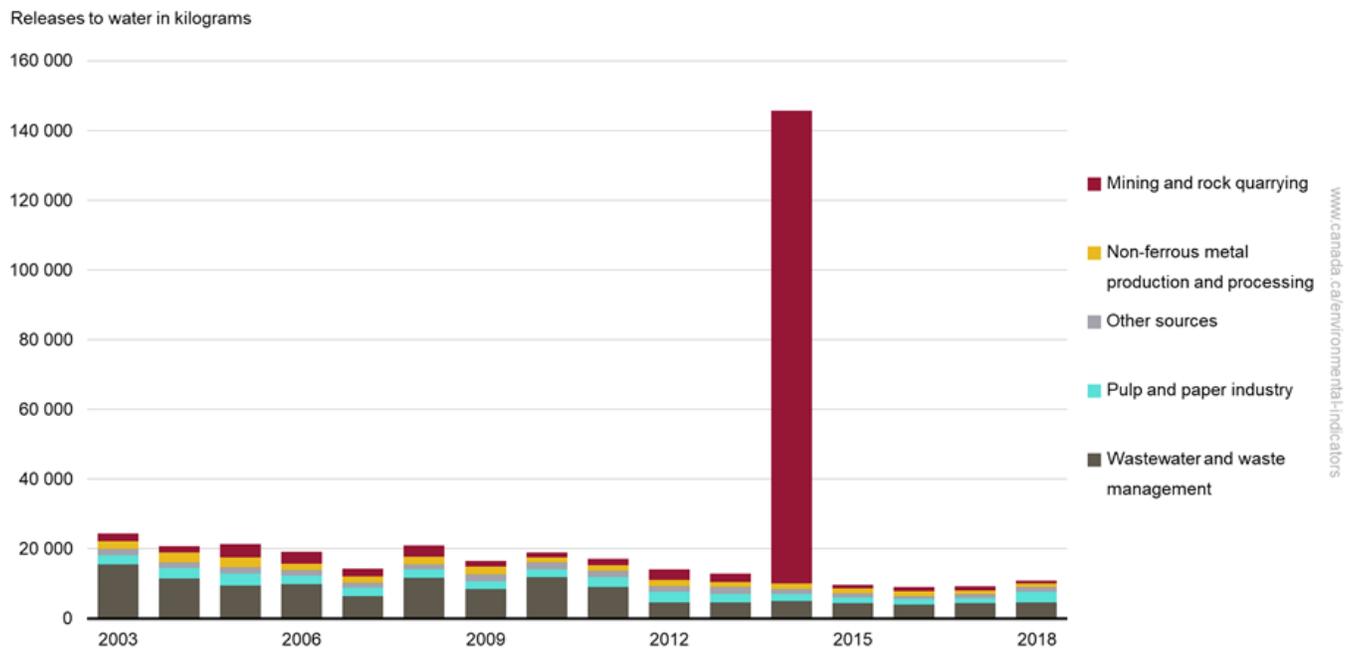
Releases of lead to water

Lead is released directly to water from sources such as the pulp and paper industry, metal processing, mining and rock quarrying, and indirectly through wastewater treatment plants. Lead in wastewater is usually from industrial discharges to sewers. Lead can be deposited on land or water surfaces and then build up in soils or sediments.

Key results

- Since 2003, lead releases to water have decreased by 56% or 13 518 kilograms (kg)
- In 2018, national releases totalled 10 820 kg
 - the largest source was wastewater and waste management, representing 43% (4 623 kg) of the total
- In 2014, a significant spill generated 92% (134 235 kg) of the 145 709 kg of lead released⁷

Figure 5. Lead releases to water by source, Canada, 2003 to 2018



[Data for Figure 5](#)

Note: The indicator reports facility-based releases only. The indicator includes the amount of elemental lead and lead in any compound, alloy or mixture reported in the National Pollutant Release Inventory based on the inventory reporting criteria. As a result, the reported lead releases to water account for only a portion of the releases of this toxic pollutant to water in Canada. Other sources include electric utilities, manufacturing (except pulp and paper), the oil and gas industry, ore and mineral industries (except non-ferrous metal production and processing) and other miscellaneous sources. For more details on sources, please consult the [Data sources and methods](#).

Source: Environment and Climate Change Canada (2020) [National Pollutant Release Inventory](#).

In 2018, 70% (7 623 kg) of national releases⁸ of lead to water came from wastewater and waste management, and the pulp and paper industry.

Wastewater and waste management contributed to an 80% (10 863 kg) reduction in lead releases to water since 2003. Mining and rock quarrying, and non-ferrous metal production and processing contributed a further 10% (1 377 kg) and 8% (1 140 kg), respectively to the decrease in releases.

⁷ On August 4, 2014, a dam securing a tailings pond at the Mount Polley mine in central British Columbia was breached, spilling mining waste into Polley Lake and surrounding waters.

⁸ The indicators only track facility-based releases of substances to water as reported to the National Pollutant Release Inventory.

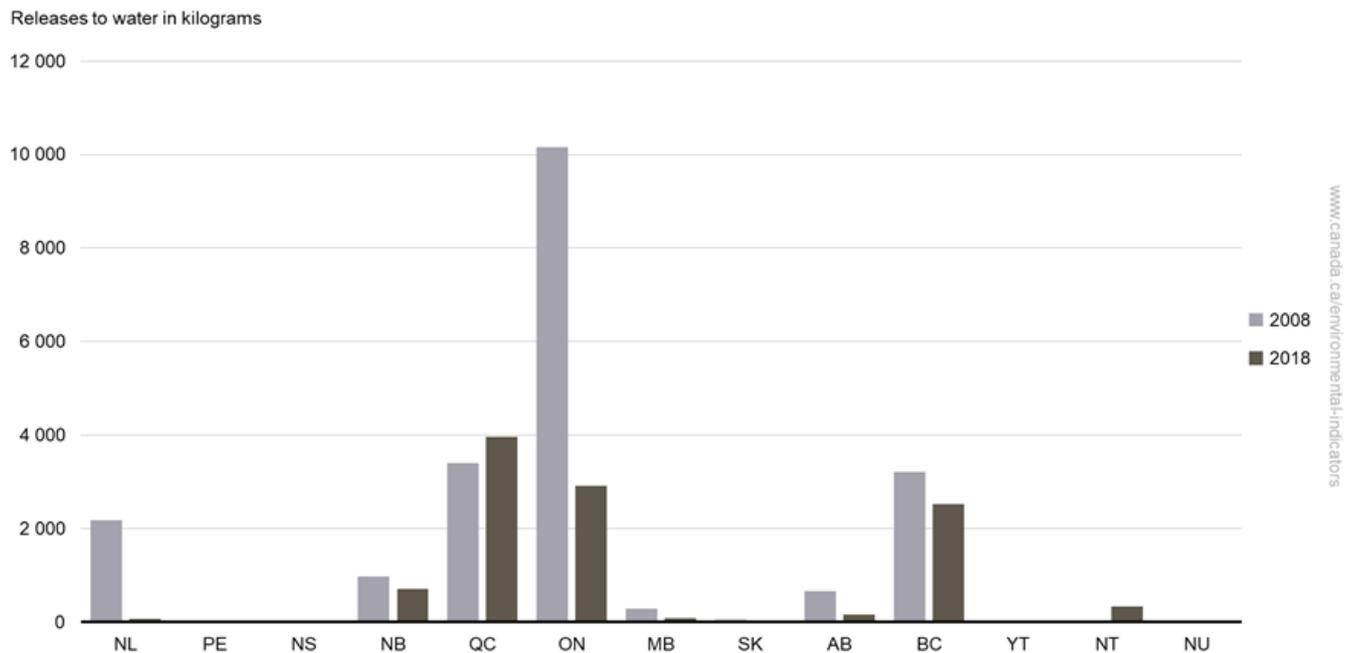
Exposure to lead, even in small amounts, can be [hazardous to both humans and wildlife](#). Fishing tackle containing lead can pose a serious threat to birds if ingested. A single sinker or jig containing several grams of lead is enough to kill a bird. A recent study estimates every year approximately 460 tonnes of lead sinkers and jigs are lost into Canada's lakes and waterways.⁹

Releases of lead to water by province and territory

Key results

- In 2018, Quebec, Ontario and British Columbia made up 87% (9 402 kg) of national lead releases to water
- Between 2008 and 2018
 - the largest reduction in releases of lead to water was from Ontario, which reduced its releases by 71% (7 246 kg)
 - the largest increase in lead releases to water was from Quebec, which had a 16% (553 kg) increase in releases

Figure 6. Lead releases to water by province and territory, Canada, 2008 and 2018



[Data for Figure 6](#)

Note: The indicator reports facility-based releases only. The indicator includes the amount of elemental lead and lead in any compound, alloy or mixture reported in the National Pollutant Release Inventory based on the inventory reporting criteria. As a result, the reported lead releases to water represent only a portion of the releases of this toxic pollutant to water in Canada. Reported releases from Prince Edward Island, Nova Scotia, Saskatchewan, the Northwest Territories and Nunavut are too small to see in the figure.

Source: Environment and Climate Change Canada (2020) [National Pollutant Release Inventory](#).

Lead releases to water were highest in Quebec in 2018, accounting for 37% (3 962 kg) of the national total.

Ontario had the largest decline in lead releases between 2008 and 2018. This decline was mostly due to reductions in releases from wastewater and waste management, and mining and rock quarrying. Quebec had the largest increase in releases over this period. A single pulp and paper facility was the primary reason for this increase.

⁹ Environment and Climate Change Canada (2018) [Study to gather use pattern information on lead sinkers and jigs and their non-lead alternative in Canada](#). Retrieved on December 30, 2020.

In 2018, wastewater and waste management was the main source of lead releases to water in Ontario, the Northwest Territories, Alberta and Prince Edward Island. In Quebec, Newfoundland and Labrador and Manitoba, the largest source was the pulp and paper industry. Mining and rock quarrying was the largest source in New Brunswick, Saskatchewan, Nunavut and Nova Scotia. In British Columbia, the largest source was non-ferrous metal production and processing.

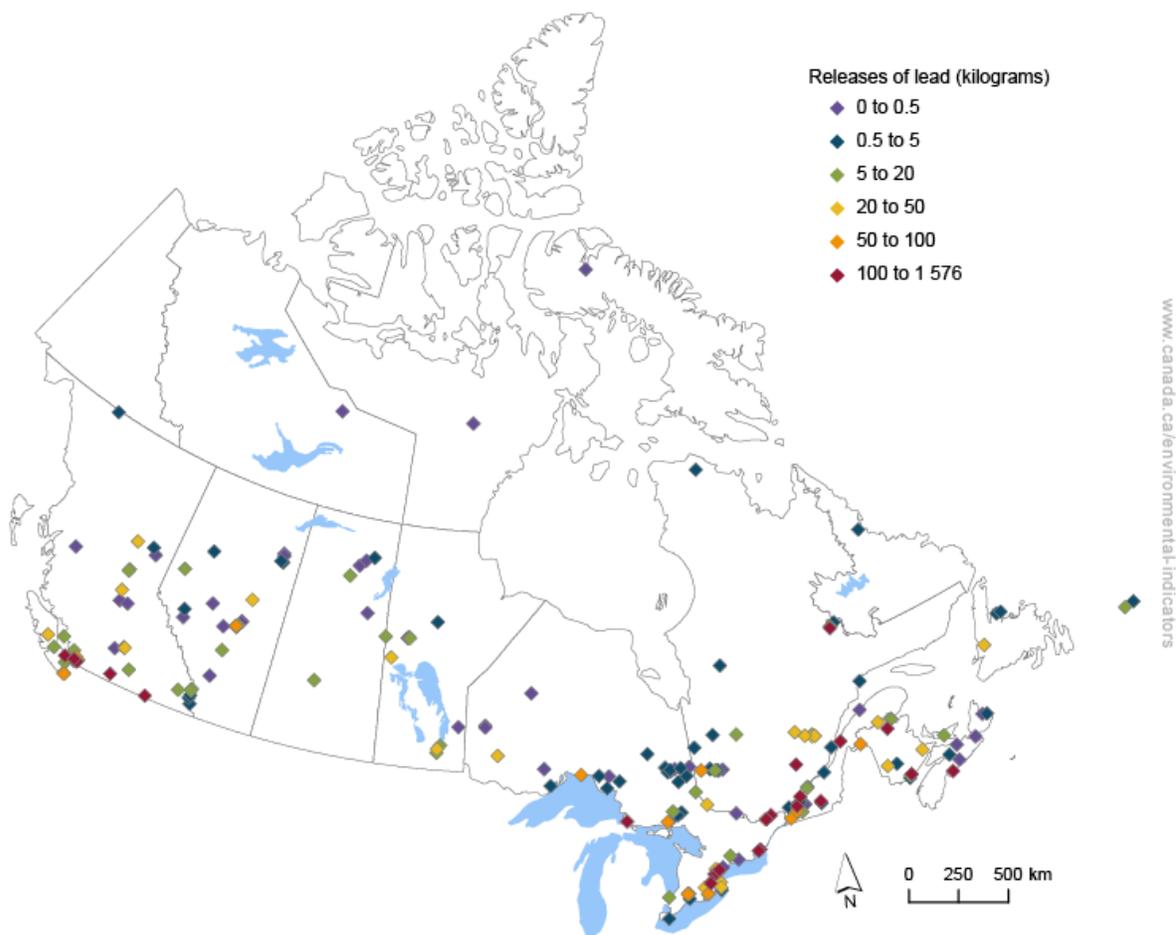
In 2008, there were no reported releases of lead in Prince Edward Island, Yukon and Nunavut. All provinces and territories reported releases in 2018, except for Yukon.

Releases of lead to water from facilities

The National Pollutant Release Inventory provides detailed information on emissions and releases from industrial and commercial facilities that meet its reporting criteria.

The Canadian Environmental Sustainability Indicators provide access to this information through an interactive map. The map allows you to explore [releases of lead to water](#) from individual facilities.

Figure 7. Releases of lead to water by facility, Canada, 2018



Navigate data using the [interactive map](#)

Source: Environment and Climate Change Canada (2020) [National Pollutant Release Inventory](#).

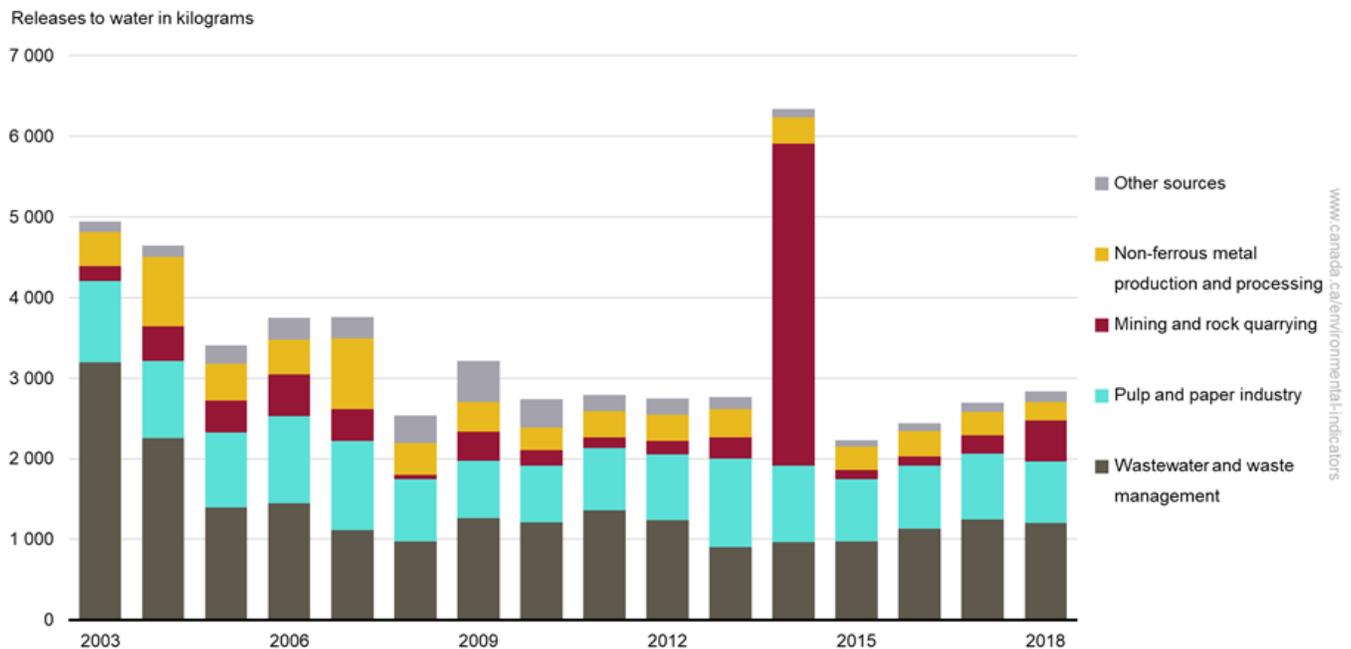
Releases of cadmium to water

Cadmium can be released directly to water from human activities such as non-ferrous metal production and processing, and fuel consumption for electricity or heating, and indirectly through wastewater treatment plants. Cadmium in wastewater is usually from industrial discharges to sewers. Cadmium is used in batteries and in electroplating to protect other metals from corrosion.

Key results

- Since 2003, cadmium releases to water have declined by 43% or 2 112 kilograms (kg)
- In 2018, national releases totalled 2 831 kg
 - the largest source was wastewater and waste management, representing about 43% (or 1 204 kg) of national releases
- In 2014, a significant spill accounted for 59% (3 768 kg) of the 6 339 kg of cadmium released¹⁰

Figure 8. Cadmium releases to water by source, Canada, 2003 to 2018



[Data for Figure 8](#)

Note: The indicator reports facility-based releases only. The indicator includes the amount of elemental cadmium and cadmium in any compound, alloy or mixture reported in the National Pollutant Release Inventory based on the inventory reporting criteria. As a result, the reported cadmium releases to water account for only a portion of the releases of this toxic pollutant to water in Canada. Other sources include electric utilities, manufacturing (except pulp and paper), the oil and gas industry, ore and mineral industries (except non-ferrous metal production and processing) and other miscellaneous sources. For more details on sources, please consult the [Data sources and methods](#).

Source: Environment and Climate Change Canada (2020) [National Pollutant Release Inventory](#).

In 2018, 87% (2 471 kg) of cadmium released to water¹¹ came from wastewater and waste management, the pulp and paper industry, and mining and rock quarrying.

Wastewater and waste management contributed to an 94% (1 991 kg) reduction in cadmium releases to water since 2003. The pulp and paper and non-ferrous metal production and processing industries together contributed an additional 21% (249 kg and 197 kg, respectively) to the total decrease in cadmium.

¹⁰ On August 4, 2014, a dam securing a tailings pond at the Mount Polley mine in central British Columbia was breached, spilling mining waste into Polley Lake and surrounding waters.

¹¹ The indicators only track facility-based releases of substances to water as reported to the National Pollutant Release Inventory.

Between 2003 and 2018, the largest reduction in releases of cadmium to water was from wastewater and waste management, with a reduction of 62% (1 991 kg). Over the same period, releases from mining and rock quarrying increased by 180% (324 kg).

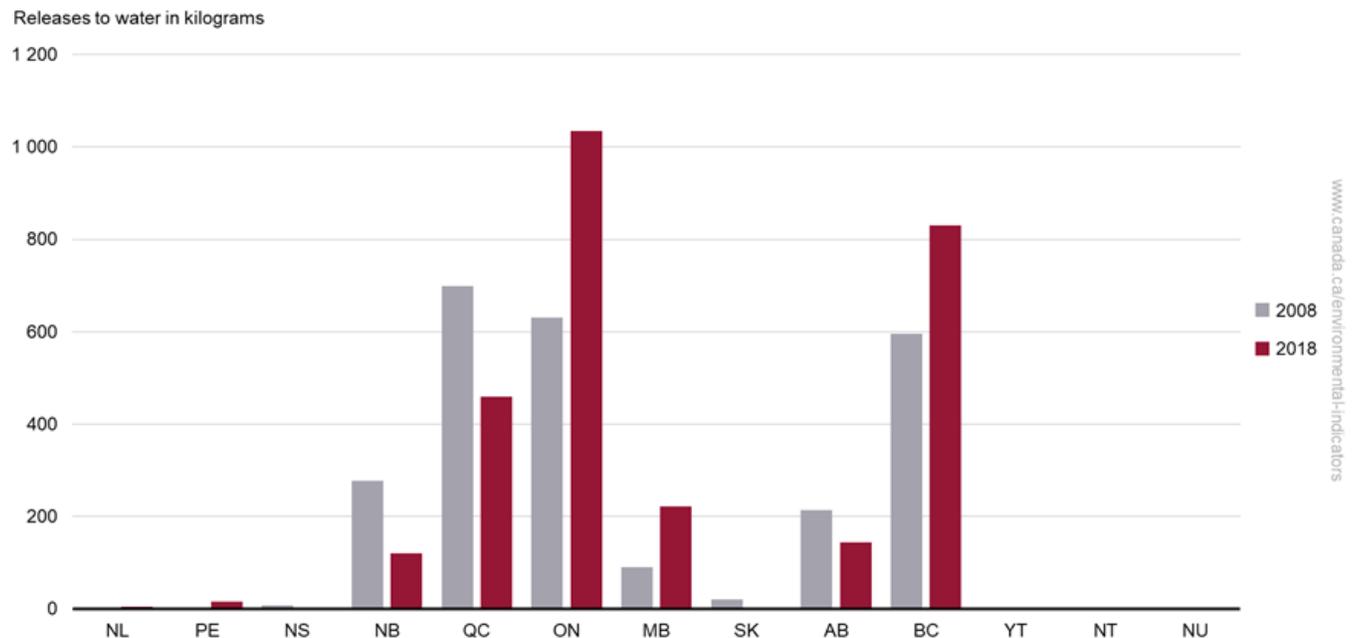
Exposure to cadmium can be [hazardous to both humans and wildlife](#) since it accumulates in the food chain over time.

Releases of cadmium to water by province and territory

Key results

- In 2018, Ontario, British Columbia and Quebec made up 82% (2 323 kg) of national cadmium releases to water
- Between 2008 and 2018
 - the largest reduction in releases of cadmium to water was from Quebec, which reduced its releases by 34% (239 kg)
 - the largest increase in cadmium releases to water was from Ontario, which had a 64% (404 kg) increase in releases

Figure 9. Cadmium releases to water by province and territory, Canada, 2008 and 2018



[Data for Figure 8](#)

Note: The indicator reports facility-based releases only. The indicator includes the amount of elemental cadmium and cadmium in any compound, alloy or mixture reported in the National Pollutant Release Inventory based on the inventory reporting criteria. As a result, the reported cadmium releases to water represent only a portion of the releases of this toxic pollutant to water in Canada. Reported releases from Newfoundland and Labrador, Nova Scotia, Saskatchewan, the Northwest Territories and Nunavut are too small to see in the figure.

Source: Environment and Climate Change Canada (2020) [National Pollutant Release Inventory](#).

Cadmium releases to water were highest in Ontario in 2018, accounting for 37% (1 035 kg) of the national total. Wastewater and waste management was the main source of these releases.

Between 2008 and 2018, Quebec had the largest decrease in cadmium releases. This decrease was mostly due to reductions at a foundry and within wastewater and waste management. Ontario had the largest increase in releases over this period. The increase resulted from wastewater and waste management.

In 2018, wastewater and waste management was the main source of cadmium releases to water in Ontario, Quebec and Saskatchewan. The pulp and paper industry was the largest source in British Columbia, Quebec, Alberta, New Brunswick, and Newfoundland and Labrador. Mining and rock quarrying was the largest source in

Manitoba and Nunavut. In the Northwest Territories and Nova Scotia, the largest sources were electric utilities and manufacturing (except pulp and paper), respectively.

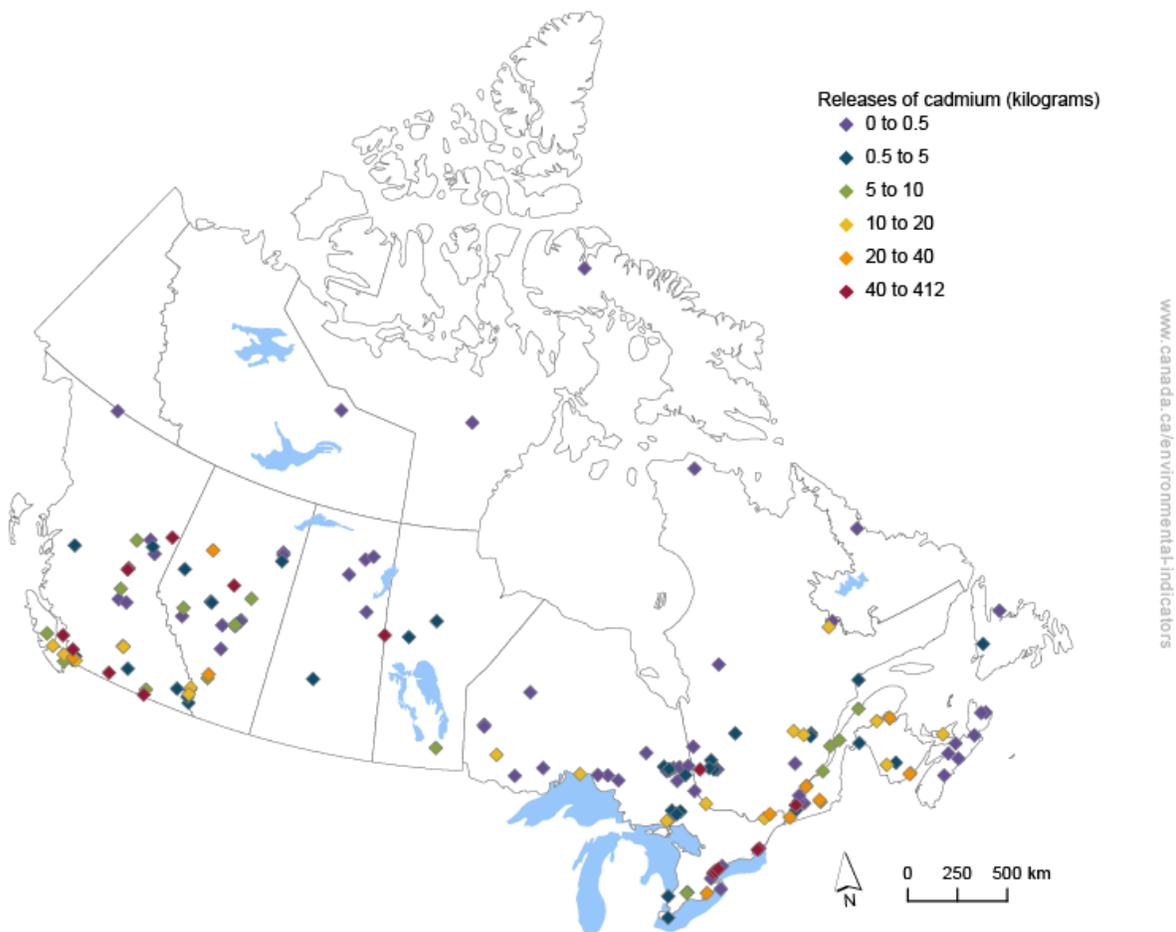
In 2008, there were no reported releases of cadmium in Prince Edward Island, Yukon, the Northwest Territories and Nunavut. All provinces and territories reported releases in 2018, except for Yukon.

Releases of cadmium to water from facilities

The National Pollutant Release Inventory provides detailed information on emissions and releases from industrial and commercial facilities that meet its reporting criteria.

The Canadian Environmental Sustainability Indicators provide access to this information through an interactive map. The map allows you to explore [releases of cadmium to water](#) from individual facilities.

Figure 10. Releases of cadmium to water by facility, Canada, 2018



Navigate data using the [interactive map](#)

Source: Environment and Climate Change Canada (2020) [National Pollutant Release Inventory](#).

About the indicators

What the indicators measure

These indicators track facility-based releases to water of 3 substances that are defined as toxic under the *Canadian Environmental Protection Act, 1999*: mercury, lead and cadmium and their compounds. For each substance, data are provided at the national, regional (provincial and territorial) and facility level and by source.

Why these indicators are important

Mercury and its compounds, lead and inorganic cadmium compounds are on the [Toxic substances list](#) under Schedule 1 of the *Canadian Environmental Protection Act, 1999*. This means that these substances are "entering or may enter the environment in a quantity or concentration or under conditions that (a) have or may have an immediate or long-term harmful effect on the environment or its biological diversity; (b) constitute or may constitute a danger to the environment on which life depends; or (c) constitute or may constitute a danger in Canada to human life or health."

The indicators inform Canadians about releases to water of these 3 substances from facilities in Canada. The Releases of harmful substances to water indicators also help the government to identify priorities and develop or revise strategies to inform further risk management and to track progress on policies put in place to reduce or control these 3 substances and water pollution in general.



Safe and healthy communities

These indicators support the measurement of progress towards the following [2019 to 2022 Federal Sustainable Development Strategy](#) long-term goal: All Canadians live in clean, sustainable communities that contribute to their health and well-being.

In addition, the indicators contribute to the [Sustainable Development Goals of the 2030 Agenda for Sustainable Development](#). They are linked to the 2030 Agenda's Goal 12, Responsible consumption and production and Target 12.4, "By 2020, achieve the environmentally sound management of chemicals and all wastes throughout their life cycle, in accordance with agreed international frameworks, and significantly reduce their release to air, water and soil in order to minimize their adverse impacts on human health and the environment."

Related indicators

The [Emissions of harmful substances to air](#) indicators track human-related emissions to air of 3 toxic substances, namely mercury, lead and cadmium, and their compounds. For each substance, data are provided at the national, provincial/territorial and facility level and by source. Global emissions to air are also provided for mercury.

The [Human exposure to harmful substances](#) indicators track the concentrations of 4 substances (mercury, lead, cadmium and bisphenol A) in Canadians.

Data sources and methods

Data sources

Data for the indicators and the interactive maps are taken from the [National Pollutant Release Inventory](#) (the inventory). These indicators include the amount of elemental mercury, lead and cadmium in any compound, alloy or mixture released to water as reported to the inventory based on its reporting criteria as listed in section 5.3 of the [Guide to Reporting to the National Pollutant Release Inventory 2018 and 2019](#) (PDF; 1.50 MB).

More information

The [inventory](#) is compiled by Environment and Climate Change Canada (the department), and includes releases reported by industrial, commercial and institutional facilities. It is Canada's legislated, publicly accessible inventory of pollutant releases (to air, water and land), disposals and transfers for recycling. It consists of information reported by facilities to the department under the *Canadian Environmental*

Protection Act, 1999 (the act). Under the act, owners or operators of facilities that manufacture, process or otherwise use or release one or more of the substances tracked by the inventory and that meet reporting thresholds and other requirements must report their pollutant releases annually.

Estimation of releases to water

Releases to water are estimated or measured through one of the following methods:

- continuous emission monitoring systems
- predictive emission monitoring
- source testing
- mass balance
- site-specific emission factors
- published emission factors
- engineering estimates

These measurement methods and estimation techniques are used by the facilities to report their releases (point sources) to the inventory. The [Report to the National Pollutant Release Inventory program](#) web page provides information to owners or operators of facilities required to report to the inventory, as well as details on the program's calculation methods.

Data completeness

Because the indicators are derived solely from the inventory's database, they reflect only releases from facilities that met the reporting criteria. As a result, the indicators do not include all releases in Canada. They are limited to the main point sources for each selected toxic substance.

Data timeliness

The data are current up to 2018. The indicators are reported approximately 1.5 years after data collection because of the time required for data validation, analysis and interpretation.

Methods

The indicators are produced by grouping data from the inventory to report on the key sources that contribute to the majority of mercury, lead and cadmium releases to water.

More information

Indicators coverage

Historical data are provided at the national level and by source for the period from 2003 to 2018. The year 2003 was selected as the first year for releases to water because it was the year the inventory updated its reporting criteria for mercury, lead and cadmium. For the provincial/territorial charts, releases to water are provided for 2008 and 2018. Releases of mercury, lead and cadmium to water by facility are displayed on the Canadian Environmental Sustainability Indicators' [interactive maps](#).

Source classification

Source descriptions for the indicators were taken from Statistics Canada's [North American Industry Classification System](#). The 4-digit code of the classification system, as reported by the facilities, was used for source classification for the data reported by the inventory. These sources were then classified into the following sources for reporting in the indicators:

- electric utilities
- wastewater and waste management
- manufacturing (except pulp and paper)
- mining and rock quarrying
- miscellaneous
- non-ferrous metal production and processing
- oil and gas industry
- ore and mineral industries (except non-ferrous metal production and processing)

- pulp and paper industry

Table 1 shows the allocation of sources of harmful substances reported in the indicators compared with those reported by the inventory.

Table 1. Alignment of sources reported in the Canadian Environmental Sustainability Indicators and the National Pollutant Release Inventory

| Sources in the Canadian Environmental Sustainability Indicators | Sources in the National Pollutant Release Inventory (based on the North American Industry Classification System) |
|--|---|
| Electric utilities | Electric power generation, transmission and distribution |
| Wastewater and waste management | Water, sewage and other systems |
| Wastewater and waste management | Waste collection |
| Wastewater and waste management | Waste treatment and disposal |
| Wastewater and waste management | Remediation and other waste management services |
| Manufacturing (except pulp and paper) | Forest nurseries and gathering of forest products |
| Manufacturing (except pulp and paper) | Sawmills and wood preservation |
| Manufacturing (except pulp and paper) | Veneer, plywood and engineered wood product manufacturing |
| Manufacturing (except pulp and paper) | Petroleum and coal product manufacturing |
| Manufacturing (except pulp and paper) | Basic chemical manufacturing |
| Manufacturing (except pulp and paper) | Pesticide, fertilizer and other agricultural chemical manufacturing |
| Manufacturing (except pulp and paper) | Pharmaceutical and medicine manufacturing |
| Manufacturing (except pulp and paper) | Other chemical product manufacturing |
| Manufacturing (except pulp and paper) | Rubber product manufacturing |
| Manufacturing (except pulp and paper) | Glass and glass product manufacturing |
| Manufacturing (except pulp and paper) | Cement and concrete product manufacturing |
| Manufacturing (except pulp and paper) | Forging and stamping |
| Manufacturing (except pulp and paper) | Spring and wire product manufacturing |
| Manufacturing (except pulp and paper) | Coating, engraving, cold and heat treating and allied activities |
| Manufacturing (except pulp and paper) | Other fabricated metal product manufacturing |
| Manufacturing (except pulp and paper) | Engine, turbine and power transmission equipment manufacturing |
| Manufacturing (except pulp and paper) | Semiconductor and other electronic component manufacturing |
| Manufacturing (except pulp and paper) | Electrical equipment manufacturing |
| Manufacturing (except pulp and paper) | Other electrical equipment and component manufacturing |
| Manufacturing (except pulp and paper) | Motor vehicle parts manufacturing |
| Manufacturing (except pulp and paper) | Aerospace product and parts manufacturing |

| Sources in the Canadian Environmental Sustainability Indicators | Sources in the National Pollutant Release Inventory (based on the North American Industry Classification System) |
|---|---|
| Manufacturing (except pulp and paper) | Other miscellaneous manufacturing |
| Mining and rock quarrying | Coal mining |
| Mining and rock quarrying | Metal ore mining |
| Mining and rock quarrying | Non-metallic mineral mining and quarrying |
| Miscellaneous | Support activities for water transportation |
| Miscellaneous | Other professional, scientific and technical services |
| Miscellaneous | General medical and surgical hospitals |
| Miscellaneous | Recyclable material merchant wholesalers |
| Non-ferrous metal production and processing | Non-ferrous metal (except aluminum) production and processing |
| Oil and gas industry | Oil and gas extraction |
| Ore and mineral industries (except non-ferrous metal production and processing) | Iron and steel mills and ferro-alloy manufacturing |
| Ore and mineral industries (except non-ferrous metal production and processing) | Steel product manufacturing from purchased steel |
| Ore and mineral industries (except non-ferrous metal production and processing) | Alumina and aluminum production and processing |
| Ore and mineral industries (except non-ferrous metal production and processing) | Foundries |
| Pulp and paper industry | Pulp, paper and paperboard mills |
| Pulp and paper industry | Converted paper product manufacturing |

For display purposes, sources with smaller releases are sometimes grouped together under the category "Other sources" in the figures and corresponding data tables of releases by source. The grouped sources may differ by substance and are listed in the notes of each figure and data table.

Recent changes

The non-ferrous smelting and refining industry source in the Canadian Environmental Sustainability Indicators was changed to non-ferrous metal production and processing to be more inclusive. Under the North American Industry Classification System, non-ferrous metal (except aluminum) production and processing includes 2 sectors: non-ferrous (except aluminum) smelting and refining and non-ferrous metal (except copper and aluminum) rolling, drawing, extruding and alloying.

Caveats and limitations

The indicators reflect only facility-based releases to water as reported to the inventory. They do not include estimates of releases from other sources, such as runoff from cities, transboundary pollution or from consumer products in Canada.

Occasional updates and data quality checking can be done after initial release of the inventory.

The number and composition of facilities that report releases to water to the inventory vary each year. This variation is due to the fact that only facilities that meet or exceed the reporting threshold are required to report. An analysis of how this might affect the apparent trends has not been undertaken.

Facilities reporting to the inventory may use different methods to calculate releases. These methods vary depending on the substance and/or facility, and may also change from year to year.

Resources

References

Environment and Climate Change Canada (2017) [Using and interpreting data from the National Pollutant Release Inventory](#). Retrieved on December 30, 2020.

Environment and Climate Change Canada (2018) [Study to gather use pattern information on lead sinkers and jigs and their non-lead alternatives in Canada](#). Retrieved on December 30, 2020.

Environment and Climate Change Canada (2020) [Bulk data files for all years – releases, disposals, transfers and facility locations](#). Retrieved on December 30, 2020.

Related information

[NPRI sector overview: Aluminium](#)

[NPRI sector overview: Electricity](#)

[NPRI sector overview: Metal ore mining](#)

[NPRI sector overview: Oil sands extraction](#)

[NPRI sector overview: Wastewater](#)

Annex

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

Table A.1. Data for Figure 1. Releases of mercury, lead and cadmium to water, Canada, 2003 to 2018

| Year | Mercury (percentage change from 2003 level) | Lead (percentage change from 2003 level) | Cadmium (percentage change from 2003 level) |
|------|--|---|--|
| 2003 | 0 | 0 | 0 |
| 2004 | -11 | -14 | -6 |
| 2005 | 41 | -13 | -31 |
| 2006 | -10 | -21 | -24 |
| 2007 | -33 | -41 | -24 |
| 2008 | -45 | -14 | -49 |
| 2009 | -10 | -32 | -35 |
| 2010 | -32 | -22 | -45 |
| 2011 | -6 | -29 | -44 |
| 2012 | -53 | -42 | -44 |
| 2013 | -44 | -47 | -44 |
| 2014 | 518 | 499 | 28 |
| 2015 | -70 | -61 | -55 |
| 2016 | -57 | -63 | -51 |
| 2017 | -68 | -62 | -46 |
| 2018 | -67 | -56 | -43 |

Note: The indicator reports facility-based releases only. This table accounts only for the releases to water reported in the National Pollutant Release Inventory based on the inventory reporting criteria for releases of mercury, lead and cadmium and their compounds. These amounts should not be interpreted as comprehensive totals of releases to water of these pollutants in Canada.

Source: Environment and Climate Change Canada (2020) [National Pollutant Release Inventory](#).

Table A.2. Data for Figure 2. Mercury releases to water by source, Canada, 2003 to 2018

| Year | Wastewater and waste management (releases to water in kilograms) | Non-ferrous metal production and processing (releases to water in kilograms) | Mining and rock quarrying (releases to water in kilograms) | Pulp and paper industry (releases to water in kilograms) | Other sources (releases to water in kilograms) | Total (releases to water in kilograms) |
|------|---|---|---|---|---|---|
| 2003 | 303.4 | 14.1 | 0.2 | 23.9 | 34.3 | 375.8 |
| 2004 | 270.3 | 13.3 | 7.1 | 16.9 | 25.3 | 333.0 |
| 2005 | 434.2 | 53.4 | 0.2 | 14.0 | 28.5 | 530.3 |
| 2006 | 225.7 | 61.6 | 3.1 | 26.0 | 20.6 | 337.0 |
| 2007 | 167.1 | 31.2 | 3.9 | 25.4 | 23.3 | 251.0 |
| 2008 | 146.8 | 10.7 | 3.2 | 22.8 | 24.5 | 208.0 |
| 2009 | 163.6 | 9.4 | 16.2 | 83.6 | 65.8 | 338.7 |
| 2010 | 136.5 | 23.3 | 4.6 | 70.5 | 21.4 | 256.2 |
| 2011 | 173.6 | 9.3 | 90.2 | 68.2 | 13.2 | 354.5 |
| 2012 | 100.3 | 5.9 | 17.0 | 43.9 | 9.1 | 176.0 |

| Year | Wastewater and waste management (releases to water in kilograms) | Non-ferrous metal production and processing (releases to water in kilograms) | Mining and rock quarrying (releases to water in kilograms) | Pulp and paper industry (releases to water in kilograms) | Other sources (releases to water in kilograms) | Total (releases to water in kilograms) |
|------|--|--|--|--|--|--|
| 2013 | 123.6 | 8.5 | 38.6 | 34.6 | 6.2 | 211.5 |
| 2014 | 87.4 | 10.4 | 2 174.4 | 47.8 | 1.4 | 2 321.4 |
| 2015 | 77.9 | 5.5 | 5.1 | 21.7 | 1.6 | 111.8 |
| 2016 | 83.5 | 30.7 | 12.5 | 21.2 | 12.2 | 160.0 |
| 2017 | 81.8 | 12.0 | 6.8 | 19.3 | 0.7 | 120.6 |
| 2018 | 80.8 | 14.3 | 14.2 | 11.3 | 1.8 | 122.5 |

Note: Totals may not add up due to rounding. The indicator reports facility-based releases only. The indicator includes the amount of elemental mercury and mercury in any compound, alloy or mixture reported in the National Pollutant Release Inventory based on the inventory reporting criteria. As a result, the reported mercury releases to water account for only a portion of the releases of this toxic pollutant to water in Canada. Other sources include electric utilities, manufacturing (except pulp and paper), the oil and gas industry, ore and mineral industries (except non-ferrous metal production and processing) and other miscellaneous sources. For more details on sources, please consult the [Data sources and methods](#).

Source: Environment and Climate Change Canada (2020) [National Pollutant Release Inventory](#).

Table A.3. Data for Figure 3. Mercury releases to water by province and territory, Canada, 2008 and 2018

| Province or territory | 2008 (releases to water in kilograms) | 2018 (releases to water in kilograms) |
|---------------------------|---------------------------------------|---------------------------------------|
| Newfoundland and Labrador | < 0.1 | 0.1 |
| Prince Edward Island | n/a | n/a |
| Nova Scotia | n/a | < 0.1 |
| New Brunswick | 12.2 | 2.6 |
| Quebec | 53.5 | 25.9 |
| Ontario | 60.0 | 26.7 |
| Manitoba | 0.2 | 0.4 |
| Saskatchewan | n/a | < 0.1 |
| Alberta | 42.5 | 35.0 |
| British Columbia | 39.6 | 31.6 |
| Yukon | n/a | n/a |
| Northwest Territories | n/a | 0.2 |
| Nunavut | n/a | n/a |
| Canada | 208.0 | 122.5 |

Note: n/a = not available, it indicates that the province or territory has no reported releases. Totals may not add up due to rounding. The indicator reports facility-based releases only. The indicator includes the amount of elemental mercury and mercury in any compound, alloy or mixture reported in the National Pollutant Release Inventory based on the inventory reporting criteria. As a result, the reported mercury releases to water represent only a portion of the releases of this toxic pollutant to water in Canada.

Source: Environment and Climate Change Canada (2020) [National Pollutant Release Inventory](#).

Table A.4. Data for Figure 5. Lead releases to water by source, Canada, 2003 to 2018

| Year | Wastewater and waste management (releases to water in kilograms) | Pulp and paper industry (releases to water in kilograms) | Other sources (releases to water in kilograms) | Non-ferrous metal production and processing (releases to water in kilograms) | Mining and rock quarrying (releases to water in kilograms) | Total (releases to water in kilograms) |
|------|--|--|--|--|--|--|
| 2003 | 15 486.5 | 2 583.0 | 1 901.7 | 2 253.9 | 2 112.9 | 24 338.1 |
| 2004 | 11 526.4 | 2 886.4 | 1 630.2 | 2 881.1 | 1 924.9 | 20 849.1 |
| 2005 | 9 472.4 | 3 340.5 | 1 964.1 | 2 778.4 | 3 712.7 | 21 268.0 |
| 2006 | 9 899.8 | 2 365.4 | 1 568.8 | 1 874.6 | 3 427.8 | 19 136.3 |
| 2007 | 6 417.4 | 2 370.8 | 1 395.0 | 1 819.4 | 2 251.7 | 14 254.4 |
| 2008 | 11 582.8 | 2 424.5 | 1 492.5 | 2 194.1 | 3 271.5 | 20 965.5 |
| 2009 | 8 489.6 | 2 252.7 | 1 954.3 | 2 148.8 | 1 611.0 | 16 456.4 |
| 2010 | 11 973.3 | 2 116.5 | 1 938.1 | 1 526.6 | 1 339.1 | 18 893.6 |
| 2011 | 8 990.8 | 2 908.8 | 1 886.3 | 1 518.9 | 1 876.0 | 17 180.8 |
| 2012 | 4 698.6 | 2 864.8 | 1 642.4 | 1 773.6 | 3 074.4 | 14 053.8 |
| 2013 | 4 660.3 | 2 423.3 | 1 905.9 | 1 483.6 | 2 388.7 | 12 861.9 |
| 2014 | 5 114.7 | 1 849.4 | 1 417.6 | 1 768.1 | 135 559.6 | 145 709.4 |
| 2015 | 4 395.9 | 1 637.9 | 1 236.7 | 1 336.7 | 996.7 | 9 603.9 |
| 2016 | 3 979.1 | 1 556.9 | 855.2 | 1 524.2 | 1 041.8 | 8 957.2 |
| 2017 | 4 428.6 | 1 431.0 | 1 130.8 | 1 107.5 | 1 071.6 | 9 169.0 |
| 2018 | 4 623.1 | 2 999.6 | 1 347.4 | 1 114.2 | 736.1 | 10 820.3 |

Note: Totals may not add up due to rounding. The indicator reports facility-based releases only. The indicator includes the amount of elemental lead and lead in any compound, alloy or mixture reported in the National Pollutant Release Inventory based on the inventory reporting criteria. As a result, the reported lead releases to water account for only a portion of the releases of this toxic pollutant to water in Canada. Other sources include electric utilities, manufacturing (except pulp and paper), the oil and gas industry, ore and mineral industries (except non-ferrous metal production and processing) and other miscellaneous sources. For more details on sources, please consult the [Data sources and methods](#).

Source: Environment and Climate Change Canada (2020) [National Pollutant Release Inventory](#).

Table A.5. Data for Figure 6. Lead releases to water by province and territory, Canada, 2008 and 2018

| Province or territory | 2008 (releases to water in kilograms) | 2018 (releases to water in kilograms) |
|---------------------------|---------------------------------------|---------------------------------------|
| Newfoundland and Labrador | 2 175.4 | 74.5 |
| Prince Edward Island | n/a | 11.6 |
| Nova Scotia | 8.5 | 0.3 |
| New Brunswick | 977.4 | 711.0 |
| Quebec | 3 408.4 | 3 961.6 |
| Ontario | 10 162.6 | 2 916.9 |
| Manitoba | 287.2 | 91.8 |
| Saskatchewan | 61.7 | 28.9 |
| Alberta | 666.7 | 160.2 |
| British Columbia | 3 215.7 | 2 524.0 |
| Yukon | n/a | n/a |

| Province or territory | 2008 (releases to water in kilograms) | 2018 (releases to water in kilograms) |
|-----------------------|--|--|
| Northwest Territories | 2.0 | 339.2 |
| Nunavut | n/a | 0.3 |
| Canada | 20 965.5 | 10 820.3 |

Note: n/a = not available, it indicates that the province or territory has no reported releases. Totals may not add up due to rounding. The indicator reports facility-based releases only. The indicator includes the amount of elemental lead and lead in any compound, alloy or mixture reported in the National Pollutant Release Inventory based on the inventory reporting criteria. As a result, the reported lead releases to water represent only a portion of the releases of this toxic pollutant to water in Canada.

Source: Environment and Climate Change Canada (2020) [National Pollutant Release Inventory](#).

Table A.6. Data for Figure 8. Cadmium releases to water by source, Canada, 2003 to 2018

| Year | Wastewater and waste management (releases to water in kilograms) | Pulp and paper industry (releases to water in kilograms) | Mining and rock quarrying (releases to water in kilograms) | Non-ferrous metal production and processing (releases to water in kilograms) | Other sources (releases to water in kilograms) | Total (releases to water in kilograms) |
|------|---|---|---|---|---|---|
| 2003 | 3 194.7 | 1 012.2 | 179.8 | 426.4 | 129.6 | 4 942.8 |
| 2004 | 2 258.1 | 957.7 | 423.0 | 867.8 | 136.2 | 4 642.7 |
| 2005 | 1 390.6 | 931.1 | 400.3 | 454.0 | 228.8 | 3 404.7 |
| 2006 | 1 450.8 | 1 076.4 | 514.6 | 435.3 | 266.9 | 3 744.0 |
| 2007 | 1 113.3 | 1 104.2 | 395.8 | 877.7 | 263.8 | 3 754.8 |
| 2008 | 977.0 | 766.1 | 52.7 | 394.8 | 346.4 | 2 536.9 |
| 2009 | 1 259.9 | 710.4 | 367.9 | 365.4 | 509.3 | 3 212.8 |
| 2010 | 1 211.2 | 704.5 | 186.3 | 289.0 | 344.7 | 2 735.8 |
| 2011 | 1 356.3 | 777.4 | 134.5 | 321.5 | 201.8 | 2 791.5 |
| 2012 | 1 233.2 | 823.7 | 158.9 | 327.0 | 200.9 | 2 743.8 |
| 2013 | 902.2 | 1 095.6 | 268.0 | 352.2 | 145.9 | 2 763.8 |
| 2014 | 968.0 | 941.5 | 4 001.7 | 319.5 | 107.9 | 6 338.6 |
| 2015 | 976.7 | 770.0 | 114.7 | 287.3 | 83.8 | 2 232.5 |
| 2016 | 1 129.4 | 784.9 | 110.4 | 314.1 | 103.3 | 2 442.1 |
| 2017 | 1 248.0 | 809.6 | 236.9 | 282.2 | 116.4 | 2 693.2 |
| 2018 | 1 204.0 | 763.2 | 503.7 | 229.6 | 130.4 | 2 830.9 |

Note: Totals may not add up due to rounding. The indicator reports facility-based releases only. The indicator includes the amount of elemental cadmium and cadmium in any compound, alloy or mixture reported in the National Pollutant Release Inventory based on the inventory reporting criteria. As a result, the reported cadmium releases to water account for only a portion of the releases of this toxic pollutant to water in Canada. Other sources include electric utilities, manufacturing (except pulp and paper), the oil and gas industry, ore and mineral industries (except non-ferrous metal production and processing) and other miscellaneous sources. For more details on sources, please consult the [Data sources and methods](#).

Source: Environment and Climate Change Canada (2020) [National Pollutant Release Inventory](#).

Table A.7. Data for Figure 9. Cadmium releases to water by province and territory, Canada, 2008 and 2018

| Province or territory | 2008 (releases to water in kilograms) | 2018 (releases to water in kilograms) |
|---------------------------|--|--|
| Newfoundland and Labrador | 2.9 | 4.2 |
| Prince Edward Island | n/a | 15.9 |

| Province or territory | 2008 (releases to water in kilograms) | 2018 (releases to water in kilograms) |
|-----------------------|--|--|
| Nova Scotia | 8.3 | 0.4 |
| New Brunswick | 277.4 | 119.8 |
| Quebec | 698.1 | 459.1 |
| Ontario | 630.9 | 1 034.7 |
| Manitoba | 90.0 | 221.3 |
| Saskatchewan | 19.8 | 0.8 |
| Alberta | 214.2 | 144.1 |
| British Columbia | 595.3 | 829.5 |
| Yukon | n/a | n/a |
| Northwest Territories | n/a | 1.0 |
| Nunavut | n/a | < 0.1 |
| Canada | 2 536.9 | 2 830.9 |

Note: n/a = not available, it indicates that the province or territory has no reported releases. Totals may not add up due to rounding. The indicator reports facility-based releases only. The indicator includes the amount of elemental cadmium and cadmium in any compound, alloy or mixture reported in the National Pollutant Release Inventory based on the inventory reporting criteria. As a result, the reported cadmium releases to water represent only a portion of the releases of this toxic pollutant to water in Canada.

Source: Environment and Climate Change Canada (2020) [National Pollutant Release Inventory](#).

Additional information can be obtained at:

Environment and Climate Change Canada
Public Inquiries Centre
12th Floor Fontaine Building
200 Sacré-Coeur Blvd
Gatineau QC K1A 0H3
Telephone: 1-800-668-6767 (in Canada only) or 819-938-3860
Fax: 819-938-3318
Email: ec.enviroinfo.ec@canada.ca