



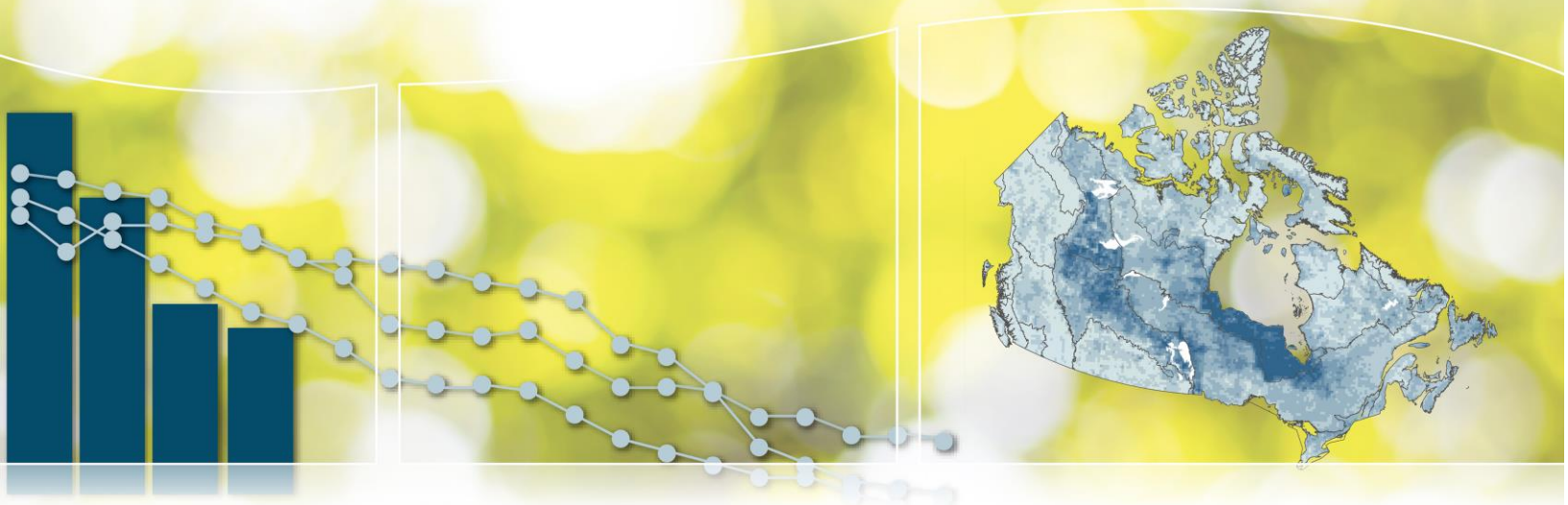
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Canadian Environmental Sustainability Indicators

First Nations Water and Wastewater System Risk



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Canadian Environmental Sustainability Indicators

First Nations Water and Wastewater System Risk

April 2016

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Part 1. First Nations Water and Wastewater System Risk Indicator

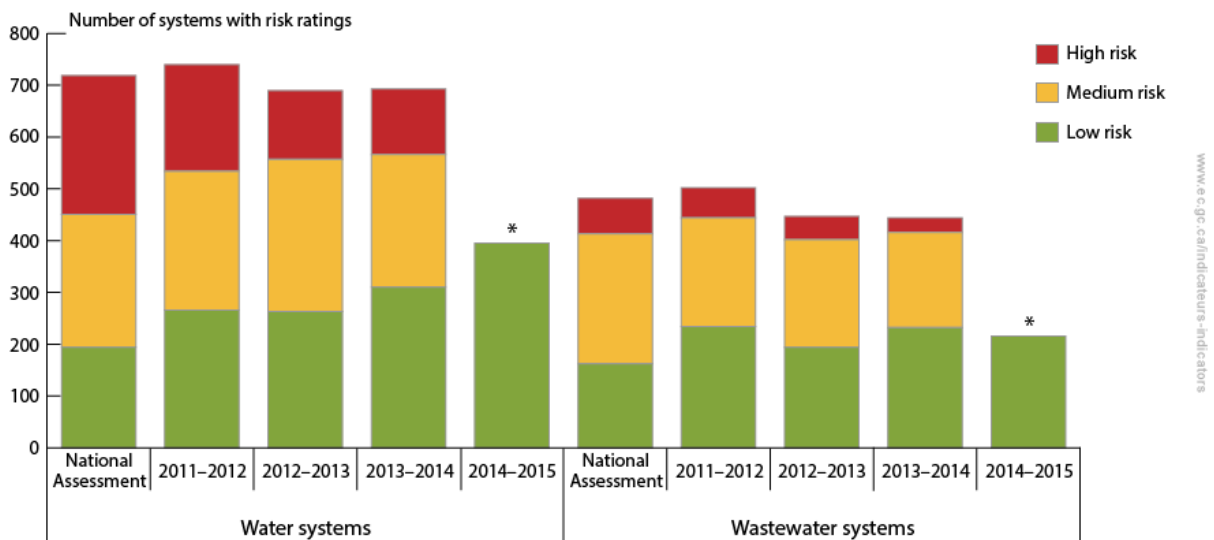
Indigenous and Northern Affairs Canada (INAC) conducts annual performance inspections (APIs) to determine the risk levels of INAC-funded water and wastewater systems. A First Nations water or wastewater system receives a low-risk rating if its inspection reveals a low chance of producing unsafe drinking water or poorly treated wastewater; such a system should be able to continue working effectively even if problems occur. A high-risk system might produce water or wastewater of equal quality to that of a low-risk system, but might not be capable of responding adequately in the event of a problem; for example, if short-term source water contamination were to occur due to flooding, the operation of a low-risk system should be able to tackle the problem with minimal service interruption, whereas a high-risk system may not.

Of the 699 INAC-funded First Nations water systems requiring inspections in 2014–2015, 395 (57%) were found to have a low risk of producing unsafe drinking water in the event of a problem, compared to 194 of 719 (27%) water systems inspected during the National Assessment.¹ Similarly, 216 of 446 (48%) INAC-funded First Nations wastewater systems requiring inspections in 2014–2015 were found to be at low risk of releasing poorly treated wastewater in the event of a problem, compared to 162 of 482 (34%) wastewater systems inspected during the National Assessment.

Between the National Assessment and 2013–2014 (the latest time period for which detailed data are available), the percentage of high-risk water systems has decreased to 18% (127 of 693 systems) from 37% (268 of 719 systems), and the percentage of high-risk wastewater systems has decreased to 6% (28 of 444 systems) from 14% (69 of 482 systems). Over the same period, the percentage of medium-risk water systems has remained relatively stable from 36% (257 of 719 systems) to 37% (256 of 693 systems), and the percentage of medium-risk wastewater systems has decreased from 52% (251 of 482 systems) to 41% (184 of 444 systems).

¹ Data collection for the National Assessment of all water and wastewater systems was carried out from 2009 to 2011.

Figure 1. Risk ratings for inspected Indigenous and Northern Affairs Canada-funded First Nations water and wastewater systems, Canada, from the National Assessment to 2014–2015



[Data for Figure 1](#)

Note: *Data on the number of medium- and high-risk systems for 2014–2015 are not publicly available. Data collection for the National Assessment of all water and wastewater systems was carried out from 2009 to 2011. The quality of drinking water or treated wastewater produced by a system is just one part of its risk rating. A high-risk system might produce water of equal quality to that of a low-risk system but be unlikely to respond adequately in the event of a problem.

Source: Neegan Burnside (2011) [National Assessment of First Nations Water and Wastewater Systems](#). Aboriginal Affairs and Northern Development Canada (2012) [Water and Wastewater Infrastructure Report – April 2010 – March 2012](#). Aboriginal Affairs and Northern Development Canada (2014) [Water and Wastewater Infrastructure Investment Report: April 2012 – March 2013](#). Aboriginal Affairs and Northern Development Canada (2014) [2013–2014 Departmental Performance Report – Aboriginal Affairs and Northern Development Canada and Canadian Polar Commission](#). Indigenous and Northern Affairs Canada (2016) [2014–15 Departmental Performance Report – Aboriginal Affairs and Northern Development Canada and Canadian Polar Commission](#).

Indigenous and Northern Affairs Canada provides financial assistance to First Nations for the planning, design, acquisition, construction, operation and maintenance of water and wastewater systems on reserves. For water and wastewater systems funded by INAC, and as defined in INAC protocols, APIs are required. While conducting these inspections, INAC uses pre-defined criteria to assign a risk rating to each system, which identifies system deficiencies and the system's ability to produce clean water or effectively treat wastewater should a problem arise. The results from APIs are further used to develop action plans to address noted deficiencies in the inspected systems and to help prioritize risk mitigation activities.

Risk ratings for water and wastewater systems are based on inspection components:

- Source water risk (drinking water systems) or effluent risk (wastewater systems)
- Design risk
- Operation and maintenance risk
- Record-keeping and reporting risk
- Operator risk

For further details on risk ratings for water and wastewater systems in First Nations communities, please consult the [Fact Sheet – Risk Assessment of Water and Wastewater Systems in First Nations Communities](#).



This indicator is used to measure progress toward [Target 3.1: On-Reserve First Nations Water and Wastewater Systems – Increase the percent of on-reserve First Nations water systems with low risk ratings from 27% to 50% by 2015; increase the percent of on-reserve First Nations wastewater systems with low risk ratings from 35% to 70% by 2015](#) of the [Federal Sustainable Development Strategy 2013–2016](#).

Part 2. Data Sources and Methods for the First Nations Water and Wastewater System Risk Indicator

Introduction

The [First Nations Water and Wastewater System Risk](#) indicator is part of the [Canadian Environmental Sustainability Indicators](#) (CESI) program, which provides data and information to track Canada's performance on key environmental sustainability issues. This indicator is also used to measure progress towards the goals and targets of the [Federal Sustainable Development Strategy 2013–2016](#).

Description and rationale of the First Nations Water and Wastewater System Risk indicator

Description

The First Nations Water and Wastewater System Risk indicator tracks the risk associated with First Nations management of on-reserve systems that are funded by Indigenous and Northern Affairs Canada (INAC). The risk rating is a measure of the overall risk associated with the system and identifies the system's deficiencies and its ability to produce clean water or effectively treat wastewater should a problem arise. When a system is assessed as low risk, it indicates the system is managed and operated in a manner that is at a low risk of producing unsafe drinking water or poorly treated wastewater in the event of a problem. By contrast, although some systems identified as high risk are providing safe water to communities, they are more likely to be overwhelmed by extreme conditions.

Rationale

Human and ecosystem health in First Nations communities rely on effective water and wastewater treatment. In this regard, INAC aims for improvements to First Nations water and wastewater systems, such that 50% of water systems and 70% of wastewater systems are characterized as low risk by 2015.

Data

Data source

The National Assessment data for this indicator are taken from the [National Assessment of First Nations Water and Wastewater Systems](#) conducted from 2009 to 2011. The 2011–2012 and 2012–2013 data sets were extracted from their respective Water and Wastewater Infrastructure Investment Reports, while the 2013–2014 and 2014–2015 data were extracted from Indigenous and Northern Affairs Canada's (INAC) 2013–2014 and 2014–2015 Departmental Performance Report.

Spatial coverage

This indicator reports results for INAC-funded First Nations water and wastewater systems on reserves across Canada, which exclude systems belonging to individuals, self-governing and modern-treaty First Nations, municipalities that provide services to First Nations communities, and systems in Nunavut and the Northwest Territories.

Temporal coverage

Data cover the 2009–2011 period and annual inspections from 2011–2012 to 2014–2015.

Data completeness

Each year, all INAC-funded water and wastewater systems are subject to an Annual Performance Inspection (API). However, the overall number of systems actually inspected varies slightly from year to year due to eligibility criteria or conditions that determine if, or to what extent, a system is subject to an inspection. For example, brand-new systems or freshly renovated systems may not be subject to an inspection. This section describes system inspections coverage over the past five years.

The National Assessment of First Nations Water and Wastewater Systems:²

Of Canada's 587 First Nations communities on reserves, 571 (approximately 97%) participated in the National Assessment. Four First Nations communities chose not to participate; and 12 have no active infrastructure on reserve lands, due to recent or on-going land-claim settlements.

In 2009–2011, there were 807 water systems serving 560 of the participating First Nations communities, while 11 communities were serviced by individual water supplies. Similarly, there were 532 wastewater systems serving 418 participating First Nations communities, with the remaining 153 communities serviced by individual septic systems.

A number of the water and wastewater systems inspected during the National Assessment are no longer included in this indicator, because they are:

- systems for which INAC does not provide direct funding;
- systems owned by self-governing and modern-treaty First Nations;
- private systems; or
- small septic systems.

As a result, the National Assessment baseline includes 771 water systems and 519 wastewater treatment systems. Of these, 52 water systems and 37 wastewater systems were less than two years old and did not require inspection. In total, the risk ratings for 719 water and 482 wastewater systems requiring inspection were included.

2011–2012 Annual Performance Inspection Cycle:³

In 2011–2012, INAC conducted APIs of First Nations water and wastewater systems as required under its protocols for federally funded water and wastewater systems.

A total of 771 water systems and 519 wastewater treatment systems were identified for inspection in 2011–2012. Of these systems, 31 water systems and 17 wastewater systems were less than two years old, thus not requiring inspection. In total, the risk ratings for 740 water systems and 502 wastewater systems requiring inspection were included.

² Neegan Burnside (2011) [National Assessment of First Nations Water and Wastewater Systems](#). Retrieved on January 29, 2016.

³ Aboriginal Affairs and Northern Development Canada (2012) [Water and Wastewater Infrastructure Report – April 2010 – March 2012](#). Retrieved on January 29, 2016.

2012–2013 Annual Performance Inspection Cycle:⁴

During the 2012–2013 API, 691 water systems and 449 wastewater treatment systems were identified for inspection. Of these systems, one water system and two wastewater systems were less than two years old, thus not requiring inspection. In total, the risk ratings for 690 water systems and 447 wastewater systems requiring inspection were included.

2013–2014 Annual Performance Inspection Cycle:⁵

During the 2013–2014 API, 698 water systems and 449 wastewater treatment systems were identified for inspection. Of these systems, one water system and one wastewater system were less than two years old, thus not requiring inspection, and four water systems and four wastewater systems were not inspected. In total, the risk ratings for 693 water systems and 444 wastewater systems requiring inspection were included.

2014–2015 Annual Performance Inspection Cycle:⁶

During the 2014–2015 API, 702 water systems and 449 wastewater treatment systems were identified for inspection. Of these systems, three water systems and three wastewater systems were not inspected. In total, the risk ratings for 699 water systems and 446 wastewater systems requiring inspection were included.

Data timeliness

The First Nations Water and Wastewater System Risk indicator was calculated using the most recent data available at the time of this report's production.

Methods

The indicator presents the number of Indigenous and Northern Affairs Canada (INAC) funded First Nations water and wastewater systems, and their risk ratings in relation to the number of systems requiring inspection. The same risk assessment tool was used for inspections carried out in other years.

A risk assessment was completed for each water and wastewater system according to INAC's [risk level guidance for water and wastewater systems](#). In the risk assessments, scores from 1 (lowest risk) to 10 (highest risk) were given for each of the following components, weighted according to the percentages listed in the table below:

⁴ Aboriginal Affairs and Northern Development Canada (2014) [Water and Wastewater Infrastructure Investment Report: April 2012 – March 2013](#). Retrieved on January 29, 2016.

⁵ Aboriginal Affairs and Northern Development Canada (2014) [2013–2014 Departmental Performance Report – Aboriginal Affairs and Northern Development Canada and Canadian Polar Commission](#). Retrieved on January 29, 2016.

⁶ Indigenous and Northern Affairs Canada (2016) [2014–2015 Departmental Performance Report – Aboriginal Affairs and Northern Development Canada and Canadian Polar Commission](#). Retrieved on January 29, 2016.

Table 1. Weighting applied to each component in calculation of system management risk scores

Component	Percentage weighting for water systems	Percentage weighting for wastewater systems
Quality and quantity of water source	10%	n/a
Ability of receiving water body to handle wastewater discharge	n/a	20%
Design of the system	30%	25%
Operation of the system	30%	25%
Recording and reporting of data	10%	10%
Training and certification of operators	20%	20%

Note: n/a = not applicable.

Systems were rated as low-, medium- or high-risk based on their scores:

- Low-risk (scores 1.0–4.0): Minor or no deficiencies observed for the system or its management. Should a problem occur, it is likely the system and associated management would react properly and would continue to provide safe water or wastewater services while the issue is being resolved.
- Medium-risk (scores 4.1–7.0): Minor deficiencies observed in several components or major deficiencies observed in one or two components. Should a problem arise, the system and associated management could be sufficient to address the problem, but the noted deficiencies could also hinder a proper response, and thus there is a medium probability that any problem could lead to unsafe water or wastewater. Issues need to be addressed.
- High-risk (scores 7.1–10): Major deficiencies observed in most of the components. Should a problem arise, the system and associated management would unlikely be able to properly respond, and thus there is a high probability that any problem could result in unsafe water or wastewater. Management and operation issues should be addressed as soon as possible.

Caveats and limitations

The risk referred to in this indicator is based on overall risk associated with system management and operation. Water or wastewater quality is included in the overall system management risk under the operation and maintenance component. A high-risk system might produce water or wastewater of equal quality to that of a low-risk system, but might not be capable of responding adequately in the event of a problem. For example, if short-term source water contamination were to occur due to flooding, the operation of a low-risk system should be able to tackle the problem with minimal service interruption, whereas a high-risk system may not.

Part 3. Annexes

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

Table A.1. Data for Figure 1. Risk ratings for inspected Indigenous and Northern Affairs Canada-funded First Nations water and wastewater systems, Canada, from the National Assessment to 2014–2015

System type	Year	Number of inspected INAC-funded systems	Number of low-risk systems	Number of medium-risk systems	Number of high-risk systems
Water	National Assessment ^[A]	719	194	257	268
Water	2011–2012	740	266	268	206
Water	2012–2013	690	263	294	133
Water	2013–2014	693	310	256	127
Water	2014–2015	699	395	n/a ^[B]	n/a ^[B]
Wastewater	National Assessment ^[A]	482	162	251	69
Wastewater	2011–2012	502	234	210	58
Wastewater	2012–2013	447	194	208	45
Wastewater	2013–2014	444	232	184	28
Wastewater	2014–2015	446	216	n/a ^[B]	n/a ^[B]

Note: Data collection for the National Assessment of all water and wastewater systems was carried out from 2009 to 2011. The quality of drinking water or treated wastewater produced by a system is just one part of its risk rating. A high-risk system might produce water of equal quality to that of a low-risk system but be unlikely to respond adequately in the event of a problem.

^[A] Data collection for the National Assessment of all water and wastewater systems was carried out from 2009 to 2011.

^[B] n/a = not publicly available.

Source: Neegan Burnside (2011) [National Assessment of First Nations Water and Wastewater Systems](#). Aboriginal Affairs and Northern Development Canada (2012) [Water and Wastewater Infrastructure Report – April 2010 – March 2012](#). Aboriginal Affairs and Northern Development Canada (2014) [Water and Wastewater Infrastructure Investment Report: April 2012 – March 2013](#). Aboriginal Affairs and Northern Development Canada (2014) [2013–2014 Departmental Performance Report – Aboriginal Affairs and Northern Development Canada and Canadian Polar Commission](#). Indigenous and Northern Affairs Canada (2016) [2014–15 Departmental Performance Report – Aboriginal Affairs and Northern Development Canada and Canadian Polar Commission](#).

Annex B. References and additional information

References and further reading

Aboriginal Affairs and Northern Development Canada (2011) [Water and Wastewater Infrastructure – Investment Report April 2006 – March 2010](#). Retrieved on January 29, 2016.

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Indigenous and Northern Affairs Canada (2011) [First Nations Water and Wastewater Action Plan](#). Retrieved on January 29, 2016.

Indigenous and Northern Affairs Canada (2014) [2013–2014 Departmental Performance Report – Indigenous and Northern Affairs Canada and Canadian Polar Commission](#). Retrieved on January 29, 2016.

Indigenous and Northern Affairs Canada (2016) [2014–2015 Departmental Performance Report – Aboriginal Affairs and Northern Development Canada and Canadian Polar Commission](#). Retrieved on January 29, 2016.

Neegan Burnside (2011) [National Assessment of First Nations Water and Wastewater Systems](#). Retrieved on January 29, 2016.

Related information

[First Nations Water and Wastewater Action Plan](#)

[National Assessment of First Nations Water and Wastewater Systems – 2009–2011](#)

www.ec.gc.ca

Additional information can be obtained at:

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