



Canadian Environmental Sustainability Indicators

Extent of Canada's Wetlands



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Extent of Canada's Wetlands

July 2016

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Part 1. Extent of Canada's Wetlands Indicator

Wetlands are among Earth's most productive ecosystems. They provide numerous ecosystem services and support a disproportionately high number of species, including species at risk and significant numbers of migratory birds, fish, amphibians, a wide diversity of plants, and many other species.

Canada has about 1.29 million km² of wetlands, covering 13% of Canada's terrestrial¹ area. This is close to one quarter of the world's remaining wetlands.² Where wetlands have been monitored, they generally show declines in extent due to conversion to agriculture and other development.³

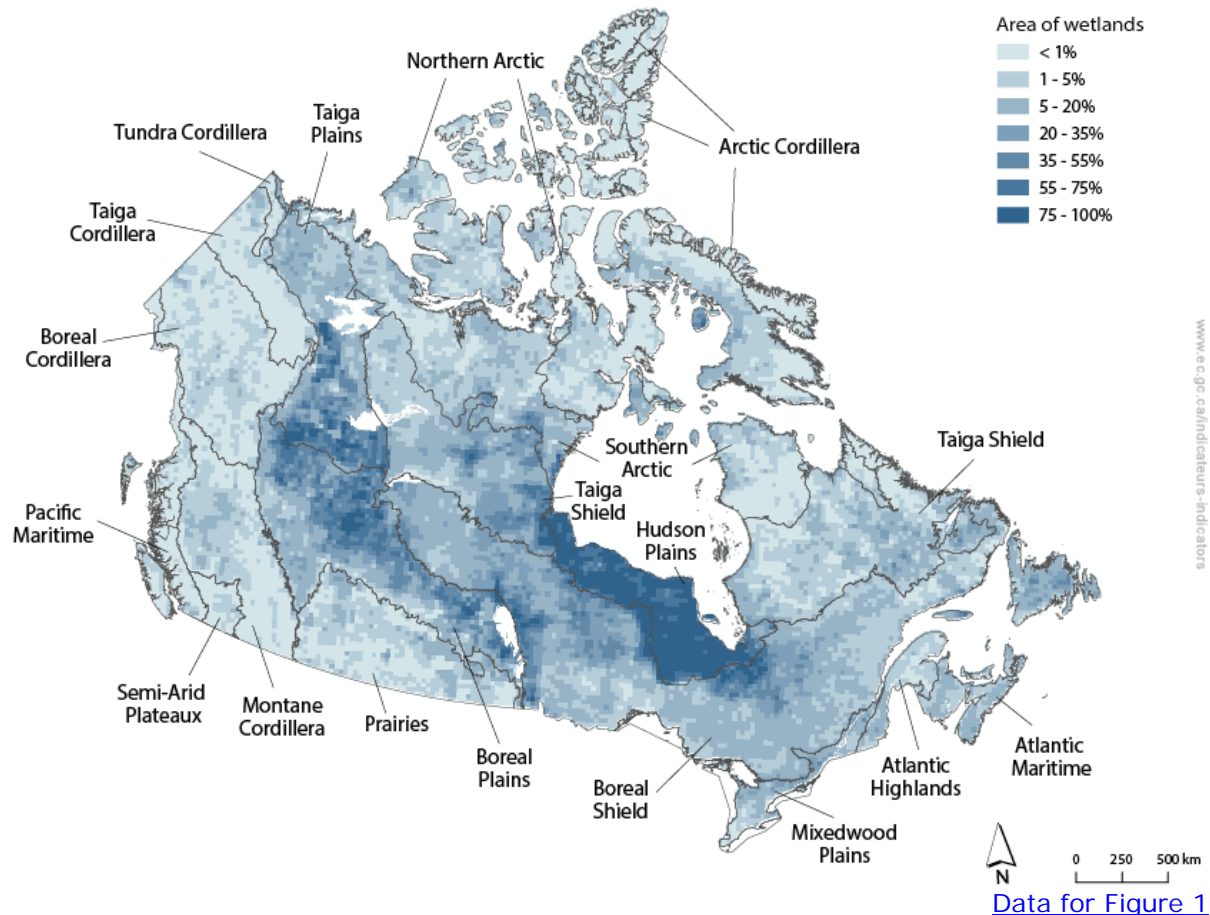
Most of Canada's wetlands occur in the Boreal Shield (25% of Canadian wetland area), Hudson Plains (21%) and Boreal Plains (18%). Wetlands form almost 80% of the Hudson Plains, and very low proportions of mountainous regions such as the Arctic Cordillera (less than 0.5%) and Montane Cordillera (less than 2%).

¹ Includes land and freshwater area.

² National Wetlands Working Group (1997) The Canadian Wetland Classification System. 2nd edition. Edited by BG Warner and CDA Rubec. The Wetlands Research Centre, University of Waterloo, Waterloo, Ontario. Available through the [Peatland Ecology Research Group](#). Retrieved on December 31, 2013.

³ Federal, Provincial and Territorial Governments of Canada (2010) [Canadian Biodiversity: Ecosystem Status and Trends 2010. Wetlands key findings](#). Retrieved on November 6, 2014.

Figure 1. Wetland extent, Canada, circa 2000⁴



[Data for Figure 1](#)

Note: Mapped values are the proportion of wetland in each 25 km by 25 km grid cell.

Source: Canadian Wildlife Service, 2016.

Wetlands can be defined as "areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt."⁵ Alternatively, a wetland can be defined by its function, as land that is saturated with water long enough to promote aquatic processes.⁶ Many types of wetlands are included within these definitions, but familiar examples include bogs, fens, marshes, swamps, and ponds.

Wetlands are valuable ecosystems. They support a disproportionately high number of species and are often very productive. Wetlands provide a range of benefits to people. Such "ecosystem services," include purifying water and removing pollutants, buffering water flows during times of flood or drought, capturing and storing carbon from the atmosphere, and providing places to watch wildlife and reconnect with the natural environment.

⁴ Contributing data sources span the late 1990s to 2014.

⁵ [Ramsar Convention definition](#). Note that marine wetlands are not included in this indicator.

⁶ National Wetlands Working Group (1997) *The Canadian Wetland Classification System*. 2nd edition. Edited by BG Warner and CDA Rubec. Wetlands Research Centre, University of Waterloo, Waterloo, Ontario.

Part 2. Data Sources and Methods for the Extent of Canada's Wetlands Indicator

Introduction

The [Extent of Canada's Wetlands](#) 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.

Description and rationale of the Extent of Canada's Wetlands indicator

Description

The indicator is a measure of the extent of Canadian wetlands, and provides a baseline from which change can be measured. A wetland is defined as a land that is saturated with water long enough to promote aquatic processes as indicated by poorly drained soils, hydrophytic vegetation and various kinds of biological activity which are adapted to a wet environment.⁷

Rationale

Wetlands are one of Earth's most productive ecosystems, providing numerous ecosystem services and supporting a disproportionately high number of species, including species at risk and significant numbers of migratory birds, fish, amphibians, a wide diversity of plants, and many other species. Despite this importance, wetlands are being lost and degraded more quickly than any other ecosystem type. This indicator can serve as a baseline to track changes over time and thereby help inform proper management of wetlands in Canada.

Recent changes to the indicator

Additional data have been incorporated since the last release.

Data

Data source

Because no national wetland monitoring system exists, data from multiple sources were combined. These include:

- [CANVEC Saturated Soil Data](#), 2013.
- [Land Cover, circa 2000](#), Natural Resources Canada, 2009.
- [Ducks Unlimited Canada](#), 2009, unpublished.
- [Ducks Unlimited Canada](#), 2014, unpublished.
- [Sensitive Ecosystem Inventory](#), British Columbia Ministry of Environment, 2005.
- [Wetlands Mapping System](#), Government of New Brunswick, 2006.
- Avalon and Minipi Wetlands, [Wetland and Coastal Stewardship](#), Government of Newfoundland and Labrador, 2014.

⁷ National Wetlands Working Group (1997) The Canadian Wetland Classification System. 2nd edition. Edited by BG Warner and CDA Rubec. Wetlands Research Centre, University of Waterloo, Waterloo, Ontario.

- [Nova Scotia Wetland Inventory](#), Nova Scotia Department of Natural Resources, 2002.
- Southern Ontario Land Resource Information System (SOLRIS) and [Land Information Ontario](#) (LIO), Ontario Ministry of Natural Resources, 2002.
- [Wetland Inventory](#), Government of Prince Edward Island, 2010.
- Conservation Atlas of Wetlands in the St. Lawrence Valley, Environment Canada, 2009.
- [Canadian Wetland Inventory](#), Phase 1, Canadian Space Agency, Ducks Unlimited Canada, Environment Canada and North American Wetlands Conservation Council (Canada), 2013.
- [Western Boreal Forest Initiative](#), Ducks Unlimited Canada, 2013.
- [Kivalliq Ecological Land Classification Map Atlas](#), Department of Environment, Nunavut, 2012.

Ecozones

Canadian Council on Ecological Areas (2014) [Canada Ecozones](#) V5b.

Spatial coverage

National.

Temporal coverage

Circa 2000.

Data completeness

Completeness of data varies geographically, with the underlying data source (see individual data sources in section [Data source](#) for details). Data from sources including provincial, territorial and federal governments, as well as non-government organizations, were considered for inclusion. A minimum mapping unit of one hectare or less was required.

Methods

The contributing datasets use varying methodology to identify wetlands, although most are based on remotely sensed data. Wetlands are mapped as vector data, which are integrated into a master geodatabase at the national scale.

Information from each contributing dataset was classified based on the Canadian Wetland Classification System,⁸ which contains five main wetland classes (bog, fen, marsh, swamp, and shallow water) that represent the types of wetlands encountered in Canada. An additional category, "partially classified," was used to preserve boundary information for wetlands that could not be classified into the main categories with existing information.

Where two or more datasets overlapped, the best dataset was selected based on the quality of collection methods and the accuracy of the data. Not all datasets had known accuracy. In these cases, accuracy was assessed by comparing a sample of wetlands polygons to Landsat imagery.

The national wetland layer contains wetland data compiled from the best available data layer for each region, classified by wetland type.

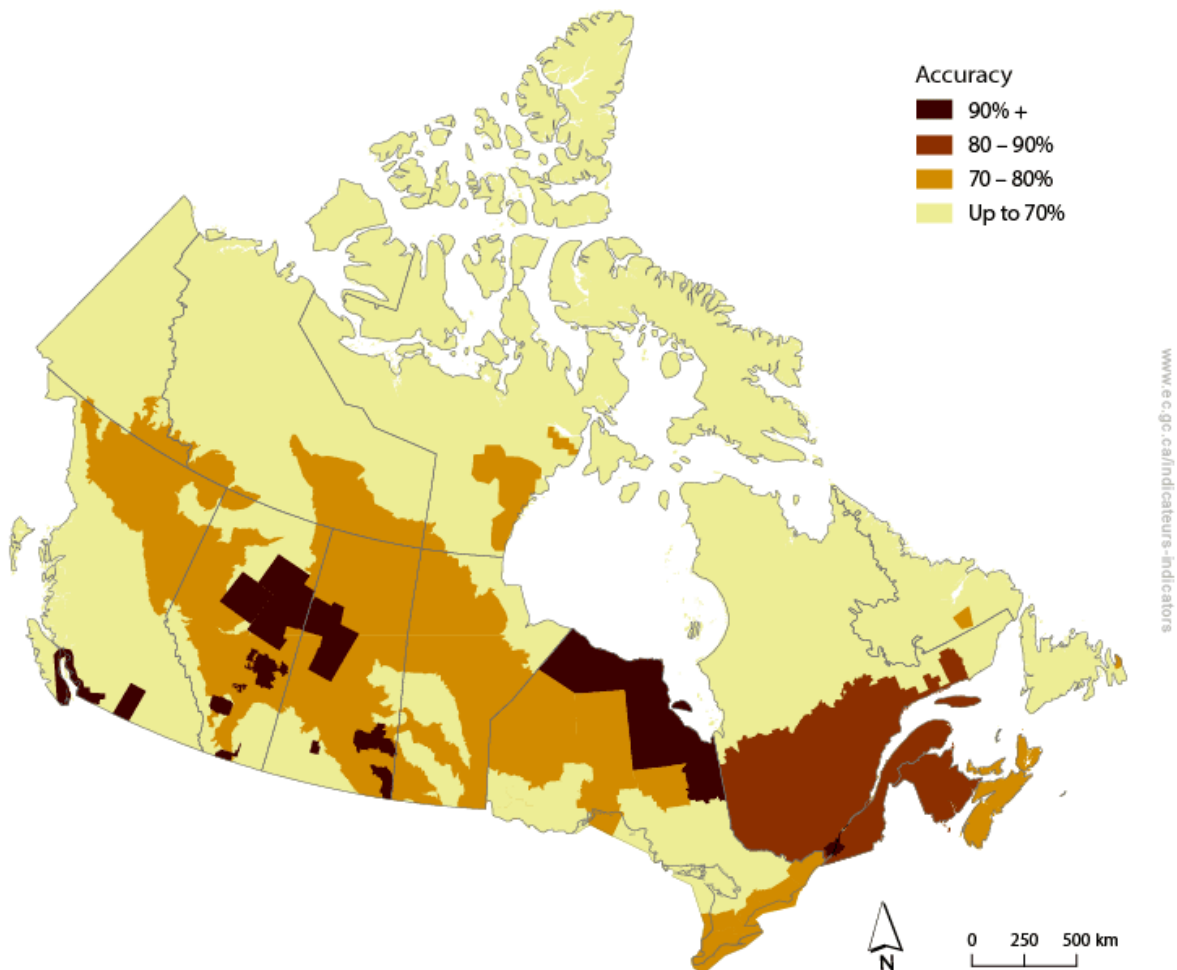
⁸ National Wetlands Working Group (1997) The Canadian Wetland Classification System. 2nd edition. Edited by BG Warner and CDA Rubec. Wetlands Research Centre, University of Waterloo, Waterloo, Ontario.

To produce the wetland map, the proportion of wetland in a 25 km by 25 km grid was calculated using ArcGIS software. These proportions were mapped as density classes using previously defined thresholds.⁹

Caveats and limitations

Wetlands are difficult to map in part because different types of wetlands contain different vegetation, and because they vary seasonally. The lack of a consistent vegetation pattern can lead to errors when using automated or semi-automated methods designed for remotely sensed data such as aerial photographs or satellite imagery, and intensive ground campaigns are required to produce maps with low error rates. The indicator uses the highest quality datasets that are available, but accuracy varies regionally. The greatest uncertainty is in northern areas. Datasets with lower accuracy tend to underestimate wetland extent, so national estimates are likely conservative.

Figure 2. Wetland data accuracy for national wetland layer (circa 2000), Canada, 2016



⁹ Wells ED and Zoltai SC (1985) The Canadian system of wetland classification and its application to circumboreal wetlands. *Aquilo Ser Botanica* 21: 45-52.

Note: Values are estimated wetland classification accuracy of different contributing datasets. Darker colours are more accurate.

Source: Canadian Wildlife Service, 2016.

More than half of the wetland polygons (58%) are partially classified, meaning that they were identified as wetlands, but could not be clearly defined as bog, fen, marsh, swamp, or shallow water.

Part 3. Annexes

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

Table A.1. Data for Figure 1. Wetland extent, Canada, circa 2000

Ecozone Label	Ecozone	Wetland area (square kilometres)	Proportion of ecozone that is wetland (percentage)
L01	Arctic Cordillera	1059	0.45
L02	Northern Arctic	48 877	3.4
L03	Southern Arctic	52 472	5.6
L04	Taiga Plains	138 737	25.0
L05	Taiga Shield	145 873	11.0
L06	Boreal Shield	320 778	16.9
L07	Atlantic Maritime	6920	6.3
L08	Mixedwood Plains	12 857	11.1
L09	Boreal Plains	235 938	30.3
L10	Prairies	14 269	3.1
L11	Montane Cordillera	8152	1.86
L12	Pacific Maritime	2587	1.2
L13	Boreal Cordillera	7121	1.28
L14	Taiga Cordillera	2581	1.12
L15	Hudson Plains	276 230	78.8
L16	Tundra Cordillera	188	0.65
L17	Atlantic Highlands	3536	3.8
L18	Semi-Arid Plateaux	460	0.81
	Total	1 290 187	12.9

Note: The sum of the wetland area of the ecozones does not equal the overall total due to the generalization of boundaries at the national scale. Mapped values are the proportion of wetland in each 25 km by 25 km grid cell.

Source: Canadian Wildlife Service, 2016.

Annex B. References and additional information

References and further reading

National Wetlands Working Group (1997) The Canadian Wetland Classification System. 2nd edition. Edited by BG Warner and CDA Rubec. Wetlands Research Centre, University of Waterloo, Waterloo, Ontario. 68 pp.

Federal, Provincial and Territorial Governments of Canada (2010) Canadian Biodiversity: Ecosystem Status and Trends 2010, [Wetlands](#), 2011. Retrieved on April 4, 2016.

Related information

[Canadian Biodiversity: Ecosystem Status and Trends 2010](#)
[The Ramsar Convention on Wetlands](#)

www.ec.gc.ca

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