

# Census of Environment: Renewable freshwater from 1971 to 2021

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Water yield is an estimate of the amount of renewable freshwater generated in an area. Tracking water yield over time provides information to help understand changes in water resources available for human use and ecosystem needs.

In 2021, 1,225 cubic kilometres ( $\text{km}^3$ ) of renewable freshwater was generated in the south of Canada, where most people live. This volume corresponds to an average 0.47 cubic metres ( $\text{m}^3$ ) of water per square metre ( $\text{m}^2$ ) of area. To put this in perspective, in 2021, Canadian households used a total of 3.2  $\text{km}^3$  of water nationally.

Since 1971, the annual water yield for southern Canada has varied from 0.45 to 0.60  $\text{m}^3/\text{m}^2$ . However, there are differences in the geographic and seasonal distribution of renewable freshwater resources and in the changes observed over time. These factors can influence water management decisions by governments, public utilities and others.

## Decreasing summer water yield on the coasts

Changes in water regimes typically evolve over many decades. When comparing water volumes generated in summer, differences can be observed over the last three climate normal periods (1971 to 2000, 1981 to 2010 and 1991 to 2020).

While the west and east coasts typically have the highest average water yields in the country, decreases were seen over time in the Pacific Coastal and Fraser–Lower Mainland drainage regions, as well as in the North Shore–Gaspé and Maritime Coastal drainage regions.

Average summer volumes increased in some regions. Notably, they tripled in the Assiniboine–Red drainage region, from 0.93  $\text{km}^3$  for the 1971 to 2000 period to 1.53  $\text{km}^3$  for the 1981 to 2010 period and 2.72  $\text{km}^3$  for the 1991 to 2020 period. Despite this increase, water yield in the Assiniboine–Red drainage region and other drainage regions in the Prairies remained among the lowest in the country.

Monitoring water flows over time can provide insights on the influence of climate change on the hydrological cycle.

## Changes in peak flows

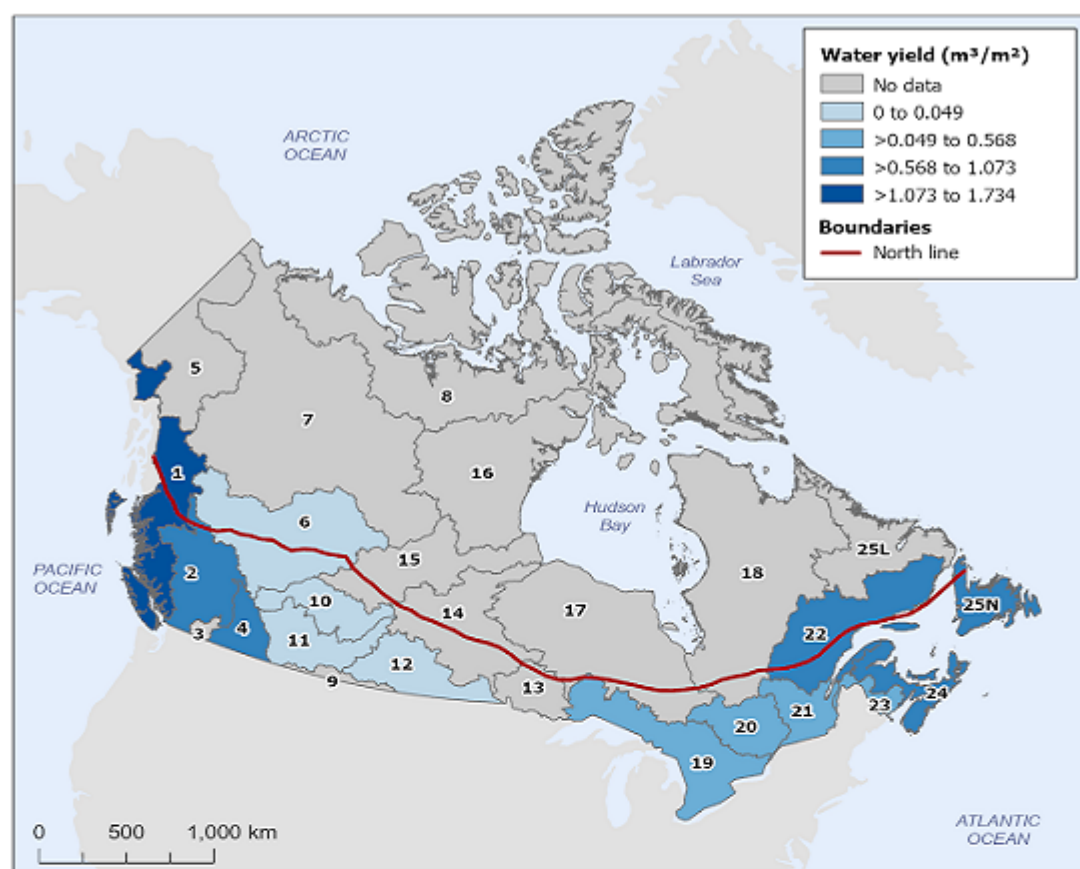
Peak water flows follow distinct patterns in different areas of the country because of factors such as the timing of spring snowmelt and precipitation. For example, in the Great Lakes drainage region, peak monthly water yield is generated in the spring. In the Pacific Coastal drainage region two peaks are typically seen: one in June and a smaller one in October.

In the Great Lakes and Newfoundland drainage regions, median monthly water yield during the spring peak period has decreased over the last three climate normal periods. Conversely, peak water yield during the month of June increased in the Columbia drainage region, rising from 17.29  $\text{km}^3$  for the 1971 to 2000 period to 18.50  $\text{km}^3$  for the 1991 to 2020 period.

Other monthly changes have been observed. A noticeable shift has occurred in some of the western drainage regions where summer yields have decreased, while spring volumes have increased. In the Fraser–Lower Mainland drainage region, for example, the median water yields were higher in April (18.4%) and May (15.2%) for the 1991 to 2020 period, compared with median water yields for the earlier 1971 to 2000 period. Changes in periods of high and low flows can have implications on the potential for flood risks and water shortages.



Map 1 – Annual water yield per area in selected drainage regions, 2021

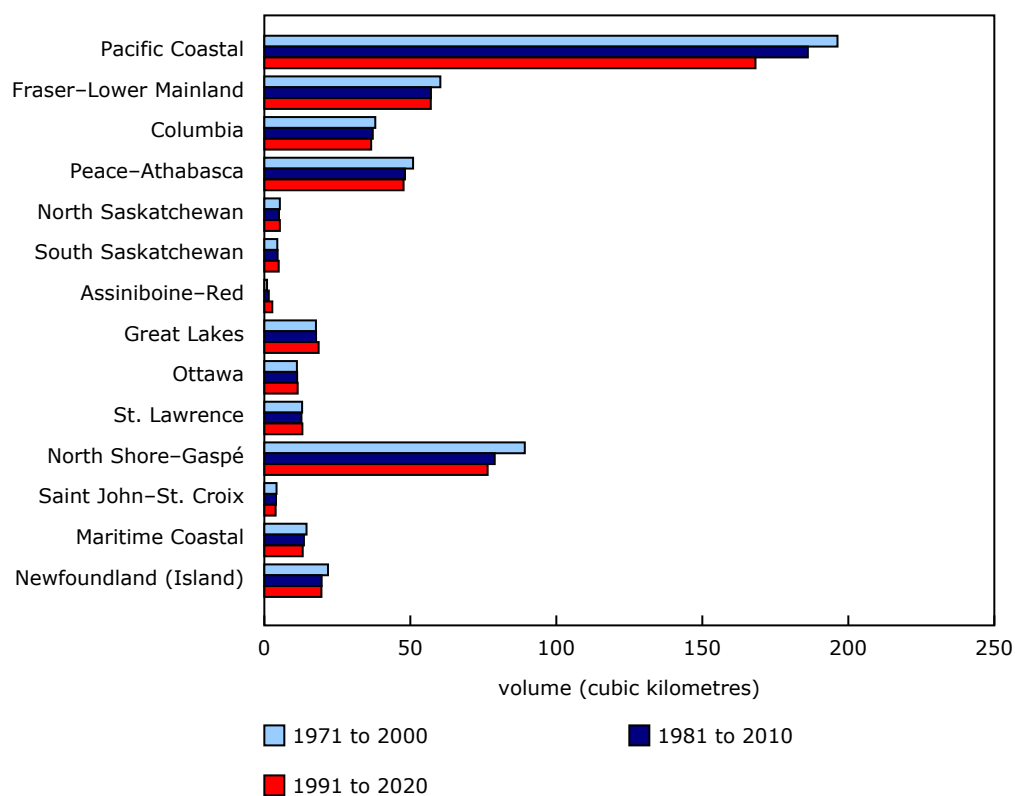


| Code | Drainage regions      | Code | Drainage regions                | Code | Drainage regions     |
|------|-----------------------|------|---------------------------------|------|----------------------|
| 1    | Pacific Coastal       | 11   | South Saskatchewan              | 21   | St. Lawrence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

**Note:** The drainage regions in this map are a modified version of the Standard Drainage Area Classification. The drainage region of Newfoundland and Labrador is separated into the Newfoundland part (25N) and the Labrador part (25L). Water yield estimates are only provided for the drainage regions where data are sufficient for validation.

**Source:** 2000, "Delineation of Canada's North: An examination of the North-South Relationship in Canada," *Geography Working Paper Series*, Statistics Canada Catalogue no. 92F0138MIE.

**Chart 1**  
**Average summer water yield in selected drainage regions**



Source(s): Table 38-10-0174-01.

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### Note to readers

Statistics Canada's [Census of Environment](#) program reports on ecosystems in Canada, providing information to help Canadians make evidence-based decisions to protect, rehabilitate, enhance and sustain our environment. It follows the internationally accepted environmental-economic standard for producing information on ecosystems' extent, their condition and the services they provide.

New estimates of water yield are now available in tables 38-10-0283, 38-10-0003, 38-10-0091, 38-10-0095 and 38-10-0174. This includes new estimates of annual, seasonal and monthly renewable freshwater for the standard climate normal periods 1971 to 2000, 1981 to 2010 and 1991 to 2020. These data allow Canadians to analyze historical long-term patterns in annual, monthly and seasonal water yield and compare geographical distribution of renewable freshwater across Canada from 1971 to 2021. Information is available for southern Canada and by drainage region ([Standard Drainage Area Classification](#)) and ecoprovince ([Ecological Land Classification 2017](#)). Southern Canada is a statistical area delineated by the north line, which separates it from the northern portion of the country.

Geospatial files and metadata are also available. They cover annual water yield from 1971 to 2021 for southern Canada and thirty-year averages over the climate normal periods: 1971 to 2000, 1981 to 2010 and 1991 to 2020.

Water yield estimates are derived from data on the monthly volume of unregulated flows in Canada's rivers and streams. Although water yield estimates the volume of renewable freshwater, it also includes non-renewable water sources such as meltwater from receding glaciers.

For more information on water yield, see the article "[Freshwater in Canada](#)," in Human Activity and the Environment (**16-201-X**), and "[The Water Yield for Canada As a Thirty-year Average \(1971 to 2000\): Concepts, Methodology and Initial Results](#)," as part of the Environment Accounts and Statistics Analytical and Technical Paper Series (**16-001-M**).

Additional information can be found in the [Physical asset accounts](#) section of the Methodological Guide: Canadian System of Environmental-Economic Accounting.

**Available tables:** [38-10-0003-01](#), [38-10-0091-01](#), [38-10-0095-01](#), [38-10-0174-01](#) and [38-10-0283-01](#).

**Definitions, data sources and methods:** survey numbers [5114](#) and [5331](#).

The "[Water yield: Geospatial files](#)" and "[Water yield: Data product specifications](#)" are now available in *Census of Environment: Spatial information products* (**16-510-X**).

For more information, or to enquire about the concepts, methods or data quality of this release, contact us (toll-free 1-800-263-1136; 514-283-8300; [infostats@statcan.gc.ca](mailto:infostats@statcan.gc.ca)) or Media Relations ([statcan.mediahotline-ligneinfomedias.statcan@statcan.gc.ca](mailto:statcan.mediahotline-ligneinfomedias.statcan@statcan.gc.ca)).