

# Open Access Water Data Hubs Across Canada

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## Research summary

Our Living Waters (OLW) identified the “percent of watersheds with open access to a data hub which pools multiple sources of data and make the data available for use at different scales of decision-making” as its desired impact measure for “Open Access Hubs”. A “data hub” is defined as an online platform that brings together various sources of data, knowledge and other water information in a way this is understandable, accessible and sustainable over time. “Open access” means that the data from the hub is freely available, easily accessible and timely. “Watersheds” refer to the [watershed boundaries defined by the Water Survey of Canada](#).

The following criteria were to be considered in determining whether a given data hub can be considered an “open access hub”:

- the data in the hub focuses on freshwater health across the entire watershed
- the data has a clear purpose and is relevant to meeting users’ needs
- the hub includes data of multiple types from multiple sources (e.g., academic research data, Indigenous and local knowledge, community-based monitoring data, industry data and government monitoring data)
- the data is readily accessible and free to use
- the data is presented in understandable and readily usable formats
- the data is reliable and trustworthy
- metadata are provided to aid in proper interpretation and use of the data (e.g., by detailing who collected the data, when it was collected and how it was analyzed)
- the data are timely and regularly updated
- the hub is sustainable over the long-term, with adequate resources available for its maintenance
- the hub is actively used
- the hub is governed by a clear and appropriate data management policy<sup>1</sup>, and
- the hub is consistently evaluated to ensure its long-term performance.

The above criteria have been intentionally chosen to be strict so as to identify only hubs that can be reasonably expected to effectively meet users’ needs and to do so reliably over time.<sup>2</sup> With the Internet providing nearly anyone with a platform to share information, it is very easy

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<sup>1</sup> See, for example, the [data policy of the Mackenzie DataStream](#).

<sup>2</sup> It is worth noting that the criteria closely reflect the quality standards applied to official national statistics and are, therefore, reasonable, appropriate and tested means of ensuring quality in the context of data (see, for example, the [quality assurance framework of Statistics Canada](#)).

today for well-intentioned groups to populate a website with water-related data. It is much harder, however, to ensure that these data are high-quality and that access to them is open and sustainable.

For the purposes of assessing the availability of open access hubs, it is useful to divide Canada’s territory into the [25 major watershed basins used by WWF Canada for its watershed reports](#).<sup>3</sup> These are, from roughly east to west (

Figure 1) and according the WWF threat level (**very low**, **low**, **moderate**, **high**, **very high**), the:

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

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<sup>3</sup> It should be noted that these 25 basins – which are sometimes referred to as the “Pearse basins” after the University of British Columbia forestry economist, Dr. Peter Pearse, lead author of the 1985 *Inquiry on Federal Water Policy* (Pearse et al., 1985) – are distinct from the five major basins that form the first layer in the watershed boundary framework of the Water Survey of Canada (WSC). The Pearse basins are still used because they provide a useful intermediate aggregation of basins between the first and second layers of the WSC.

Figure 1 - Canada's 25 major watershed basins



Source: Statistics Canada (<https://www.statcan.gc.ca/eng/subjects/standard/sdac/maps/m005>)

Below, we assess each of the 23 basins with a WWF threat level of low or greater in terms of the availability of open access hubs. For each basin, we provide a subjective rating of the overall quality of the available open access hubs (low, medium, high) reflecting the degree to which they meet the criteria above. We provide an overall assessment following the individual basin assessments.

1. **Newfoundland and Labrador basin** (WWF threat level – moderate)
  - [Atlantic DataStream](#) – Atlantic DataStream is one of three open access hubs funded by the Gordon Foundation<sup>4</sup> in partnership with the [Atlantic Water Network](#), WWF Canada and the RBC Foundation. It is an open access platform for sharing information on freshwater health that allows users to access, visualize, and download full water quality datasets collected by 23 monitoring groups from Newfoundland and Labrador, New Brunswick, Prince Edward Island and Nova Scotia. The three DataStreams funded by the Gordon Foundation are, in many ways, best-practice water data hubs. The hub provide on-line space for contributors to store, share, access and visualize water monitoring data. They are free, open for anyone to use and accommodates a wide range of water quality data including physical, chemical and biological characteristics, pesticides and hydrocarbons. The hubs work with Indigenous and other community groups, researchers and governments that collect data through diverse monitoring initiatives.
  - [Newfoundland and Labrador Water Resources Portal](#) – The Water Resources Portal provides access a wide variety of water data, including drinking water quality data; drinking water treatment profiles; protection areas for ground and surface water supplies; boil water advisories; ambient water quality data, station profiles and watersheds; real time water quality data; hydrometric station data and station profiles; climate station profiles; dam locations and sewage outfall locations. The portal is operated by the Newfoundland and Labrador Department of Environment and Climate Change.

*Overall open access hubs quality rating for the  
Newfoundland and Labrador basin:*

**High**

The Atlantic DataStream represents a  
best-practice open access hub.

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<sup>4</sup> The other two are the Mackenzie DataStream and the Lake Winnipeg DataStream, both of which are mentioned further below.

## 2. North Shore-Gaspé basin (WWF threat level – moderate)

- [River Quality Monitoring Database](#)<sup>5</sup> – This database, updated annually by the Quebec Ministry of the Environment and Climate Change, is available through the open data portal of the Government of Quebec. The database aggregates data from the province’s water quality monitoring networks. It covers common physicochemical and bacteriological parameters, such as total phosphorus, total nitrogen, nitrites and nitrates, ammonia nitrogen, chlorophyll, fecal coliforms, turbidity, suspended materials, pH, conductivity, dissolved organic carbon and temperature.

*Overall open access hubs quality rating for the  
North Shore-Gaspé basin:*

**Medium**

The data are not of multiple types and do not come from multiple sources and the “hub” is a database rather than a true hub

## 3. Maritime Coastal basin (WWF threat level – moderate)

- [Atlantic DataStream](#) – See description under Newfoundland and Labrador basin
- [VisionH<sub>2</sub>O](#) – VisionH<sub>2</sub>O is one of a number of local watershed-focused organizations in New Brunswick. Since its formation in 2003, VisionH<sub>2</sub>O has focused on the issues relevant to the watershed around the small village of Cap-Pelé on the Northumberland Strait east of Moncton. Though the organization and its focus are both very local, VisionH<sub>2</sub>O has many attributes that make qualify it for consideration as an open access hub. It is well supported, with partners that include the local, provincial and federal governments as well as other NGOs and the private sector. It has been established since 2003 and provides simple, free access to a [range of water quality data](#) that are up-to-date and well documented. It could serve as a model for other local open access hubs.

*Overall open access hubs quality rating for the  
Maritime Coastal basin:*

**High**

The Atlantic DataStream represents a best-practice open access hub.

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<sup>5</sup> Translation of “Suivi de la qualité de l'eau du fleuve et des rivières”.

4. **St. John-St. Croix basin** (WWF threat level – **high**)

- [Atlantic DataStream](#) – See description under Newfoundland and Labrador basin

*Overall open access hubs quality rating for the  
St. John-St.Croix basin:*

**High**

The Atlantic DataStream represents a  
best-practice open access hub.

5. **Northern Quebec basin** (WWF threat level – **low**)

- [River Quality Monitoring Database](#)<sup>6</sup> – See description under North Shore-Gaspé basin

*Overall open access hubs quality rating for the  
Northern Quebec basin:*

**Low**

The data are not of multiple types and do not come from multiple sources, the “hub” is a database rather than a true hub and there are only a few water-quality monitoring stations in the basin, all in the vicinity of the town of Val d’Or

6. **St. Lawrence basin** (WWF threat level – **moderate**)

- [River Quality Monitoring Database](#)<sup>7</sup> – See description under North Shore-Gaspé basin

*Overall open access hubs quality rating for the  
St. Lawrence basin:*

**Medium**

The data are not of multiple types and do not come from multiple sources and the “hub” is a database rather than a true hub

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<sup>6</sup> Translation of “Suivi de la qualité de l'eau du fleuve et des rivières”.

<sup>7</sup> Translation of “Suivi de la qualité de l'eau du fleuve et des rivières”.

7. **Ottawa basin** (WWF threat level – **high**)

- [Provincial Groundwater Monitoring Network](#) – This Ontario government dataset is available through the province’s open data portal. It contains data on groundwater quality parameters (mainly for groundwater in the populated southern part of the province), including water levels and water chemistry. The data are readily downloadable and well documented.
- [Provincial \(Stream\) Water Quality Monitoring Network](#) – This Ontario government dataset is available through the province’s open data portal. It contains data on stream water quality parameters (mainly for groundwater in the populated southern part of the province but also for a fair number of sites in the north ), including water levels and water chemistry. The data are readily downloadable and well documented.

*Overall open access hubs quality rating for the  
Ottawa basin:*

**Medium**

The data are not of multiple types and do not come from multiple sources and the “hubs” are databases rather than true hubs

8. **Northern Ontario basin** (WWF threat level – **low**)

- [Provincial Groundwater Monitoring Network](#) – See description under Ottawa basin
- [Provincial \(Stream\) Water Quality Monitoring Network](#) – See description under Ottawa basin

*Overall open access hubs quality rating for the  
Northern Ontario basin:*

**Low**

The data are not of multiple types and do not come from multiple sources, the “hubs” are databases rather than true hubs and there is relatively little monitoring undertaken in the basin

9. **Great Lakes basin** (WWF threat level – **very high**)

- [Toronto Monitoring Hub](#) – The Toronto Monitoring Hub provides open access to community-based monitoring data on basic water quality parameters (*e coli* and total coliforms) for four locations on Toronto’s waterfront. The hub has been in operation since 2016 with support from OLW Network member, [Swim Drink Fish](#), a registered charity devoted to freshwater conservation across Canada and from Environment and Climate Change Canada. The hub is one of four that will eventually be supported by Swim Drink Fish (see below).
- [Niagara Community Monitoring Hub](#) – Similar to the Toronto hub but for eastern Lake Erie.
- [Zhiibaahaasing Community Monitoring Hub](#) – Similar to the Toronto hub but for Manitoulin Island on Lake Huron. This hub is run the Zhiibaahaasing First Nation.
- [Provincial Groundwater Monitoring Network](#) – See description under Ottawa basin
- [Provincial \(Stream\) Water Quality Monitoring Network](#) – See description under Ottawa basin

*Overall open access hubs quality rating for the  
Great Lakes basin:*

**Medium**

*Community monitoring:* hubs are focused on just two water quality parameters and monitoring is limited in geographic scope

*Provincial monitoring:* data are not of multiple types and do not come from multiple sources and the “hubs” are databases rather than true hubs



#### 10. Winnipeg basin (WWF threat level – **very high**)

- [Lake Winnipeg DataStream](#) – Similar to the Atlantic DataStream (see description under Newfoundland and Labrador basin) but for the Winnipeg basin.
- [Canadian Watershed Information Network](#) – This network which houses the open-access [CanWIN Data Hub](#) for water quality data in Manitoba housed at the University of Manitoba and supported by the governments of Manitoba and Canada as well as the Lake Winnipeg Foundation and other supporters. The network provides a clear “[data statement](#)” defining, among other things, use of the data, quality assurance, metadata requirements and contribution procedures. The data are freely available for download.

*Overall open access hubs quality rating for the  
Winnipeg basin:*

**High**

Both the Lake Winnipeg DataStream and the CanWIN Data Hub  
represent best-practice open access hubs.

#### 11. Churchill basin (WWF threat level – **moderate**)

- [Churchill River Basin Long-term Water Quality Monitoring Data](#) – This open database is compiled by Environment and Climate Change Canada and available through the Government of Canada’s open data portal. It provides daily monitoring data from 2000 to present for a variety of standard water quality parameters measured at three sites across the Churchill basin.
- [Surface Water Quality Data](#) - The open data hub managed by the Saskatchewan Water Security Agency provides historical water quality data for a number of sites across the province (but not covering the entire Churchill basin). The data are readily accessible and free to download. They cover standard water quality parameters.

*Overall open access hubs quality rating for the  
Churchill basin:*

**Medium**

The data are not of multiple types and do not come from multiple  
sources and the “hubs” are databases rather than true hubs

**12. Lower Saskatchewan-Nelson basin** (WWF threat level – moderate)

- [Canadian Watershed Information Network](#) – See description under Winnipeg basin.
- [Lake Winnipeg DataStream](#) – See description under Winnipeg basin.

*Overall open access hubs quality rating for the  
Lower Saskatchewan-Nelson basin:*

**High**

Both the Lake Winnipeg DataStream and the CanWIN Data Hub represent best-practice open access hubs.

**13. Assiniboine-Red basin** (WWF threat level – Very high)

- [Lake Winnipeg DataStream](#) – See description under Winnipeg basin.

*Overall open access hubs quality rating for the  
Assiniboine-Red basin:*

**High**

The Lake Winnipeg DataStream represents a best-practice open access hub.

#### 14. Missouri basin (WWF threat level – high)

- [Alberta surface water quality data](#) – This portal is provided by Alberta Environment and Parks and its partners, who collect surface water quality samples in rivers, lakes and other water bodies across the province. The portal includes a Guide to Surface Water Quality Data and Online Tools giving users information about the data, tips on how to use the search tools and a table of water quality variable names and units. An e-mail address is provided where users can ask additional questions. In addition, a variety of search tools are provided to access commonly requested data: [Water Quality Data Portal](#), [Long-term River Station Data](#) and [Lake Water Quality Data](#)
- [Saskatchewan surface water quality data](#) - The open data hub managed by the Saskatchewan Water Security Agency provides historical water quality data for a number of sites across the province (but not covering the entire Churchill basin). The data are readily accessible and free to download. They cover standard water quality parameters.

*Overall open access hubs quality rating for the  
Missouri basin:*

**High**

Though the data do not come from multiple sources, these are in other aspects high-quality hubs

#### 15. South-Saskatchewan basin (WWF threat level – very high)

- [Alberta surface water quality data](#) – See description under Missouri basin.
- [Saskatchewan surface water quality data](#) – See description under Missouri basin.

*Overall open access hubs quality rating for the  
South Saskatchewan basin:*

**High**

Though the data do not come from multiple sources, these are in other aspects high-quality hubs

**16. Lower Mackenzie basin** (WWF threat level – **low**)

- [Mackenzie DataStream](#) – Similar to the Atlantic DataStream (see description under Newfoundland and Labrador basin) but for the Mackenzie basin.

*Overall open access hubs quality rating for the  
Lower Mackenzie basin:*

**High**

The Mackenzie DataStream represents a  
best-practice open access hub.

**17. North Saskatchewan basin** (WWF threat level – **high**)

- [Alberta surface water quality data](#) – See description under Missouri basin.
- [Saskatchewan surface water quality data](#) – See description under Missouri basin.

*Overall open access hubs quality rating for the  
North Saskatchewan basin:*

**High**

Though the data do not come from multiple sources, these are in  
other aspects high-quality hubs

**18. Peace-Athabasca basin** (WWF threat level – **moderate**)

- [Alberta surface water quality data](#) – See description under Missouri basin.
- [Saskatchewan surface water quality data](#) – See description under Missouri basin.

*Overall open access hubs quality rating for the  
Peace-Athabasca basin:*

**High**

Though the data do not come from multiple sources, these are in  
other aspects high-quality hubs

### 19. Columbia basin (WWF threat level – high)

- [Provincial Ambient Water Quality Monitoring](#) - Physical, chemical and biological data are collected biannually from a wide variety of B.C. lakes to determine current water quality status and to understand long-term trends. Currently, 53 lakes are sampled, covering various watershed basins. Data are freely available in real time through the province's [Real-time Water Data portal](#).
- [Provincial Groundwater Observation Well Network](#) – This program of the BC government collects groundwater samples from provincial network and analyzes them for nutrients, metals and general water chemistry. The results of all tests are [publicly available](#).

*Overall open access hubs quality rating for the  
Columbia basin:*

**Medium**

The data are not of multiple types and do not come from multiple sources and the “hubs” are databases rather than true hubs

## 20. Okanagan-Similkameen basin (WWF threat level – high)

- [Okanagan Basin Water Board Water Quality Monitoring](#) – This hub (which is more of an aggregation website than a true hub) brings together information on water quality monitoring programs operated by other local, provincial and federal organizations in the basin. The hub does not provide direct access to water quality data but provides links to other sites where data can be obtained. None of the other sites could be considered a true hub either, as all are, in one way or another, narrowly focused (e.g., focused only on lake water quality and not rivers or streams or focused on monitoring within the context of a single research project).
- [Okanagan Lake Collaborative Monitoring](#) – The British Columbia Ministry of Environment and Climate Change Strategy in partnership with the City of Kelowna, the Regional District of Central Okanagan and the District of Summerland began this seasonal sampling program on Okanagan Lake in 2011 to increase the temporal resolution of water quality data being gathered. Sampling of four sites in Okanagan Lake is carried out each year between March and September. Sampling focuses on physical parameters, water chemistry and biological activity. Data are freely available, but only in PDF format.  
[Provincial Groundwater Observation Well Network](#) – See description under Columbia basin.  
[Provincial Ambient Water Quality Monitoring](#) – See description under Columbia basin.

*Overall open access hubs quality rating for the  
Okanagan-Similkameen basin:*

**Medium**

*Community monitoring:* hubs are narrowly focused and monitoring is limited in geographic scope

*Provincial monitoring:* data are not of multiple types and do not come from multiple sources and the “hubs” are databases rather than true hubs

## 21. Fraser-Lower Mainland basin (WWF threat level – high)

- [Fraser Riverkeeper Vancouver Water Monitoring](#) - The Vancouver Water Monitoring Program is a year-round, citizen-science initiative launched in the summer of 2018. It focuses on testing and public reporting of recreational water quality data in the Vancouver area. The primary purpose of the program is the protection of public health from contaminated water with the goal of providing the public with current, reliable water quality data. A summary of the monitoring results is provided [here](#), though there appears to be no ready means of downloading the data. An annual report is prepared in PDF format. The program is part of a country-wide program of recreational swimming site monitoring known as [Swim Guide](#).
- [Shuswap Watershed Council Water Quality report](#) – An annual report is prepared on water quality in the Shuswap watershed. Available in PDF format only. Data are available in electronic form through the Provincial Ambient Water Quality Monitoring portal (see below).
- [Provincial Groundwater Observation Well Network](#) – See description under Columbia basin.
- [Provincial Ambient Water Quality Monitoring](#) – See description under Columbia basin.

*Overall open access hubs quality rating for the  
Fraser-Lower Mainland basin:*

**Medium**

*Community monitoring:* hubs are narrowly focused and monitoring is limited in geographic scope

*Provincial monitoring:* data are not of multiple types and do not come from multiple sources and the “hubs” are databases rather than true hubs

## 22. Pacific Coast basin (WWF threat level – low)

- [Provincial Groundwater Observation Well Network](#) – See description under Columbia basin.
- [Provincial Ambient Water Quality Monitoring](#) – See description under Columbia basin.

*Overall open access hubs quality rating for the  
Pacific Coast basin:*

**Medium**

Data are not of multiple types and do not come from multiple sources  
and the “hubs” are databases rather than true hubs

## 23. Yukon basin (WWF threat level – low)

- [Yukon River Inter-Tribal Watershed Council Indigenous Observation Network](#) – Since 2006, the Yukon River Inter-Tribal Watershed Council has facilitated integration of Indigenous stories and experiences with scientific environmental monitoring in the Yukon basin. The Council partnered with the United States Geological Survey to collect high quality environmental data about the water and the land. The data collected through the Indigenous Observation Network are available for free through this [portal](#).

*Overall open access hubs quality rating for the  
Yukon basin:*

**Medium**

Data comes from only two sources the “hub” is a database  
rather than a true hub



*Overall open access hubs quality rating for Canada:*

**Medium**

All 23 basins with WWF threat levels of low or higher have some form of open access data, either through a true hub or a database providing ready and free access to any user. The hubs/databases are supported by organizations with proven track records and clear long-term commitments to monitoring. A mix of data types is available, though government-funded scientific monitoring dominates. Metadata are widely available and data standards are established for many hubs/databases. The geographic scope of monitoring is reasonably good, though much less monitoring is done in remote basins (which, it must be noted are generally not highly threatened).

At the same time, four basins (the Ottawa, Great Lakes, Okanagan-Similkameen and Fraser-Lower Mainland basins) have high or very high WWF threat levels but rank only medium in terms of hub quality.