



Water Resources Branch Data Networks

Last updated: April 2022



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What data does the Water Resources Branch collect?

The Government of Yukon's Water Resources Branch (WRB) operates/co-operates several "data networks." Each of these networks are composed of a certain number of sites which collect various types of hydrometeorological, water quantity and quality data over differing periods of time. Each network was created for different reasons, and is operated/co-operated by different employees at WRB and in some cases, with other partners. This document provides an overview of each network to provide a better understanding of the data collected by WRB. WRB also stores a variety of water licence data from locations or projects associated with a water licence, though this data is not included here. For more information on the databases used for storing data, refer to the glossary.



Canada-Yukon Hydrometric Network

Alternative names: Water Survey of Canada Network, Large Streams/River Network

Date established: 1940s

Primary Operator: Water Survey of Canada

Partners: WRB participates in operational planning and national committees related to the network (the National Administrators Table and the National Hydrometric Program Coordinating Committee).

Number of active sites: 75

Background: This network was initiated originally to provide hydrometric information related to transportation (e.g., culvert design) and fisheries concerns. The network was expanded over time as a lack of river flow data in the Yukon was identified and a need for this data increased due to hydroelectric and mining development. The network is operated by the Water Survey of Canada through a cost-share agreement with the Government of Yukon. The present-day objectives of the network are to collect long term hydrometric data on rivers and lakes prioritized to meet territorial and federal needs, including flood forecasting, inter-jurisdictional needs, environmental flows, science, transportation and baseline information for future developments (e.g., oil/gas pipelines, hydroelectric development, quartz and placer mining developments, in addition to culverts and fisheries concerns). Both the amount of stations and types of instrumentation have ebbed and flowed over time: the network originally established 40 manually operated crest gauge stations, which were discontinued and/or converted in the late 1970s and early 1980s to continuous monitoring via pressure transducers. The network incorporates key stations representing the streamflow characteristics of different hydrological regions, and now has 75 operating stations within the Yukon.

Parameters measured: Primarily continuous water level and flow (discharge). Sediment concentration and loading was recorded at 12 stations between 1969 and 1992. Other



parameters (river width, depth, velocity, water temperature, ice thickness, river conditions and pictures) are collected during site visits and available by request.

Data Location: Environment and Climate Change Canada ([Real-Time Hydrometric Data Map Search - Water Level and Flow - Environment Canada \(ec.gc.ca\)](#)). The Government of Yukon Water Resources Branch is also working on putting the data into the Aquarius database (see glossary for more information).



Small Stream Network

Alternative names: Yukon Hydrometric Network

Date established: 1974

Primary Operator: Government of Yukon

Partners: McMaster University assists with the operation of three stations

Number of active sites: 17

Background: This network was originally started by Government of Canada Department of Indian Affairs and Northern Development in 1974 based on a project oriented basis, with the objective of providing one or two years of data for culvert design and fishery concerns. The establishment of the network was prompted by the realization that very little hydrometric information was available for small drainages. The network transitioned to the Government of Yukon when the Water Resources Branch joined the territorial government as part of devolution in 2003. In the 1990s and again in the 2010s, additional stations were added to the network. This network aims to collect long-term hydrometric data on small draining basins (less than 500 km²) and provide baseline information for future developments. The network incorporates key stations representing the streamflow characteristics of different hydrologic regions. The network also includes sites from the Wolf Creek Research Basin.

Parameters measured: Water level and streamflow (discharge); water temperature data collection was established at most sites between 2008 and 2011 (open water seasons only). Some sites in the Wolf Creek Research Basin also monitor conductivity.

Data Location: Most data from 2004 to present is uploaded to the Aquarius server and data from previous years is stored by WRB. The public can contact WRB for access to the data (water.resources@yukon.ca). WRB tracks the status of data uploads to Aquarius and performs data quality assurance. Data is graded based on missing data, data uncertainty, etc. Rating curves are developed using discharge measurements and



stage observations and then applied to recorded stage data to produce calculated discharge time series.



Canada-Yukon Water Quality Monitoring Network

Alternative names: Canada-Yukon Agreement on Water Quality and Aquatic Ecosystem Monitoring; Pacific-Yukon Long-term Monitoring; Pacific-Yukon Long-term Trend Monitoring; Long-term Water Quality Monitoring Network; Federal-Territorial Water Quality and Aquatic Ecosystem Monitoring Network; Yukon Water Quality Monitoring Network

Date established: The Government of Yukon – Government of Canada Agreement for the operation of the network was established in 2005, but signed in 2019. Prior to 2005, the network was solely federally operated. The oldest of the 15 active sites dates back to 1980. Other active sites were established in 1991, 1992, 1993, 2005, 2007, 2008, and 2011. Some sites were de-activated and then re-activated, and thus have data gaps. Sites established in the 1980s (all currently inactive) and 1990s (some currently inactive, some currently active) were initiated under the Arctic Environmental Strategy or the Yukon Baseflow Study by Environment and Climate Change Canada.

Primary Operators: Government of Yukon and Government of Canada

Partners: Government of Canada, Environment and Climate Change Canada (data analysis, data storage); Indigenous Partners (data collection); Parks Canada (data collection)

Number of active sites: 15

Background: The goal of the network is to maintain long-term water quality and aquatic ecosystems monitoring. This occurs through the collection and analysis of water quality information. This information is used to support the health of aquatic systems while focusing on watersheds that are important for water supply, fish and wildlife, subsistence harvest, industry, and recreation, and which may be altered by land use activities and climate change. A network evaluation was conducted in 2021 to assess whether the network is achieving the intended outcomes, impacts and objectives of the program and a few recommendations from this evaluation are now implemented.

Parameters measured: Continuous (logger/sonde data) and discrete (CABIN, benthic samples, grab samples) data for various physical, chemical, and biological parameters. See ECCC portal below for full list of parameters.

Data Location: Data from 2000-2019 for most sites can be found on Environment and Climate Change Canada's National Long-term Water Quality Monitoring Data portal:

<https://data-donnees.ec.gc.ca/data/substances/monitor/national-long-term-water-quality-monitoring-data/?lang=en>

and the Freshwater Quality Monitoring and Surveillance Portal:

<http://aquatic.pyr.ec.gc.ca/webdataonlinenational/>

Station location and metadata can be found on the Yukon Water Data Catalogue:

<https://yukon.maps.arcgis.com/apps/webappviewer/index.html?id=2365a4c0b8744f34be7f1451a38493d2>

Additionally, water quality indices are calculated for six to seven stations across the Yukon and published yearly in the Yukon State of the Environment Report.

Other: ECCC has conducted a trend analysis for water quality at the South McQuesten River site, with plans to conduct similar analyses for the Liard River (Upper Crossing) and Yukon River at Takhini River sites.

Yukon Observation Well Network

Alternative names: Yukon Groundwater Program; Previous to 2014 this network was referred to as the Yukon-Wide Long Term Groundwater Monitoring Program

Date established: The Yukon-Wide Long Term Groundwater Monitoring Program was established in 2001 as part of a multi-disciplinary research program in the Wolf Creek drainage and later expanded to other locations. The network was expanded starting in 2014 under the action items of the Yukon Water Strategy and renamed the Yukon Observation Well Network (YOWN).

Primary Operators: Government of Yukon

Number of active sites: One well was established in 2001 (via Wolf Creek research initiatives), and three wells were established between 2008 and 2014, otherwise the rest of the existing 61 active sites (as of 2022) were established in 2015 or later.

Background: The network was established to collect information on long-term trends in groundwater (depth and quality), especially in areas with existing infrastructure.

Parameters measured: Water level, temperature, specific conductance are continuously measured (hourly). Water samples are collected twice per year (spring and fall) at all wells. Wells are sampled by WRB except for those at waste management facilities, which are sampled by environmental consultants contracted by the Government of Yukon's Site Assessment and Remediation Unit (SARU), working on behalf of the Department of Community Services and the Department of Highways & Public Works. Water samples are analyzed by third-party laboratories for various physical and chemical parameters (see [Yukon.ca/en/get-information-about-yukon-groundwater-and-wells](https://yukon.ca/en/get-information-about-yukon-groundwater-and-wells) for the current list) and by Environment and Climate Change Canada for stable water isotopes and artificial sweeteners (acesulfame, cyclamate, saccharin, sucralose, sulfamate). Additionally, all wells at waste management facilities are routinely analyzed for petroleum hydrocarbons.

Data Location: Continuous data and field visit readings are stored on the Aquarius server, discrete data is stored in the WRB's EQWin database. The public can contact WRB for access to the data (water.resources@yukon.ca).



Water Resources Meteorology Network

Alternative names: Yukon Meteorology Network

Date established: First site established in 1993 followed by expansions in 1996, 2014 and 2017.

Primary Operators: Government of Yukon

Partners: McMaster University (Wolf Creek Research Basin sites, Rio Roca, and Windy Pass)

Number of active sites: 10 (including 3 Wolf Creek Research Basin sites), 4 of these 10 sites are in conjunction with the Yukon Snow Survey Network.

Background: This meteorological network was established largely to support the Flood Forecasting Program and the Yukon Streamflow Forecasting Program. Six initial sites were selected by WRB's previous Senior Hydrologist (Ric Janowicz) and were all associated with the upper reaches of sub basins important for flood forecasting purposes.

Parameters measured: Automated stations measure air temperature, soil moisture and temperature, incoming solar radiation, total precipitation, rainfall, snow depth, and SWE (snow water equivalent measured using snow pillows). Soil moisture and solar radiation are not consistently measured at all sites. The Wolf Creek Research Basin sites also measure relative humidity, wind speed and direction, barometric pressure, soil heat flux, air snow interface temperature, infrared canopy temperature, incoming and outgoing short wave radiation and net radiation, and blowing snow rate.

Data Location: Data is stored on the Aquarius server. The public can contact WRB for access to the data (water.resources@yukon.ca). Wolf Creek Research Basin data is available on a University of Saskatchewan website:

<http://giws.usask.ca/KistersWeb/main.php>



Yukon Snow Survey Network

Date established: A single station was established in 1958. A few stations were added in the 1960s, and the bulk of currently active stations were established in the 1970s and 1980s.

Primary Operator: Government of Yukon

Partners: Field help has been provided by a variety of entities including other branches of Government of Yukon, BC Ministry of Environment Water Stewardship Division, USDA Natural Resources Conservation Service, Parks Canada, Yukon Energy, First Nation governments and private contractors.

Number of active sites: 57 sites located in all of the Yukon's six major basins including some stations in British Columbia and Alaska.

Background: The data gathered from this network (snow depth and snow water equivalent, or SWE) provides information that is published three times annually in the Yukon Snow Survey Bulletin and Water Supply Forecast (early March, April, and May). It is primarily used for flood forecasting during both the river ice breakup and freshet periods. Snow data was utilized by Global Water Futures at University of Saskatchewan in the development of MESH (Modélisation Environnementale Communautaire - Surface and Hydrology) hydrological land surface models for the Yukon River Basin, which are used to produce streamflow forecasts. The data are also used to assist in planning and design of development projects, wildlife studies (e.g., ungulate surveys), avalanche forecasting, highway maintenance, forest fire indexing, climate change studies, and building design. Data is collected by a combination of manual snow surveys and automated snow pillows. Sites were selected primarily to inform the flood forecasting program, though some sites were established adjacent to airstrips to complement Environment Canada weather stations with long term baseline data. Efforts were made to distribute the stations evenly across the territory with approximately four stations per sub-basin. When the network was established, site selection was largely dictated by accessibility via snow machine or fixed wing aircraft.

Now, more remote sites are accessed using helicopter allowing for access to higher elevation sites to get a representative distribution of watershed-averaged snow water equivalent. Snow depth (using sensors) and SWE (using snow pillows) is also measured as part of the met station network.

Parameters measured: Snow depth and SWE are measured manually at 10 sub-sample points (generating average values) at each site in the week prior to the March, April and May bulletins following the BC Snow Survey Sampling Guide for snow surveying. Snow depth is measured using a metric federal sampling tube and samples are weighed in the field using a spring balance. SWE is determined using snow density by averaging SWE values from 10 sub-samples at each site. The majority of sites are in mature forests with natural openings to minimize wind impacts.

Data Location: The data is stored in a Microsoft Access Database on Water Resources Branch servers. Data is also available on Yukon Snow Survey Network open data portal:

<https://open.yukon.ca/data/datasets/yukon-snow-survey-network>

Data is reported after each sampling event. Snow Survey Bulletins and Water Supply Forecasts are prepared and issued by Government of Yukon's Water Resources Branch.



Glossary

Aquarius Server: Aquarius is an online platform used for managing water resources data. It stores data in an accessible central location. Within the platform you can view and grade data as well as download timeseries. Aquarius is used within WRB to store continuous data, otherwise defined as data that is collected by dataloggers. This platform is not publicly accessible and is accessed via username and password within WRB.

EQWin: EQWin is a desktop system database tool used to store, manage, analyze water data. EQWin is used within WRB to store discrete data, otherwise defined as data that is collected by grab samples (lab data). This tool is not publicly accessible and is accessed within WRB.

ECCC Data Explorer: A windows based application that provides user-friendly publicly accessible interface to HYDAT database (which contain inventory information on streamflow, water level, and sediment stations as well as computed data for stations listed in HYDEX database including daily/monthly means of flow, water levels, and sediment concentrations for sediment sites).

Water Data Catalogue: A public web mapping application that allows users to search for water monitoring sites across the Yukon. Housed and managed by WRB. Data is not accessible via the application, only site metadata.

Wolf Creek Basin: Jointly established in 1993 by Government of Yukon and university partners to better understand cold region hydrological processes in northern mountainous environments, providing publically accessible scientific research and information on water, climate and biosphere.