

Guide to Surface Water Quality Data and Online Tools

Background

Alberta Environment and Parks, and its partners, collect surface water quality samples in rivers, lakes and other waterbodies across the province. Much of the physical and chemical data from the monitoring program are stored in the Water Data System (WDS), a module of the Environmental Management System (EMS). The EMS supplies data to the Environmental Data Warehouse (EDW), which is the source of the online surface water quality data. Other datasets, such as biological data, are being added to WDS as resources allow.

Disclaimer: The data have gone through a verification/validation process; however, occasional errors or anomalies may exist. Users should be aware of changes and improvements to field sampling and analytical laboratory methods (e.g., improved method detection limits) when comparing water quality samples collected over time.

Contact us: swq.requests@gov.ab.ca

- For further information or to request additional data not available online
- For questions regarding surface water quality data search tools
- If anomalies are discovered in the dataset

The Surface Water Quality Data webpage has tools to view or download data for commonly requested water quality variables.

- <https://www.alberta.ca/surface-water-quality-data.aspx>

Information about the tools, codes and tips on how to produce data are found below.

Station Inventory

- [Station Inventory](#)

The Station Inventory is a summary of sample locations and associated metadata, including:

- Latitude and longitude
- Sample matrix (e.g., water, sediment)
- Sample count (approximate number of samples) by decade
- Water quality variable categories (e.g., routine ions, nutrients, metals, pesticides, trace organics)

Note: *Sample counts* (by decade) are approximate because they are based on water quality variables indicative of each category/group.

Continental River Basin	CHURCHILL RIVER, MACKENZIE	River Basin	ATHABASCA RIVER, BATTLE RIV
Sub River Basin	OSAA, UPPER OLDMAN RIVER - C	Station Type	0 (RIVER OR STREAM), 1 (LAKE)
Station Name	ATHABASCA RIVER	Station Number	AB07BE0320, ATHABASCA RIVER, ABOVE TOWN OF ATHABASCA

Sample Class	Agency Code	Station Number	River Sub-Basin Code	Station Type	Station Name and Description	Station Comment	Latitude (Decimal Degrees)	Longitude (Decimal Degrees)	Sample Matrix	Total Sample Count	Earliest Sample Date	Prior to 1970	1970-79	1980-89	1990-99
A	211	AB07BE0320	07BE	0 (RIVER OR STREAM)	ATHABASCA RIVER ABOVE TOWN OF ATHABASCA		54.72222	-113.28011	0 (WATER)	111	19-Nov-1967	52	97	2	0

The station inventory is also available on the **Water Quality Data Portal**, a map-based tool used to view and search for surface water quality monitoring stations in Alberta.

- [Water Quality Data Portal](#)

Station information obtained from the portal can inform data requests or support the download of commonly requested water quality variables using the tools below.

Long Term River Station Data

- [Long Term River Station Data](#)

View or download commonly requested water quality data for monthly samples collected at long term monitoring stations.

Continental River Basin	MACKENZIE RIVER, MISSOURI	River Basin	ATHABASCA RIVER, BATTLE RIV
Sub River Basin	OSAD, WATERTON RIVER, OSAG	Station Type	0 (RIVER OR STREAM)
Station Name	ATHABASCA RIVER	Station Number	AB07BE0010, ATHABASCA RIVER, AT TOWN OF ATHABASCA

Station No.	Station Name Description	Latitude (Decimal Degrees)	Longitude (Decimal Degrees)	Sample Matrix	Sample Type	Collection Code	Sample Comment	Sample Date	Chlorophyll-a (ppb)	Water Temperature (°C)	Dissolved Oxygen (mg/L)	Turbidity (NTU)	True Colour (PCU-units)	Dissolved Organic Carbon (DOC) (mg/L)	Specific Conductance (µS/cm)	Phosphorus Total (TP) (mg/L)
AB07BE0010	ATHABASCA RIVER AT TOWN OF ATHABASCA	54.72222	-113.28011	0	1			17-Feb-1967 16:50	1.00	0.50	9.70	3.5	21	5.8	400	0.0140
AB07BE0010	ATHABASCA RIVER AT TOWN OF ATHABASCA	54.72222	-113.28011	0	1			18-Mar-1967 12:30	1.20	0.50	9.60	2.8	8.8	400	0.0120	

Transect Stations include surface water quality samples taken across the width of the river. The data are presented in two formats:

1. Originally, each sampling point across the transect was assigned separate station numbers (e.g., Oldman River near Brocket – Right Bank, Centre and Left Bank were given three distinct station numbers).
2. Since 2009, transects are given only one station number (e.g., North Saskatchewan River at Devon). Each sample in the transect is assigned additional measurements (e.g., Distance from Right Bank with units of % or meters) to identify where it was collected across the river channel.

The North Saskatchewan River mainstem stations have been converted to the single transect station format; work continues to convert the remaining mainstem river stations across the province.

Lake/Reservoir Data

Lake data (including reservoirs) are available in two forms: raw data and summary format (table or graph). These data are whole-lake (composite) samples which are made up of multiple sub-samples of the upper water column taken throughout the lake. The sub-samples are combined to make a composite sample which is used to determine the overall water quality conditions of an individual lake or reservoir during the open-water period (May to October).

Lake Water Quality Data – view or download composite lake data for commonly requested water quality variables.

- [Lake Water Quality Data](#)

Station Name Description	Sample Number	Sample Date	Latitude (Decimal Degree)	Longitude (Decimal Degree)	Sample Matrix	Sample Type	Collection Code	Secchi Disk Transparency m
BAPTISTE LAKE - NORTH BASIN COMPOSITE - (A807940810)	8348003408	11-May-1983 14:00	54.78333	-113.53000	0	13		1.8
BAPTISTE LAKE - NORTH BASIN COMPOSITE - (A807940830)	8348003427	29-Jun-1983 11:00	54.78333	-113.53000	0	13		2.1
BAPTISTE LAKE - NORTH BASIN COMPOSITE - (A807940830)	8348003428	07-Jul-1983 11:00	54.78333	-113.53000	0	13		2.0
BAPTISTE LAKE - NORTH BASIN COMPOSITE - (A807940830)	8348003429	04-Aug-1983 12:00	54.78333	-113.53000	0	13		1.0

Lake Condition is often based on the level (or concentration) of two key trophic indicators:

- Total phosphorus (a key nutrient)
- Chlorophyll-a (a general measure of algal biomass)

These measurements, which can be representative of biological productivity, are used to group Alberta lakes into a range of trophic categories:

- Oligotrophic (low productivity)
- Mesotrophic (moderate productivity)
- Eutrophic (high productivity)
- Hyper-eutrophic (very high productivity)

Trophic Condition of Alberta Lakes is a summary of lake condition by trophic category. Trophic condition is determined by calculating the overall mean (from each lake's annual average) of total phosphorus or chlorophyll-a concentrations for lakes with at least three composite samples in any single year (May to October).

- [Trophic Condition of Alberta Lakes](#)

Lake Name	Latitude (Decimal Degree)	Longitude (Decimal Degree)	TP Sample Count	Average Total Phosphorus (µg/L)	Total Phosphorus Trophic Condition	Chl-a Sample Count	Average Chlorophyll-a (µg/L)	Chlorophyll-a Trophic Condition
ADAMSON LAKE - COMPOSITE - (A100864210)	53.61564	-112.02044	5	424.2	Hyper-eutrophic, Very High Productivity	5	85.6	Hyper-eutrophic, Very High Productivity
ALEX LAKE - CENTRE COMPOSITE - (A100501910)	52.35048	-113.12893	80	36.9	Eutrophic, High Productivity	80	80.8	Eutrophic, High Productivity
ANBIE LAKE - COMPOSITE - (A100441020)	54.81811	-112.82308	8	32.4	Mesotrophic, Moderate Productivity	8	6.5	Mesotrophic, Moderate Productivity
ANGLING LAKE - COMPOSITE - (A100404480)	54.20130	-110.32630	13	32.7	Mesotrophic, Moderate Productivity	13	55.1	Eutrophic, High Productivity

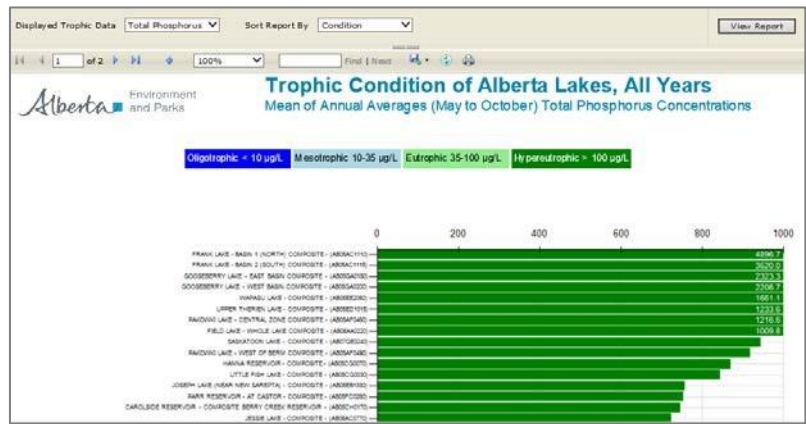
Select an individual lake or “All stations” to view the summary table. From the table, select the lake name to view annual data and select a year to view monthly sample data. Data can be exported to .csv from any of the tables.

View the summary graph by clicking on “[Graph of Trophic Condition](#)” link above the table or click here:

- [Graph](#)

Select an individual lake or “All Stations” to view the graph. Once in the graph:

- Use the drop-down menu to select: total phosphorus or chlorophyll-a
- Select option to sort by trophic condition or by lake name

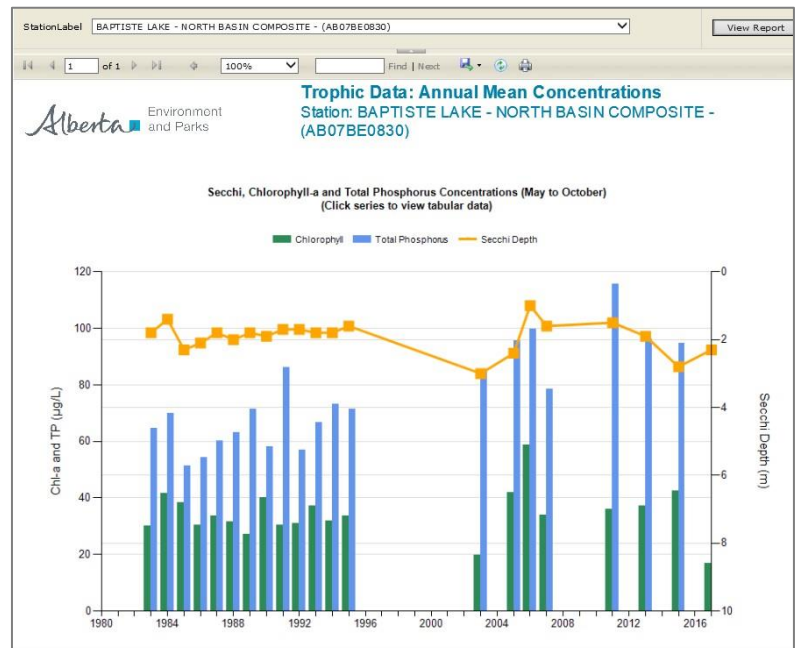


The *trophic categories* (oligotrophic, mesotrophic, eutrophic and hypereutrophic) are based on the 1982 publication, *Eutrophication of Waters, Monitoring Assessment and Control*, by the Organization for Economic CoOperation and Development (OECD, Paris, France). These categories (commonly used by others throughout the world) have been used in Alberta since the 1980s.

Trophic Data: Annual Mean Concentrations - displays annual trophic data (total phosphorus, chlorophyll-a and secchi depth) for an individual lake.

- [Trophic Data: Annual Mean Concentrations](#)

Select a lake to access the graph. Click on the graph to access data that can be exported to .csv format.



Year	Phosphorus Total Average (µg/L)	Phosphorus Total Min (µg/L)	Phosphorus Total Max (µg/L)	Phosphorus Total Sample Count	Chlorophyll-a Average (µg/L)	Chlorophyll-a Min (µg/L)	Chlorophyll-a Max (µg/L)	Chlorophyll-a Sample Count	Secchi Depth Average (m)	Secchi Depth Min (m)
1983	64.7	38.6	115.6	7	30.1	15.3	60.5	7	1.8	1.0
1984	70.0	39.2	107.5	6	41.7	7.3	98.7	6	1.4	0.9

Codes and Descriptions

The following are codes and descriptions used for surface water quality samples.

Sample Class 'A' - data collected by Alberta Environment and Parks (AEP) staff or partners trained and audited by AEP staff. The data for samples collected since 1996 have been authenticated in accordance with AEP's verification/validation process.

Agency Code '211' - samples collected by or for AEP's Surface Water Monitoring group.

Station Number - a unique code for a specific surface water site or combination of sites. The format for surface water station numbers is AB05CE0350, where:

- "AB" is the Province
- "05" represents the continental river basin
- "CE" the sub-basin
- The last four numbers are arbitrarily assigned (number order does not determine upstream to downstream locations)

Every station number is linked to a Station Name/Station Description (e.g., "North Saskatchewan River at Devon"). The Station Name ("North Saskatchewan River") provides a general description of the sampling location, and Station Description ("at Devon") provides specific information about the sampling site.

Sample Matrix - a numeric value identifying the substance or material being sampled (e.g., water, sediment). Other matrices, such as epilithic algae, aquatic vegetation, or effluent may also be available at a sample location.

Collection - a numeric value identifying the method used to collect the water, sediment or biota components of a sample.

Sample Type - a numeric value identifying the type of sample collected (e.g., composite, grab).

Lake Data Codes:

Code Type	Code	Description from WDS
Collection	133	Weighted sampling tube with one way valve
Collection	16	Hand collection - whether water; sediment or biota
Collection	17	Kemerrer/van dorn - water collection bottle
Collection	26	Steel bailer
Sample Matrix	0	Water
Sample Type	13	Euphotic composite
Sample Type	18	Epilimnetic composite

River Data Codes:

Code Type	Code	Description from WDS
Collection	1	Manual
Collection	122	In situ recording meter
Collection	128	Sample bottle in weighted holder
Collection	14	Sample collection with multiple sampler
Collection	15	Sample collection with qa/qc replicate sampler

Collection	16	Hand collection - whether water; sediment or biota
Collection	32	Submersible pump
Sample Matrix	0	Water
Sample Type	1	Discrete sample (grab)
Sample Type	6	Composite sample
Sample Type	14	Vertical integrated
Sample Type	15	Spatial composite
Sample Type	17	Flow weighted composite (proportional to flow)

Tips for Producing Data

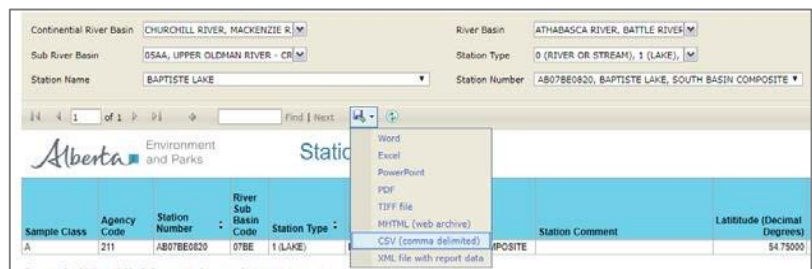
- For “Station Inventory” and “Long Term River Station Data”, when criteria is selected from the drop-down options, the filters will automatically reduce available selections for the other search categories (Continental River Basin, River Basin, Sub River Basin, Station Type, Station Name, and Station Number).

Cautionary note: if the report is run a second time with different criteria, the filters need to be manually reset. For example:

- Select “Bow River” under River Basin and 05BA and 05BB under Sub River Basin and run the report
 - Then change River Basin to “All”
 - In this case, the two Sub River Basins will remain selected. The filter must be reset (Sub River Basin to “All”) or refresh the report to run a different set of criteria
- Once “All” is selected for Station Names, the Station Number filter will expand to maximum width. Use the grey scroll bar immediately below this filter to navigate to the “View Report” button.

- The best method to download data is:

- Select the .csv format
- Select ‘Open’ when prompted at the bottom of the page to open in Excel
- Or select ‘Save’ to save it as .csv



- It is not recommended to download data from the graphs because the column headers cannot be properly formatted, and in the case of the Trophic Condition graph, the column header always says Chlorophyll even if Phosphorus is selected. In Addition, when exporting the graph to pdf, there is no way to control the page breaks so part of the station name might flow onto the next page.
- To navigate back to the main page from the trophic graph and sub-reports, use the blue back arrow in the report header (highlighted below).



- A measurement below the detection limit will be preceded by ‘L’ and a measurement with ‘G’ indicates the measurement could not be determined.

Table of Water Quality Variable Names and Units

Data downloaded to .csv from “Long Term River Station Data” and “Lake Water Quality Data” do not have properly formatted column headers. The correct names are provided below.

Variable Name	Units	Unit Description
Secchi Disk Transparency	m	meters
Chlorophyll-a	µg/L	Micrograms per Liter
Water Temperature	°C	Degrees Celsius
Dissolved Oxygen	mg/L	Milligrams per Liter
Turbidity	NTU	Nephelometric Turbidity Units
True Colour	PtCo units	Platinum-Cobalt units
Dissolved Organic Carbon (DOC)	mg/L	Milligrams per Liter
Specific Conductance	µS/cm	Microsiemens per centimeter
Phosphorus Total (TP)	mg/L	Milligrams per Liter
Phosphorus Total Dissolved (TDP)	mg/L	Milligrams per Liter
Ammonia (NH ₃ -N)	mg/L	Milligrams per Liter
Nitrate+Nitrite (NO ₃ +NO ₂ -N)	mg/L	Milligrams per Liter
Nitrate (NO ₃ -N)	mg/L	Milligrams per Liter
Nitrite (NO ₂ -N)	mg/L	Milligrams per Liter
Total Kjeldahl Nitrogen (TKN)	mg/L	Milligrams per Liter
Total Nitrogen (TN)	mg/L	Milligrams per Liter
TN:TP Ratio		
Total Dissolved Solids (TDS)	mg/L	Milligrams per Liter
Filterable Residue (FR)	mg/L	Milligrams per Liter
Non-Filterable Residue (NFR)	mg/L	Milligrams per Liter
pH	pH units	
Total Alkalinity (CaCO ₃)	mg/L	Milligrams per Liter
Phenolphthalein Alkalinity (CaCO ₃)	mg/L	Milligrams per Liter
Total Hardness (CaCO ₃)	mg/L	Milligrams per Liter
Bicarbonate (HCO ₃)	mg/L	Milligrams per Liter
Carbonate (CO ₃)	mg/L	Milligrams per Liter
Chloride Dissolved (Cl)	mg/L	Milligrams per Liter
Sulphate Dissolved (SO ₄)	mg/L	Milligrams per Liter
Calcium Dissolved (Ca)	mg/L	Milligrams per Liter
Magnesium Dissolved (Mg)	mg/L	Milligrams per Liter
Sodium Dissolved (Na)	mg/L	Milligrams per Liter
Potassium Dissolved (K)	mg/L	Milligrams per Liter
Fluoride Dissolved (F)	mg/L	Milligrams per Liter
Fecal Coliforms	No/100 mL	Number per 100 milliliter
E. Coli	No/100 mL	Number per 100 milliliter
Cyanide	mg/L	Milligrams per Liter