# Channel-scale Hydrology Portal - User Guide

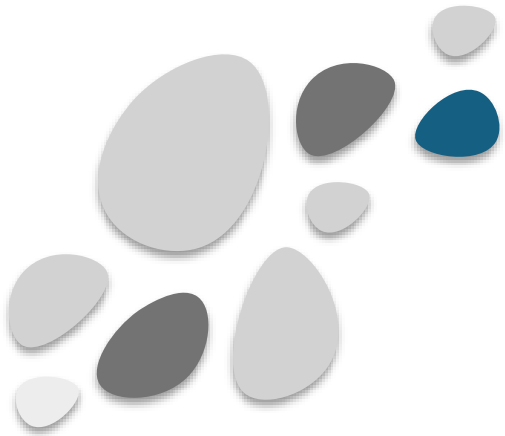
## Overview

The Channel-scale Hydrology Portal provides access to high-resolution, vector-based projections of **streamflow, water temperature, and saturated dissolved oxygen** for individual streams and lakes within British Columbia. Vector-based means the hydrologic data are linked to individual features represented spatially by line segments for rivers and polygons for lakes.

Using the interactive map, you can:

- Select individual stream reaches or lakes and download data (CSV)
- Search for individual features by name
- Navigate to a location using coordinates (either in BC Albers, WGS84, or Web Mercator)
- Filter and download data by variable, climate model, and emissions scenario
- Explore the topology of the drainage network
- Download spatial data in GeoJSON format

This portal provides **raw projections data only.** It does not include built-in analytical tools, ensemble summaries, or derivative products. It is designed for users who want to download data and conduct their own post-processing and analysis of streamflow, water temperature and dissolved oxygen data. This approach allows users the flexibility to develop their own site-specific hazard metrics or other summary products suited to their needs.



# Available Data

## Variables

The portal provides daily projections for:

- **Streamflow ($m^3/s$)**
  Flow of water through a stream, or outflow from a lake or reservoir, expressed as the volume of water passing a point per unit time ($m^3/s$)
- **Water temperature (°C)**
  - For streams, water temperature is averaged over the entire depth of the stream
  - For lakes and reservoirs, water temperature is averaged over the surface layer only
- **Saturated dissolved oxygen (mg/L)**
  Maximum amount of oxygen water can hold at a given temperature and pressure (100% saturation)

Data are provided as daily mean values and represent conditions at the outlet (downstream end) of each selected river reach or lake.

For sites affected by storage regulation, the simulated data represent naturalized flow conditions.

## Climate Scenarios

The data are based on an ensemble of climate scenarios derived from nine Global Climate Models (GCMs; Table 1) and two Shared Socioeconomic Pathways (SSPs) from the Sixth Coupled Model Intercomparison Project (CMIP6). The SSPs represent moderate (SSP2-4.5) and high (SSP5-8.5) greenhouse gas emissions trajectories for the period 2015-2100.

Using multiple climate models and emissions pathways helps capture uncertainty in future climate projections arising from both future greenhouse gas emissions and differences among climate models. Each climate scenario also includes a historical period (1950-2014), where each GCM was driven by historical greenhouse gas emissions and concentrations.

In addition to future projections, a historical simulation based on PNWNAmet is also available. This scenario covers the period from 1945 to 2012 and is based on observed weather data from PCIC's gridded meteorological dataset for northwestern North America. It can be used to evaluate model performance by comparing with observations of streamflow and water temperature, where available.

**Table 1.** Subset of nine global climate models selected from CMIP6

| Model ID | Institution |
|---|---|
| CNRM-ESM2-1 | Centre National de Recherches Meteorologiques, France |
| FGOALS-g3 | Chinese Academy of Sciences, China |
| IPSL-CM6A-LR | Institute Pierre Simon Laplace, France |
| MIROC-ES2L | JAMSTEC (Japan Agency for Marine-Earth Science and Technology), AORI (Atmosphere and Ocean Research Institute, The University of Tokyo), NIES (National Institute for Environmental Studies), and R-CCS (RIKEN Center for Computational Science), Japan |
| MPI-ESM2-0 | Max Planck Institute for Meteorology, Germany |
| MRI-ESM2-0 | Meteorological Research Institute, Japan |
| NorESM2-LM | Norwegian Climate Center, Norway |
| TaiESM1 | Research Center for Environmental Changes, Academia Sinica, Taiwan |
| UKESM1-0-LL | Met Office Hadley Centre, United Kingdom |

# Using the Interactive Map

## Map overview

The portal features an interactive map that displays lakes, rivers and streams across British Columbia (Figure 1). All lakes, rivers and streams are displayed in **blue**. The navigation pane in the top-left corner allows you to zoom in to areas on the map, or search for specific features by name. In the bottom-left corner, you can input coordinates for a specific location. The help button in the bottom-right corner brings up the User Guide.

The following section provides an overview of how to navigate to, select and download data for an individual stream or lake using the map.

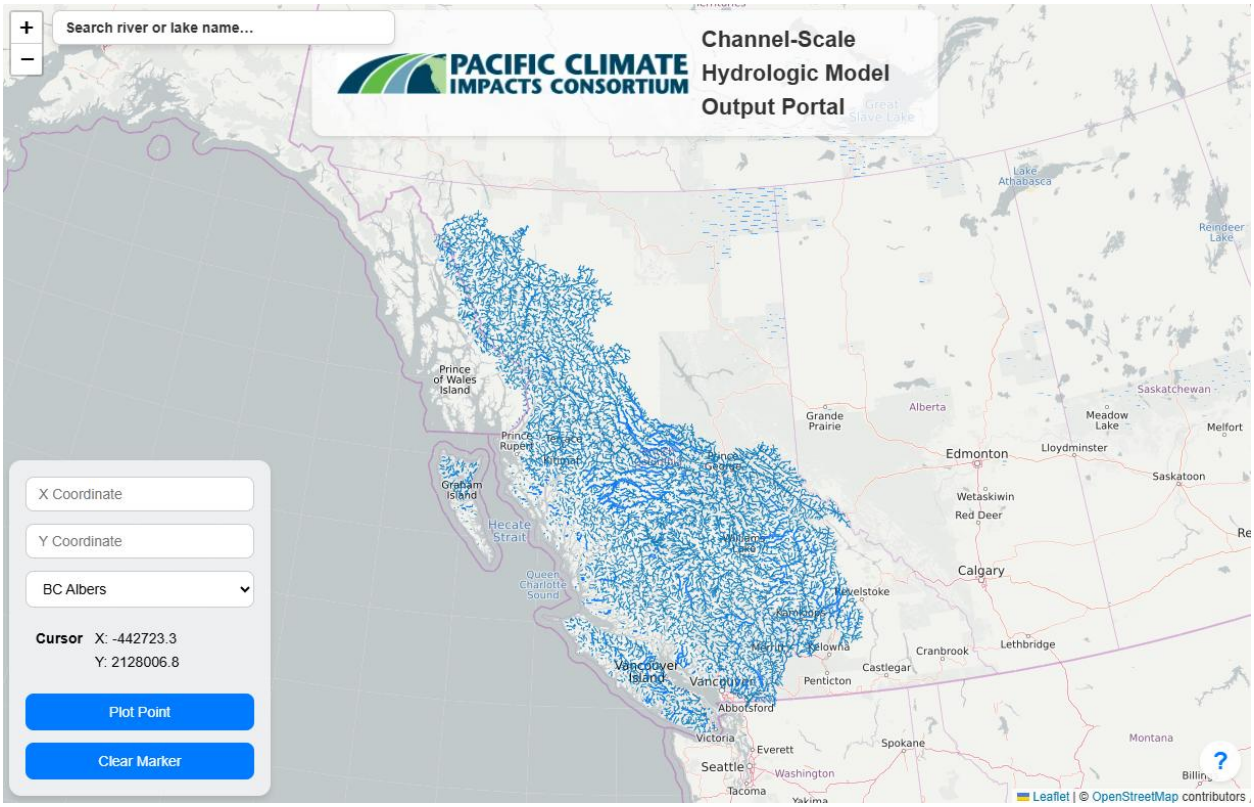



**Figure 1.** Screenshot of the interactive map interface.

## Navigating to a feature

There are three ways to navigate to a feature of interest:

### *1. Enter coordinates (Point Plotter)*

The Point Plotter allows users to manually input coordinates to navigate to features of interest. It is located at the bottom-left of the portal interface. To use the Point Plotter, enter coordinates and click the "Plot Point" button to mark the location on the map. Click "Clear Marker" to remove previously plotted points.

Supported coordinate systems include:

- **BC Albers**: British Columbia-specific coordinate system
- **WGS 84:** Global coordinate system used in GPS
- **Web Mercator:** Common for web mapping applications (e.g., Google Maps)

### *2. Search by name*

At the top-left of the interface, users can manually search for a specific river or lake by name. To search by name, enter a search term in the text box and select a name from the drop-down list. The selected feature will be highlighted in blue (Figure 2).

River and waterbody data available in the search box has been derived from the BC Freshwater Atlas. **Please note** that the search box is limited to rivers and lakes in BC.

### *3. Zoom and pan*

Use the zoom controls in the top-left corner of the map to zoom in or out. Click and drag anywhere on the map to move (pan) across the screen.

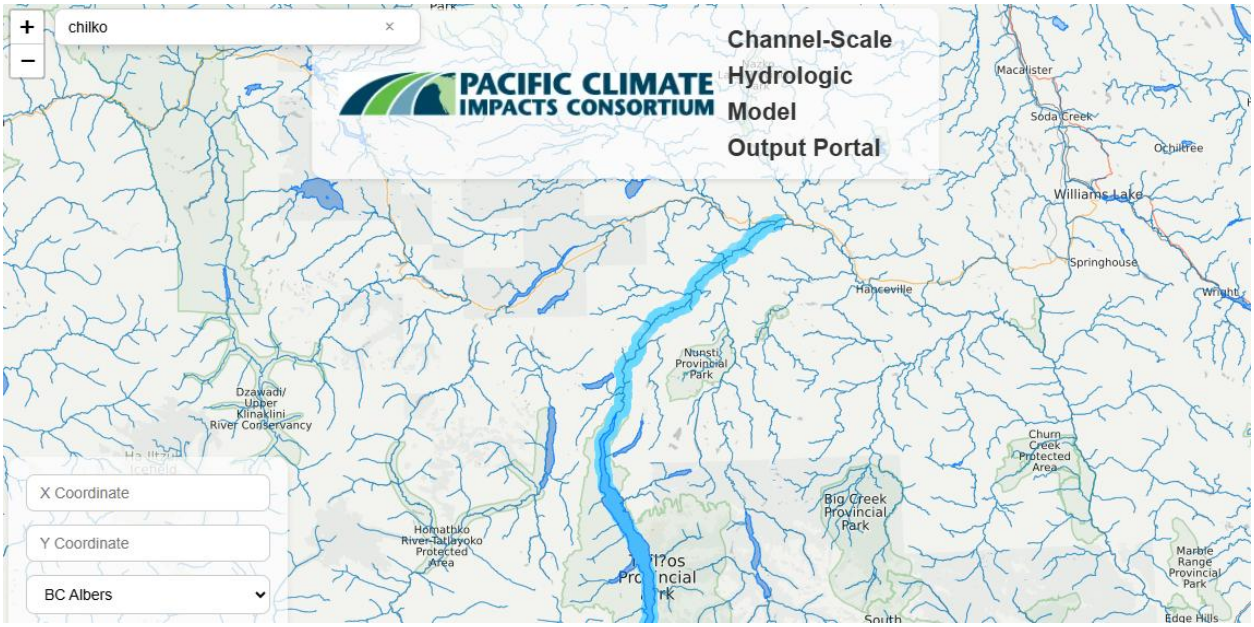



**Figure 2.** Search result for the Chilko River using the search bar. The Chilko River is highlighted in light blue.

## Selecting a feature

You can hover over features with your cursor to highlight them. Once you select a feature, it will become highlighted in **red**. All lakes and streams upstream from the selected feature will be highlighted in **teal**. The downstream path to tidewater will be highlighted in **purple**.

When you click on a feature, a data pop-up window will appear (Figure 3). The pop-up window shows:

- **Subbasin ID (SubId)**
  A unique identifier for the selected river segment
- **Download GeoJSON (link)**
  Click to download spatial data in GeoJSON format for use in GIS applications

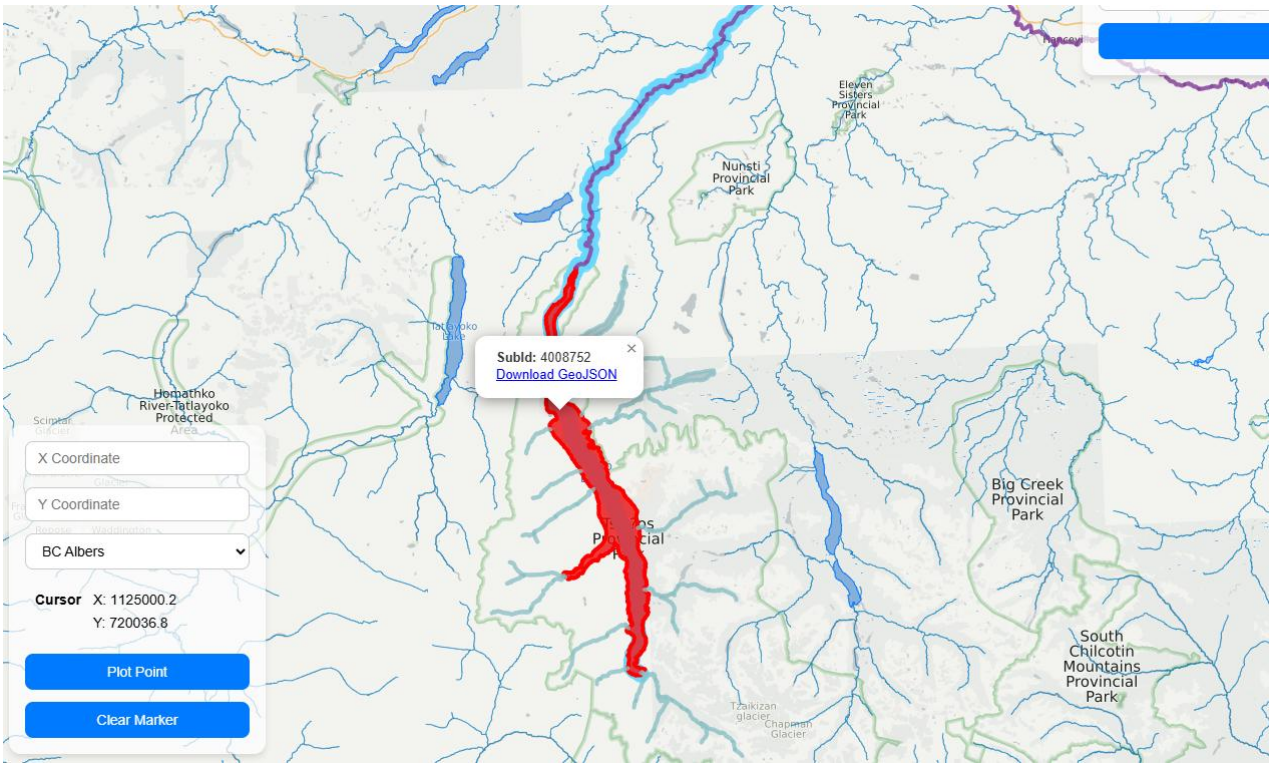



**Figure 3.** Chilko Lake is selected (in red) and a pop-up window has appeared. Upstream waterbodies are highlighted in teal. The downstream path to tidewater is highlighted in purple.

## Downloading data

On the right side of the map, the "Data Download" panel allows users to download hydrological time series data for selected parameters (Figure 4). This panel appears once you select a feature.

### *Step 1: Select a feature*

Click on a stream reach or lake on the map.

### *Step 2: Choose data filters*

Using the download panel, select data parameters using the drop-down menus.

- **Climate model**
  For future projections, select an individual climate model from the nine-model ensemble. For historical data, select PNWNA (historical).
- **Emissions scenario**
  Select from the intermediate ("historical, SSP2-4.5") or high ("historical, SSP5-8.5") emissions scenarios. For historical data, select "historical (PNWNAmet only)".
- **Variable**
  Select an output variable. A description of each variable is provided in *Available Data* above.

### *Step 3: Download*

Click "Download CSV" to export the data in CSV format. Data are provided as a daily time series from 1950 to 2100.

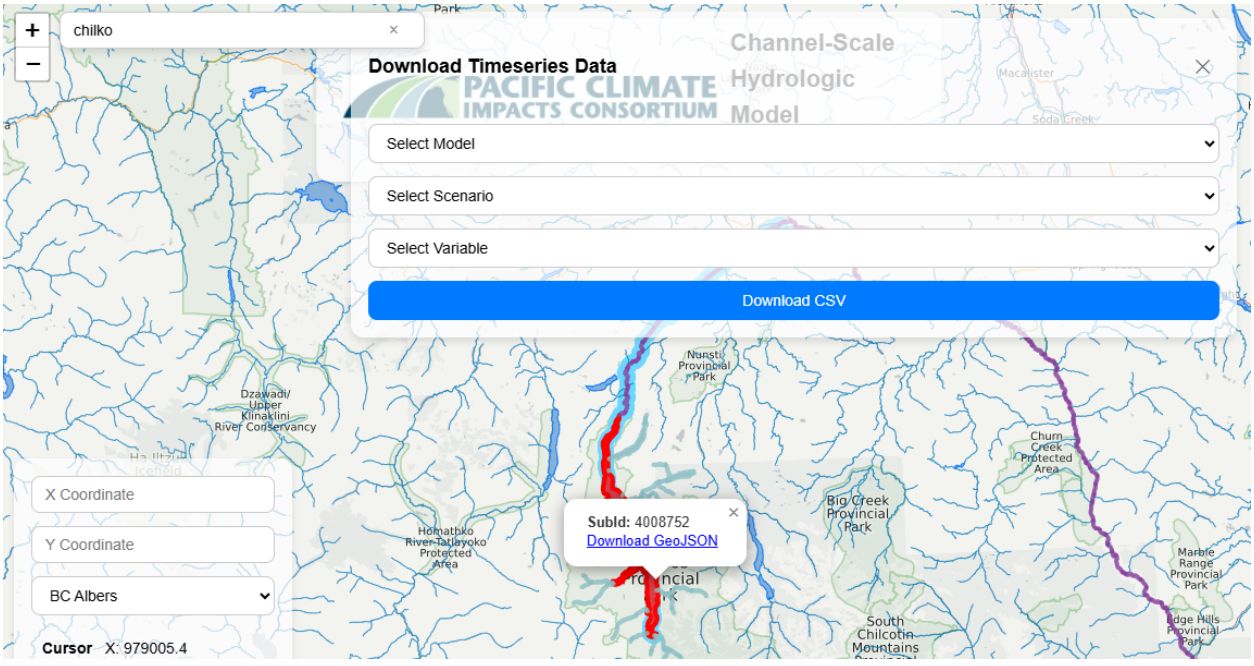



**Figure 4.** Data download panel with drop-down menus for model, scenario and variable. The data download panel pops up once you select a feature.

## File naming

The exported CSV files are named using the following convention:

<subId>_<gcmId>_<scenario>_<variable>.csv

- ***<subId>*** is a unique outlet ID assigned to each feature
- ***<gcmId>*** is the GCM model ID (See Table 1)
- ***<scenario>*** is the emission scenario name, either 'historical, ssp245' or 'historical, ssp585'
- ***<variable>*** is the variable name, either 'streamflow', 'water_temp', or 'DO_sat'

***Example***

2009409_CNRM-ESM2-1_historical, ssp245_streamflow.csv

This file is for streamflow data downloaded for feature 2009409 (Quesnel Lake) for climate model CNRM-ESM2-1 and emissions scenario SSP2-4.5.

## File contents

Each file includes:

- Metadata (variable, climate model, emissions scenario, feature ID)
- Daily time series values

***Example***

For example, for streamflow data downloaded for feature 3008419 for climate model CNRM-ESM2-1 and emissions scenario SSP2-4.5, the contents are as follows:

**Attribute, value**
Variable, streamflow
Outlet, 3008419
Scenario, historical, ssp245
Model, CNRM-ESM2-1

**Metadata**

**Time, streamflow (m**3 s**-1)**
1950-01-01 00:00:00, 11.710326288080136
1950-01-02 00:00:00, 18.83493874248273
1950-01-03 00:00:00, 32.82399651509237
1950-01-04 00:00:00, 45.63165250532725
1950-01-05 00:00:00, 55.99715283964133
…

**Daily time series**