Columbia Basin Water Monitoring Framework

A coordinated monitoring network to support the tracking and understanding of climate impacts on water availability for communities and ecosystems

Program Overview

Living Lakes Canada acknowledges that this project is taking place in the unceded traditional territories of the Ktunaxa, Lheidli T'enneh, Secwepemc, Sinixt, and Sylix Nations who have stewarded these lands for generations. Recognizing Indigenous People as the rightful caretakers of their unceded territories, Living Lakes Canada works to complement their intergenerational work and Indigenous-led water stewardship initiatives.

Figure 1. Assiniboine Creek near a CBWMF hydrometric station in the Columbia-Kootenay Headwaters Hydrologic Region.

The goal of the Columbia Basin Water Monitoring Framework (CBWMF) is to establish a unified monitoring network to support the tracking of climate and other impacts on water supply for communities and ecosystems. The data collected will be used to inform adaptive strategies for watershed management and freshwater stewardship in the Columbia Basin.

The CBWMF is intended to complement the valuable monitoring and stewardship work carried out by local stewardship groups, First Nations, provincial agencies, municipal and regional governments, and the private sector to fill important data gaps across the region's complex landscapes.

Monitoring sites for the project are selected using a Priority Monitoring Matrix based the results of a geospatial data gap analysis combined with community input gathered through multi-sector Local Reference Groups. The result is a nested monitoring network, which addresses both scientific data gaps and community priorities. In 2022, Living Lakes Canada piloted this approach in three areas of interest:

- Mid-Columbia Kootenay Hydrologic Region
- Columbia-Kootenay Headwaters Hydrologic Region
- Elk River Valley (in partnership with the Elk River Alliance) in the Upper Kootenay Hydrologic Region

As of 2023, the program is being implemented in the Lower Columbia-Kootenay Hydrologic Region and remaining areas of the Upper Kootenay Hydrologic Region (see map).

Several monitoring sites operated by Living Lakes Canada and external partners that pre-date this program have been integrated into the network. Living Lakes Canada also works to support the monitoring efforts of existing stewardship groups, First Nations, and all levels of government through collaboration, workshops, and sharing of best practices.

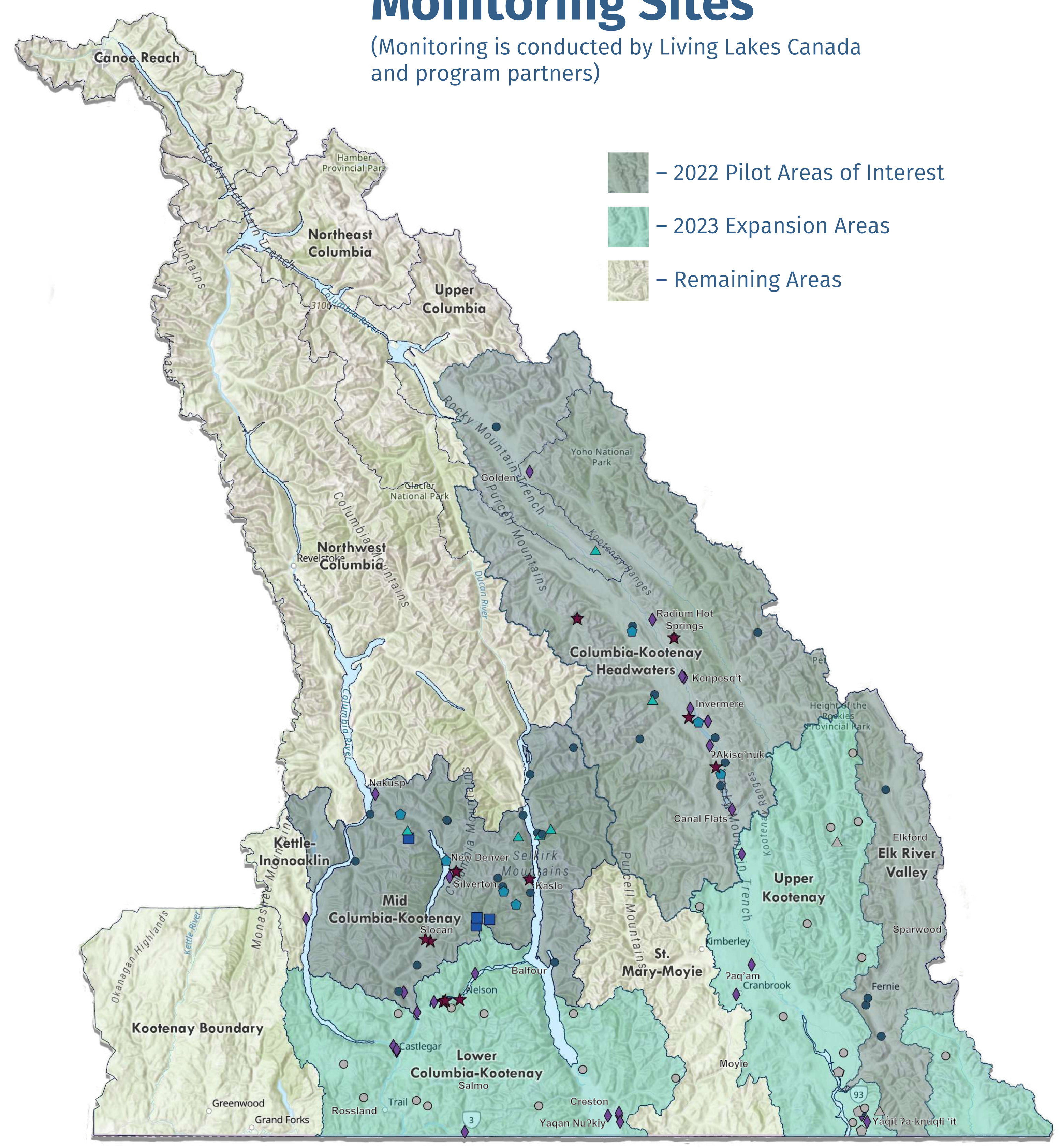
COLUMBIA BASIN WATER HUB

Preliminary data from the CBWMF is now available on the Columbia Basin Water Hub database, along with datasets from many other regional contributors.

visit cbwaterhub.ca

Map of CBWMF Monitoring Sites

(Monitoring is conducted by Living Lakes Canada and program partners)



Hydrometric – These sites measure discharge and water temperature on streams, capturing critical data for understanding water supply and watershed function.

Lake and Wetland – These sites measure the water level and water temperature in lakes and wetlands.

Groundwater – These sites measure the water level and water temperature in groundwater aquifers using privately owned Volunteer Observation Wells (VOW). The Living Lakes Canada Groundwater Program predates the CBWMF program and some VOWs exist outside of the present CBWMF areas of interest.

Climate – These sites measure wind speed and direction, insolation, barometric pressure, temperature, precipitation and snow depth.

High Elevation – The Living Lakes Canada High Elevation Monitoring Program monitors lake ecosystems at the headwaters of critical watersheds. Monitoring parameters include biological, physical and chemical components of alpine lakes and streams, as well as vegetation and wildlife observations.

Biomonitoring – Using the federal CABIN protocol and/or the STREAM protocol, monitoring at these sites uses benthic macroinvertebrate samples to assess ecosystem health.

Locations in Grey – These are being added to the network in 2023, locations are approximate.

Data Snapshot

2023 has been an unprecedented year with regard to snowfall, rainfall, drought and wildfires. Across the region, lower-than-average snowpacks, followed by above-average spring air temperatures, contributing to a very early spring melt and snow-free conditions one month earlier than is typically recorded. Below is an example of some of the preliminary data from two stations in the network, which provide valuable information about how these conditions were experienced at a local scale.

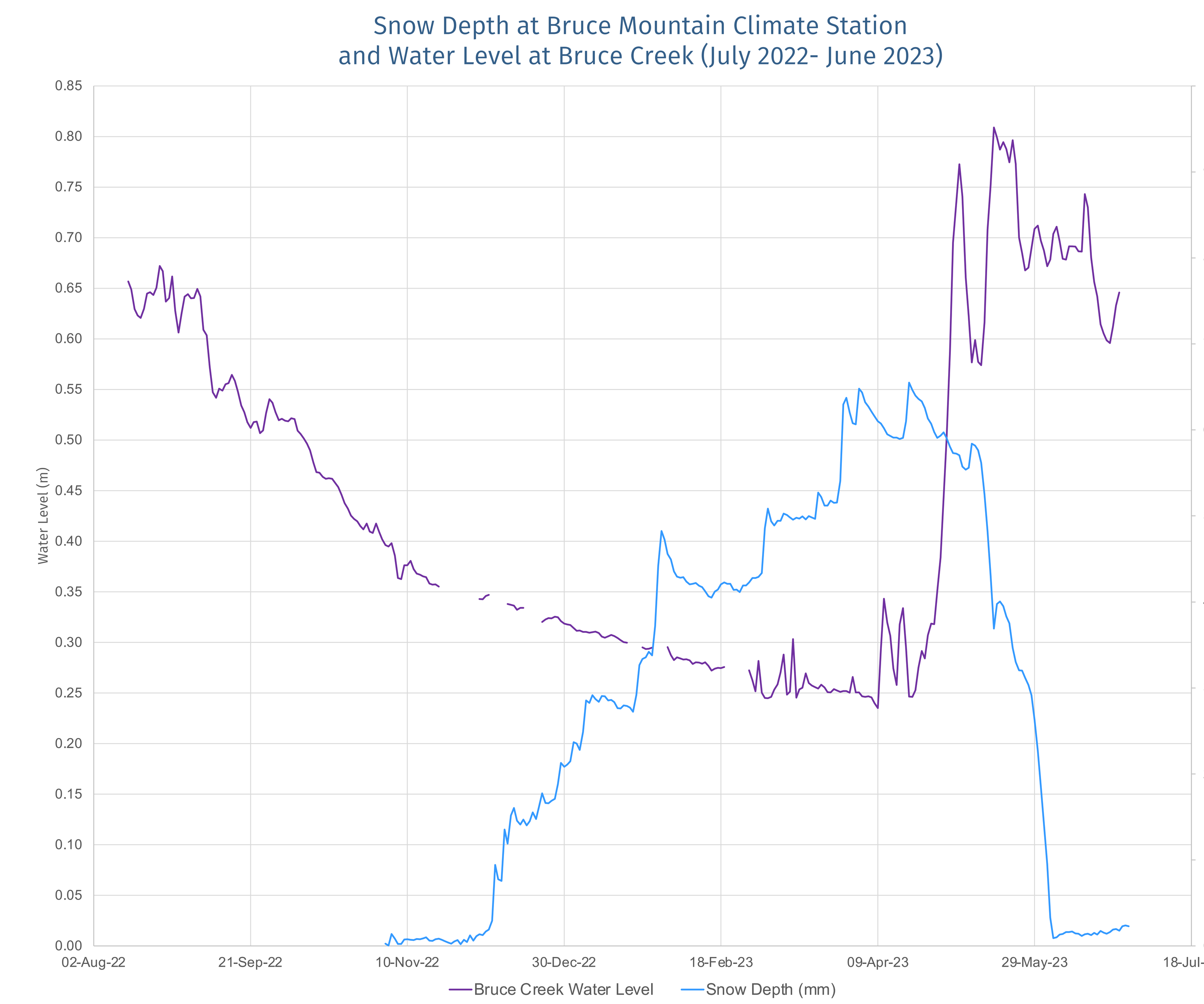


Figure 2: Preliminary snow depth data from the Bruce Mountain climate station (50.547954, -116.24747) and water level from the Bruce Creek hydrometric station (50.563931, -116.236086). Stage-discharge relationships are being developed and final graded datasets will be made available on the Columbia Basin Water Hub in Winter 2024.

Climate monitoring at the Bruce Mountain site found that the snowpack peaked at the end of March/early April with snow melting out by the end of April, consistent with the alarming early spring melt that was observed throughout the province. Climate monitoring shows the snow depth reached a maximum on March 14, 2023; after this time, the air temperature began to consistently go above 0°C, with the snowpack reaching 0 cm on April 28, 2023 (Figure 2). Note that snow depth is different than snow water equivalent (SWE), where one is a measure of the depth of the snowpack and the other a measure of how much water is contained in the snowpack. Monitoring on Bruce Mountain shows that the snowpack likely peaked in the end of March/early April and was gone by the end of April.

Impacts from the lower-than-average snowpack and early melt trends were recorded by hydrometric stations on Bruce and Assiniboine Creeks. The data shows that stream flows and water levels peaked in mid-May, indicating a strong snow melt influence on the system. During this time, both creeks showed a strong diurnal pattern, demonstrating that discharge was driven by run-off from snowmelt, which reaches a maximum during mid-day when air temperatures and solar radiation is greatest.

Acknowledgements to MacDonald Hydrology Consultants for supporting data collection and interpretation.

Living Lakes CANADA