MEMO

DATE: September 22, 2023

TO: Columbia-Kootenay Headwaters Local Reference Group

FROM: Living Lakes Canada

SUBJECT: CBWMF Pilot Year Data Summary for Columbia-Kootenay Headwaters Hydrologic Region

---

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

Living Lakes Canada is completing its first year of data collection through the Columbia Basin Water Monitoring Framework (CBWMF) project. As part of the project's pilot year, water quantity, water quality and climate were monitored in three sub-regions of the Canadian Columbia Basin: the Columbia-Kootenay Headwaters (CKH), Mid-Columbia Kootenay (MCK) and Elk River Valley (ERV). The importance of this monitoring in understanding the state of freshwater in the Columbia Basin cannot be overstated — 2023 has been an unprecedented year with regard to snowfall, rainfall, drought and wildfires. The following summary of surface water and climate conditions is based on the hydrometric and climate data that was collected in the CKH region. A full report will be released early 2024.

Across the CKH region, lower-than-average snowpacks were followed by above-average spring and summer temperatures, contributing to snow-free conditions one month earlier than is typically recorded. Climate monitoring at our 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.

Impacts from the lower-than-average snowpack and early melt trends were recorded by our 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.

Rainfall has had a much smaller impact than snow melt on streamflow, with late May and early June rainfall events maintaining surface water levels until mid-June, since which time a prolonged dry period has resulted in declining surface water throughout much of the CKH region.

Seasonal discharge patterns show that, with sustained high temperatures and low precipitation, there is a continued decline in surface water levels throughout the open water (ice-free) season. This decline in water levels — due to lower-than-average snowpacks, higher-than-average early season temperatures, and low precipitation — can be seen in data for all of the CKH sites where monitoring was initiated in the 2022 season. This was the same for sites within the MCK and ERV regions as well.

Also of concern are the effects of these climate conditions on glacial-dominated systems such as Delphine Creek. After several days of maximum daily temperatures above 30°C, increasing flows in the creek were driven by the melting of high elevation snow and glacier ice. As glaciers melt, glacial surface water works its way down through the glacier (interglacial flow), making its way to the bed below creating sub glacial flow. As the water runs beneath the glacier, fine glacial sediment is entrained in the flow, eventually making its way to the terminus of the glacier where meltwaters can become extremely turbid. Observations from a July 2023 site visit to Delphine found extremely turbid high flows, highlighting glacial meltwater and the importance of monitoring these rapidly changing vulnerable systems. Continued monitoring of Delphine Creek will allow us to track the changing input to water systems from glacially-fed streams since they will change quickly as glaciers continue to recede. Data obtained from Delphine Creek will help to inform our understanding of glacial melt in the Columbia Basin, by enabling us to model other nearby basins that contain glaciers, many of which are important water sources for local residents.

With continued monitoring, data collected by the CBWMF will be instrumental in supporting local climate adaptation and freshwater stewardship in the CKH region.

The CBWMF project is intended to expand upon 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. These include:

- Columbia Wetlands Stewardship Partners
- Columbia Lake Stewardship Society
- Lake Windermere Ambassadors
- CHARS (Columbia Headwaters Aquatic Restoration Secwépemc Strategy) led by Shuswap Band
- East Kootenay Invasive Species Council
- BC Lake Stewardship Society
- Certainteed Canada Inc.

Water data for the CKH is shared on the Columbia Basin Water Hub by many of these groups and can be found here. Preliminary CKH data from the CBWMF project is available here.

Living Lakes Canada continues to welcome community feedback and collaboration on the CBWMF project, and encourages the sharing of water data through the Columbia Basin Water Hub database.

If you have any questions, please contact: Paige Thurston, CBWMF Program Manager, at paige@livinglakescanada.ca.

To learn more about the CBWMF, visit www.livinglakescanada.ca/cbwmf.