WATERSHED BULLETIN #5

January 2026

GROUNDWATER REPORT FLAGS AT-RISK AQUIFERS FOR PRIORITY MONITORING

Living Lakes Canada acknowledges that this project 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.

Beneath communities across Canada lies a hidden world of groundwater. As climate change makes surface water less reliable, this freshwater source is becoming increasingly important. A lifeline for farms, communities, and the environment, groundwater remains a challenge to both understand and manage sustainably. A new report sheds light on groundwater across the Canadian Columbia Basin, pinpointing the most vulnerable aquifers and providing a roadmap for future monitoring and mapping to support all who depend on them.

This Watershed Bulletin dives into the findings from Assessing Aquifers for Monitoring in the Columbia Basin, a report prepared for Living Lakes Canada by Western Water, an independent hydrogeology consulting firm. The report used a Geographic Information System (GIS) and publicly available data to map and assess groundwater. By analyzing information on well locations, types, distribution, and estimated water use, along with soil types, geology, and existing aquifer maps, the report identifies previously-unmapped aquifers and highlights those most vulnerable to stress, including key hotspots near Creston, Baynes Lake, Sparwood, and Golden.

WHAT IS AN AQUIFER?

Groundwater is freshwater stored underground between rock, sand, and gravel. It's collected in natural layers called aquifers, which can hold and/or move water.

GIS EXPLAINED

GIS is a digital tool that uses spatial data (satellite imagery, soil and land classifications, land use, elevation, aquifer boundaries, etc.) and visually displays the data in formats like maps and tables.

In addition to helping decision makers identify aquifers needing special consideration for usage and management, these findings will guide Living Lakes Canada's Columbia Basin Groundwater Monitoring Program in prioritizing aquifers for observation. This community-based program manages a network of 32 "Volunteer Observation Wells" (VOWs), private wells offered by owners for monitoring, where Living Lakes tracks seasonal and annual groundwater changes. This program complements the eight wells monitored by the Provincial Groundwater Observation Well Network in the Basin.

This work provides Indigenous communities, municipalities, regional districts, and others involved in water management with a tool to help empower a water-secure future. Healthy aquifers and data-driven decisions about water use form the foundation of safe communities, resilient ecosystems, productive farms, and thriving local economies.

GROUNDWATER MONITORING: WHY IT MATTERS

Groundwater monitoring is a valuable tool for predicting whether a well's water supply is at risk of going dry and identifying when water is most abundant. These two insights are essential in informing water management, especially during periods of drought.

Groundwater conditions vary widely across the Columbia Basin region, shaped by factors such as sediment types, surficial geology, the rate of recharge from snowmelt and rain, and their connection to surface water. These wide-ranging influences can cause groundwater trends to differ greatly from one location to another. Because aquifers can take hundreds, sometimes thousands, of years to recharge, their depletion can pose long-term risks to water security.

DID YOU KNOW?

Launched in 2017, the Columbia Basin Groundwater Monitoring Program partners with diverse well owners, including Yaq̓it ʔa·knuqƛi 'it First Nation, the City of Cranbrook, Selkirk College, and McDonald Ranch and Lumber. Data is publicly available on **BC Real-Time Water Data tool** and the **Columbia Basin Water Hub**.

Data from four observation sites, including both provincial and Living Lakes wells (Figures 1-4) between Cranbrook and Golden from July 2020 to July 2025, is presented below to show an example of how much water-level trends can vary between aquifers, and why it is important to monitor a diverse range of aquifers.

LEFT: MONITORING AT VOW 13 IN BRISCO. RIGHT: MONITORING AT VOW 21 WITH RADIUM PUBLIC WORKS TEAM. LLC PHOTOS

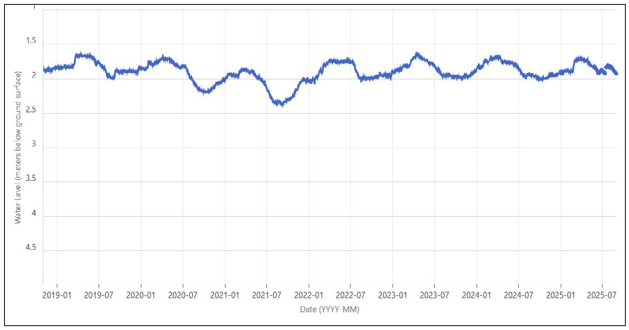

Figure 1. Provincial Observation Well 468 in Cranbrook shows seasonal lows around August and September and peaks around May and June, with fluctuation of ~0.3-0.6 metres. No visual long-term decline since 2019.

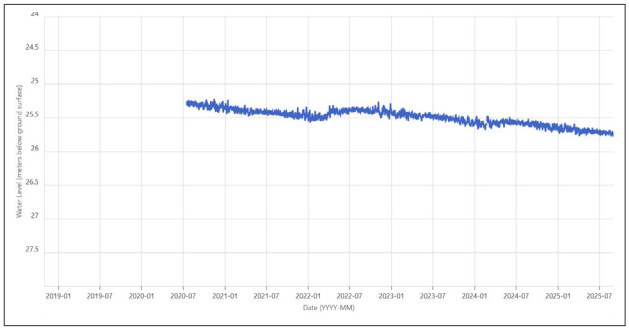

Figure 2. Living Lakes' VOW 18 in the Columbia Valley Trench (between Canal Flats and Skookumchuk) shows no seasonal pattern but a declining trend since monitoring began in August, 2020.

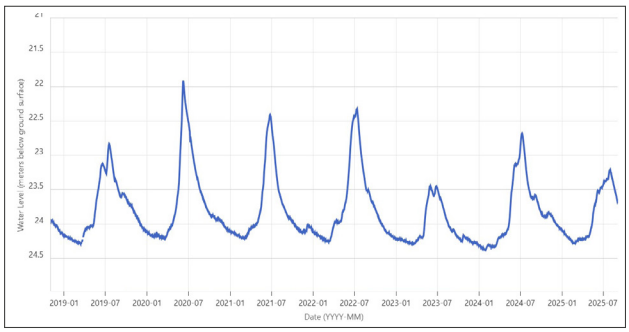

Figure 3. Provincial Observation Well 309 in Golden shows seasonal lows around February and peaks in June, with a fluctuation of ~0.9-1.3 metres. No visual long-term decline since 2019.

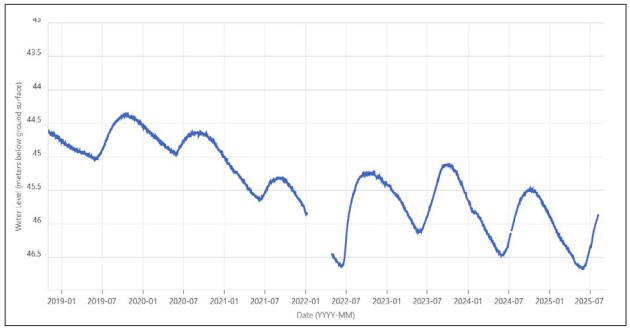

Figure 4. Living Lakes' VOW 10 in Windermere shows seasonal lows around May and peaks around October, with a fluctuation of ~0.5-1.5 metres. Long-term decline observed since 2019.

Identifying aquifers and grading their vulnerability allows future monitoring and water-use planning to target high-priority areas. This will focus attention on regions under heavy demand, experiencing drought stress, or facing streamflow pressures, and help identify locations where more detailed mapping or management and protections may be needed.

DIVE DEEPER

A **2024 global study**, looking at aquifers that provide approximately 75% of global groundwater withdrawals, found that groundwater levels in some regions are dropping by more than half a metre each year. Cumulative stressors on groundwater, including shifting climate, physical changes to freshwater systems, withdrawal rates, and land-use changes have resulted in widespread and accelerating groundwater-level declines across the globe.

GROUNDWATER REPORT: ASSESSING AQUIFER VULNERABILITY

To understand which aquifers need the most attention, the report assigned a priority ranking using four key criteria:

1. **Current Groundwater Demand:** Aquifers with higher estimated water use received higher scores.
2. **Susceptibility to Drought:** Aquifers that respond quickly to dry conditions received higher scores.
3. **Streamflow Depletion:** Aquifers connected to stressed streams received higher scores.
4. **Groundwater Supply Constraints:** Aquifers with existing concerns (e.g., low water levels or water allocation notations) received higher scores.

Assigning scores to each of those criteria, Western Water ranked each aquifer by monitoring priority. Aquifers with lower monitoring-priority rankings show lower risk to impacts from drought, consumption, and supply, whereas higher priority ranking signals a greater need for attention and support for long-term water security.

In addition to the 185 provincially mapped aquifers, the model identified 96 potential aquifers that have not been mapped by the Province of B.C. Of these aquifers, both mapped and newly identified, 54 were flagged as high priority for monitoring—80% of which are not currently monitored. The number of aquifers that are currently monitored (by either Living Lakes or the Province) or unmonitored in each priority ranking are summarized below (Table 1). Provincially mapped aquifers were, in some cases, delineated into multiple units within this model to support the vulnerability assessment. This resulted in the increase of mapped aquifers represented.

Table 1. Number of aquifers in the Columbia Basin by monitoring priority (Western Water, 2025). Scores for each aquifer are the sum of its score for each of the four criteria described above.

Columbia Basin Aquifier Assessment: Priority for Monitoring

Priority Ranking	Very Low (<1)	Low (>1-5)	Moderate (>5-10)	High (>10-15)	Very High (>15)
# Monitored	0	7	26	11	0
# Unmonitored	0	62	209	43	0
Total Aquifiers per Ranking	**0**	**69**	**235**	**54**	**0**

DID YOU KNOW?

Bedrock aquifers store water within spaces in solid rock formations (e.g., fractures), while unconsolidated aquifers hold water in loose materials such as sand, gravel, and silt. Found near the surface in valleys and floodplains, unconsolidated aquifers often interact directly with rivers, lakes, and wetlands.

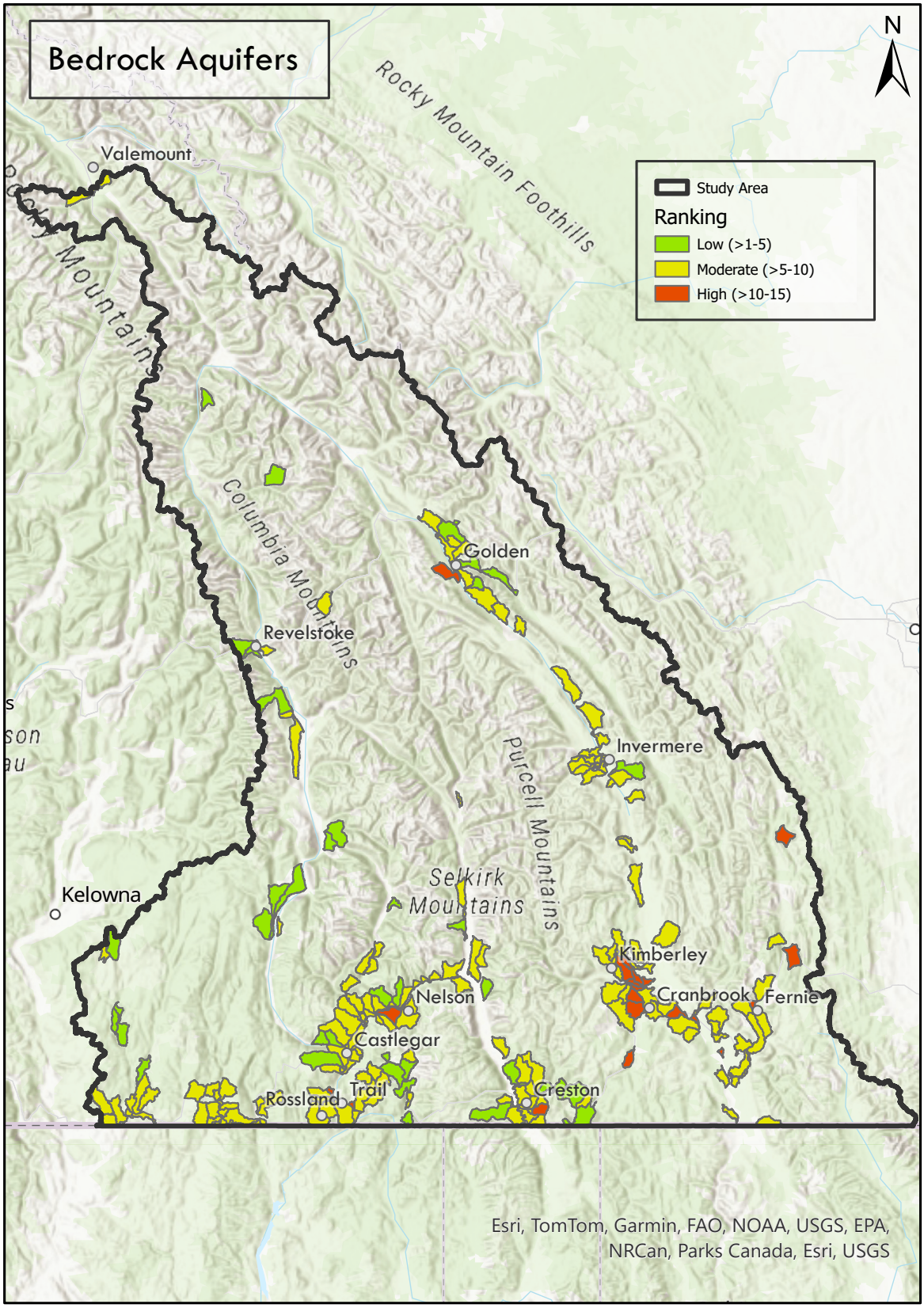

Figure 5. Map showing the priority ranking of bedrock aquifers as polygons within the study area.

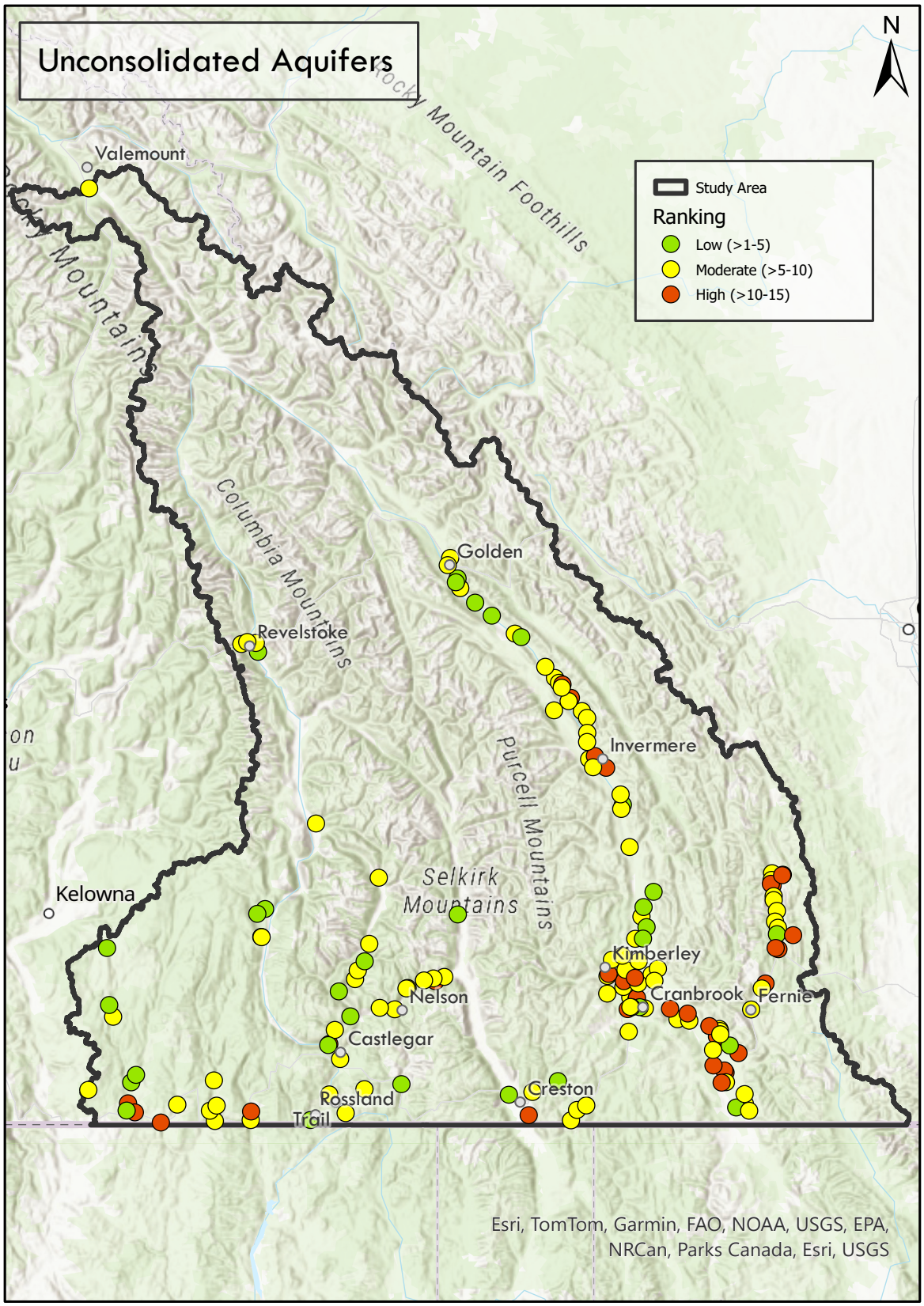

Figure 6. Map showing the priority ranking of unconsolidated aquifers as points within the study area.

AT-RISK AQUIFER HOTSPOTS

By focusing strategically on at-risk aquifers, monitoring efforts can be expanded to where it matters most. This supports water use for drinking, agriculture, and industry while also maintaining stream flows and lake levels for healthy ecosystems.

The report identified nine high-priority aquifers in proximity of "prime agricultural lands." These lands are classified by the Agricultural Land Commission of BC for their ideal climate and soil for growing the widest range of crops. Two of these aquifers, near Creston (488 – bedrock, and 489 – unconsolidated), are already being monitored by Living Lakes, with aquifer 489 also monitored by the Province. The remaining seven unmonitored aquifers were grouped into three hotspots pertinent to agricultural lands for priority monitoring.

This report confirms the value of existing monitoring while pinpointing locations that need additional monitoring attention. It also points to the need for further aquifer mapping to protect both agricultural and community water supplies.

VOW 28 NEAR CRESTON, LLC PHOTO

HOTSPOT #1: BAYNES LAKE AREA

Two high-priority aquifers south of Jaffray (519 and 520), underlying lands classified as "prime agricultural lands," are not currently being monitored. They received monitoring priority scores of 11 and 13, respectively, with contributing factors such as pressures from combined domestic and agricultural use by surrounding communities, connections to stream systems with limited or no capacity for additional withdrawals, and smaller, unconsolidated (loose materials) aquifers with fast responses to drought.

> ***For years, we've voiced concerns about groundwater uncertainty in our community. To have that validated by a formal scientific assessment is incredibly powerful. This report shows the desperate need for the sustained monitoring we've been advocating for, and a path toward protecting our water for future generations.***
>
> *- Stan Doehle, resident of the Baynes Lake area and Area B Director of the Regional District of East Kootenay*

HOTSPOT #2: SPARWOOD AND FERNIE AREAS

Four aquifers near Sparwood and Fernie (bedrock: 1078, 1080, and unconsolidated: 1082, and 534) are deemed high monitoring priority due to cumulative pressures from their proximity to municipalities and prime agricultural land. Currently, these aquifers are not being monitored by either Living Lakes or the Province of B.C.

Aquifer 1080 near Sparwood faces the maximum possible strain, scoring 5 in Current Groundwater Demand, Susceptibility to Drought, and Streamflow Depletion risk categories. The remaining aquifers—1078, 1082, and 534—all exhibit a consistently very high risk of Streamflow Depletion (all scoring at least 4.5) from being connected to stressed streams with restrictive Water Allocation Notations.

HOTSPOT #3: SOUTHWEST OF GOLDEN

A potential bedrock aquifer ("unmappedBED_75") southwest of Golden was identified, which had not previously been mapped by the Province of BC. This aquifer supplies domestic and commercial wells and is near agricultural land. Its exposure to multiple stressors led to its classification as high priority.

ABOUT AQUIFER MAPPING

The B.C. government maintains a database of registered water wells and provincially-mapped aquifers (GWELLS). Aquifer mapping has generally been focused on developed areas (areas where there is a history of groundwater use and there is sufficient data available). Due to the complexity of mapping subsurface hydrogeology, the boundaries and connectedness of some aquifers are not currently known, and many wells exist outside of mapped aquifers.

In some situations, for example if aquifers are stacked on top of each other, or if information is lacking in the well construction report, it may not be known which aquifer a well is drawing water from. The provincial aquifer database currently lists 185 mapped aquifers in the Columbia Basin. Of the region's 14,265 reported wells, only 52% are correlated to these mapped aquifers.

VOW 33 IN GOLDEN. PHOTO BY STEVE EDWORTHY

WHAT'S NEXT? WORKING TOGETHER FOR WATER SECURITY

The report identified 96 potential aquifers that have not been mapped by the Province. Expanded mapping could provide a more complete picture of these potential aquifers, further highlighting those at risk, and filling data gaps to support better decision making.

The report outlines a clear roadmap for prioritizing groundwater mapping and monitoring to safeguard the aquifers that support communities, farms, and ecosystems in the Basin. Living Lakes Canada's recommendations for follow-up action include:

- Using available datasets to inform management decisions in highest-risk aquifers
- Contacting local decision makers to share the takeaways of the technical aquifer assessment report relevant to their jurisdictions
- Conducting more detailed mapping of newly identified aquifers and surficial geology
- Improving knowledge of groundwater usage
- Correlating wells to mapped aquifers
- Continuing to build on this work by periodically reviewing the model, incorporating new data as it becomes available

VOW 15 IN CANAL FLATS. LLC PHOTO

Sustaining and expanding the monitoring network requires strong collaboration with communities, First Nations, government, industry, and researchers. The report's screening-level assessment, combined with local knowledge, community priorities, sufficient funding, and suitable volunteer observation wells, provides a strong foundation for Living Lakes to continue expanding its community-based groundwater monitoring program.

> ***This new GIS model lets us identify aquifers most at risk of declining water levels. By strategically expanding monitoring in those areas, we aim to support data-driven decisions that ensure safe and equitable access to freshwater.***
>
> *- Arlo Bryn-Thorn, Program Manager of the Columbia Basin Water Monitoring Framework, Living Lakes Canada*

RESIDENTS OF THE COLUMBIA BASIN CAN LEARN MORE ABOUT AND SUPPORT THIS WORK BY:

- Connecting with the Living Lakes team if you're interested in volunteering your inactive well for monitoring in the program. Contact: CBWMF@livinglakescanada.ca
- Exploring the Columbia Basin Groundwater Monitoring Program page.
- Viewing VOW data by visiting the Columbia Basin Water Hub.
- Learning about groundwater basics in our Groundwater 101 resource.

Thank you to our generous funders, the Investment Agriculture Foundation of BC, the Government of British Columbia, FortisBC, the Columbia Basin Trust, and the Royal Bank of Canada, who supported this work.

The Government of British Columbia and the Investment Agriculture Foundation of BC are pleased to participate in the production of this publication. We are committed to working with our industry partners to address issues of importance to the agriculture and agri-food industry in British Columbia.

Opinions expressed in this publication are those of Living Lakes Canada and not necessarily those of the Investment Agriculture Foundation or the Government of British Columbia.

APPENDIX A: RELEVANT RESOURCES

Assessing Aquifers for Monitoring in the Columbia Basin Report - The primary report featured in this Watershed Bulletin. Provides detailed findings on the aquifer vulnerability assessment.

Aquifer Assessment Shape Files - To access the GIS files used in the assessment, including aquifer locations and characteristics, please email groundwater@livinglakescanada.ca.

Columbia Basin Groundwater Monitoring Program Page - General information about this Living Lakes program and its community-based observation network.

Columbia Basin Water Hub - Access groundwater level data from Living Lakes volunteer observation wells. Compare water levels across years using the “Preview data” option in the dataset view.

BC Realtime Water Data Tool - Groundwater level data from the Provincial Observation Well (OW) Network and the Living Lakes Groundwater Program Volunteer Observation Wells (LLC-VOW).

GWELLS - Database of provincially mapped aquifers and wells drilled in the Province of BC.