RBC Blue Water Project™

Groundwater Connections

UNIVERSITY OF CALGARY

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Newsletter for Rocky View County Community-Based Groundwater Monitoring Program
Reporting progresses and updates of the program to community volunteers.

Another year of little groundwater recharge. Are we in a drought?

We had another year of below-normal precipitation in Rocky View County. You may recall hearing the news about water-use restriction in Calgary last summer. The Alberta Government is warning us of water scarcity in the upcoming season. So, are we in a drought? Scientists use technical terms when talking about drought. Three years of low precipitation definitely puts us in a 'meteorological drought', and the low river flow and reservoir levels signal a 'hydrological drought' with respect to surface water. However, compared to surface water, groundwater is less sensitive to meteorological droughts. It can take several years of meteorological drought to cause a 'groundwater drought'. In Rocky View County, we are fortunate to have a long-term record of water levels thanks to the volunteers like you. We have 24 active wells in the Rocky View Well Watch network, and about half of them are showing the lowest water level recorded since 2008. Figure 1 shows examples of nine wells from different parts of the county. The aquifers tapped by these wells received some recharge in 2019 and 2020, but the recharge was not large enough and the water level kept going down. Despite that, the water levels are still within a normal range expected for these aquifers. We do not expect a major problem with the aquifers unless the current meteorological drought keeps going for several more years. Calgary Herald published an article featuring the data from Rocky View Well Watch on January 21. If you like reading articles on the internet, you can search the article using 'Calgary Herald no recharge'.

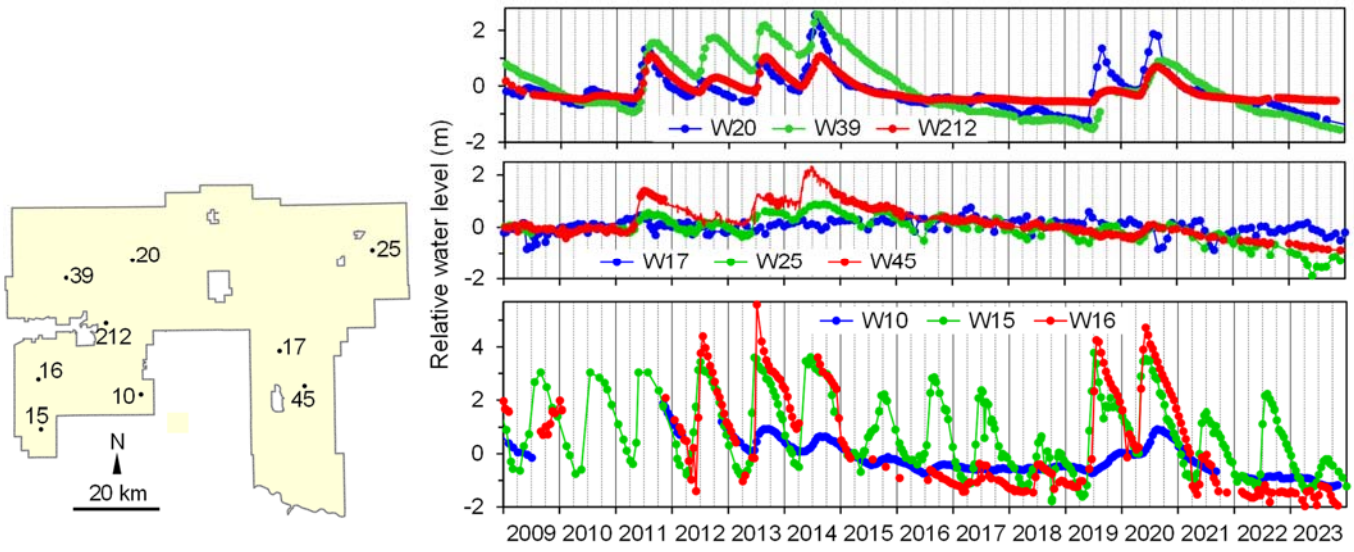

Figure 1. Map showing the location of selected wells within Rocky View County (left) and graphs showing relative changes in water level in these wells (right).

Long-term patterns of meteorological drought

Scientists use numbers to describe the severity of droughts. One such number is called the standard precipitation index (SPI) indicating periods of high or low precipitation. For example, in Figure 2, blue bars indicate wetter-than-normal and red bars indicate drier conditions based on the precipitation data measured at Calgary Airport. The water level monitoring in Rocky View County started during a short pause in a decade-long wet period with four good years of recharge in 2011-2014. Then, a dry period started in 2015 causing a sustained drop of the water levels (Figure 1). We had a short pause of dryness in 2019-2020, but we are still in a dry period. A good news is that dry periods do not normally last longer than a decade, so the weather will likely switch back to a wet phase in 2024 or 2025. At that time, aquifers will be fully recharged again and be ready for another dry period. We can always count on our aquifers for stable water supply as long as we do not overuse it by pumping too much water.

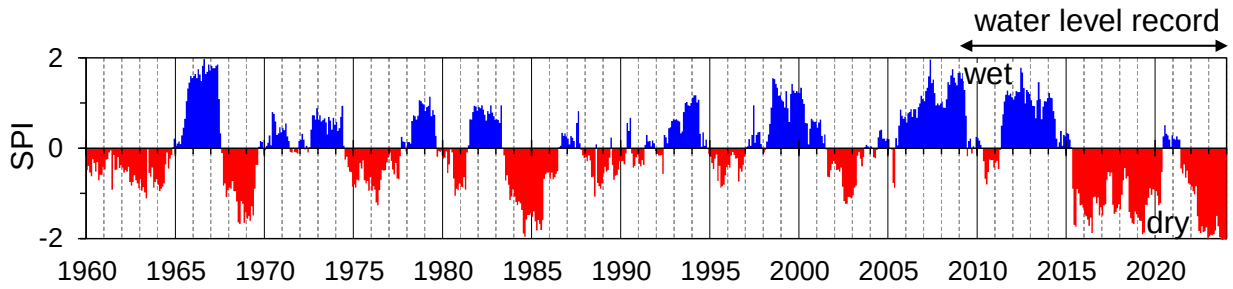

Figure 2. Standard precipitation index (SPI) for Calgary indicating wetter (blue) and drier (red) conditions compared to the long-term average

Pumping from aquifers: How much is too much?

We are used to thinking about how much we can pump from our wells. For example, if you continuously pump more than 5 gallons per minute (GPM) from a 5-GPM well for a long time, eventually the pump will stop when the water level drops to the pump intake. The question of 'how much' requires a bit more thinking when it comes to pumping from an aquifer. It works like a bank account. We can compare a bank account to an aquifer by looking at:

Bank: Revenue – Expense = Change in account balance

Aquifer: Recharge – Discharge – Pumping = Change in water level

The water balance in an aquifer can be seen as a 'leaky bucket' (Figure 3). The aquifer receives recharge during wet periods. In addition to pumping, it discharges groundwater to springs and creeks. The water level in the bucket represents 'pressure' in the aquifer, meaning that discharge decreases when the water level goes down. To keep the water flowing in creeks and springs, it is important to maintain high enough water level in the aquifer by avoiding pumping too much water from too many wells. Rocky View Well Watch helps us keep our eyes on the water levels.

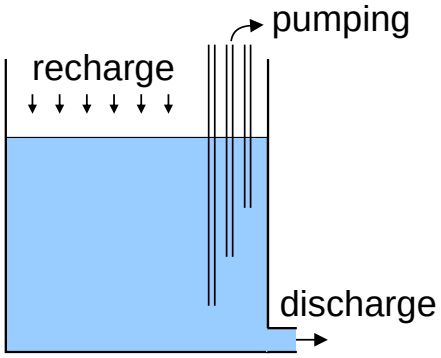

Figure 3. Leaky bucket analogy of the water balance of an aquifer. Discharge feeds springs and creeks, and sustain aquatic habitats.

Rocky View Well Watch web:
https://gwfnet.net/rockyview

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