RBC Blue Water Project™

Groundwater Connections

UNIVERSITY OF CALGARY

FEBRUARY 2020

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

Heavy rain in June and a rise in water levels

The last edition of Groundwater Connections (February 2019) reported a continuing decline of water levels that started in 2015. As a result, more than half of the wells in Rocky View Well Watch had the lowest water levels recorded since 2008. Fortunately, 2019 was a different kind of year. Figure 1 shows examples of water level in three wells in the northwestern part of the county (W14, W20, and W39), three wells in the central and eastern parts (W17, W26, and W45), and two wells in the southwestern part. These graphs show the water level in each well relative to the average value over the whole period. The heavy rain that started on June 19 infiltrated into the ground, mostly from the numerous ponds that were formed by runoff, and recharged aquifers for most wells except for a few deep ones. The University of Calgary weather station at Spyhill Farm recorded 150 mm (six inches) of rain in just nine days. This is almost the same as the total amount of rain in June and July (168 mm) of an average year. It was a good year for groundwater in the county.

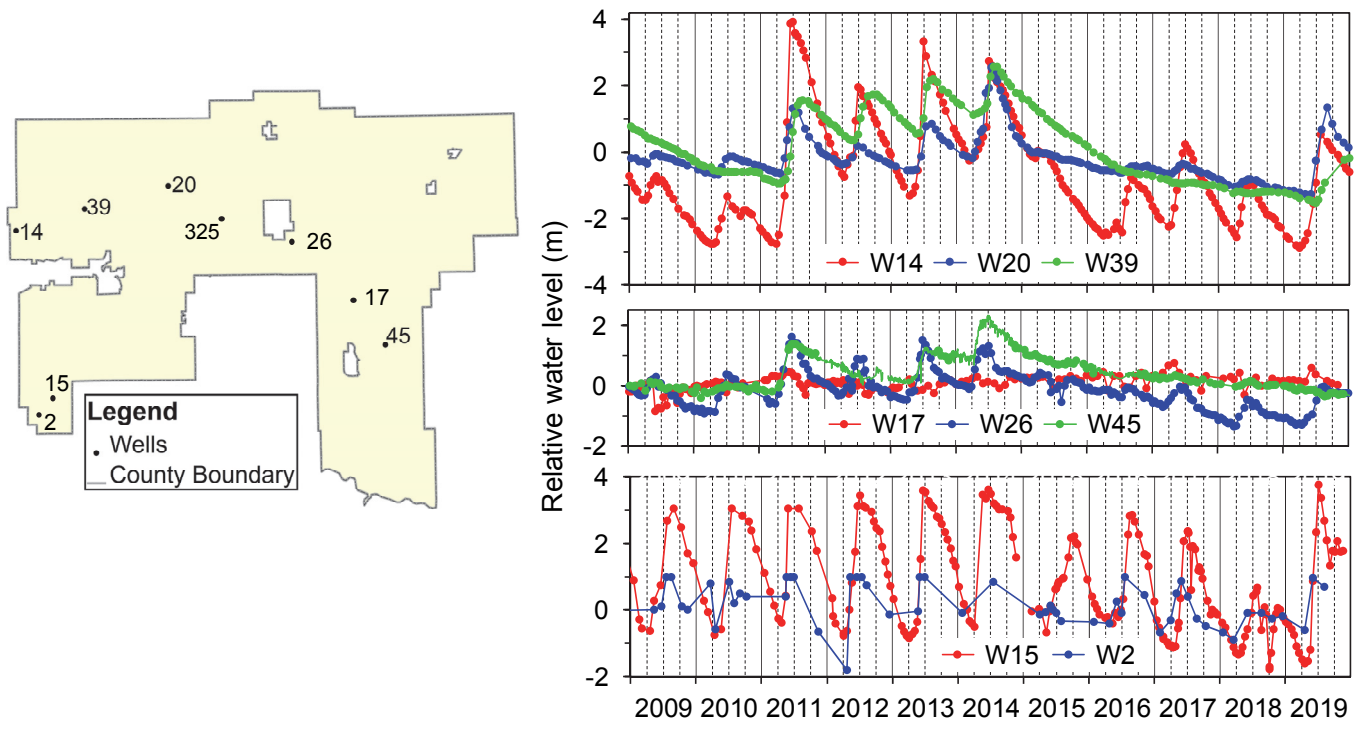

Figure 1. Map showing the location of selected wells within Rocky View County (left), and graphs showing relative changes in water level in these wells (right).

Common aquifer types in Rocky View County

When talking about wells, it is common to say: “We have a 5-gpm (gallons per minute) well, but our neighbor has a 10-gpm well.” The number refers to the rate at which a well can be pumped without causing an excessive drawdown of the water level. It sounds like the property of the well. However, the number actually refers to the property of the aquifer, assuming that the well has been properly constructed and maintained. Aquifers are the containers of groundwater, which receive recharge from rain and snowmelt. Some aquifers have high permeability, meaning that water can flow into the well fast enough to keep up with pumping. Other aquifers may have lower permeability. The permeability can change even over a short distance, resulting in different gpm values for different wells. Groundwater is usually contained in tiny pore spaces of aquifers, although there are some rare cases of ‘underground rivers’, such as karst caves. Figure 2 shows common types of aquifer in Alberta. Underneath our ground is a package of glacial sediments called till, left by a thick ice sheet over 10,000 years ago. The till contains a fair amount of clay and hence is not permeable enough to be an aquifer. However, sand or gravel layers within the clay till or in buried channels of old rivers are highly permeable and provide productive aquifers. The alluvial sediments around modern river channels can also be good aquifers. These aquifers are called surficial aquifers. Underneath the surficial sediments is bedrock. The bedrock in Rocky View County is mainly made up of mudstone and sandstone. Mudstone is not permeable, but sandstone can have high permeability. The majority of wells in Rocky View Well Watch have well screens in sandstone aquifers covered by thick clay till. In Figure 1, Wells 17, 20, 26, 39, and 45 are screened in this type of aquifer. Wells 2 and 15 are also in sandstone aquifers, but these aquifers have relatively thin cover of clay till. As a result, Wells 2 and 15 respond more quickly to seasonal groundwater recharge than other wells. Well 14 is screened in a gravel aquifer. Compared to other wells in sandstone aquifers, the water level in Well 14 is more sensitive to recharge events. Sandstone aquifers under thick clay till may be slow to recharge, but are usually well protected from contamination from surface sources. Surficial aquifers are easily recharged, but may be more vulnerable to contamination.

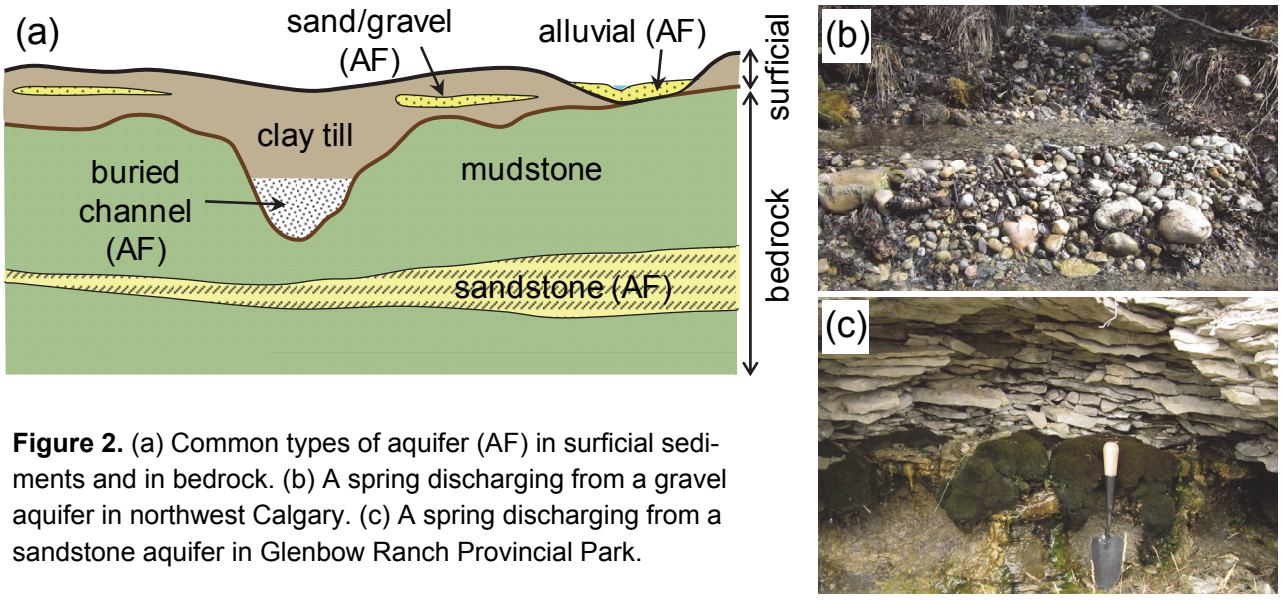

Figure 2. (a) Common types of aquifer (AF) in surficial sediments and in bedrock. (b) A spring discharging from a gravel aquifer in northwest Calgary. (c) A spring discharging from a sandstone aquifer in Glenbow Ranch Provincial Park.

Contact Information: Evan Sieben - Hydrology Technician

Department of Geoscience
University of Calgary
2500 University Drive NW
Calgary, Alberta, T2N 1N4

Phone: 403-220-2495
E-mail: hydro@ucalgary.ca