Groundwater Connections

RBC Blue Water Project™

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.

Steady groundwater levels in Rocky View County

Rocky View Well Watch has accumulated nearly ten years of water level data. This is a unique example of a volunteer-run network of long-term groundwater monitoring system – very rare in the world. Thank you very much for completing another year of water level measurements! This type of data allows us to learn about the relationship between groundwater and meteorological conditions, not just in Rocky View County, but also in the wider Canadian Prairies. In the last edition of Groundwater Connections (February 2017), we reported a declining trend of groundwater levels in Rocky View County that started in 2015. The declining trend stopped and steady water levels were observed in most wells in 2017. As an example, Figure 1 shows water levels in three wells in the western part of the county (W14, W20, and W39) and three wells in the central and eastern parts of the county (W17, W26, and W45). These graphs show the water level in each well with respect to the average value over the whole period. Most wells had water level rises in spring or early summer in response to the recharge of groundwater by snowmelt and rain. The rise was followed by a gradual drop related to the natural discharge of groundwater to numerous springs. The recharge and discharge are more or less balanced over a long time, but the water levels go up during wet periods and go down during dry periods. Scientists use a number called Standard Precipitation Index (SPI) to express the wetness or dryness of the weather. For example, in Figure 2, blue bars indicate wetter-than-normal and red bars indicate drier conditions based on the precipitation data measured at the Calgary Airport. The Well Watch water level records started in a dry period (2009-2010), followed by a wet period (2011-2014), and by another dry period (2015-2017). High water levels were observed during the wet period. There were much drier periods in the recent past, for example, during the severe Prairie-wide drought of 2001 -2003. Groundwater provides a relatively stable source of water supply, even though the water level may go down during a prolonged drought. With a relatively high snowmelt runoff this spring, we expect a fair amount of groundwater recharge this year.

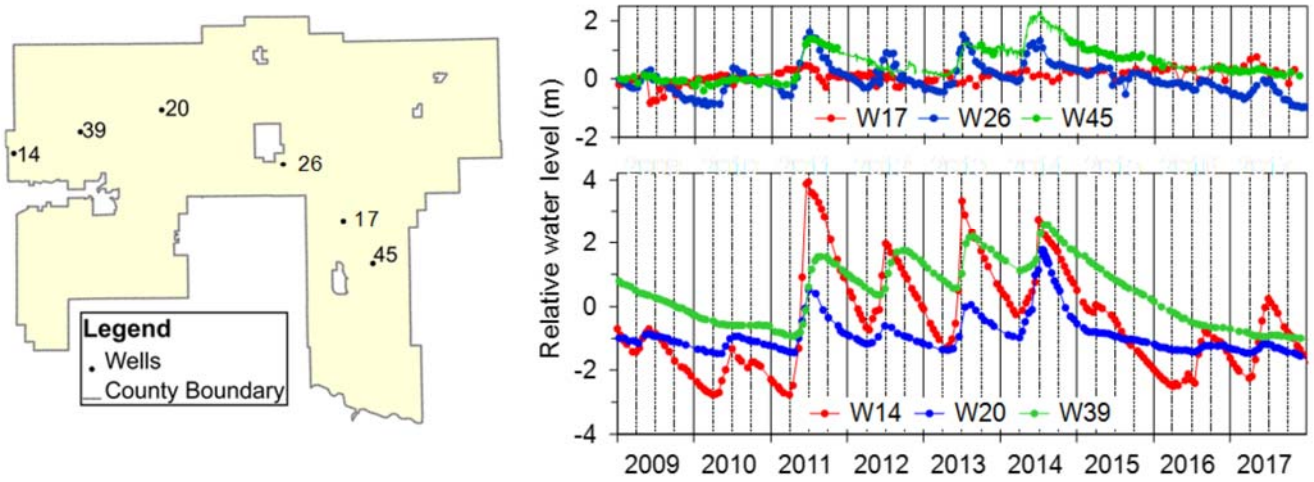

Figure 1. Map showing the location of selected wells within Rocky View County (left), and graphs showing relative changes in water level in these wells (right).

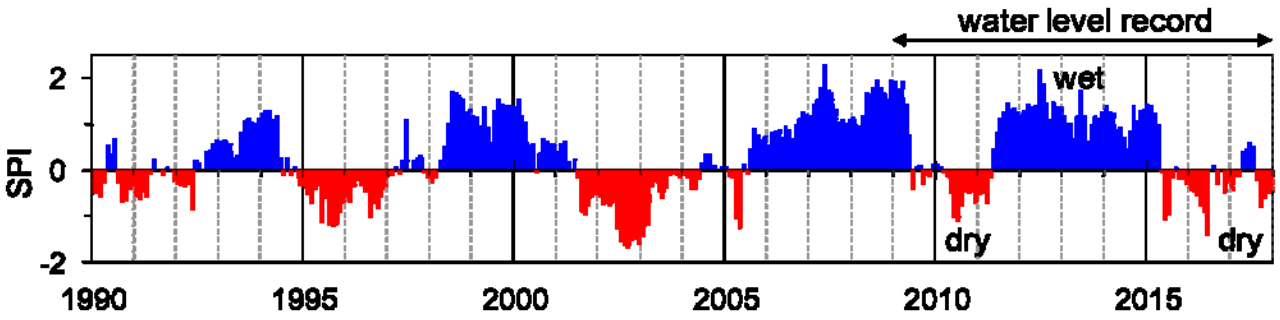

Figure 2. Standard Precipitation Index (SPI) in Calgary indicating wetter (blue) and drier (red) conditions compared to the long-term average.

New groundwater management framework in Alberta

As we can see in Figure 1, groundwater levels remain more or less stable over a long time when the water demands by humans (pumping) and the environment (spring discharge) are balanced by recharge. When groundwater is extracted from local aquifers at an excessively large rate, the natural balance can become upset and water levels in the aquifer may start dropping steadily. This type of situations have happened in many parts of the world, and resulted in the drainage of aquifers, the drying up of springs and creeks, the subsidence of land surfaces, and other undesirable consequences. To prevent these situations from happening in the future, the Government of Alberta is planning to develop a new Groundwater Management Framework based on the sound scientific principles. A group of professors and students from the University of Calgary are helping the development of the new framework by contributing a scientific understanding of groundwater recharge processes through a project called Groundwater Recharge in the Prairies (GRIP). In 2017, we established two new study sites in southern Alberta for this project. The photo below shows soil moisture sensors to track down the movement of snowmelt and rain water to the water table at the site near Lethbridge. The water level data collected by Rocky View Well Watch have been playing an important role in the GRIP project because they allow us to test our scientific theories and models about how groundwater recharge is affected by changes in meteorological conditions.

University of Calgary student installing soil moisture sensors at the GRIP site near Lethbridge.

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