

WATER BULLETIN

SPRING 2020

REMARKABLE SNOWPACK CONDITIONS

The winter season of 2019/2020 has brought extraordinary accumulations of snow in the mountain headwater areas, with a number of stations reporting record depths. Roughly 90% of the snowpack has typically accumulated by the beginning of April, and the last few weeks has seen a continuing increase in snow depth. As of March 1st, the percentage of Normal values in all basins along the eastern front ranges of the Rocky Mountains were reporting well above average conditions (Figure 1).

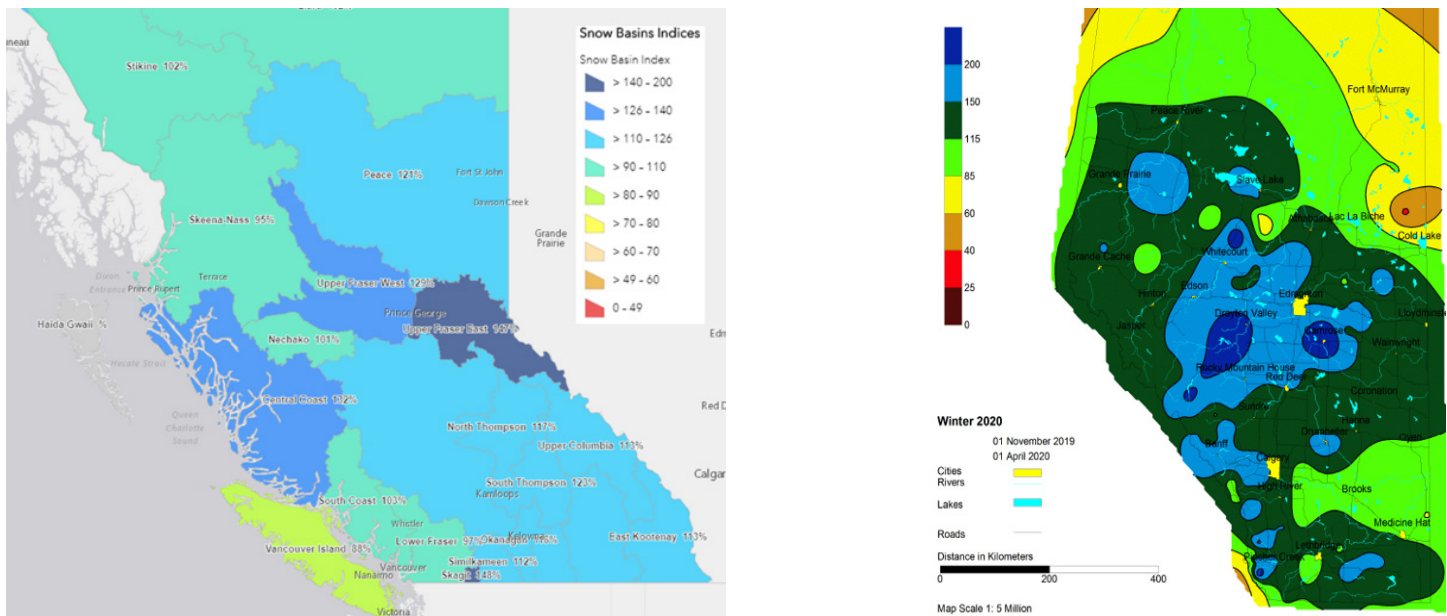


Figure 1. Snow accumulations (% of Normal) in British Columbia and Alberta for the Winter of 2020¹. (Source ¹: [Link #1](#); [Link #2](#))

As for the prairie snowpack, similarly elevated percentage of Normal values have been recorded as of March 1 this year for most areas (Figure 2). One notable exception is the Coronation region, which includes the Battle River and Sounding basins. Data reported for area of the province ranges from 42-69% of Normal as of March 1 indicating the potential for a water shortfall this year.

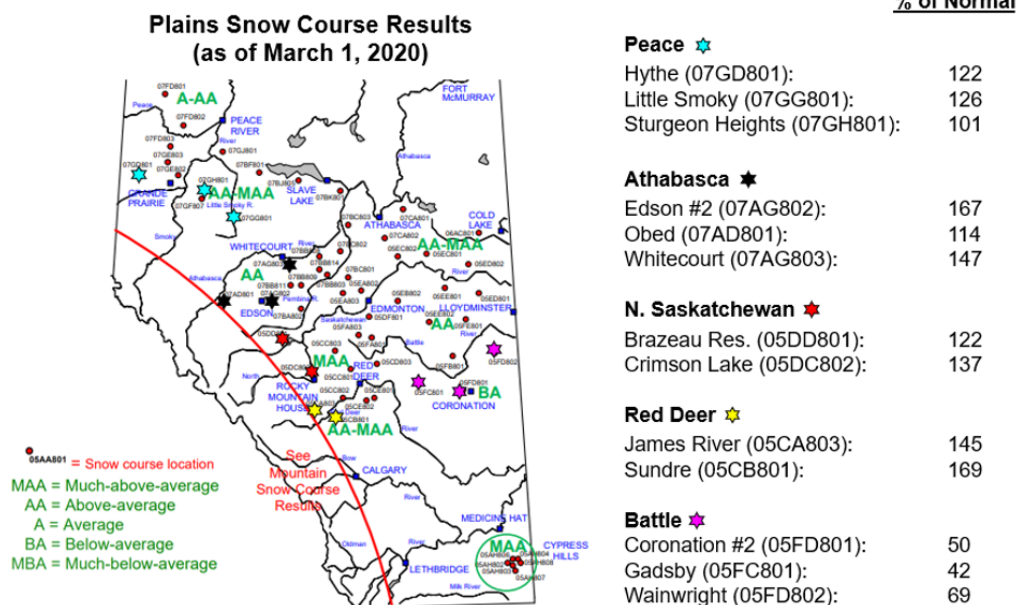
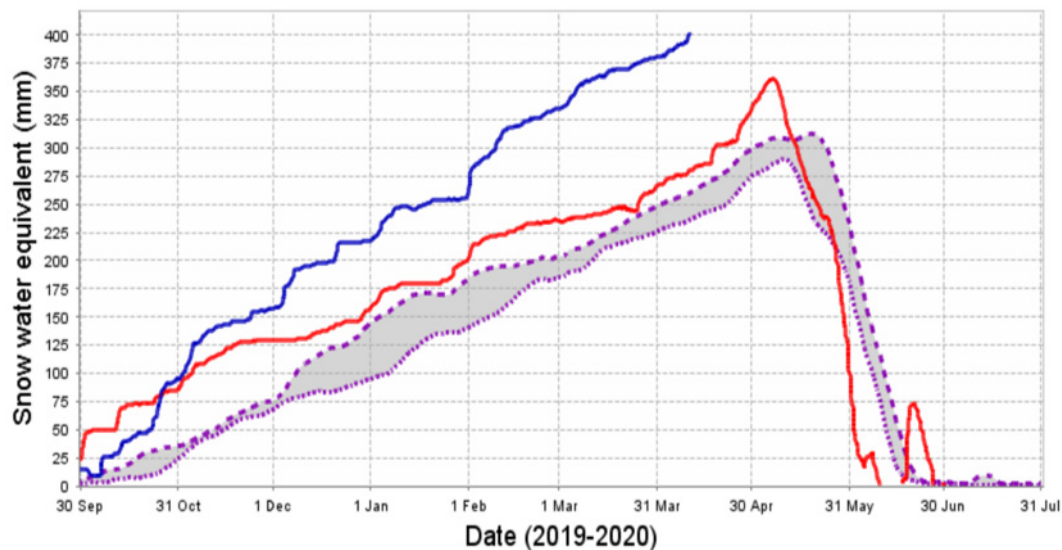


Figure 2. Snow accumulation results for the prairie regions and % of Normal values for selected stations.² (Source ²: [Link #1](#); [Link #2](#))

Conversely, the risk of flooding applies to other parts of the province, in particular basins heavily influenced by melting of the annual snowpack. Of particular concern are the Kakwa/Cutbank, Smoky, Little Smoky, Simonette and Wapiti. As the rate of melting increases over the coming weeks and into May, rivers are poised for higher than normal flow conditions. Snow stations close to, or within, the headwater areas feeding these rivers are still showing accumulating trends as the cooler spring continues to provide suitable conditions for further accumulation (Figure 3).

Southesk 05DD804 (April 11, 2020)
located near headwater area of Athabasca River. ³



Revolution Creek 1A17P (April 11, 2020) located near
Kakwa Provincial park and headwaters area of Kakwa, Smoky, and
Wapiti rivers. ⁴

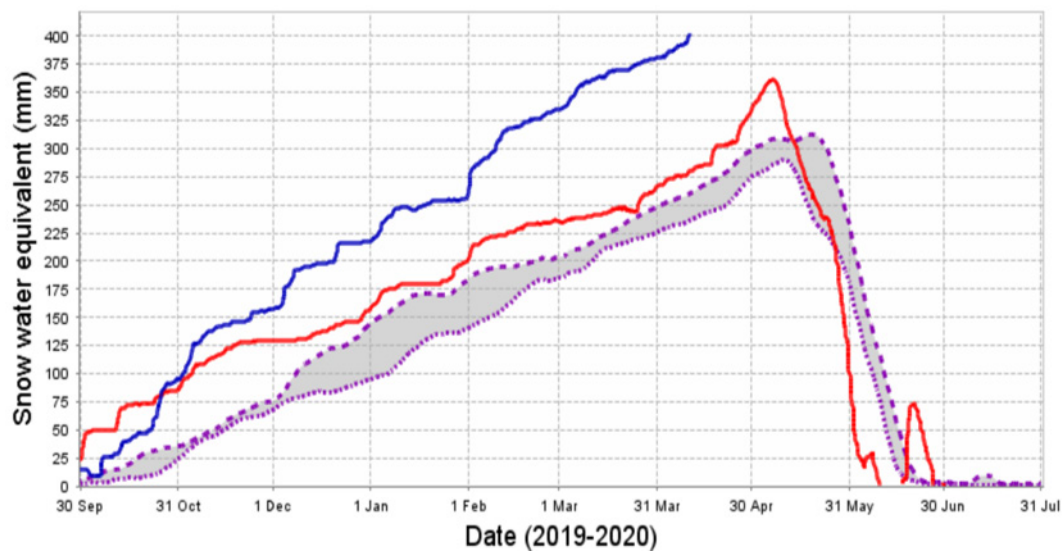


Figure 3. Winter 2020 snow accumulation trajectories for headwater areas serving the Athabasca, Kakwa, Smoky and Wapiti rivers. (Source ³: [Link #1](#); Source ⁴: [Link #2](#))

CAUTION FOR THE COMING MELT

Western Canada is currently under the influence of a neutral phase of the El Niño–Southern Oscillation (ENSO) cycle. Typically, when positive (negative) phases of this climate phenomenon occur, western Canada experiences drier (wetter) conditions than normal. During a neutral phase, projections of moisture conditions are less certain and can swing either way. Seasonal forecasts provided by Environment and Climate Change Canada extending out for the next 3 months indicate a better than equal chance of below normal temperatures and about an equal chance of above normal precipitation. With the current Pacific Decadal Oscillation (PDO) index trending negative and a concurrently negative Pacific North American (PNA) pattern, this points towards a relatively wetter spring.

Regardless of these indicators, the most critical factor is the timing and magnitude of spring rainfall events, which can exacerbate the rate of snow melt due to rain-on-snow events. The flooding that occurred in southern Alberta in 2013 was the result of an intense and sustained rainfall on a remaining snowpack, compounded by reasonably elevated soil moisture conditions in the basin due to a series of earlier rainfall events. Similarly, in June of 2017, excessive flows occurred in the rivers draining the Grande Prairie/Hythe/Greenview, in particular the Wapiti, Smoky and Little Smoky rivers. High-flow conditions on the Smoky River (Figure 4), estimated to be a 1:25 flood event (i.e. 4% chance of happening any given year), caused considerable damage and destruction of water intake infrastructure, stream banks and adjacent lands, and hydrologic monitoring stations in vulnerable reaches (e.g. Smoky River at Watino). The cause of the event was again rain-on-snow events on a slightly above-normal snowpack. At present, the snow conditions in the mountain headwater areas, and associated seasonal forecasts, increase the risk of another such event.

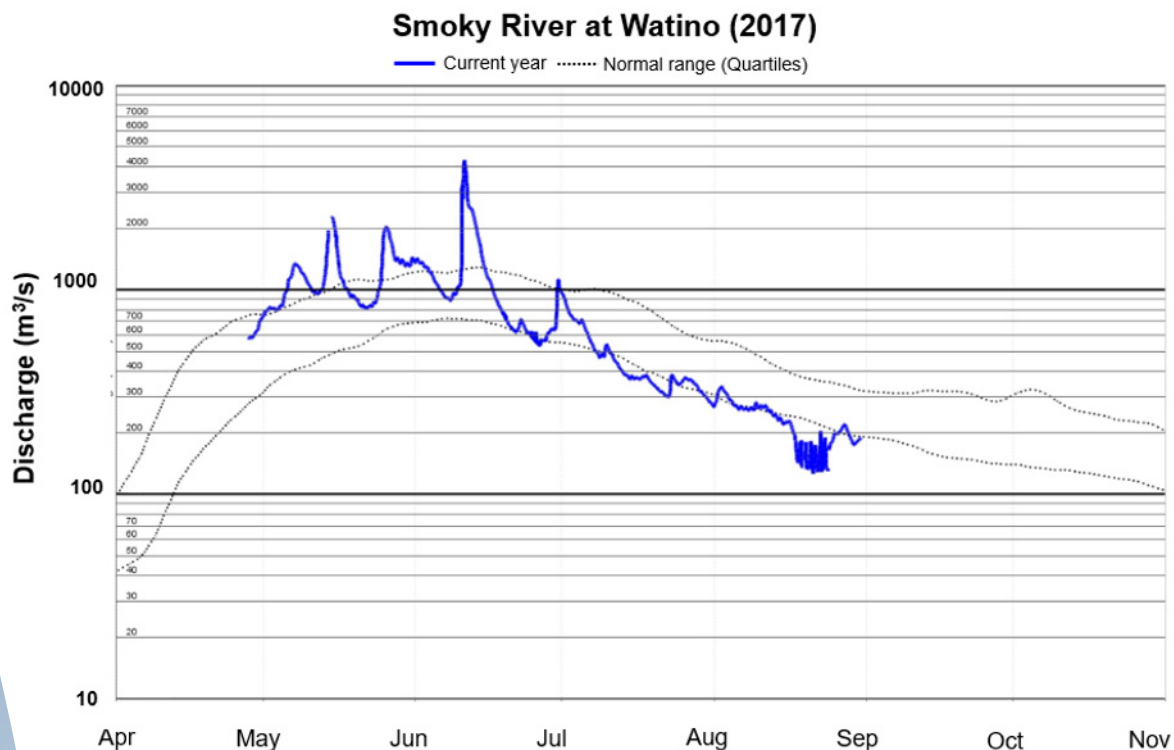


Figure 4. Flow conditions at the Smoky River at Watino station during the 2017 spring-fall period. ⁵ (Source ⁵: Alberta Environment)



With all of this in mind, attention to the coming spring rainy season, and tracking of storm activity in higher risk regions, is strongly recommended to ensure vulnerable assets or areas are protected, and that individuals are wary of the possibility for quickly changing river flow conditions.

Did You Know?

Our water and climate specialists track emerging climate trends that directly affect water availability and reliability in western Canada. Our approach to risk management customizes this type of information for our clients so that adverse events can be planned for and mitigated before they impact business continuity.

Do You Need?

Water Security plans are an effective way to de-risk water-dependent enterprises. Knowing and understanding the trends can make the difference between successful years and those where water managers are left scrambling to keep projects on track.

Let us know if we can help build more climate resiliency into your business.

