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## Melting Rockies' snowpack shows extreme variability

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While much of southern Alberta has received streamflow advisories and flood warnings this spring – not to mention actual flooding – Bow Valley residents need not worry about massive spring snowmelt causing similar problems in Banff and Canmore.

“Despite the concerns of those in High River, snowmelt alone does not usually cause flooding from the foothills and front ranges,” said John Pomeroy, the Canmore-based head of the University of Saskatchewan’s Centre for Hydrology.

Snowmelt in conjunction with heavy rain, however, can create some bad situations, depending on the intensity of the rain and the altitude of snow line. While snowmelt floods have affected Canmore and Banff in past years, the mountaintops in central Banff National Park, where the Bow River originates at Bow Lake, are not as snow-laden as the peaks in the southern Rockies.

Snowpack levels have been a little above average around Canmore and further into Banff park, but not excessively so. A precipitation gauge located at Skoki Lodge did register slightly above normal measurements, Pomeroy said, but that snow has already melted. A monitoring site at Sunshine ski area was in the top 25 per cent of snowpacks at its peak, with just over 700 millimetres water equivalent, compared to the average 600 millimetres, but that snowpack is now melting at a normal rate.

On the Rockies’ eastern slope, study sites in the Nakiska area also peaked above average with more late-season snow than last year, but are now beginning to melt normally.

What is most remarkable, Pomeroy pointed out, is the extreme range of variability in the Rockies’ region with the northern Rockies, Athabasca and Peace River regions suffering from drought and large-scale wildfires, while the southern Rockies are in flood.

“It’s the old joke, in Alberta extreme drought and extreme flooding averages out to normal,” Pomeroy said. “But it is not normal to have such extremes in snowpacks in the Rockies.”

At Waterton National Park’s Akamina Pass, the snowpack, which usually peaks around the first week of April at 410 millimetres water equivalent, peaked around May 1 at 810 millimetres water equivalent. At Gardner Creek in the Castle region, a normal snowpack/water equivalent of 650 millimetres peaked at 1,020 millimetres and has just barely begun melting.

Meanwhile, the snowmelt flood for the upper Bow River has already passed. The upper elevations in Kananaskis, such as the Three Isle Lake area, are showing evidence of an unusually late spring, with levels of 650 millimetres, compared with an average of 450 millimetres.

While downstream the big river basins collect water from a number of tributaries causing the levels to average out, on a more local scale the mountain streams, ski hills and ecosystem are more directly affected by the shortage or overabundance of snow. As such, this season’s extremely generous southern snowpack might help Waterton’s glaciers from decreasing this year.

Overall, the greater extremes of weather are exactly what all the models have predicted as the earth’s climate changes. In the past decade, Canada’s prairie provinces have recorded both their wettest and driest years. The research being conducted by Pomeroy and his team in the Rockies is working toward that specific aim; to better predict streamflow amounts and patterns as land use and the climate undergo significant changes.

“This is the greatest variability we’ve ever seen,” Pomeroy said. “These greater extremes in weather are consistent with the type of variability we might be seeing more of in the future in response to climate change. It’s more evidence that the patterns we’re used to seeing in the past are no longer good indicators of what we’ll see in the future.”

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