

## GNFAC 2019-2020 snowpack summary

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In the Rocky Mountains early season snow is typically not good for stability. In southwest Montana, this year was on the worse end of the spectrum for bad stability caused by early season snow. Weak snow near the base of the snowpack resulted in large avalanches all season. The poor snowpack structure prompted months of strongly worded forecasts with phrases such as,

“Avoid avalanche terrain. Avoid heavily wind loaded slopes... As weak layers get deeper there are fewer warning signs. Multiple tracks can cross a slope before one finds the weak spot and collapses the whole hillside... A conservative mindset is essential. Big objectives should wait until late spring or next season... Think carefully about the terrain you plan to ride... Come home alive.”

Avalanche activity peaked with a widespread deep slab avalanche cycle in February. More snow followed and there was steady avalanche activity through April. For the first winter since 2012-13 there were zero avalanche fatalities in southwest Montana.

On September 21 the first 9” of snow in the mountains was enough to create small wet loose avalanches when the sun came out ([photos](#)). By the start of November settled snow depth was 1-1.5 feet (30-50 cm) near West Yellowstone, Big Sky and in the Bridger Range, and 2-3 feet (60-90 cm) in Hyalite and Cooke City. The mountains got 1-2 feet of snow at the start of November followed by dry, warm weather through Thanksgiving. The shallow snowpack became weak and faceted with various crusts ([photo](#), [photo](#), [photo](#)).

We began daily forecasts on November 30. The mountains got 2-4 feet of snow over the first couple weeks of December, then were mostly dry until the New Year. During the second half of December avalanche danger was Low in the mountains near Bozeman and Moderate elsewhere. Near West Yellowstone heavy snow on Christmas Day spiked danger to High for a day. To start 2020 the mountains throughout our area received steady snowfall which brought danger to High and Considerable on January 2.

Through January 9 there had been six days with High danger somewhere, and 15 days with Low danger in the mountains near Bozeman. Near West Yellowstone, Big Sky and Cooke City danger was at least Moderate every day through mid-February, except one day with Low danger near Cooke City.

Small storms slowly increased the snowpack’s total snow water equivalent (SWE) 50-80% from January 1 to January 20. Loading events were relatively small storms followed by steady wind. This prevented slopes from breaking all at once in a widespread natural avalanche cycle, but kept weak layers sensitive to human triggers and maintained heightened avalanche danger.

We saw three snowmobile triggered avalanches with crowns 10-15 feet deep during the first half of January ([photo](#)). There were more than 50 avalanches reported over the first 20 days of

2020 ([avalanche log](#)). As the snow piled up there were eventually fewer warning signs like collapsing or natural avalanches, but the snowpack structure remained poor and human triggered avalanches continued to break deeper and larger. Most avalanches were triggered on persistent weak layers near the ground and on heavily wind loaded slopes. The biggest were on slopes where many small snowstorms were drifted into thick, heavy slabs by strong southwesterly winds.

We issued our first and only avalanche warning of the season on February 6 and 7 at the start of a storm that dropped 3-4 feet of snow equal to 3-4" of SWE over four days. Danger was high near Bozeman and Big sky through February 10. Snow and wind continued the following week and a widespread deep slab avalanche cycle occurred in the Bridger Range, Hyalite and near Big Sky. From February 6-18 we recorded 98 avalanches ([avalanche log](#)). Danger dropped to Low near West Yellowstone on February 18, and near Bozeman and Big Sky remained Considerable or Moderate until March 9.

On February 27 a snowcat grooming a trail between Bozeman and Big Sky triggered a slide which rolled and badly damaged the vehicle with no serious injury to the operator ([details and photos](#)). The avalanche broke on weak, sugary snow on the ground, and was on a low elevation slope (7800', W aspect) with a relatively shallow, 2-4 foot deep snowpack.

Through March avalanches mostly involved snow from recent storms, and at the end of the month a crust/facet/surface hoar persistent weak layer buried 2-3 feet deep was reactive for a few weeks.

As of mid-April, we have not had a significant warm up or extended above freezing temperatures to induce deeper wet slab avalanches. Temperatures have been generally cool and maintained most of the snowpack. Wet snow avalanche activity has been limited to mostly wet loose slides 1-2 feet deep. There is still a chance for very large wet slabs to fail on weak layers at the base of the snowpack during the spring thaw. The snowpack will melt more with each sunny day, and there is sure to be a few more storms. We expect wet snow and new snow avalanche activity to continue through May.