

## **A Discussion of the Weather Conditions in southwest and north-central Montana in 2018**

A discussion of weather in 2018 could not start without starting in late December 2017.

Cold air overspread the region in late December 2017 and brought heavy snows (up to 48 inches near St Mary) and cold temperatures by the end of the month. By January 1 2018, up to a foot of snow was on the ground over the hi-line with low temperatures as cold as -37F near Rudyard. January had its typical ups and downs with temperatures. Windy conditions did prevail in the chinook areas and the snow was gone in these areas by mid-month. Snow held on over eastern and southwestern portions. Although temperatures averaged above normal in some areas, the highest state temperature of 58F at Badger Peak was the lowest such temperature since January 2004. Persistent snow over the southwest had caused the snowiest water-year since 1997 and 3<sup>rd</sup> highest of record. Havre had their 4<sup>th</sup> snowiest such period.

Temperatures were persistently below normal in February. At Havre, only one day averaged above normal. Lows dropped as cold as -46F north of Havre on the 12<sup>th</sup>. Wind chills as low as -68F were recorded near Hingham on the 10<sup>th</sup>. Snow continued to pile up for the first one-half of the month. By mid-month, two feet of snow was on the ground at Havre. Deep amounts were common over much of the region. After record amounts of snow over the Rocky Mountain Front (up to 78" at East Glacier and 24" at Cut Bank in Feb), winds picked up on the 23<sup>rd</sup>. Ground blizzard conditions prevailed through the 25<sup>th</sup>, with additional blowing on the 27<sup>th</sup>. Roads were blocked across western Glacier and Pondera Counties. US 89 and 2 were closed for several days from Cut Bank to East Glacier and the Canadian line to Choteau, along with MT 434 (Duck Lake Rd). Duck Lake Rd remained closed through Mar 1. Many people on the Blackfeet reservation were snowed in and were running low on food and fuel. Havre's high temperature of 38F was their coolest February maximum since 1969. The persistent snowfall caused Havre and Cut Bank to record their wettest and snowiest February's of record. East Glacier also had their snowiest, with 78-inches. Great Falls tied 2011 for the snowiest February of record. For Montana, this is the first winter since 1984-85 in which low temperatures colder than -40F were recorded in all three winter months of Dec, Jan and Feb. The area high temperature of 55F at Whitehall is the coolest Feb max temp since 1969.

Snow continued to fall into March, with below normal temperatures for much of the month. Although snowfall amounts were not in record territory, the snowpack continued to deepen over the plains. Havre reached 26 inches on the ground and did not have a snow depth of less than 20 inches until the 22<sup>nd</sup>. Snow melted out over other plains locations to the south and west earlier in the month. The area's highest temperature of 62F was the coldest March high temp since 1975. It was generally a wet March with some locations having their wettest since the late 1980s. By the end of the month, Havre had their snowiest season to-date, Bozeman MSU, Cut Bank and Great Falls were all at second snowiest as was East Glacier.

April continued the trend of below normal temperatures and snowy conditions. Temperatures dropped as low as -15F at Carter and near Rudyard on the 3<sup>rd</sup>. This was the coolest temperature in April since 2008. Heavy snow blanketed the area from the 6<sup>th</sup>-8<sup>th</sup> at Helena. After a brief warm-up another round of snow brought 8-14 inches of snow from Fairfield to Grass Range. By mid-month, Great Falls had 20.2 inches of snow, their 8<sup>th</sup> snowiest April. The last snow of the season fell at Havre on the 13<sup>th</sup>. Although they tallied up an impressive 92.5-inches of snow, it was 0.9" less than the seasonal record set in 1981-82. New seasonal records were set at Choteau (89.3"), Chester (85.4") Much warmer temperatures brought flooding to northern areas on the 15<sup>th</sup> and 16<sup>th</sup> and lasting into the latter part of the month.

Many roads in Hill, Choteau and Liberty Counties were closed or even washed out. Flooding began in southwest Montana by the 22<sup>nd</sup>. Another storm moved through the area on the 23<sup>rd</sup>, bringing up to 17 inches of snow in the mountains and over one inch of precipitation at lower elevations. At Bozeman airport, 1.25 inches of rain fell in a 24-hour period. This tied their all-time maximum 24-hour amount for April. As it was a cold month, Havre had their latest first 60F day of the year. Occurring on the 20<sup>th</sup>, it was about 1 ½ months later than average. By the end of the month, Bozeman MSU, Cut Bank and Havre ranked as their snowiest water-years of record. The high amounts of snow over the winter caused the state to spend nearly \$30 million in plowing costs through April 1, while an average winter's costs are \$22.3 million. The persistent snowpack and winds and resulting blizzard conditions caused thousands of livestock to perish across the area.

In May, the month was fairly active, from a severe weather point. There were severe convective weather reports on eight days. This is the most since at least 1970. Thunderstorms with heavy rain prevailed from the 9<sup>th</sup>-12<sup>th</sup>. This was a widespread event with over three inches of rain falling in some spots, with a small tornado near Moore on the 9<sup>th</sup>. Flooding resulted in many rivers in the area. Sun River was completely flooded. Temperatures warmed to above normal values after mid-month. River flooding from melting snow dominated the latter half of the month. After a very cold winter, on many accounts the worst since 1978-79 (snow and cold), May averaged the warmest since 1958 at Cut Bank and Great Falls, and since 1985 at Bozeman and Lewistown.

After a warm and wet May, June started out cold with some lingering rain from May. River flooding continued in southwest Montana through the 5<sup>th</sup>. Another round of heavy rain fell on the 7<sup>th</sup> and 8<sup>th</sup>. Up to two inches of rain fell from Bozeman to Lewistown to the Bears Paws. After record high temperatures on the 9<sup>th</sup>, sharply colder air arrived on the 10<sup>th</sup>. Highs dropped from near 90F to 60F. Snow fell over the mountains on the 10<sup>th</sup> and 11<sup>th</sup>. Another round of heavy rain fell from the 15<sup>th</sup>-19<sup>th</sup>. Nine inches of rain fell at Wood Creek SNOTEL, while 7.7-inches fell at Gibson Dam. Amounts greater than five inches occurred along the Rocky Mountain Front from west of Choteau to west of Augusta. The 7.50-inch amount at Gibson Dam was their highest 4-day total since June 1964. Moderate flooding was reported on most rivers in central Montana as a result. This flooding continued through the 21<sup>st</sup>. Some stages were higher than from the snowmelt flooding in May, and higher than stages seen in 2011. All roads to Augusta were closed for a time. Highway 200, closed on the 19<sup>th</sup>, reopened on the 22<sup>nd</sup> after a washed-out culvert was repaired. On the 23<sup>rd</sup>, torrential rains fell in the Shelby and Great Falls areas. Much of the western part of Shelby from the town to the Interstate Bridge was underwater. North of Great Falls, over 4.50-inches of rain fell in 2 ½ hours, with over 3-inches in only 15 minutes. This downpour established many short-term precipitation intensity records for Montana, out to 10 hours. 3.70-inches of rain fell in one hour. This exceeded the old record of 2.60" at Glendive on Aug 30, 1989. 1.77" fell in 5-minutes. This exceeded the old record of 0.78" at Billings on Aug 5, 2011. This amount in 5-minutes was a rate of 21.25 inches per hour. A small tornado was also sited near Highwood from this complex. The heavy rain of the month caused many areas to have their wettest water-year in many years. At Bozeman, they had their wettest since 1885. A wet microburst occurred between Fairfield and Sun River on the 25<sup>th</sup>. Heavy rain and hail, along with damaged buildings and downed trees resulted on area farms. Although severe weather occurred, it was on only five days, the lowest number of days in June since 2015. The largest hail of the season, 1.5" hail, fell near Coffee Creek and Benchland in early June

July was dry. There were several rounds of severe weather, including snow at higher elevations on the 3<sup>rd</sup>. Up to 4 inches of snow was reported. Only 0.01" of rain fell at Helena, resulting in their driest July of record. Dillon had their second driest of record, with only a trace. The area average of only 0.29 inches was the second driest of record. Only July 1919 was drier.

August was a somewhat average month. On the 5<sup>th</sup>, a thunderstorm produced a lot of pea to dime size hail near Montana City. Hail drifts caused numerous slide-offs and one crash. A plow cleared the hail drifts. Hot weather set in from the 9<sup>th</sup>-11<sup>th</sup>. Record high temperatures were set at several spots on the 10<sup>th</sup> and 11<sup>th</sup>, reaching 108F at Armells Creek on the 11<sup>th</sup>. The hot temperatures were the warmest in the area since July 2007. Relative Humidity values also dropped into record ranges. Cut Bank had an RH of 5.04% on the afternoon of the 10<sup>th</sup> (T-101F; Td-18F). This set a new low humidity record, and the lowest since 2005. Bozeman fell to 3.66% (T-97F; Td-8F). This also set a new low humidity record, and their lowest since July 2013. Sharply cooler air moved across the region on the 20<sup>th</sup>. High temperatures did not climb out of the 50s at many locations. This set record cold high temperature values for the date. A similar cold air mass moved in for the 27<sup>th</sup>. Some spots, especially along the Rocky Mountain Front did not reach 50F for the day. Some heavy rain and thunderstorms occurred from Bozeman to Grass Range. Thunderstorms crossed southwest Montana on the 20<sup>th</sup>. A small tornado, and the third of the season (near normal), was seen east of Wisdom. It damaged a shed and fencing. A nearby weather station reported a gust of 78 mph, the highest convective gust in Montana in August since 2013. Smoke from forest fires in the west was a big factor for air quality in August. While visibility restrictions were seen throughout the region, some of the most severe and persistent were in north central Montana. Cut Bank set a new record for the most hours of visibility less than 3, 4, 5, 6, 7, 8 and 9 miles. This also occurred at Havre.

After a slightly cooler than normal summer, September continued this trend. The weather throughout the month was fairly typical for September. Isolated thunderstorms occurred throughout the month. Two larger storm systems moved through the area from the 12<sup>th</sup>-20<sup>th</sup>. These produced up to two inches of rain over north central Montana. Some snow fell on the 29<sup>th</sup> and 30<sup>th</sup>. Cut Bank's high temperature of 32F on the 30<sup>th</sup> was their coolest high temperature in September since 2000, and they had their coolest September since 1993.

October continued a pattern of below normal temperatures. Precipitation was also below normal. There were no significant storms that moved through the area during the month. The most notable, around the 13<sup>th</sup>, produced up to one-half inch of precipitation over parts of southwest Montana.

After a mild period nearly in November, temperatures generally averaged below normal with periods of snow through the 18<sup>th</sup>. Then mild and dry conditions with increased winds closed out the month. For the fall period, it was the coolest period since 2000 at most locations. The last 70F high temperature of the year occurred at Armells Creek on the 28<sup>th</sup>. This was 13 days earlier than normal and the earliest since 2011.

The first seven days of December had temperatures averaging below normal. Snow fell on the first and second, with amounts up to six inches south of Great Falls. A relatively dry and colder period followed. The coldest temperatures of the month occurred between the 5<sup>th</sup> and 7<sup>th</sup>, with the southwest valleys having temperatures as low as -29°F. Milder and windier conditions prevailed from the 10<sup>th</sup> through 23<sup>rd</sup>. Winds gusts of over 70 mph were reported on seven of eleven days from the 11<sup>th</sup> to 21<sup>st</sup>. The highest gust was 84 mph at Deep Creek (Glacier) on the 11<sup>th</sup>. Gusts reached 74 mph at Browning. On the 24<sup>th</sup>, a transition to cooler temperatures began. A slight warm-up on the 29<sup>th</sup> brought very windy conditions again. A gust of 102 mph at Deep Creek was their highest since January 2012; the highest non-convective gust in the state in 2018; and the highest non-thunderstorm gust in the state since November 2015. Snow fell over much of the state on the 30<sup>th</sup>. The heaviest amounts were in central Montana, with 8 inches reported at Choteau (Teton), 7 inches near Raynesford (Judith Basin) and 6 inches at Rocky Boy (Hill). Cold conditions on the 31<sup>st</sup> were highlighted with wind chills near -20°F over portions of northcentral Montana.

During the month, Great Falls had seven days with gusts of 50 mph or higher. This is the highest in any month since December 1991, when 8 days had gusts of 50 mph or higher.