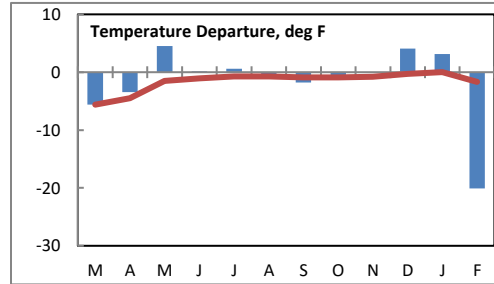
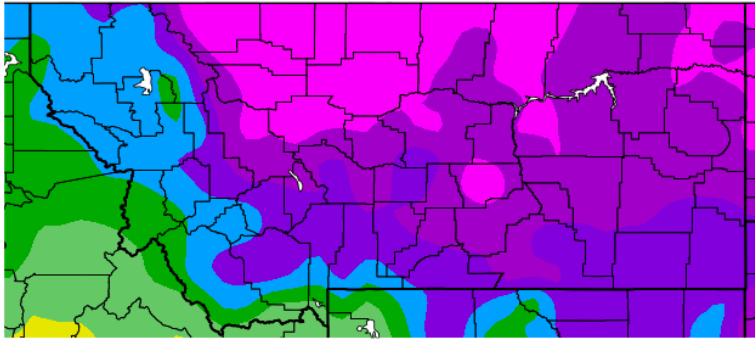


Montana Weather/Precipitation Summary

February 2019 NOAA's National Weather Service Great Falls Montana

February was one of the coldest months of record in Montana. The upper level flow was highlighted by a strong trough of low pressure over western North America (Fig. 1). This kept a steady stream of cold air from the north over Montana. Precipitation was generally above normal with winds lighter than normal

February temperature anomalies ranged from slightly below normal southwest to 28°F below normal over northern areas. The map below shows the variation. The warmest average temperatures were in western Montana. The warmest, Heron had an average temperature of 21.0°F, while the coolest was -6.2°F at Chinook. The highest temperature was 61°F at Forsyth on the 1st. The coldest temperature was -51°F at Scobey on the 8th. The state-wide temperature



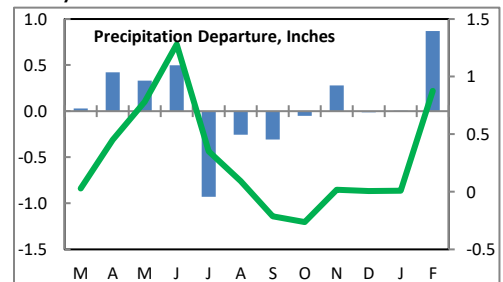
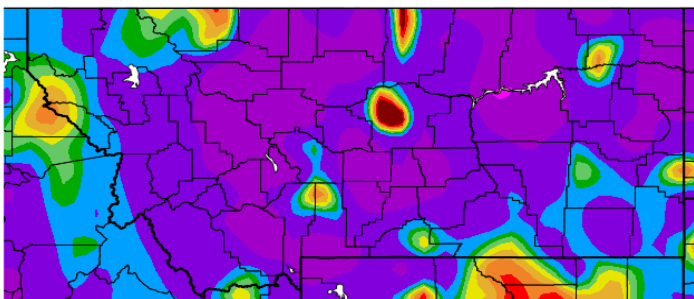
average of 4.7° was 19.5°F below normal and coldest since 1936. Some locations across northern Montana, including Havre with a 28.1°F cold departure, had the

highest cold departures from normal since January 1969. The red line on the graph shows the cumulative 12-month departure from normal, which is 1.4°F below normal. See the state summary and temperature tables below for more details.

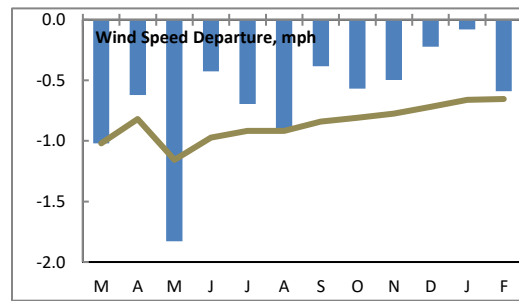
Precipitation was heaviest along the western border and West Yellowstone areas of Montana. The highest amount (17.90-inches) fell at Black Bear SNOTEL (Gallatin). This is likely a new record for the most precipitation at any location in February in Montana. The existing record is 17.25-inches at Poorman Creek SNOTEL in 1979. The highest amount elsewhere was 7.14-inches at Greenough. The statewide composite average of 1.52-inches was 0.87" above normal and the second largest amount for February. The highest is 1.55-inches in 1986. The green line on the precipitation graph shows the cumulative 12-month departure from normal, which is 0.88-inches

above normal. See state summary and precipitation tables below for more details. The heaviest monthly snow amount was 77.1-inches at Mystic Lake. The state average snowfall was 24.9-inches, which is the highest of record. The previous record was set last year with 22-inches.

Percent of Normal Precipitation (%)
2/1/2019 – 2/28/2019



Winds averaged weaker than normal over the state. Statewide, the month ranked as the 15th calmest February of record, with an average speed of 8.1-mph. The strongest averages were in the southwest. The composite statewide average was 0.7-mph below normal. The brown line of the wind graph to the right shows the 12-month cumulative statewide wind departure from normal. The 12-month average is running 0.5-mph below normal. All months have had wind averages below normal since January 2018.



Refer to NEIC's State of the Climate report for the latest monthly discussion:
<http://www.ncdc.noaa.gov/sotc/>

After a couple of warm days to start the month, a cold front moved through on the 2nd that caused rapid temperature drops. In 10-minutes, the temperature dropped 31°F at Loma, from 57° to 26°F. In 20 minutes, the temperature dropped 35°F. The previous record for a 10-minute drop in temperature was 27°F at Boulder Hill (41 to 12) on November 29, 2014. Heavy snow fell across central and southwest Montana, with 4-5-inches of snow. Blizzard conditions prevailed through the Bearmouth Canyon as strong east winds brought in cold air. By the 4th, high temperatures were around -10°F across much of central Montana. Heavy snow fell over northeast Montana. Ending on the 5th, Glasgow had a record 3-day snowfall of 13.5-inches. The cold air caused temperatures to plunge to -46°F north of Havre on the 7th, and to -51°F at Scoby on the 8th. Many record lows were set on these dates over northern Montana. As cold air continued to push into western Montana, blizzard conditions occurred in the northern Flathead Valley with strong winds and heavy snow. Bigfork measured 7-inches.

As the cold air pushed into southwest Montana, Dillon had a record cold maximum temperature on the 9th, reaching only -3°F. Strong east winds continued over portions of western Montana, producing wind chills to -45°F. On the 10th, Cut Bank reached only -12°F, again setting a cold record. On the 12th and 13th, heavy snow fell over northwest Montana. Two to four feet of snow fell in the Yaak area. Heavy snow continued over southern Montana. Billings picked up 5-inches and Cooke City measured 11-inches on the 13th and 14th. As the snow continued to pile up with the cold temperatures, Great Falls measured 14-inches of snow on the ground on the 16th. This was their greatest depth since 17-inches on April 30, 2009. The snow continued over southeast Montana with 12-14-inches of new snow reported from Miles City to Baker and Broadus.

After a brief warming, temperatures again bottomed out at -37°F at Shelby on the 19th. Temperatures rose above 20°F over portions of the plains on the 20th, which was the first since the cold air hit. A cold front brought blizzard conditions to central Montana on the 23rd. For the rest of the month, there were periods of snow, sometimes heavy, with persistent cold conditions. The cold air made it to southwest valleys late in the month. There were rapid temperature changes when this happened. At one spot near Cameron, the temperature rose from -1°F to 30°F in 30 minutes, and then fell back to -1°F in a 15 minute period.

Many records for cold and longevity of the cold were set during this period. New records were also established for monthly precipitation.

Records...

Location	Element	Amount/days	Old record
Bozeman Airport	Record monthly and any month snowfall	27.1 inches	15.5" - Feb 1959 26.1" - Jan 1949
	Days of measurable snow Feb and any month	18 days	13 - Feb 1942 17 - Nov 1947
	Days of measurable precipitation Feb	14 days	14 - 2007
Bozeman MSU	Record high for Feb	29.2 inches	28.1" - 2003
Cut Bank	Days of maximum temperature of 32°F or colder in Feb	26 days	26 - 1936
Dillon	February coldest temperature average	9.9°F	10.8° - 1989
	Days of maximum temperature of 32°F or colder in Feb	23 days	20 - 1969
	Days of minimum temperature of 0°F or colder in Feb	16 days	13 - 1989
Glasgow	Feb snowfall	28.2 inches	21.4 - 1952
Great Falls	Days of Trace or more snow in Feb	21 days	20 days - 2014
	Days of measurable snow Feb and any month	21 days	16 - Feb 1989 20 - Jan 1957
	Days of 1" or more snow Feb and any month	11 days	10 - Feb 2011, 2018 11 - Jan 1957
	Days of measurable precipitation Feb and any month	22 days	16 - Feb 2007 22 - May 1927
	Feb precipitation	2.58 inches	2.16 - 1958
	Days of maximum temperature of 32°F or colder in Feb	26 days	24 - 1936
	Average Feb wind speed	8.1 mph	8.2 - 2010
	Consecutive days maximum temperature less than 32°F	32 days - Feb 3 - Mar 6, 2019	31 - Jan 15- Feb 24, 1929
Havre	Days of measurable snow Feb	17 days	15 - Feb 1899, 1940
	Days of measurable precipitation Feb	17 days	15 - 1899
Helena	Days of 1" or more snow Feb and any month	11 days	9 - Feb 1891, 1914 10 - Dec 1880
	Days of measurable precipitation Feb	17 days	17 - 1936
	Feb precipitation	2.29 inches	1.62 - 1895
Lewistown	Days maximum temperature 0°F or colder in Feb	10 days	8 - 1936
	Days of maximum temperature of 32°F or colder in Feb	25 days	22 - 1936, 2018

Precipitation/convection

Severe convective weather occurred on 0 days in February, which is normal.

Winter period (Dec-Feb) and Water year (Oct-Feb)

For the winter period, the temperature average was 18.0°F, 3.7°F below normal. The cold February brought the average down, as both December and January had above average temperatures. This was the 41st coolest winter season, and the past two winter seasons have been even slightly cooler. For the water year, the average of 25.4°F is the 33rd coolest of record.

Composite precipitation totaled 3.08-inches, 0.86" above normal. This was the 21st wettest winter season. Last winter was even wetter, ranking 7th wettest. Heavy snow fell most areas. The composite snowfall was 43.6-inches, ranking 13th highest and 14.7-inches above normal. Last winter was 2nd snowiest with 50.8-inches. For the water year, the precipitation average of 5.24-inches is the 27th wettest of record. Average snowfall of 53.7-inches is the 13th highest of record.

Although December was windy, February had very light winds so the season's average of 8.7-mph was the 13th calmest of record and calmest winter since 2014-15. For the water year, average winds of 8.5-mph rank as 8th lightest of record and lightest winds for such period since 2008.

February information:

High Temperature	61°F at Forsyth (1 st)	Greatest Precip	7.14" at Greenough
Low Temperature	-51°F at Scobey (8 th)		17.90" at Black Bear SNOTEL
Warmest Ave Temp	21.0°F at Heron	Peak Wind Gust	67 mph at Browning (2 nd)
Coolest Ave Temp	-6.2°F at Chinook		74 mph at Deep Creek (2 nd)
Range of Temp departures	-0.6°F at West Yellowstone to -28.1°F at Havre	Highest Ave Wind	15.3 mph at Monida Pass
21 city mean monthly Temperature/Normal	4.7/24.2F normal. 4 th coldest of record (since 1880). 3 rd percentile.	20 city mean monthly wind speed/Normal	8.1 mph/8.7 mph; 15 th calmest of record (since 1936). 19 th percentile.
22 city mean monthly precipitation/Normal	1.52"/0.65" – 233% of normal. 2 nd wettest of record (since 1880). 97 th percentile.	20 city mean monthly snowfall/Normal	24.9"/7.6" +17.1" 1 st percentile.

**Historical Rank of Precipitation (inches)
for the Current Month and Water Year to Date**

Location	Feb	% of Norm	Rank	Pcntl	Oct 1 - Feb	% of norm	Rank	Pcntl	Years
Baker	0.07	22%	20	13	2.67	108%	5	74	21
Billings	2.00	345%	2	1	4.80	118%	17	14	118
Belgrade	1.02	224%	4	4	3.78	114%	31	37	82
Butte	1.05	244%	7	5	2.81	101%	56	45	124
Cut Bank	1.50	714%	1	1	4.04	287%	3	2	112
Dillon	0.48	200%	14	16	1.53	83%	47	59	79
Glasgow	1.41	542%	3	2	4.29	197%	8	6	120
Great Falls	2.58	549%	1	1	5.24	176%	14	10	127
Havre	1.38	493%	3	1	2.88	143%	56	40	139
Helena	2.30	767%	1	1	3.68	165%	37	26	140
Jordan	1.54	616%	1	1	4.32	211%	3	10	21
Kalispell	1.75	180%	14	10	6.35	101%	63	50	125
Lewistown	1.01	230%	19	15	3.81	109%	69	55	124
Livingston	1.81	362%	1	1	4.91	146%	18	15	116
Miles City	0.29	126%	86	60	2.46	114%	71	50	142
Missoula	1.62	231%	14	9	7.35	162%	18	12	139
Mullan Pass	1.41	45%	67	87	21.67	103%	45	57	78
Wolf Point	0.14	67%	8	35	2.25	111%	2	5	21
Glendive	1.03	322%	5	3	3.56	139%	17	13	121
Sidney	0.87	264%	6	6	3.24	111%	20	24	79
BZN MSU	1.61	206%	7	4	7.65	140%	11	7	142
W Yellowst	6.47	410%	1	1	11.98	124%	20	18	105

Rankings and Percentiles are 1=driest, higher numbers=wetter.

For an automated version of this chart, updated daily, go to

<http://www.wrh.noaa.gov/tfx/dx.php?wfo=tfx&type=&loc=products&fx=PCPNTOTALS>

**Historical Rank of Average Temperature (°F)
for the Current Month and Water Year to Date**

Location					Oct 1 -				Years
	Feb	Normal	Rank	Pcntl	Feb	Normal	Rank	Pcntl	
Baker	0.4	24.7	106	99	24.1	26.9	74	69	107
Billings	8.4	30.4	84	99	30.0	33.6	70	82	85
Belgrade	9.2	24.7	82	98	25.4	27.6	66	78	84
Butte	10.6	22.2	120	96	23.7	25.5	103	82	125
Cut Bank	-3.8	24.2	110	99	24.1	28.3	92	83	110
Dillon	9.9	26.2	76	100	25.8	28.7	68	91	75
Glasgow	-3.4	19.2	123	99	23.1	24.7	62	50	124
Great Falls	-0.2	27.3	122	99	27.3	31.2	104	85	122
Havre	-5.9	22.2	139	99	24.2	26.8	87	62	139
Helena	6.5	27.7	135	97	27.5	30.1	99	71	139
Jordan	-1.9	22.6	101	99	24.4	26.6	74	74	99
Kalispell	12.9	27.1	118	99	28.0	29.5	27	22	119
Lewistown	1.8	25.7	120	99	25.9	29.7	101	86	117
Livingston	11.5	29.1	117	99	30.0	32.3	102	88	116
Miles City	2.1	24.4	138	99	25.9	28.5	95	69	137
Missoula	17.3	30.0	124	97	28.9	31.6	96	76	126
Mullan Pass	13.4	23.3	41	99	25.9	26.1	24	56	42
Wolf Point	-4.7	17.8	21	100	21.7	23.2	13	60	21
Glendive	1.5	24.0	125	99	26.5	28.9	73	59	123
Sidney	-2.6	22.7	96	100	22.1	27.5	75	78	96
W Yellowst	14.9	15.2	58	62	19.3	18.9	68	72	95

**Historical Rank of Average Wind Speed (mph)
for the Current Month and Water Year to Date**

Location					Oct 1 -				Years
	Feb	Normal	Rank	Pcntl	Feb	Normal	Rank	Pcntl	
Baker	10.7	10.2	10	43	10.7	10.7	12	55	21
Billings	9.4	11.6	79	95	12.1	11.9	48	57	83
Belgrade	4.3	5.2	47	87	4.4	5.2	42	77	54
Butte	4.7	5.8	44	80	4.9	5.6	38	69	55
Cut Bank	8.4	12.8	75	99	13.1	13.7	61	79	77
Dillon	8.7	9.6	53	80	8.9	9.4	54	83	65
Glasgow	9.7	9.6	18	23	9.6	9.6	42	56	74
Great Falls	8.1	13.0	80	100	12.0	13.7	73	91	80
Havre	8.3	8.9	81	62	10.3	9.2	31	23	130
Helena	5.3	6.4	125	90	5.3	6.2	135	97	139
Jordan	7.4	7.3	16	45	7.4	7.3	21	59	35
Kalispell	9.3	4.8	3	2	4.8	4.6	112	94	119
Lewistown	8.0	9.6	66	87	9.1	9.9	64	83	77
Livingston	14.7	16.3	45	83	17.3	17.5	39	75	52
Miles City	8.9	9.8	52	40	9.2	9.7	54	42	128
Missoula	7.5	4.9	5	5	4.6	4.6	53	63	84
Mullan Pass	5.6	5.8	20	66	4.7	5.8	28	100	28
Wolf Point	7.7	7.5	11	50	7.6	7.4	9	40	21
Glendive	8.6	9.5	23	85	9.2	10.0	23	85	27
Sidney	7.9	8.8	26	83	8.58	9.0	22	73	30
W Yellowst	7.9	6.4	2	25	5.50	6.2	5	100	5

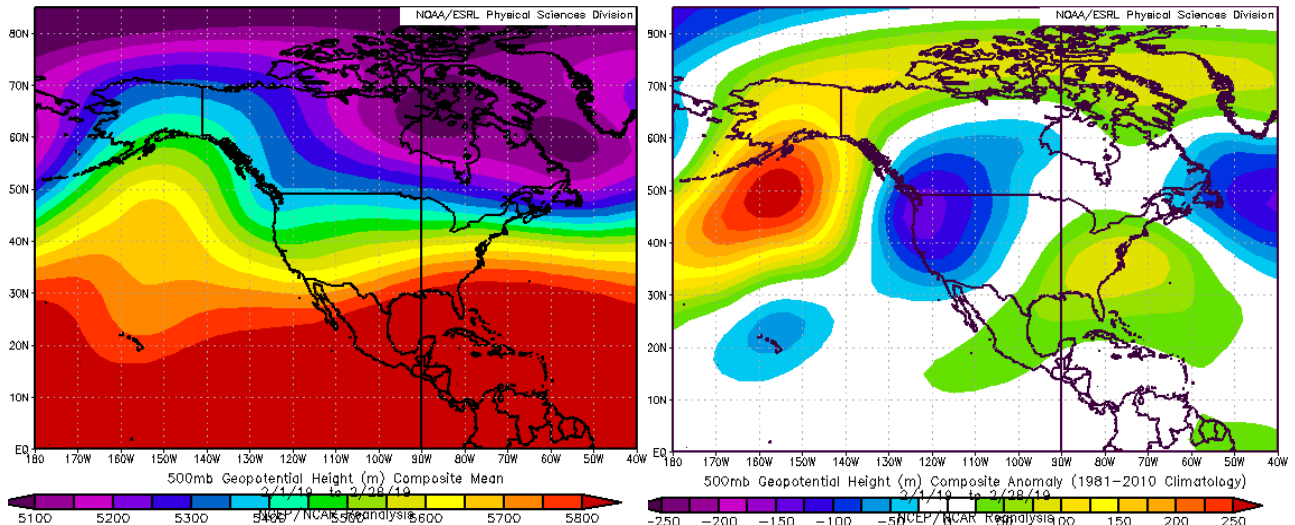


Figure 1. Mean flow at 500 millibars (~18,000 ft) for this month (upper left) and departure from normal (upper right).

For the latest information on mountain snowpack from the NRCS, go to: <https://www.wcc.nrcs.usda.gov/gis/snow.html>

For the latest U.S. Drought Monitor, issued weekly by the National Drought Mitigation Center, USDA and NOAA, go to: <http://droughtmonitor.unl.edu/>

These data are preliminary and have not undergone final QC by NEIC. Therefore, these data are subject to revision. Final and certified climate data can be access at the National Environmental Information Center (NEIC) <http://www.nei.noaa.gov>. Many more links are on the Drought Information Page of the NWS Great Falls web site at <http://www.wrh.noaa.gov/tfx/main/drought.php?wfo=tfx>. The climatological record for normals is 1981-2010. The ranking period for temperature, precipitation and snowfall is since 1880. The ranking period for wind speeds is since 1936. The ranking period for soil moisture is since 1995.