

# Montana Weather/Precipitation Summary

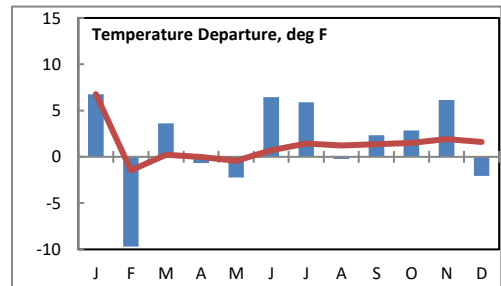
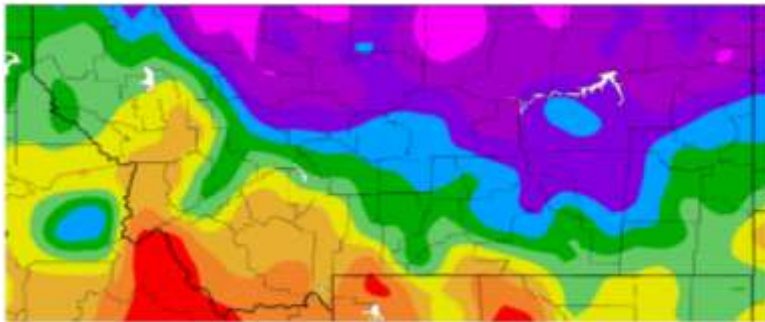
December 2021 NOAA's National Weather Service Great Falls Montana

## This is the final Montana Weather Summary.

A trough of low pressure dominated western North America when normally a ridge sets up along the west coast (Fig. 1). This trough produced much below normal temperatures across north central and northeast Montana, with above normal values in the southwest portions.

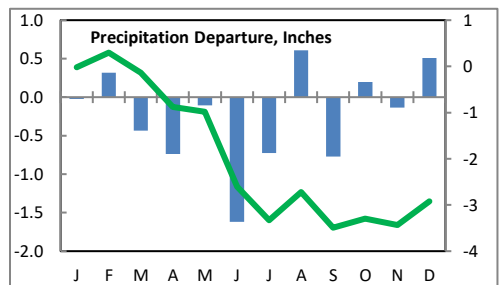
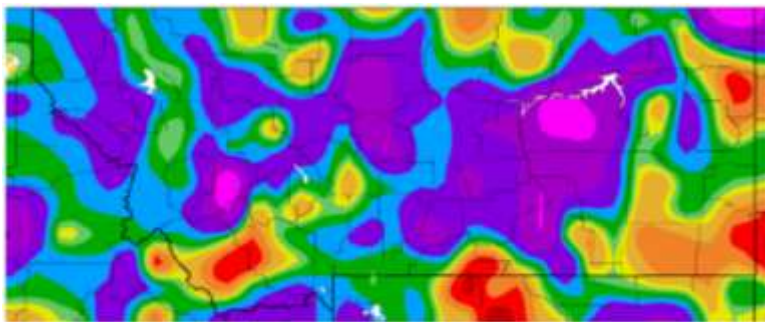
Precipitation was variable, with mostly above normal values. There were notable pockets with below normal precipitation. Winds averaged near to above normal.

December temperature anomalies ranged from 5.3°F above normal at Butte to 8.6°F below normal at Cut Bank and Havre. The map below shows the variation in departures. The warmest average temperatures were in southern and western Montana. The warmest average of 33.5°F was at Norris Madison (Madison), while the coolest was 11.0°F at Turner (Blaine). The highest temperature was 78°F at Jordan (Garfield) on the 1<sup>st</sup>, which tied for the warmest of record for December in Montana. This last occurred on the 5<sup>th</sup> in 1939 at Crow Agency. The coldest temperature was -38°F at Chinook (Blaine) on the 28<sup>th</sup>. This range of 116°F is well above the normal range of 108°F for December. This is the largest range in December statewide temperature extremes since 2017. The record is 129°F set in 1924. The statewide temperature average of 19.8°F was 2.1°F below normal and the 42<sup>nd</sup> coolest of record. It was the coolest since 2016. The red line on the graph shows the cumulative 12-month departure from normal, which was 1.6°F above normal. See the state summary and temperature tables below for more details.



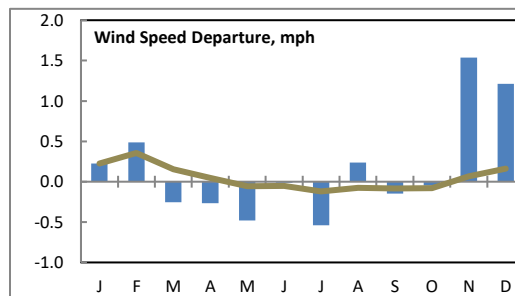
## Temperature departure from normal (HPRCC)

Precipitation was heaviest over mountains of northwest and western Montana. Much of the state received above normal precipitation, with scattered pockets of below normal. The highest amount (14.40-inches) fell at Flattop Mountain SNOTEL (Lincoln), with 6.24-inches at Noxon (Sanders). The month's statewide composite of 1.31" was 0.51" above normal. This ranks as the 11<sup>th</sup> wettest December of record for Montana, and wettest since 2010. The green line on the precipitation graph (right) shows the cumulative 12-month departure from normal, which is now 2.92" below normal. Snowfall averaged 16.1-in, which was 5.5-in above normal. This was the highest in



December since 2017. It was 0.5-in below normal for the snowfall season and lowest for the season since 2018.

Wind speed averages were near to above normal. As a composite average, the state's winds ranked as the 29<sup>th</sup> windiest for December, with an average speed of 10.2-mph, which was 1.2-mph above normal. The strongest averages were along the northern Rocky Mountain and Livingston area. The brown line of the wind graph to the right shows the 12-month cumulative statewide wind departure from normal, which is 0.2-mph above normal.



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

December was generally mild for the first half. There were many windy days as well. There was a cool period that mainly affected the northeast mid-month, but the coldest period did not begin until around Christmas. Record high temperatures were set on the 1<sup>st</sup> with values in the 60s common over much of the state. A high of 78°F occurred at Jordan, which tied the all-time warmest for December in Montana. This period caused temperatures to be as much as 30-35°F above normal. It was a very windy day with gusts over 100-mph along the Rocky Mountain Front and gusts in the 70-mph range through portions of north central Montana. This caused fires that broke out in the Browning, Great Falls and Denton areas to spread uncontrolled for several hours and cause major destruction in the Great Falls and Denton areas. Generally dry conditions that continued through the fall caused many area ski areas to delay their opening days. A brief cold period around the 6<sup>th</sup> brought temperatures as low as -26°F to the Poplar area. Temperatures rebounded to much above normal values on the 14<sup>th</sup>, with Little Bighorn reaching 65°F. Cooler conditions and some snow fell from the 14<sup>th</sup>-17<sup>th</sup>, but above normal temperatures returned for the days before Christmas. A strong cold front on the 23<sup>rd</sup> ushered in the coldest air of the season. Another round of heavier precipitation occurred on the 23<sup>rd</sup>-24<sup>th</sup>, when a cold front moved through the state. Heavy snow fell over portions of the northwest during the last week of the month. West Glacier had nearly 55-inches of snow during the month, with much of it falling during the last week. This was their 13<sup>th</sup> snowiest December of record. Cold persisted over the northeast during this period as well. The lowest temperature in the state was -38°F at Chinook on the 28<sup>th</sup>.

The highest daily temperatures in December occurred on four days at Billings and Little Bighorn, while Scobey had the state's lowest temperature on seven. For the calendar year, Yaak Hill has been the state's warmest on 48 days and Gates Park and West Yellowstone have been coolest on 45 days. The state's warmest daily temperature has been in the western climate division on 127 days and coldest was in the southwest division on 173 days. Divisions are shown in following map.

### Water year-to-date

The water year so far has produced a composite temperature average of 34.5°F, which was 2.3°F above normal. This is the warmest such period since 2005. Precipitation totaled 3.44-inches, which was 0.15" below normal. This is the 22<sup>nd</sup> wettest such period. Statewide winds averaged 9.8-mph, which was almost 1-mph above normal. This was the 23<sup>rd</sup> highest average of record, and highest since 1994.



It has been a very windy fall. Although the averages are not at record levels, the number of days of peak winds of threshold values are. Following are tables showing the numbers of peak gusts over 40-, 45-, 50-, 55-, 60- and 65-mph at locations in central and southwest Montana. Most have set some sort of record for the numbers of peak wind gust records set during this 3-month period. A valued with (\*\*) indicates a record value.

	Oct-Dec days gusts >40 mph				Oct-Dec days gusts >45				Oct-Dec days gusts >50 mph			
	curr tot	Rank high to low	normal	Highest since	curr tot	Rank high to low	normal	Highest since	curr tot	Rank high to low	normal	Highest since
BZN	11**	1	3.9	8 2020	6**	1	1.8	5 2017	3**	1	0.7	1958
CTB	50**	1	32.5	48 2020	39**	1	23.3	36 2020	31**	1	14.9	25 2020
DLN	27**	1	6.3	14 2014	12**	1	2.4	9 2014	6**	1	1.1	6 2014
GTF	43	3	19.1	50 1990	27	3	10.4	39 1990	20	2	4.8	25 1990
HLN	21**	1	7.1	17 1990	12	1	4	12 2020	5	2	1.9	2020
HVR	25	2	10.6	1990	12	5	5.5	2011	8	6	2.5	1990
LWT	22	1	11.5	21 1999	17**	1	6.1	12 1990	13**	1	2.6	8 1949

	Oct-Dec days gusts >55				Oct-Dec days gusts >60 mph				Oct-Dec days gusts >65			
	curr tot	Rank high to low	normal	Highest since	curr tot	Rank high to low	normal	Highest since	curr tot	Rank high to low	normal	Highest since
BZN	2**	1	0.3	1958	0		0.1		0			
CTB	23**	1	8.4	14 2007	12**	1	4.8	12 1978	9**	1	2.5	6 1995
DLN	2	2	0.4	1949	1**	1	0.1	2017	0		0	
GTF	12	2	2.3	1990	6	3	0.8	1990	1	12	0.2	2020
HLN	1	8	0.7	2020	1	2	0.3	2019	0		0	
HVR	2	15	1.2	2020	1	10	0.5	2020	0		0.1	
LWT	8	1	1.2	5 1953	2	2	0.4	2015	0		0.1	

### Calendar Year 2021

The calendar year had a composite temperature average of 45.0°F, which was 1.6°F above normal. This is the warmest such period since 2016, and 21<sup>st</sup> warmest of record. The state's extremes were 112°F at Sweeney Creek in June and -47°F near Ulm in February. This was an absolute difference of 159°F, which was the largest since 2007, and above the normal of 151°F. Precipitation totaled 12.06-inches, which was 2.92" below normal and driest since 1988. This has been the 17<sup>th</sup> driest such period. Composite snowfall was 49.2-inches, which was the lowest since 2016, ranking 47<sup>th</sup> lowest overall. Statewide winds averaged 9.3-mph, which is slightly above normal. This was the 40<sup>th</sup> lowest average of record.

### Precipitation/convection

Severe convective weather occurred on one day in December, which is one day above normal. A fast moving strong cold front produced convective showers on the 23<sup>rd</sup>, and gusts as high as 63-mph occurred with this line of showers.

### PM2.5 data for the month (MT DEQ)

Location	Dec 2021 PM2.5 Average	Rank	December Average	Records began
Billings	7.1 µg/m <sup>3</sup>	7 <sup>th</sup> lowest	7.8 µg/m <sup>3</sup>	1999
Great Falls	4.3 µg/m <sup>3</sup>	5 <sup>th</sup> lowest	6.3 µg/m <sup>3</sup>	2000
Missoula	2.6 µg/m <sup>3</sup>	1 <sup>st</sup> lowest	12.7 µg/m <sup>3</sup>	1999
Sidney	3.7 µg/m <sup>3</sup>	3 <sup>rd</sup> lowest	5.0 µg/m <sup>3</sup>	2008

### December information:

<b>High Temperature</b>	78°F at Jordan (Garfield) (1 <sup>st</sup> )	<b>Greatest Precip</b>	6.24" Noxon (Sanders)
<b>Low Temperature</b>	-38°F at Chinook (Blaine) (28 <sup>th</sup> )		14.40" at Flattop Mountain SNOTEL (Flathead)
<b>Warmest Ave Temp</b>	33.5°F at Norris Madison (Madison)	<b>Peak Wind Gust</b>	102 mph near East Glacier (Glacier) (1 <sup>st</sup> )
<b>Coollest Ave Temp</b>	7.8°F at Plentywood (Sheridan)		108 mph at Deep Creek RAWS (Glacier) (1 <sup>st</sup> )
<b>Range of Temp departures</b>	-8.6°F at Cut Bank and Havre to +5.3°F at Butte	<b>Highest Ave Wind</b>	22.5 mph at Livingston
<b>21 city mean monthly Temperature/Nrml</b>	19.8/21.8F normal. 42 <sup>nd</sup> coolest of record (since 1880). 30 <sup>th</sup> percentile.	<b>20 city mean monthly wind speed/Nrml</b>	10.2 mph/9.0 mph; 29 <sup>th</sup> windiest of record (since 1936). 34 <sup>th</sup> percentile.
<b>22 city mean monthly precipitation/Nrml</b>	1.31"/0.80" – 163% of normal. 11 <sup>th</sup> wettest of record (since 1880). 91 <sup>st</sup> percentile.		

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

Location	% of Norm				Oct 1 -				
	Dec	Norm	Rank	Pcntl	Dec	norm	Rank	Pcntl	Years
Baker	0.19	53%	67	32	2.03	98%	30	70	97
Billings	0.97	170%	19	15	2.76	109%	38	69	121
Belgrade	0.49	111%	39	45	2.46	108%	33	38	85
Butte	0.35	73%	80	62	1.15	60%	79	61	128
Cut Bank	0.40	129%	37	32	1.13	87%	58	50	115
Dillon	0.16	35%	97	79	1.61	84%	69	56	122
Glasgow	0.86	200%	18	14	1.31	71%	79	63	124
Great Falls	0.89	168%	37	28	1.29	57%	109	84	130
Havre	0.76	190%	32	22	1.84	112%	54	38	142
Helena	0.98	213%	26	17	1.58	86%	91	63	143
Jordan	1.14	308%	6	5	1.78	93%	43	43	98
Kalispell	1.67	111%	46	35	4.79	114%	36	28	128
Lewistown	0.74	145%	49	38	1.76	72%	102	81	126
Livingston	0.79	158%	26	21	2.36	95%	66	55	119
Miles City	0.25	114%	89	61	2.68	176%	25	17	145
Missoula	1.23	114%	53	36	3.30	96%	64	45	142
Mullan Pass	10.87	226%	4	4	22.66	166%	2	1	84
Wolf Point	0.28	187%	27	33	1.28	107%	39	49	79
Glendive	0.59	153%	36	27	4.65	244%	3	2	125
Sidney	0.35	73%	49	59	2.33	110%	21	25	82
BZN MSU	1.54	158%	20	13	4.65	118%	27	18	145
W Yellowst	4.13	153%	8	6	7.68	121%	19	16	111

Rankings and Percentiles are 1=wettest, higher numbers=drier.

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	Current Month				Oct 1 -				
	Dec	Normal	Rank	Pcntl	Dec	Normal	Rank	Pcntl	Years
Baker	19.5	20.7	64	42	34.3	31.4	25	78	110
Billings	25.5	27.6	84	34	40.3	37.2	16	88	124
Belgrade	24.0	20.7	27	69	36.0	31.4	3	98	87
Butte	24.3	19.0	28	78	34.5	29.1	18	87	128
Cut Bank	14.2	22.8	95	17	31.4	31.8	66	42	113
Dillon	25.9	21.1	21	45	35.8	31.1	10	88	78
Glasgow	11.9	18.5	92	41	32.9	31.3	28	79	127
Great Falls	20.1	26.0	104	20	36.2	34.8	68	46	125
Havre	12.5	21.1	114	20	32.2	32.0	78	45	142
Helena	25.3	23.4	63	55	38.3	33.9	8	95	142
Jordan	17.2	21.2	74	29	35.5	32.2	22	79	103
Kalispell	22.6	24.1	15	32	34.5	32.4	30	76	123
Lewistown	20.6	24.3	90	26	35.5	33.3	34	73	122
Livingston	27.6	27.6	74	39	39.4	36.1	24	81	119
Miles City	18.1	22.4	98	30	35.5	33.8	49	65	140
Missoula	28.4	24.4	33	74	37.9	33.6	8	95	130
Mullan Pass	20.0	21.8	35	25	29.5	28.9	15	68	45
Wolf Point	9.0	17.1	65	20	30.5	30.1	36	54	77
Glendive	15.5	22.3	97	25	33.1	34.4	74	23	126
Sidney	13.0	20.0	72	25	31.8	32.3	46	28	99
W Yellowst	19.9	12.4	8	93	28.6	23.8	12	94	115

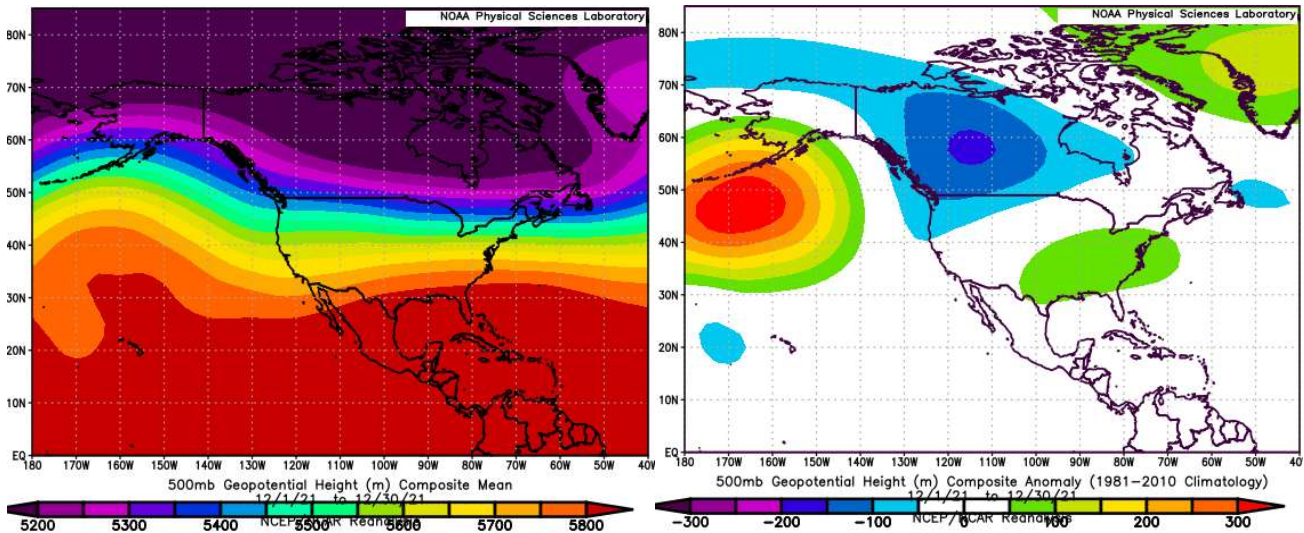
Rankings and Percentiles are 1= warmest, higher numbers=colder.

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

Location	Dec	Normal	Rank	Pcntl	Oct 1 - Dec	Normal	Rank	Pcntl	Years
Baker	11.3	4.8	8	66	10.9	5.1	10	61	24
Billings	11.3	12.6	75	14	11.5	11.8	67	23	87
Belgrade	7.3	4.8	10	86	6.4	5.1	18	77	75
Butte	6.8	4.7	11	81	6.2	5.2	19	69	59
Cut Bank	14.7	15.0	46	42	16.0	14.5	13	85	79
Dillon	12.2	9.2	11	84	11.0	9.1	11	85	68
Glasgow	10.0	9.3	23	60	10.4	9.9	28	64	77
Great Falls	12.7	13.8	70	18	13.8	13.0	37	57	84
Havre	10.2	10.3	51	61	10.5	10.1	31	77	133
Helena	7.2	5.5	32	77	6.7	6.0	56	61	142
Jordan	7.9	7.3	11	71	8.4	7.7	3	95	38
Kalispell	5.9	4.0	76	79	5.4	4.2	114	7	123
Lewistown	11.9	10.4	24	70	11.3	10.1	21	74	79
Livingston	22.5	20.0	6	88	20.1	17.8	7	89	57
Miles City	9.9	9.4	38	70	9.8	9.7	42	68	131
Missoula	5.1	3.9	35	60	4.7	4.0	49	44	87
Mullan Pass	6.0	5.5	14	51	5.6	5.8	22	28	30
Wolf Point	7.2	7.2	12	52	7.3	7.5	11	57	24
Glendive	10.5	10.0	13	56	10.5	10.0	8	59	30
Sidney	8.9	9.0	18	50	9.3	9.0	10	48	34

Rankings are 1=windiest, higher numbers=calmer. Percentiles are 1=calmest, higher=windier.

**Figure 1.** Mean flow at 500 millibars (~18,000 ft) for this month (left) and climatology for the month (right) (from [NOAA/ESRL Physical Sciences Laboratory](http://www.noaa.gov/esrl-physical-sciences-laboratory)).



For the latest information on mountain snowpack from the NRCS, go to: <https://www.nrcs.usda.gov/wps/portal/wcc/home/quicklinks/>

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 NCEI. Therefore, these data are subject to revision. Final and certified climate data can be access at the National Centers for Environmental Information (NCEI) <http://www.ncei.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=txf>. The climatological record for normals is 1991-2020. 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.