

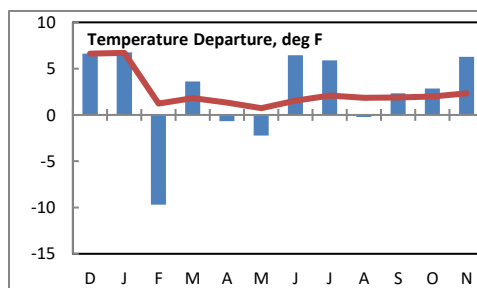
# Montana Weather/Precipitation Summary

November 2021 NOAA's National Weather Service Great Falls Montana

**This summary will be discontinued in 2022.**

A stronger-than-normal ridge of high pressure dominated the area for much of November (Fig. 1). In Montana temperatures averaged much above normal. Precipitation was mostly below normal, with the exception higher values over the northwest, south and southeast. Wind averaged above normal.

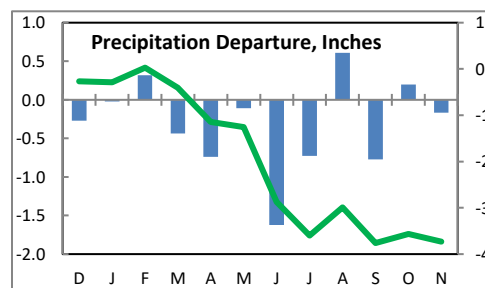
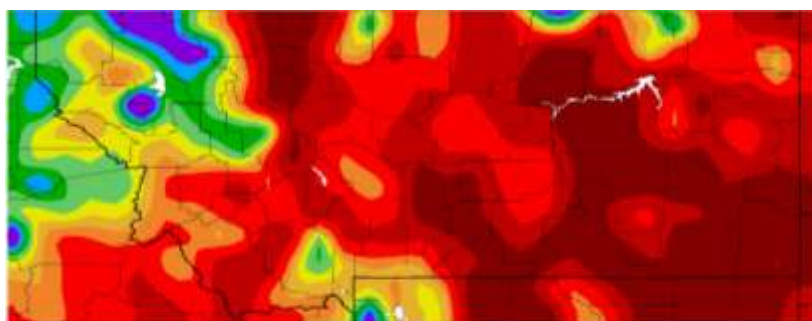
November temperature anomalies ranged from 2.4°F above normal at Glendive to 8.8°F above normal at Jordan. The map below shows the variation in departures. The warmest average temperatures were in south central. The warmest average of 44.5°F was at Cascade and Yellowtail Dam (Big Horn), while the coolest was 24.1°F at Yellow Mule (Gallatin). The highest temperature was 74°F at Jordan (Garfield) on the 4<sup>th</sup>. The coldest was -8°F at Dagmar (Sheridan) on the 24<sup>th</sup>. This range of 82°F is well below the normal range of 97°F for November. This is the smallest range in statewide temperatures in November since 1949. The statewide temperature average of 37.3°F was 6.3°F above normal and the 15<sup>th</sup> warmest of record. It was the warmest since 2016. The red line on the graph shows the cumulative 12-month departure from normal, which was 2.3°F above normal. See the state summary and temperature tables below for more details.



**Temperature departure from normal (HPRCC)**

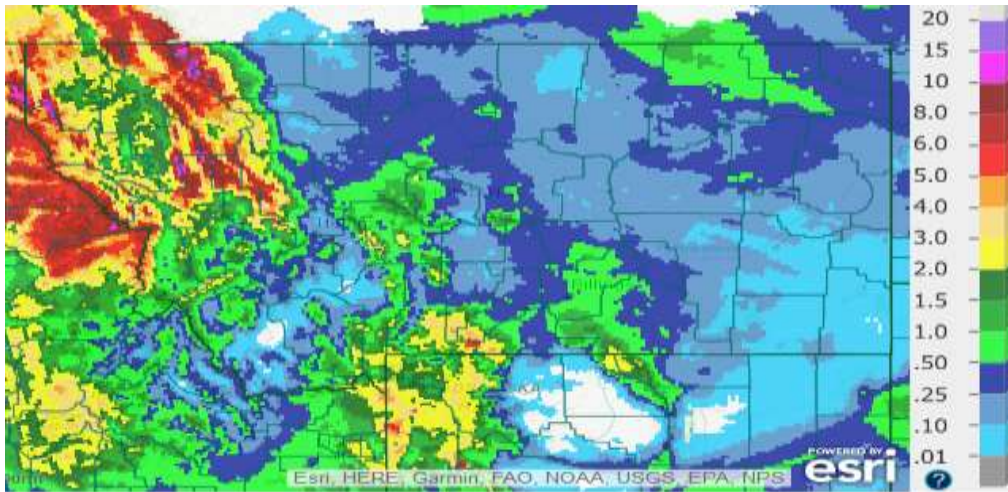


Precipitation was heaviest over mountains of northwest and western Montana due to a series of atmospheric river events during the month. Much of central and northeast Montana received below normal precipitation. The highest amount (14.10-inches) fell at Flattop Mountain SNOTEL (Lincoln), with 8.68-inches falling at Goat Haunt (Glacier) and 5.33-inches at Noxon (Sanders). The month's statewide composite of 0.66" was 0.16" below normal. This ranks as the 53<sup>rd</sup> driest November of record for Montana. The green line on the precipitation graph (right) shows the cumulative 12-month departure from normal, which is now 3.73" below normal. Snowfall averaged 2.2-in, which was 5.8-in above normal. This is also 5.8-in below normal for the snowfall season.



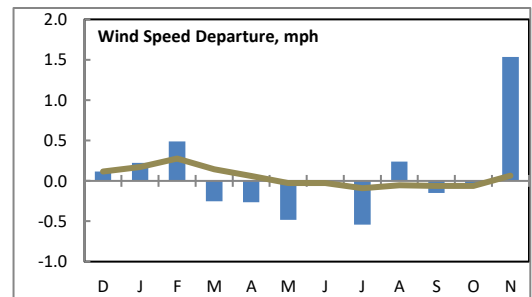
**Precipitation percent of normal (gauge only)**



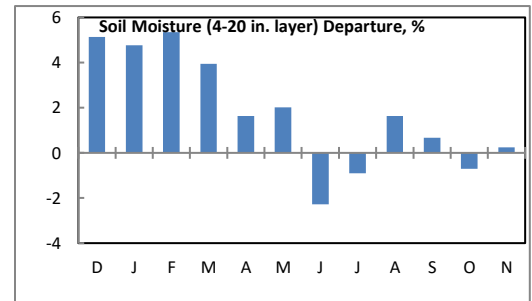


Total precipitation (inches) from radar and gauges for November 2021.

Wind speed averages were above normal. As an average, the state's winds ranked as the 14<sup>th</sup> windiest for November, with an average speed of 10.5-mph, which was 1.5-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 normal.



Below normal precipitation and warm and windy conditions continued to keep soil moisture values below normal. The average statewide values for November are 12<sup>th</sup> lowest (since 1995).



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

November was a month with typical warm and cool periods, but the warm periods were very warm, and the cool periods somewhat mild. The strong westerly flow aloft kept precipitation falling over western mountains, but dried as it passed over the continental divide. There were five days on which high temperatures were more than 70°F somewhere in the state. One of the periods with heavier precipitation in western Montana was from the 12<sup>th</sup>-15<sup>th</sup>. Some points in the northern Rockies received over five-inches of precipitation. Meanwhile, very strong winds and mild temperatures were experienced along and east of the divide. Deep Creek (Glacier) recorded their highest gust of record on the 14<sup>th</sup>, reaching 117-mph. Nearby Two Medicine also set an all-time peak gust record with a speed of 96-mph. Many locations in the state set new all-time November peak gust records from the 13<sup>th</sup>-16<sup>th</sup>. A table below summarizes. Another round of heavier precipitation occurred on the 23<sup>rd</sup>-24<sup>th</sup>, when a cold front moved through the state. This brought the first measurable snowfall to many parts of central Montana. With more than one-inch of snow on the ground on the 24<sup>th</sup>, this was the latest for one-inch or more snow cover at Great Falls since 2004, and 1999 at Helena.

The highest daily temperatures in November occurred on ten days at Jordan, while Dagmar had the state's lowest temperature on 6 days. For the year through November, 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 120 days and coldest was in the southwest division on 172 days.

### All-time gusts records at airports set in November

Date	Location	Gust	Record type	Previous record
Nov 15	Kalispell	63-mph	all-time November	60 mph in 1958
	Missoula	68-mph	all-time November	59 mph in 1978
Nov 16	Jordan	76-mph	all-time November	61 mph in 2019
	Sidney	58-mph	all-time November	57 mph in 2015
	Wolf Point	67-mph	all-time November	61 mph in 2007

### Calendar Year-to-date

The calendar year has produced a composite temperature average of 47.3°F, which was 2.0°F above normal. This is the warmest such period since 2016. Precipitation totaled 10.72-inches, which was 3.46" below normal and driest since 1988. This has been the 12<sup>th</sup> driest such period. Statewide winds averaged 8.9-mph, which is slightly above normal. This was the 26<sup>th</sup> lowest average of record.

### Past 12 months precipitation

Persistently warm temperatures during June and July caused the warmest June and July combined in 33 years. The growing season temperatures averaged 2.0°F above normal, and was the 1988. Precipitation has been variable during the past 12 months. In June, some areas of the northeast received heavy rain, then were dry the rest of the time. Other areas were dry in June and July, then received above normal rain in August. The fall was also dry over central and northeastern portions of the state. For the past 12 months, Butte, Glasgow and Lewistown have recorded their driest 12-month period, when compared with a calendar year. Many other spots across the state have ranked in the top ten driest.

Following are summaries of periods ending with November where the location ranks in the top ten driest years, its rank, driest since period and the normal precipitation for the period. Glasgow has had 387-days with 6-inches or less accumulated precipitation. This is their 3<sup>rd</sup> longest such period and longest since the record of 402-days starting in May 1979.

### Dec 2021-Nov 2022

Area/Location	Amount	Rank from driest	Driest since	Normal
State	11.20"	21 <sup>st</sup> driest	1988	14.98"
Baker	8.41"	4 <sup>nd</sup> driest	2002	14.60"
Bozeman	10.39"	9 <sup>th</sup> driest	2020	13.43"
Butte	6.24"	1 <sup>st</sup> driest	1935	12.76"
Cut Bank	7.20"	10 <sup>th</sup> driest	2006	10.77"
Glasgow	6.21"	1 <sup>st</sup> driest	2017	13.44"
Havre	7.01"	8 <sup>th</sup> driest	2001	11.82"
Helena	7.99"	10 <sup>th</sup> driest	1994	11.40"
Lewistown	10.55"	1 <sup>st</sup> driest	1956	17.17"
Sidney	8.63"	7 <sup>th</sup> driest	2020	14.98"
Wolf Point	8.77"	8 <sup>th</sup> driest	2020	12.21"

### Precipitation/convection

Severe convective weather occurred on zero days in November, which is normal.

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

Location	Nov 2021 PM2.5 Average	Rank	November Average	Records began
Billings	6.1 µg/m <sup>3</sup>	8 <sup>th</sup> lowest	6.6 µg/m <sup>3</sup>	1999
Great Falls	3.7 µg/m <sup>3</sup>	2 <sup>nd</sup> lowest	6.2 µg/m <sup>3</sup>	2000
Missoula	4.7 µg/m <sup>3</sup>	1 <sup>st</sup> lowest	12.0 µg/m <sup>3</sup>	1999
Sidney	3.0 µg/m <sup>3</sup>	1 <sup>st</sup> lowest	4.7 µg/m <sup>3</sup>	2008

**November information:**

<b>High Temperature</b>	74°F at Jordan (Garfield) (4 <sup>th</sup> )	<b>Greatest Precip</b>	8.68" at Goat Haunt (Glacier)
<b>Low Temperature</b>	-8°F at Dagmar (Sheridan) (24 <sup>th</sup> )		14.10" at Flattop Mountain SNOTEL (Flathead)
<b>Warmest Ave Temp</b>	44.5°F at Cascade and Yellowtail Dam (Big Horn)	<b>Peak Wind Gust</b>	96 mph near East Glacier (Glacier) (14 <sup>th</sup> )
<b>Coollest Ave Temp</b>	24.1°F at Yellow Mule (Gallatin)		117 mph at Deep Creek RAWS (Glacier) (148 <sup>th</sup> )
<b>Range of Temp departures</b>	+2.4°F at Mullan Pass to +8.8°F at Jordan	<b>Highest Ave Wind</b>	28.5 mph at Deep Creek RAWS 22.6 mph at Livingston
<b>21 city mean monthly Temperature/Nrml</b>	46.5/43.6F normal. 52 <sup>nd</sup> warmest of record (since 1880). 63 <sup>rd</sup> percentile.	<b>20 city mean monthly wind speed/Nrml</b>	10.5 mph/9.0 mph; 35 <sup>th</sup> calmest of record (since 1936). 84 <sup>th</sup> percentile.
<b>22 city mean monthly precipitation/Nrml</b>	0.66"/0.82" – 80% of normal. 53 <sup>rd</sup> driest of record (since 1880). 37 <sup>th</sup> percentile.		

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

Location	Nov	% of Norm	Rank	Pcntl	Oct 1 - Nov	% of norm	Rank	Pcntl	Years
Baker	0.08	16%	86	11	1.84	108%	25	75	97
Billings	0.34	57%	81	66	1.79	91%	48	61	121
Belgrade	0.22	30%	79	93	1.97	107%	33	38	85
Butte	0.28	47%	92	72	0.80	56%	84	65	128
Cut Bank	0.10	24%	85	74	0.73	74%	58	50	115
Dillon	0.24	46%	90	74	1.45	99%	51	41	122
Glasgow	0.19	39%	60	46	0.45	32%	101	81	124
Great Falls	0.30	44%	90	69	0.40	23%	125	96	130
Havre	0.42	86%	70	49	1.08	87%	69	48	142
Helena	0.20	34%	114	80	0.60	44%	122	85	143
Jordan	0.07	14%	86	86	0.64	41%	74	75	98
Kalispell	1.63	121%	38	29	3.12	116%	35	27	128
Lewistown	0.45	67%	85	67	1.02	53%	105	83	126
Livingston	0.31	50%	87	72	1.57	79%	80	67	119
Miles City	0.02	6%	140	97	2.43	187%	17	11	145
Missoula	1.02	86%	61	42	2.07	88%	63	44	142
Mullan Pass	6.10	121%	28	33	11.79	134%	14	16	84
Wolf Point	0.13	50%	43	54	1.00	95%	37	46	79
Glendive	0.30	67%	73	56	4.06	267%	3	2	126
Sidney	0.27	50%	52	62	1.98	121%	21	25	82
BZN MSU	0.61	51%	108	75	3.11	105%	45	31	145
W Yellowst	1.50	78%	59	50	2.92	80%	64	56	113

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	Nov	Normal	rank.eq	Pcntl	Oct 1 -				Years
					Nov	Normal	rank.eq	Pcntl	
Baker	36.4	30.0	15	86	41.8	36.7	12	90	110
Billings	43.8	36.2	6	95	47.7	42.1	6	96	124
Belgrade	37.8	30.0	6	93	42.1	36.7	4	97	87
Butte	35.6	27.8	13	90	39.6	34.2	17	87	128
Cut Bank	36.7	30.6	17	85	40.1	36.3	19	84	113
Dillon	37.3	29.9	8	38	40.7	36.1	12	86	78
Glasgow	36.9	30.2	10	22	43.5	37.7	3	98	127
Great Falls	40.5	33.6	20	84	44.3	39.2	22	83	125
Havre	36.9	30.9	18	87	42.1	37.5	14	91	142
Helena	39.7	32.8	10	92	44.9	39.2	2	99	142
Jordan	39.8	31.0	6	94	44.6	37.8	5	96	103
Kalispell	36.9	31.4	54	91	40.5	36.5	60	52	123
Lewistown	39.1	32.1	10	91	43.0	37.8	10	93	123
Livingston	42.2	35.1	8	93	45.4	40.3	12	91	119
Miles City	39.0	32.7	17	88	44.2	39.6	14	91	141
Missoula	37.8	32.3	11	90	42.7	38.2	10	93	130
Mullan Pass	30.0	27.7	10	78	34.3	32.5	13	80	60
Wolf Point	34.5	28.9	13	83	41.2	36.7	9	89	77
Glendive	36.0	33.3	33	74	41.9	40.5	36	74	126
Sidney	34.4	31.0	20	79	41.2	38.4	19	81	99
W Yellowst	31.3	22.9	3	97	34.2	29.5	12	98	115

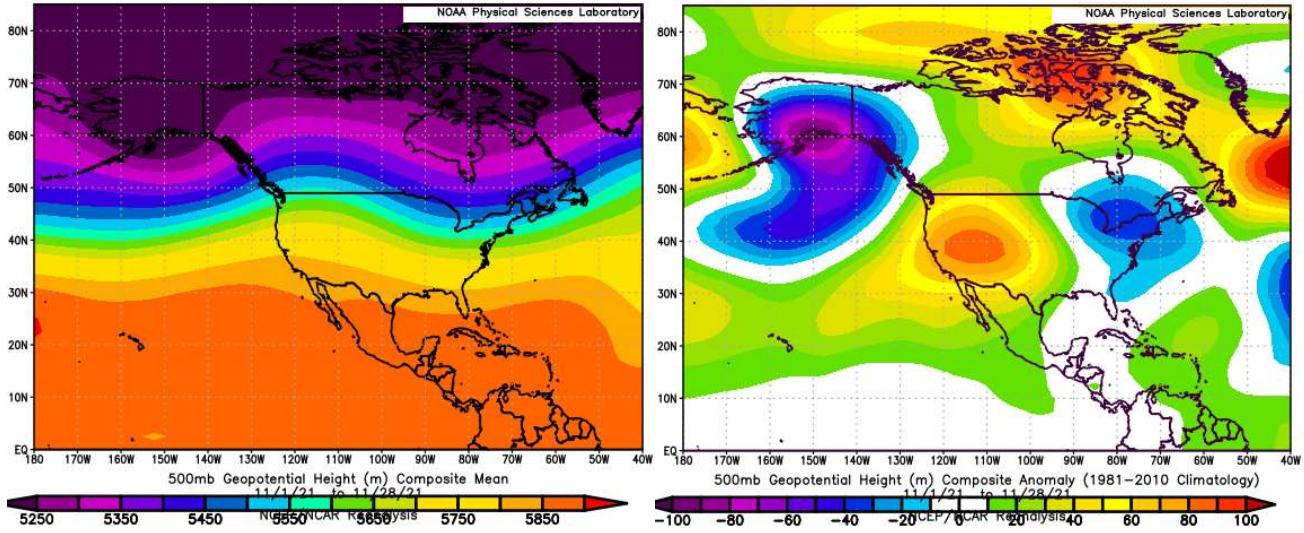
Rankings and Percentiles are 1=warmest, higher numbers=colder.

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

Location	Nov	Normal	Rank	Pcntl	Oct 1 -				Years
					Nov	Normal	Rank	Pcntl	
Baker	10.6	4.9	11	52	10.8	5.3	11	57	24
Billings	12.9	12.1	29	65	11.6	11.4	47	47	87
Belgrade	6.1	4.9	19	73	5.9	5.3	18	77	74
Butte	5.8	5.0	25	57	6.0	5.5	24	60	59
Cut Bank	20.0	15.0	4	95	16.6	14.3	8	91	78
Dillon	11.0	9.4	16	77	10.4	9.1	17	76	68
Glasgow	10.9	9.7	13	82	10.6	10.1	27	66	77
Great Falls	16.8	13.6	4	94	14.4	12.7	16	82	84
Havre	11.4	10.3	19	85	10.6	10.0	25	82	133
Helena	6.9	6.0	48	66	6.5	6.2	77	46	142
Jordan	9.2	7.5	2	93	8.7	7.9	5	89	38
Kalispell	5.0	4.2	121	55	5.1	4.4	118	4	123
Lewistown	12.9	10.4	10	87	11.0	10.0	22	73	78
Livingston	22.6	18.6	2	96	18.9	16.8	7	89	57
Miles City	10.1	9.6	28	78	9.8	9.9	41	69	131
Missoula	3.9	4.0	64	25	4.6	4.1	53	40	87
Mullan Pass	6.1	6.1	15	50	5.4	5.9	26	17	31
Wolf Point	7.4	7.2	13	30	7.4	7.6	16	35	24
Glendive	10.9	9.8	4	83	10.5	10.0	10	90	30
Sidney	9.9	8.9	5	85	9.6	8.9	5	88	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://noaa.esrl.noaa.gov)).



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=tfx>. 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.