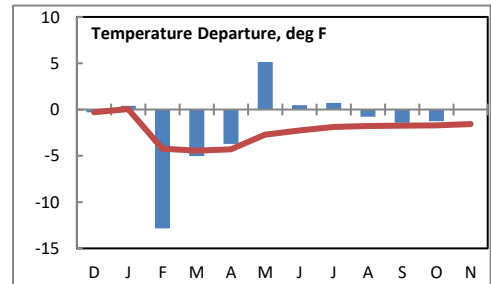
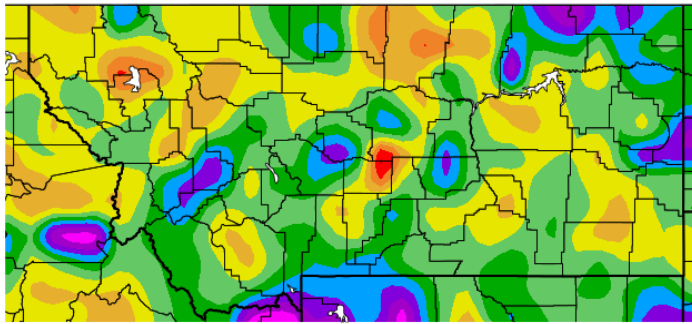


Montana Weather/Precipitation Summary

November 2018 NOAA's National Weather Service Great Falls Montana

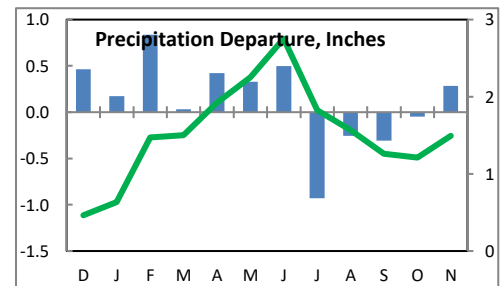
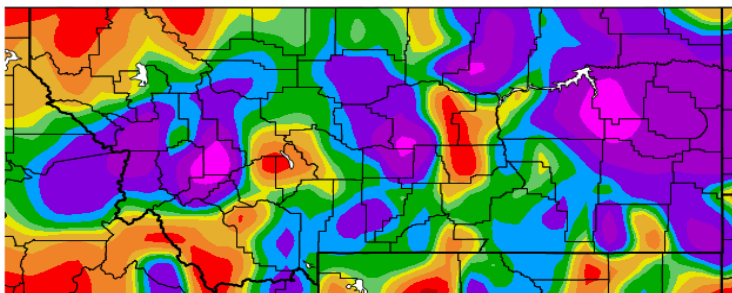
In November, upper level flow was from the northwest (Fig. 1). For Montana, temperatures averaged from a range of below to above normal in a fairly random pattern. Precipitation amounts were mostly above normal, with the largest are of below normal over the northwest. Winds averaged below normal most areas.

November temperature anomalies ranged from almost four degrees below normal over scattered sections of the state from the northeast through southwest...to about three degrees above normal over northern portions. The map below shows the variation. The warmest average temperatures were in the south central portion – near Billings. The warmest, Yellowtail Dam had an average temperature of 36.8°F, while the coolest was 18.5°F at West Yellowstone. The highest temperature was 66°F at Little Bighorn on the 14th. The coldest temperature was -20°F at Elk Park on the 12th. The state wide temperature average of 30.6° was just slightly below normal and coolest since 2015. The red line on the graph shows the cumulative 12-month departure from normal, which is 1.6°F below normal. There have been four consecutive months with below normal averages. See the state summary and temperature tables below for more details.

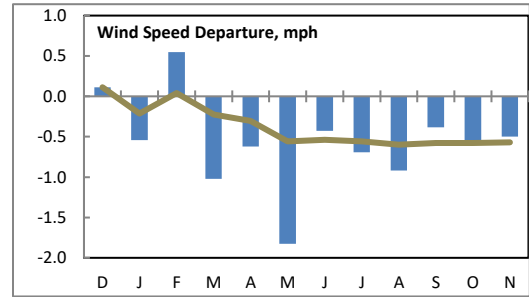


Precipitation was heaviest along the western border of Montana. The highest amount (12.30-inches) fell at North Fork Jocko (Missoula). The highest amount elsewhere was 4.53-inches at Libby 28SSW. The statewide composite average of 1.15-inches was 0.28" above normal. The green line on the precipitation graph shows the cumulative 12-month departure from normal, which is 1.49-inches above normal. See state summary and precipitation tables below for more details. The heaviest monthly snow amounts were 47-inches at Mystic Lake and 29.7-inches at Hebgen Dam.

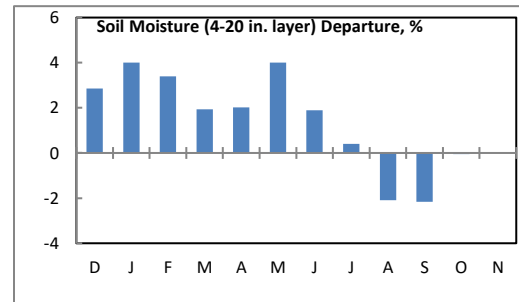
Percent of Normal Precipitation (%)
11/1/2018 – 11/30/2018



The winds averaged weaker than normal over the state. Statewide, November ranked as the 21st calmest November of record, with an average speed of 8.5-mph. The strongest averages were along the northern Rocky Mountain Front. The composite statewide average was 0.6-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. Only two of the last 12 months have had wind averages above normal.



Statewide soil moisture averages are the 11th wettest of record, and at the average for November. The graph to the right shows the trends in departures from normal over the past 12 months.



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

After starting out with temperatures above normal, there was a colder period with snow from the 5th through 18th. Both the warmest and coldest temperatures in the state occurred during this period. After this point, temperatures were generally above normal with dry and windier conditions to close out the month.

Precipitation/convection

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

Fall summary

For the autumn period (Sep-Nov), state temperatures averaged 42.6°F, or 0.9°F below normal. This was the coolest such period since 2002 and the 29th coolest of record. During this period, statewide precipitation averaged 3.04 inches, or only 0.07” below normal. This was the driest fall since 2012 and the 63rd driest of record. Snowfall of 10.2” was the 68th highest of record and about one-inch below normal. Winds averaged 8.1-mph, 0.5-mph below normal. This was the calmest fall on a statewide average since 2013 and the 11th calmest of record.

November information:

High Temperature	66°F at Little Bighorn (Big Horn) (14 th)	Greatest Precip	4.53" at Libby 28 SSW
Low Temperature	-20°F at Elk Park (12 th)		12.30" at North Fork Jocko SNOTEL
Warmest Ave Temp	36.8°F at Yellowtail Dam	Peak Wind Gust	67 mph at Two Medicine (14 th)
Coolest Ave Temp	18.5°F at West Yellowstone		87 mph at Deep Creek (2 nd)
Range of Temp departures	-3.7°F at West Yellowstone to +1.8°F at Havre	Highest Ave Wind	18.3 mph at Livingston 22.8 mph at Deep Creek RAWS
21 city mean monthly Temperature/Normal	30.6/30.6F normal. 56 th warmest of record (since 1880). 41 st percentile.	20 city mean monthly wind speed/Normal	8.5 mph/9.0 mph; 21 st calmest of record (since 1936). 27 th percentile.
22 city mean monthly precipitation/Normal	1.15"/0.87" – 132% of normal. 39 th wettest of record (since 1880). 71 st percentile.	20 city mean monthly snowfall/Normal	7.9"/0.1" 60 th percentile.

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

Location	Nov	% of Norm	Rank	Pcntl	Oct 1 – Nov 30	% of norm	Rank	Pcntl	Years
Baker	1.20	229%	2	91	1.99	115%	6	74	21
Billings	0.46	61%	70	58	1.16	58%	78	66	118
Belgrade	1.00	133%	21	25	2.09	113%	30	36	82
Butte	0.82	137%	33	26	1.30	94%	57	45	125
Cut Bank	0.65	181%	18	15	1.50	188%	17	14	112
Dillon	0.29	74%	46	58	0.87	81%	39	49	79
Glasgow	0.77	193%	16	12	1.89	164%	18	14	121
Great Falls	0.65	110%	57	44	1.35	93%	71	56	127
Havre	0.49	114%	60	43	0.79	78%	88	63	139
Helena	0.22	45%	110	78	0.75	64%	102	73	140
Jordan	0.73	187%	9	38	1.31	102%	12	52	22
Kalispell	1.03	72%	75	60	2.60	107%	50	40	125
Lewistown	1.36	192%	13	10	2.12	115%	44	35	123
Livingston	1.06	180%	28	23	2.44	132%	34	29	116
Miles City	0.79	203%	26	18	1.43	109%	60	42	142
Missoula	2.57	242%	6	4	3.85	196%	7	4	139
Mullan Pass	5.05	104%	36	44	8.98	114%	34	42	79
Wolf Point	0.88	226%	1	1	1.81	151%	2	5	21
Glendive	0.97	216%	14	10	1.47	97%	49	40	122
Sidney	1.24	225%	7	8	1.69	102%	26	32	79
BZN MSU	1.69	142%	26	18	3.75	129%	22	15	142
W Yellowston	1.43	69%	62	56	2.52	70%	70	64	108

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	Nov	Normal	Rank	Pcntl	Oct 1 – Nov 30	Normal	Rank	Pcntl	Years
Baker	29.9	29.7	68	68	35.7	36.5	89	83	107
Billings	35.8	35.8	44	51	41.0	42.0	60	70	85
Belgrade	30.3	29.7	41	48	36.6	36.5	49	58	84
Butte	27.9	27.7	75	60	34.5	34.3	77	61	125
Cut Bank	31.0	30.3	52	47	35.9	36.6	69	62	110
Dillon	30.9	30.5	46	61	36.5	37.0	57	76	75
Glasgow	29.5	29.3	59	48	36.8	37.0	68	54	124
Great Falls	33.6	33.4	76	60	38.9	39.3	93	76	122
Havre	32.0	30.2	57	41	37.7	37.3	79	57	139
Helena	33.2	32.5	65	46	39.1	39.1	71	51	139
Jordan	31.1	30.1	57	61	36.7	37.2	77	77	100
Kalispell	32.1	31.8	52	43	36.7	37.0	59	49	120
Lewistown	30.3	32.0	80	67	36.5	37.9	94	78	120
Livingston	34.8	34.0	57	49	39.8	39.6	83	71	116
Miles City	32.0	32.0	77	55	37.9	39.3	114	82	138
Missoula	32.1	33.2	75	59	38.1	39.2	81	63	127
Mullan Pass	28.9	27.2	13	30	33.8	32.4	13	29	42
Wolf Point	28.2	27.7	13	60	35.2	35.7	14	65	21
Glendive	33.1	33.0	58	47	39.4	40.4	80	65	123
Sidney	27.1	31.6	63	65	34.2	39.3	87	91	96
W Yellowst	18.5	20.9	70	74	27.6	28.3	76	79	96

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

Location	Nov	Normal	Rank	Pcntl	Oct 1 – Nov 30	Normal	Rank	Pcntl	Years
Baker	10.6	10.8	9	50	10.4	10.6	12	55	21
Billings	12.9	11.6	23	27	11.6	11.0	38	45	84
Belgrade	4.2	5.2	45	85	4.5	5.4	37	69	53
Butte	3.8	5.6	57	104	5.8	6.0	33	59	55
Cut Bank	14.6	14.1	28	36	13.3	13.5	42	55	75
Dillon	9.4	9.2	34	52	8.7	9.0	44	67	65
Glasgow	9.4	9.6	20	26	9.7	10.0	47	63	74
Great Falls	13.4	14.2	53	67	11.9	13.3	67	84	80
Havre	10.6	9.3	25	19	10.3	9.1	24	18	130
Helena	5.2	6.4	125	90	5.4	6.5	133	96	139
Jordan	7.5	7.1	14	38	7.5	7.5	23	65	35
Kalispell	3.7	4.8	117	97	3.9	4.7	114	95	120
Lewistown	8.9	10.1	61	81	8.6	9.7	61	81	75
Livingston	18.3	18.3	29	53	16.0	16.0	34	62	54
Miles City	9.5	9.6	37	28	9.2	9.8	56	43	128
Missoula	2.9	4.6	78	93	3.2	4.7	80	95	84
Mullan Pass	4.9	6.2	29	97	4.8	6.1	28	100	28
Wolf Point	7.5	7.3	10	75	7.6	7.5	9	40	21
Glendive	9.2	10.2	24	89	9.2	10.1	24	89	27
Sidney	8.2	9.1	23	76	8.40	9.0	25	81	31
W Yellowst	4.8	6.6			4.85	6.1			5

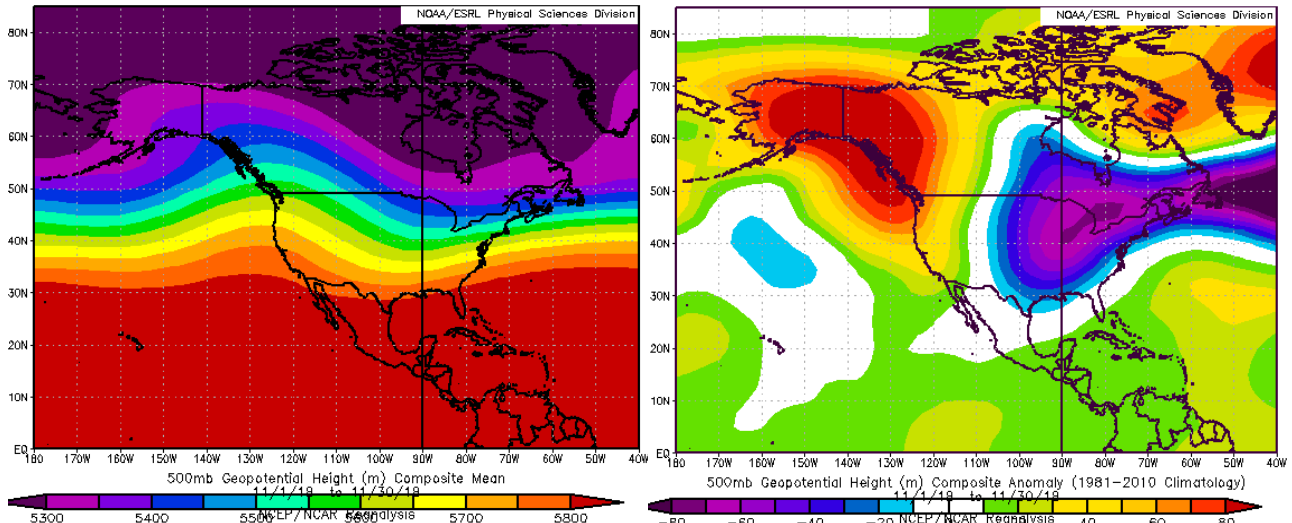


Figure 1. Mean flow at 500 millibars (~18,000 ft) for this month (upper left) and departure from normal (upper right).

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.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 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.