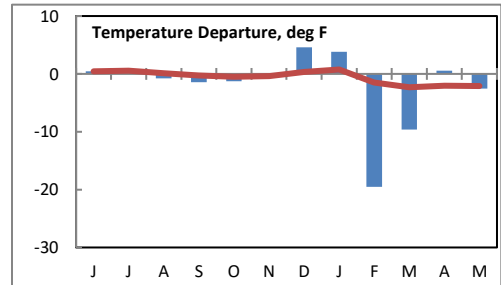
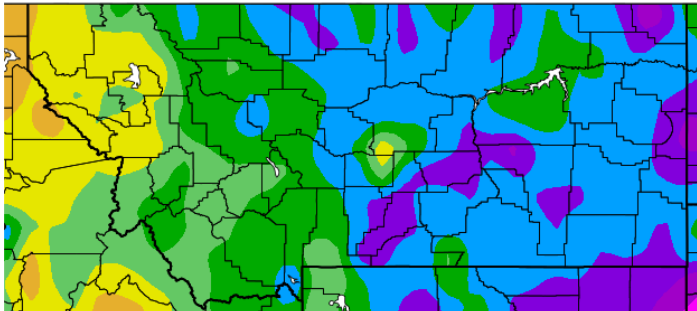


Montana Weather/Precipitation Summary

May 2019 NOAA's National Weather Service Great Falls Montana

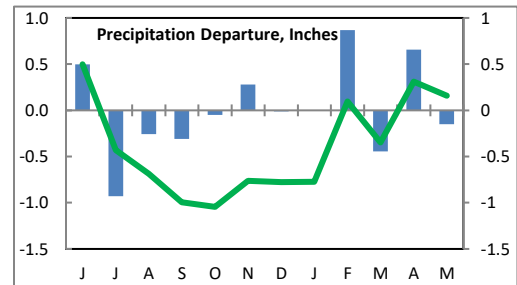
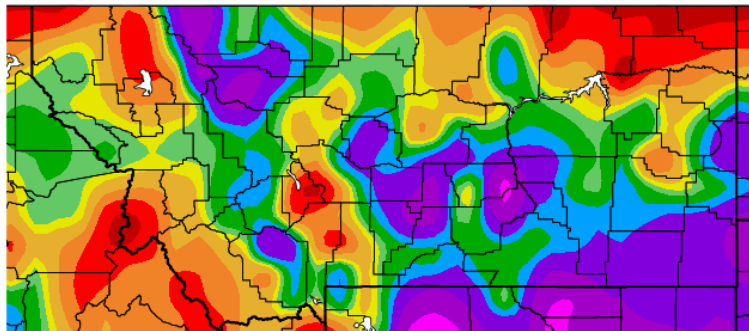
May's average temperatures were below normal over eastern Montana, with slightly above normal values in the west. Precipitation was above normal over much of central and southeast portions, with below normal elsewhere. The upper level flow was generally from the northwest (Fig. 1). This maintained the below average temperatures east and above west. Wind speeds generally averaged below normal.

May temperature anomalies ranged from 6.1°F below normal at Baker to 2.1°F above normal at Mullan Pass. The map below shows the variation. The warmest average temperatures were in western Montana. The warmest average temperature was at Troy, with an average of 56.8°F, while the coolest was 35.3°F at Placer Basin (Sweet Grass). The highest temperature was 88°F at Philipsburg on the 31st. The coldest temperature was 0°F at Placer Basin and Newlan Creek (Meagher) on the 1st. This absolute range of 88°F is average for May (May's record is 108°F). The statewide temperature average of 49.5°F was 2.6°F below normal and coolest since 2011. The red line on the graph shows the cumulative 12-month departure from normal, which is 2.1°F below normal. See the state summary and temperature tables below for more details.



Temperature departure from normal

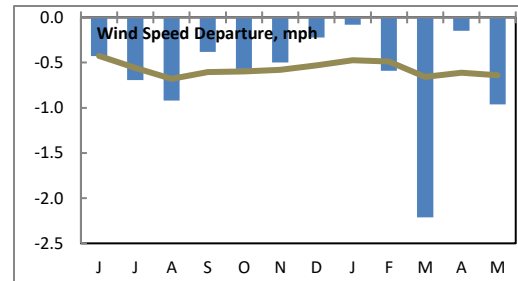
Precipitation was heaviest along the Rocky Mountain Front. The highest amount (11.43-inches) fell southwest of Augusta. The statewide composite of 2.15-inches was 0.15" below normal. The green line on the precipitation graph shows the cumulative 12-month departure from normal, which is 0.16" above normal. See state summary and precipitation tables below for more details. The heaviest monthly snow amount was 24.0-inches at Mystic Lake. The statewide average snowfall was 0.6".



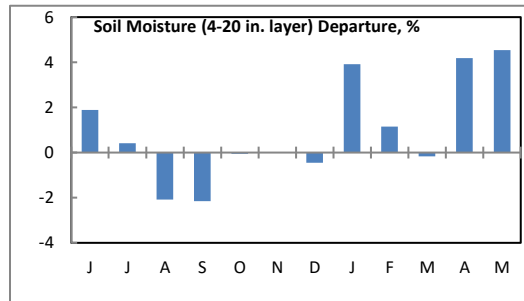
Precipitation percentage of normal

Wind speed averages were variable, but generally averaged below normal. Statewide, the month ranked as the 4th calmest May, with an average speed of 8.6-mph. The strongest averages were

in southeast Montana, the southwest and portions of the Hi-line. The composite statewide average was 1.0-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 0.6-mph below normal. All months since January 2018 have had below average wind speeds. Helena's peak gust of 35 mph was their lowest monthly for May since 1995.



Statewide soil moisture averages are above normal for May (right). This data is from NRCS SCAN and SNOTEL, NOAA CRN and MT Mesonet stations. For May, this was the wettest of record, the second wettest month of record and the wettest since June 2011. The record began in 1995.



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

Snow, which started on April 30, continued over southeastern portions of Montana on the 1st. Up to 8-inches fell at Luthur (Carbon), while cold air spilled into the northern and central portions. Newlan Creek and Placer Basin fell to 0°F. This was the coldest temperature in the state since 2002. Record lows were set over portions of central Montana. Snow again fell on the 5th and 6th. Four inches were observed at Choteau, while six-inches fell at Ridge (Carter). Another storm brought snow to portions of the state on the 8th. Nye reported 7-inches, while cold air moved in again behind the snow. Placer Basin fell to 11°F on the 9th, while Gold Butte saw 18°F. Record lows for the date were wet at Havre and Miles City. Warmer air arrived on the 11th as temperatures reached the 70s and 80s. Thunderstorms on the 13th produced gusts to 61 mph at Miles City, the highest for the month. This was also the lowest May wind gust since 2002. Thunderstorms on the 14th produced a gust to 58 mph at Dillon and Livingston. Hail to 1.75-inches in diameter fell in the Roundup area.

Snow returned with colder temperatures on the 17th. When the storm was over, 11-inches fell at Lodge Pole (Blaine), 7-inches at Carlyle (Wibaux), 6-inches at Ekalaka, and 5-inches at Grass Range. Some points stayed in the 30s all day, setting new cool maximum temperature records for the day. While not widespread, snow fell in around Red Lodge on the 22nd, with up to 20-inches reported.

Warmer air again brought thunderstorms. On the 26th, severe thunderstorms produced 2-inch hail at Biddle (Powder River), which broke a windshield. Two-inch hail also fell at Alzada. Heavy rain fell over the Memorial Day weekend. Flooding occurred in the Two Dot (Wheatland) area. Meanwhile, rainfall of up to 7-inches fell over the Rocky Mountain Front from west of Augusta to west of Dupuyer. This caused roads to be washed-out and closed and several communities to experience flooding along the Elk Creek and Sun River. Smoke from Alberta wildfires filtered into the state by the 29th. From then to the end of the month, hazy skies dominated, along with scattered thunderstorms. The warmest temperatures of the month were observed on the 30th, when Glasgow and Plentywood reached 87°F.

Precipitation/convection

Severe convective weather occurred on 3 days in May, which is normal.

Spring season (Mar-May)

The spring seasonal average temperature was 38.8°F, 4.1°F below normal. This was the 14th coolest spring and coldest since 2011.

Composite spring precipitation totaled 2.15-inches, 0.15" above normal. The spring ranked 62nd wettest. The snowfall composite average was 0.6", a little more than one-inch below normal.

Winds averaged 8.5-mph, which is 1.1-mph below normal. This was the second calmest spring period of record. Last year had slightly lower winds.

Water year (Oct-May)

For the water year, the temperature average was 30.4°F, 3.0°F below normal. The cold February, March and May kept the average down, as both December and January had above average temperatures. This was the 16th coolest such season, and the coolest in 40 years - since 1979.

Composite precipitation totaled 9.98-inches, 1.16" above normal. This was the 27th wettest of record. Last water year was even wetter, ranking 2nd wettest. Although April's snowfall was concentrated in the higher terrain, heavy snow has fallen in most areas over the water year. The composite snowfall was 60.9-inches, ranking 32nd highest and more than 5-inches above normal. At this point last winter, it was the 3rd snowiest with 83.7-inches.

Although December was windy, February, March and May had very light winds so the season's average of 8.5-mph is the 2nd calmest of record and calmest such period since 2010.

May information:

High Temperature	88°F at Philipsburg (31 st)	Greatest Precip	11.43" near Augusta
Low Temperature	0°F at Newlan Ck & Placer Basin SNOTEL (1 st)		10.9" at Dupuyer Creek SNOTEL
Warmest Ave Temp	56.8°F at Troy	Peak Wind Gust	61 mph at Miles City (13 th)
Coolest Ave Temp	35.3°F at Placer Basin		
Range of Temp departures	-6.1°F at Baker to +3.1 at Mullan Pass	Highest Ave Wind	12.4 mph at Livingston 12.1 mph at Ekalaka
21 city mean monthly Temperature/Normal	49.5/52.0F normal. 18 th coldest of record (since 1880). 14 th percentile.	20 city mean monthly wind speed/Normal	8.6 mph/9.6 mph; 4 th calmest of record (since 1936). 6 th percentile.
22 city mean monthly precipitation/Normal	2.15"/2.30" - 93% of normal. 62 nd wettest of record (since 1880). 55 th percentile.		

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

Location	May	% of Norm	Rank	Pcntl	Oct 1 - May	% of norm	Rank	Pcntl	Years
Baker	3.18	202%			7.74	139%			21
Billings	2.41	97%	37	30	9.56	102%	31	26	118
Belgrade	1.79	75%	53	63	8.54	105%	30	36	82
Butte	2.53	122%	30	23	7.86	116%	39	31	124
Cut Bank	2.15	110%	38	33	8.04	173%	6	5	112
Dillon	1.49	77%	48	59	5.30	99%	32	40	79
Glasgow	1.20	63%	63	51	6.55	122%	38	31	119
Great Falls	2.19	90%	60	46	9.91	128%	28	21	127
Havre	1.68	97%	56	40	5.49	107%	79	57	139
Helena	2.44	130%	30	21	8.38	148%	24	17	140
Jordan	2.45	107%			8.44	142%			21
Kalispell	0.88	44%	103	82	10.00	94%	66	52	125
Lewistown	2.42	85%	73	59	8.26	94%	74	59	124
Livingston	2.72	102%	50	42	11.69	135%	15	12	114
Miles City	2.85	131%	36	25	7.67	122%	49	34	142
Missoula	1.80	89%	56	39	12.51	143%	13	9	138
Mullan Pass	2.78	104%	31	38	31.26	100%	41	52	78
Wolf Point	1.37	77%			4.90	94%			21
Glendive	2.55	114%	36	28	7.83	117%	26	21	119
Sidney	2.07	102%	30	37	6.61	100%	37	46	79
BZN-MSU	1.61	51%	121	84	14.29	116%	16	11	142
W Yellowstone	2.72	122%	26	24	18.65	123%	16	16	96

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	May	Normal	Rank	Pcntl	Oct 1 - May	Normal	Rank	Pcntl	Years
Baker	46.8	51.4	107	99	29.2	32.8	94	89	106
Billings	53.4	55.6	63	74	35.1	38.4	74	87	85
Belgrade	49.8	51.4	54	64	29.6	33.3	77	92	84
Butte	47.2	47.6	72	57	28.3	30.7	105	84	125
Cut Bank	47.7	49.9	81	73	29.2	33.0	93	84	110
Dillon	48.4	50.3	58	76	30.2	33.7	73	97	75
Glasgow	52.7	55.1	91	75	29.7	31.9	69	56	123
Great Falls	49.7	51.7	110	87	31.9	35.6	115	94	122
Havre	50.0	54.0	129	92	29.6	33.1	106	76	139
Helena	52.3	54.0	73	52	32.1	35.7	117	84	139
Jordan	49.4	52.7	98	97	30.0	32.9	83	86	96
Kalispell	53.4	51.8	30	24	32.9	34.8	28	23	119
Lewistown	46.6	50.0	107	88	30.2	34.1	108	93	116
Livingston	48.3	50.6	98	84	33.1	36.2	111	97	114
Miles City	50.4	55.9	139	99	31.4	34.9	113	82	137
Missoula	54.6	53.5	38	29	34.1	37.0	102	81	126
Mullan Pass	45.1	42.0	9	20	29.5	29.3	21	49	42
Wolf Point	51.1	54.2			28.4	30.6			21
Glendive	52.0	57.2	118	94	32.2	35.4	83	69	120
Sidney	49.9	58.0	94	98	28.8	34.6	29	30	96
W Yellowstone	39.7	43.7	79	84	23.7	24.6	75	82	92

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

Location	May	Normal	Rank	Pcntl	Oct 1 - May	Normal	Rank	Pcntl	Years
Baker	10.9	12.4			10.9	11.3			21
Billings	10.0	9.9	59	69	11.3	11.3	64	77	83
Belgrade	6.3	6.8	43	79	4.8	5.7	46	85	54
Butte	6.2	8.0	51	91	5.1	6.4	50	91	55
Cut Bank	10.3	12.9	71	93	12.1	13.5	73	95	77
Dillon	10.3	9.3	13	18	8.8	9.5	60	92	65
Glasgow	11.4	11.9	23	30	10.0	10.4	58	78	74
Great Falls	9.8	11.2	65	79	11.4	13.0	82	101	81
Havre	10.3	9.9	35	26	10.4	9.4	31	23	130
Helena	6.9	8.2	136	97	5.6	6.9	139	100	139
Jordan	9.0	9.7	23	65	7.7	8.0	26	74	35
Kalispell	8.1	6.8	17	13	5.4	5.4	108	91	119
Lewistown	9.2	9.4	44	57	9.0	9.8	66	86	77
Livingston	12.2	11.8	31	57	15.4	15.9	44	84	52
Miles City	9.7	11.6	72	56	9.4	10.3	67	52	128
Missoula	6.2	6.8	62	73	4.9	5.3	65	77	84
Mullan Pass	2.4	5.4	30	100	4.5	5.8	28	100	28
Wolf Point	8.8	9.6			8.1	8.2			21
Glendive	9.8	11.6	26	96	9.5	10.5	26	96	27
Sidney	8.9	10.5	26	86	9.1	9.4	20	67	30
W Yellowstone	2.9	6.0			5.3	6.6			5

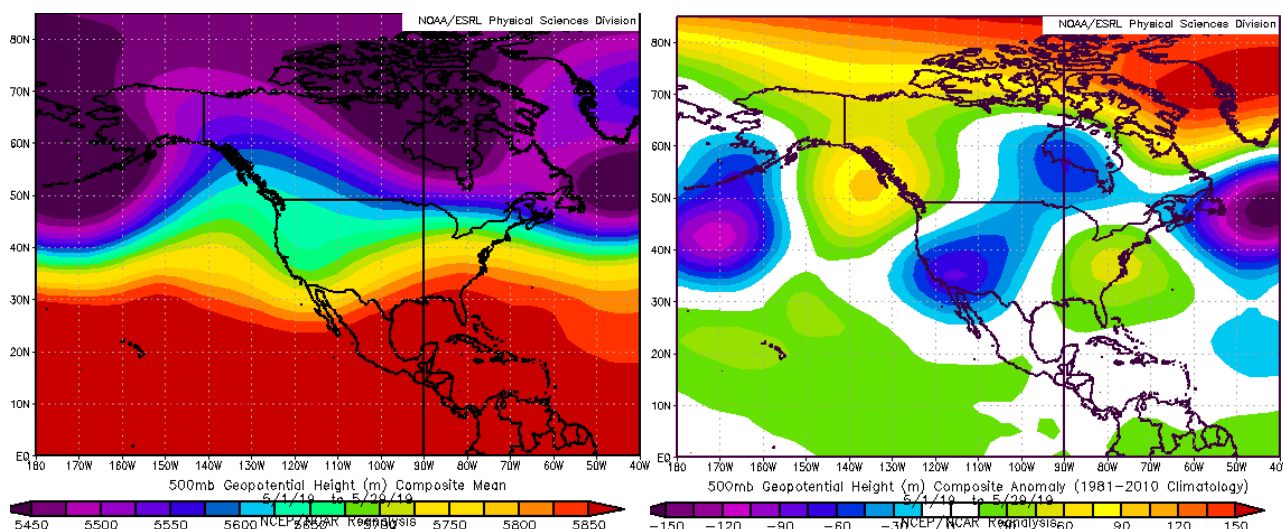


Figure 1. Mean flow at 500 millibars (~18,000 ft) for this month (upper left) and departure from normal (upper right).

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=txf>. 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.