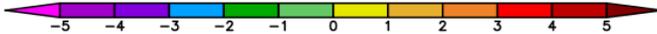
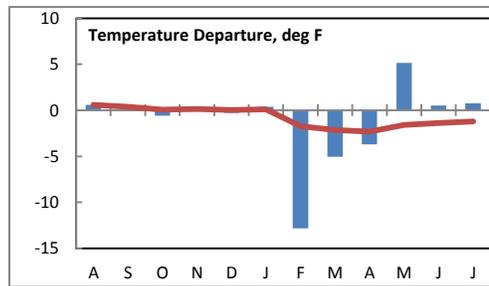
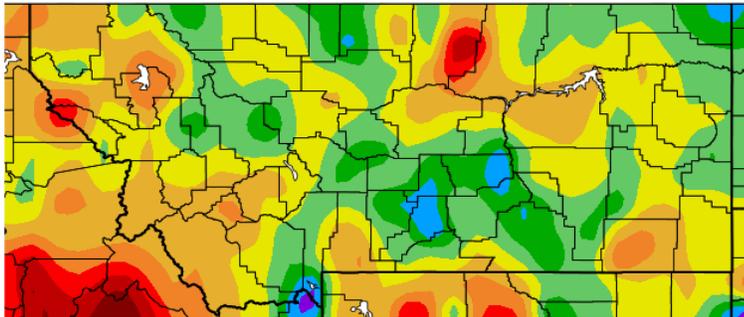


Montana Weather/Precipitation Summary

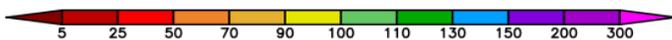
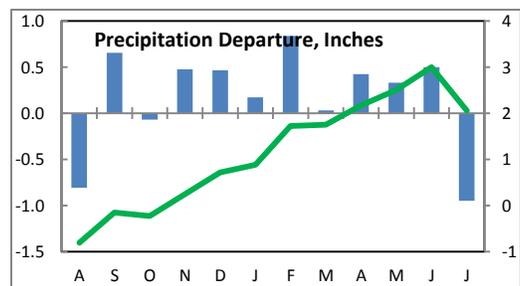
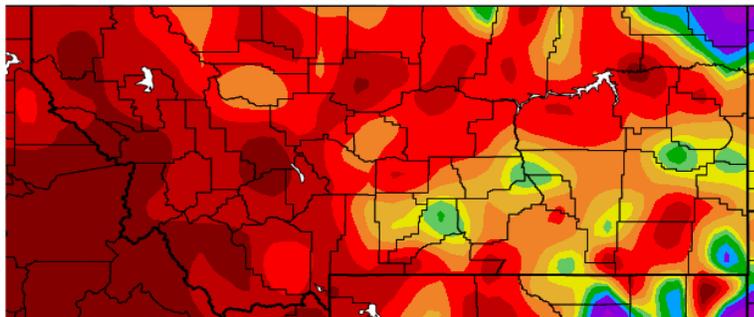
July 2018 NOAA's National Weather Service Great Falls Montana

For July, the upper level flow pattern averaged a large ridge of high pressure over western North America (Fig. 1). This was stronger than normal over the Gulf of Alaska. For Montana, temperatures averaged a degree or two warmer or cooler than normal. near to slightly above normal. Precipitation was mixed, with below normal values across northern Montana and areas of the southwest and extreme southeast. Winds averaged much below normal.

July temperature anomalies ranged from about two degrees below normal in the West Yellowstone area, to three degrees above normal in southeast Montana. Most areas were within two degrees of normal. The warmest average temperatures were in the southeast. Broadus had an average temperature of 75.2°F, while the coolest was at Placer Basin (Sweet Grass) with an average temperature of 52.6°F. The highest temperature was 105°F at Powderville on the 10th. The coldest temperature was 24° at Elk Park and Gates Park on the 4th. The state wide temperature average of 68.9° was 0.8°F above normal. The red line on the graph shows the cumulative 12-month departure from normal, which is 0.7°F below normal. See the state summary and temperature tables below for more details.

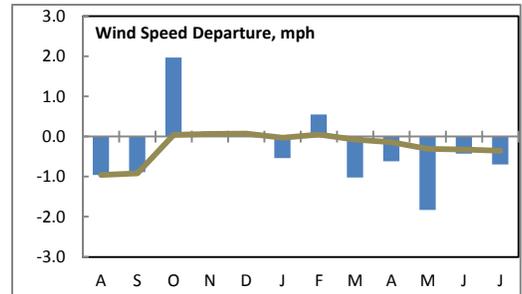


Precipitation was heaviest over extreme northeast Montana and a small part of the southeast. Rainfall amounts as high as 4.65-inches fell near Plentywood. In southeast Montana, 3.52-inches was reported near Ridge. Similarly, the rainfall departures from normal were most above normal in the northeast and southeast, with below, to much below normal across much of the rest of the state. Helena recorded only 0.01", their driest July of record. Dillon received a trace of rain. The statewide composite of 0.56-inches was 0.95-inches below normal. The green line on the precipitation graph shows the cumulative 12-month departure from normal, which is 2.05-inches above normal. Only three the past 12 months have recorded below normal precipitation. See state summary and precipitation tables below for more details.

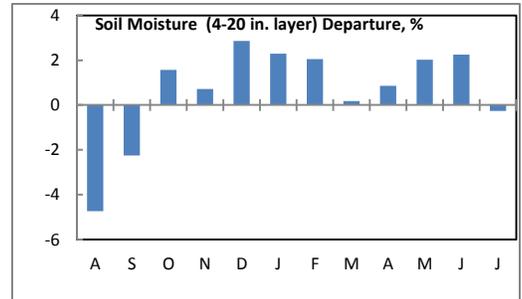


During a cool period around July 3, some snow fell at higher elevations in the west. Up to 4-inches fell. See picture from Showdown Ski Area at the end of this report.

The winds averaged much weaker than normal over the state. Statewide, July ranked as the 7th calmest July of record, with an average speed of 7.4-mph. The strongest averages were primarily along the Rocky Mountain Front and extreme northeast Montana. 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 0.4-mph below normal. Eight of the past 12 months have had below normal average speeds.



Statewide soil moisture averages are the 12th wettest of record, 0.3-percentage points below average. 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/>

July's weather was somewhat typical for July. Temperatures averaged close to normal for the state, while precipitation was mostly below normal. Thunderstorms occurred throughout the month. The month started cool, with some snow at higher elevations on the 3rd. Thunderstorms along a front ahead of the cold air produced golf-ball size hail at Lame Deer on the 2nd. Wind gusts over 65 mph were common over eastern Montana on the 3rd. Gusts as high as 94 mph were reported near Jordan and Ekalaka. Winds damaged aircraft at the airport at Jordan. Temperatures were in the 30s and lower 40s by the morning of the 4th. After a lull in weather activity, thunderstorms caused damage in eastern Montana again on the 9th. A macroburst hit the Plentywood area causing damage at the airport and parts of town. An EF-1 tornado was spotted in southeast Plentywood, along with wind gusts to 86 mph at Dagmar (Sheridan). On the 10th, thunderstorms accompanied a strong cold front sweeping across the state. Wind gusts in the 55-65-mph range were common throughout central and southwest Montana.

After another lull in the weather, isolated thunderstorms in the Neihart area produced heavy rain and localized flooding. Flooding also occurred in the Alzada area where 4-5-inches of rain fell. On the 21st, strong thunderstorm winds blew over rail cars near Culbertson. Gusts of 103-mph were reported near Froid, along with 2.8-inches of rain. This was the strongest recorded wind speed in Montana in July since 2005. Isolated thunderstorms continued to close out the month in eastern Montana. Some of the largest hail of the month fell on the 28th. Hail to 2-inches fell at Columbus, along with wind gusts to 68-mph near Billings.

Precipitation/convection

Severe convective weather occurred on 11 days in July, while normal is 12 days. A tornado was seen near Plentywood on the 9th. Several micro- and macrobursts caused severe wind damage. The largest reported hail was 2.0-inches at Columbus on the 28th. Thunderstorm wind gusts reached 103-mph near Froid on the 21st and 94-mph near Jordan and Ekalaka on the 3rd.

July information:

High Temperature	105°F at Powderville (10 th)	Greatest Precip	8.19" near Roundup
Low Temperature	24°F at Elk Park and Gates Park (4 th)		10.00" at Wood Creek SNOTEL (Lewis and Clark)
Warmest Ave Temp	75.2°F at Broadus	Peak Wind Gust	87 mph at Sprole (Richland (7 th))
Coollest Ave Temp	52.6°F at Placer Basin (Sweet Grass)		
Range of Temp departures	-1.0°F at West Yellowstone to 2.3°F at Glasgow	Highest Ave Wind	12.1 mph at Browning 12.9 mph at Deep Creek RAWS
21 city mean monthly Temperature/Normal	68.7/67.9F normal. 65 th warmest of record (since 1880). 53 rd percentile.	20 city mean monthly wind speed/Normal	7.4 mph/8.1 mph; 7 th calmest of record (since 1936). 10 th percentile.
22 city mean monthly precipitation/Normal	0.56"/1.51" - 37% of normal. 10 th driest of record (since 1880). 8 th percentile.		

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

Location	Jul	% of Norm	Rank	Pcntl	Oct 1 - Jul	% of norm	Rank	Pcntl	Years
Baker	1.72	121%			11.26	118%			20
Billings	0.65	51%	61	51	18.58	148%	4	3	117
Belgrade	0.23	19%	72	88	14.87	126%	11	13	81
Butte	0.14	10%	122	98	11.38	109%	44	35	124
Cut Bank	0.28	22%	98	87	10.24	121%	32	28	110
Dillon	0.00	0%	78	99	8.93	104%	22	27	78
Glasgow	0.92	52%	72	59	8.65	91%	72	61	118
Great Falls	0.12	8%	121	94	14.03	119%	34	26	126
Havre	0.49	30%	107	77	10.02	112%	60	43	138
Helena	0.01	1%	140	100	14.18	159%	12	8	139
Jordan	0.52	28%			13.60	132%			20
Kalispell	0.28	19%	109	87	13.97	96%	51	41	124
Lewistown	0.62	32%	109	89	17.82	129%	24	19	122
Livingston	0.95	65%	61	53	17.11	137%	8	6	112
Miles City	0.99	60%	81	57	15.33	147%	16	11	141
Missoula	0.02	2%	134	96	14.20	119%	23	17	133
Mullan Pass	0.08	7%	63	79	51.23	146%	4	4	76
Wolf Point	0.49	25%			7.48	76%			20
Glendive	1.48	79%	67	55	11.30	103%	58	50	116
Sidney	1.47	58%	48	61	10.43	88%	47	60	78
BZN-MSU	0.31	21%	130	92	22.15	131%	5	3	135
W Yellowstone	0.58	33%	94	85	21.85	114%	21	22	93

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	Jul	Normal	Rank	Pcntl	Oct 1 -				Years
					Jul	Normal	Rank	Pcntl	
Baker	70.5	67.0	65	62	37.2	38.9	83	80	104
Billings	72.5	72.8	45	53	42.3	44.5	64	76	84
Belgrade	67.5	67.0	32	38	37.9	39.2	51	61	83
Butte	65.1	63.2	34	27	36.5	36.5	64	52	123
Cut Bank	65.3	64.6	46	41	35.9	38.6	85	78	109
Dillon	66.3	65.7	42	55	38.3	39.4	56	75	74
Glasgow	73.4	71.1	29	23	36.9	39.0	72	59	122
Great Falls	69.0	67.4	65	52	39.5	41.2	104	86	121
Havre	70.1	69.2	59	42	35.8	39.6	121	88	138
Helena	71.0	70.0	22	15	39.9	41.8	81	58	138
Jordan	71.4	69.9	65	65	37.2	39.5	85	90	94
Kalispell	66.0	64.7	45	37	39.8	40.1	39	33	116
Lewistown	65.9	65.5	61	50	37.7	39.6	89	78	114
Livingston	67.4	66.9	77	67	41.5	41.5	77	68	112
Miles City	73.5	73.9	80	58	39.0	41.9	114	84	136
Missoula	68.4	68.6	55	43	42.0	42.6	48	38	124
Mullan Pass	63.4	60.4	7	15	35.5	34.5	10	23	41
Wolf Point	72.3	70.4			36.4	37.8			20
Glendive	73.8	73.8	65	52	40.4	42.3	71	61	117
Sidney	70.9	72.1	41	43	37.6	41.5	38	40	95
W Yellowstone	59.0	58.6	51	53	31.5	30.7	42	46	91

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

Location	Jul	Normal	Rank	Pcntl	Oct 1 -				Years
					Jul	Normal	Rank	Pcntl	
Baker	9.8	11.1			11.1	11.3			20
Billings	8.3	8.9	80	95	10.8	10.9	67	81	82
Belgrade	5.3	6.2	50	94	5.5	5.8	33	62	53
Butte	5.8	7.4	52	94	5.3	6.6	50	92	54
Cut Bank	9.6	10.8	57	76	13.1	13.1	41	53	76
Dillon	7.2	7.7	47	72	9.2	9.2	41	63	64
Glasgow	10.7	10.3	16	20	10.3	10.4	51	69	73
Great Falls	8.4	9.8	67	87	11.8	12.5	56	71	79
Havre	8.7	8.2	41	31	10.5	9.2	18	13	129
Helena	6.4	7.3	129	93	6.3	7.0	133	96	138
Jordan	7.8	7.9	19	53	8.3	8.1	14	39	34
Kalispell	5.7	5.7	91	76	5.9	5.5	107	90	119
Lewistown	7.0	7.9	65	85	9.3	9.5	57	75	76
Livingston	8.3	9.4	53	98	14.9	14.7	33	64	51
Miles City	8.5	9.7	68	54	9.3	10.2	70	55	127
Missoula	5.2	6.6	76	91	5.0	5.6	68	82	83
Mullan Pass	4.2	5.0	23	79	5.2	5.7	24	88	27
Wolf Point	8.1	7.7			8.1	8.2			20
Glendive	8.6	9.8	23	121	9.9	10.4	20	77	26
Sidney	7.4	8.0	18	81	9.0	9.2	19	66	29
W Yellowstone	5.2	5.5			5.9	6.5			4

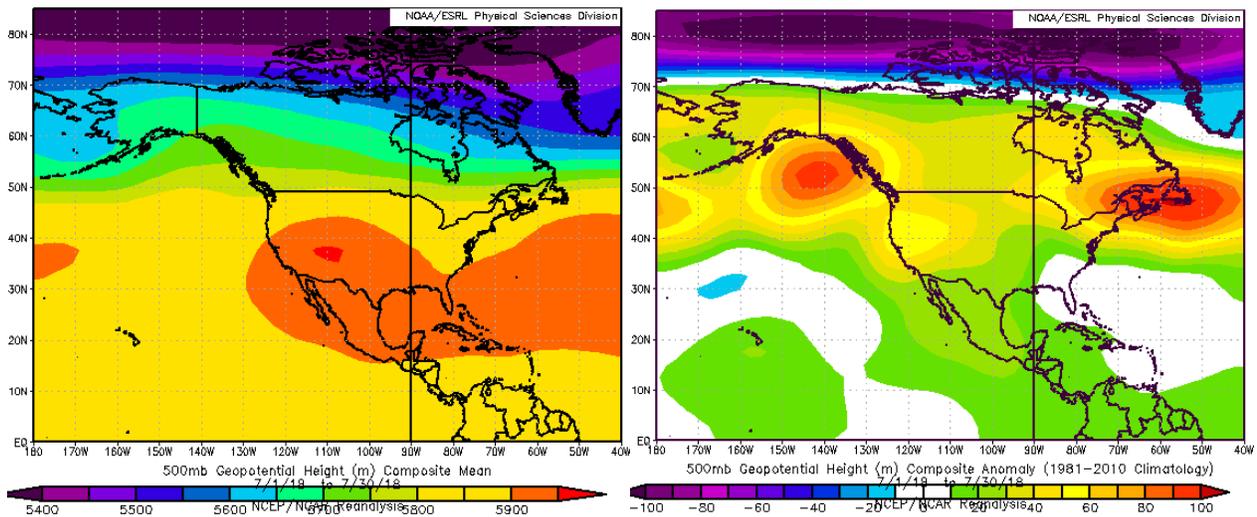


Figure 1. Mean flow at 500 millibars (~18,000 ft) for this month (upper left) and departure from normal (upper right).



Snow fall at Showdown Ski Area on July 3, 2018.

For the latest information on mountain snowpack from the NRCS, go to: <http://www3.wcc.nrcs.usda.gov/snow/index.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.