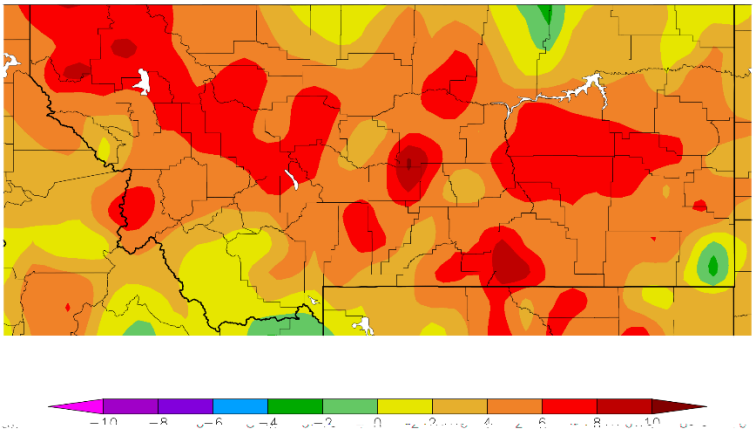
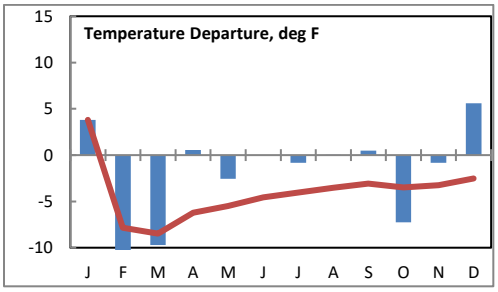
Montana Weather/Precipitation Summary

December 2019 NOAA's National Weather Service Great Falls Montana

For December, the upper level flow over Montana was generally from the west-northwest. Both the ridge along the west coast and the trough over central North America were weaker than normal (Fig. 1). December's average temperatures were above normal. Precipitation amounts were variable, with a large area of above normal values over central and northern Montana. Winds averaged below normal.

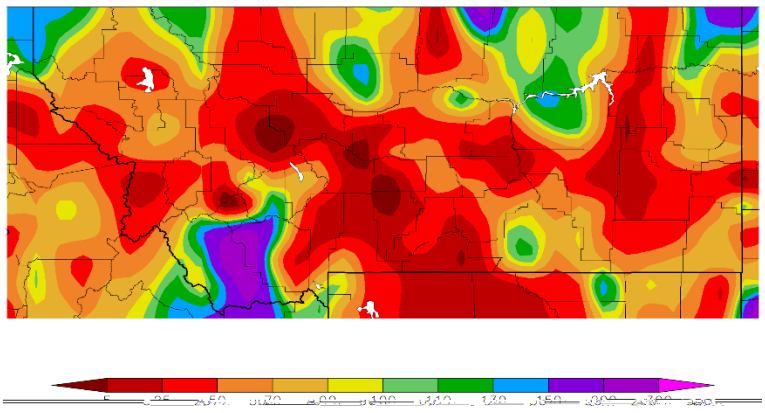
December temperature anomalies ranged from 1.0°F below normal at West Yellowstone to 8.2°F above normal at Helena. The map below shows the variation. The warmest average temperatures were in west and south central Montana. The warmest average temperature was at Yellowtail Dam, with an average of 37.4°F, while the coolest was 14.0°F at Bluff Creek (Valley). The highest temperature was 62°F at Fort Benton and Loma on the 21st. The coldest temperature was -31°F northeast of Wolf Point (Roosevelt) on the 71th. The absolute range of 93°F was slightly below December's average of 97°F. The statewide temperature average of 25.9°F was the 32nd warmest of record. The red line on the graph shows the cumulative 12-month departure from normal, which is 2.5°F below normal. See the state summary and temperature tables below for more details.

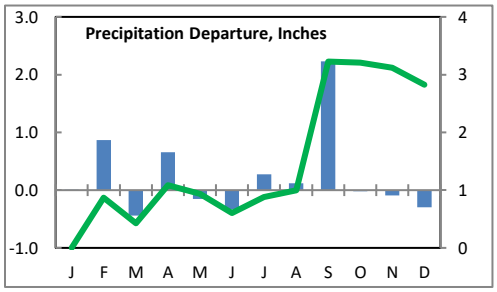




Temperature departure from normal

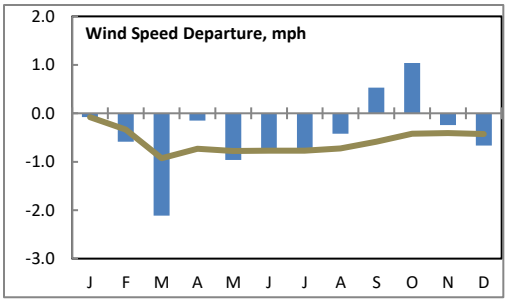
Precipitation was heaviest in the northern Rockies. The highest amount (13.50-inches) fell at Flattop Mountain SNOTEL. The statewide composite of 0.46-inches was 0.30" below normal. This ranks as the 22nd driest December of record for the state. The green line on the precipitation graph shows the cumulative 12-month departure from normal, which is 2.82" above normal. See state summary and precipitation tables below for more details. Snowfall was relatively light. Southwest Montana, including the Dillon area, had a record snowfall from the 24th to 26th. Dillon had 13-inches of snow, which was their greatest snow depth since February 1949. The heaviest monthly snow amount was 30.1-inches at Haugen.



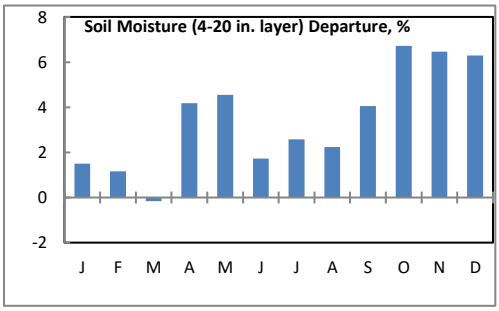


Percent of normal precipitation

Wind speed averages were near to below normal. Statewide, the month ranked as the 10th calmest December, with an average speed of 8.3-mph. The strongest averages were in along the Rocky Mountain Front and Livingston areas. 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.



Statewide soil moisture averages continued above normal for December (right). This data is from 33 NRCS SCAN and SNOTEL, NOAA CRN and MT Mesonet stations. For December, this was the wettest of record, replacing 2014. 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/

The first week of December had generally above normal temperatures. Some freezing rain fell over the northwest on the third, while gust winds prevailed along the east slopes on the second and third. A location west of Bynum had a gust of 72 mph on the second, while gusts reached 70 mph at Cut Bank on the third. Cooler air moved over the region starting on the sixth. The coldest temperature of -31°F was reported near Wolf Point. Heavy snow fell mostly over northeast Montana…five to eight inches of snow were reported. Heavy snow fell over parts of the state on the 9th, with 15-inches reported at Cooke City. The southern mountains and central Montana were hit with additional snow on the 13th through 15th. Up to 19-inches fell in the Little Belts, with six inches from Loma to Hingham. Warmer and windier conditions returned on the 16th. Gusts reached 67 mph near Bynum on the 16th. Some freezing rain was observed over a large portion of northwest Montana on the 19th and 20th. Meanwhile, heavy snow fell at higher elevations. Marias Pass measured six inches, while nine inches were reported in the higher elevations of Lincoln County. Windy conditions on the 20th and 21st. Gusts of 79 mph were measured near Bynum, 75 mph at Browning and 71 mph at Livingston. Snow affected portions of western and southwest Montana from the 24th through 26th. The heaviest amounts fell in over Beaverhead and Madison Counties, with amounts up to 13-inches reported. Some of the colder temperatures of the month occurred from the 27th to 29th, with values of -24°F reported at Bannack and West Yellowstone. Some snow, freezing rain and windy conditions were seen on the 31st. Up to six inches of snow fell in the Heron area, while freezing rain fell around Kalispell. Gusts along the east slopes reached 80 mph at Livingston and 72 mph near Bynum.

Precipitation/convection

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

New Snowfall Records established this season…

Several locations have already exceeded their seasonal average snowfall. Following is a table showing several sites with their snowfall through December, along with their seasonal normal snowfall. If they have already exceeded their seasonal normal, it is denoted with an *.

Location	Current Season Snow	Normal for whole season	Record for season (inches)
Bozeman	18.3″	40.2″	97.8 (1947-48
Bozeman MSU	38.3	91.0″	158.5 (1996-97)
Chinook	28.0	31.2″	66.0 (2010-11)
Choteau*	69.9*	39.8″	92.9 (2017-18)
Cut Bank*	65.0*	33.6″	76.2 (1946-47)
Dillon	38.6*	37.9″	90.8 (1988-89)
East Glacier	121.8	176.6″	319.0 (1971-72)
Gold Butte	49.0	82.5″	130.0 (2010-11)
Great Falls	62.2	63.5″	117.5 (1988-89)
Havre	44.2*	39.5″	93.3 (1981-82)
Helena	20.1	38.1″	112.8 (1880-81)
Lewistown	40.1	63.1″	111.1 (1927-28)
W Yellowstone	53.7	162.7″	316.6 (1994-95)

Water-year-to-Date (Oct-Dec)
The water-year average temperature was 30.8°F and 0.8°F below normal. This was the coolest such period since 2014 and the 29th coolest of record.
This season's composite precipitation was 2.29-inches and 0.40-inches below normal. This was the driest such period since 2014 and the 39th driest of record.
Seasonal snowfall was 24.0-inches and 2.3-inches above normal. This was the 38th highest amount for the season and snowiest since 2018.
Winds averaged 8.9-mph, which was normal. This was the 22nd calmest such period, but windiest since 2017.

Calendar year (Jan-Dec)
The calendar-year average temperature was 40.7°F and 2.5°F below normal. This is the 7th coldest year of record, and coolest since 1996.
Composite calendar-year precipitation totaled 18.29-inches, 2.82″ above normal. This was the tenth wettest year, and wettest since 2011.
Calendar-year snowfall has averaged 71.2-inches and 14.9-inches above normal. This was the 14th snowiest calendar year of record and snowiest since 2017.
Winds averaged 8.4-mph, which is 0.5-mph below normal. This was the fourth calmest calendar-year and calmest since last year.

December information:

High Temperature	62°F at Fort Benton & Loma (21st)	**Greatest Precip**	5.06" at Heron
Low Temperature	-31°F at northeast of Wolf Point (7th)		13.50" Flattop Mountain SNOTEL
Warmest Ave Temp	37.4°F at Yellowtail Dam	**Peak Wind Gust**	99 mph at Deep Creek RAWS (16th) and 80 mph at Livingston (31st)
Coolest Ave Temp	14.0°F at Bluff Creek RAWS (Valley)		
Range of Temp departures	+1.0°F at West Yellowstone +8.4°F at Helena	**Highest Ave Wind**	20.5 mph at Deep Creek RAWS 18.5 mph at Browning
21 city mean monthly Temperature/Normal	25.9/20.3F normal. 32nd warmest of record (since 1880). 77th percentile.	**20 city mean monthly wind speed/Normal**	8.8 mph/9.0 mph; 28th calmest of record (since 1936). 34th percentile.
22 city mean monthly precipitation/Normal	0.46"/0.76" – 60% of normal. 22nd driest of record (since 1880). 16th percentile.	**20 city mean monthly snowfall/Normal**	12.5"/4.6"' 13th highest of record.

Historical Rank of <u>Precipitation</u> (inches)
for the Current Month and Water Year to Date

Location	Dec	% of Norm	Rank	Pcntl	Oct 1 - Dec	% of norm	Rank	Pcntl	Years
Baker	0.00	0%			1.54	79%			22
Billings	0.14	21%	101	84	1.94	72%	66	55	119
Belgrade	0.09	18%	81	98	1.63	69%	64	77	83
Butte	0.09	18%	120	95	0.63	33%	101	80	126
Cut Bank	0.20	100%	68	60	2.28	228%	11	9	113
Dillon	0.70	269%	4	4	1.22	91%	35	43	80
Glasgow	0.37	93%	48	39	1.84	119%	44	36	122
Great Falls	0.17	31%	114	88	2.70	135%	41	31	128
Havre	0.34	85%	78	55	2.15	152%	41	29	140
Helena	0.04	10%	136	96	1.85	118%	71	50	141
Jordan	0.33	114%			2.24	143%			23
Kalispell	0.93	60%	93	74	2.85	71%	97	77	126
Lewistown	0.27	41%	103	83	2.65	106%	53	42	124
Livingston	0.06	12%	114	96	2.05	86%	78	66	117
Miles City	0.03	10%	133	93	0.47	29%	138	96	143
Missoula	0.74	73%	94	65	2.17	73%	103	73	140
Mullan Pass	3.57	80%	57	71	8.99	73%	70	87	80
Wolf Point	0.04	13%			0.83	55%			22
Glendive	0.34	89%	69	54	1.55	82%	67	55	122
Sidney	0.31	60%	50	62	1.32	61%	51	63	80
BZN MSU	0.20	22%	136	96	3.57	93%	63	44	143
W Yellowst	1.25	49%	84	82	3.96	64%	77	72	107

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	Dec	Normal	Rank	Pcntl	Oct 1 - Dec	Normal	Rank	Pcntl	Years
Baker	23.4	19.0	41	37	30.0	30.7	84	78	108
Billings	33.1	26.5	9	9	36.0	36.8	67	78	86
Belgrade	25.2	19.0	18	20	29.8	30.7	66	77	85
Butte	21.2	17.4	56	44	27.6	28.6	100	79	126
Cut Bank	27.3	22.2	26	23	29.0	31.8	90	81	111
Dillon	22.5	20.8	43	56	29.0	31.6	72	95	76
Glasgow	20.4	16.3	37	29	29.5	30.1	73	58	125
Great Falls	31.7	24.8	29	22	33.3	34.5	100	81	123
Havre	24.9	19.1	40	28	29.2	31.2	105	75	140
Helena	30.0	21.8	12	8	33.3	33.3	87	62	140
Jordan	25.4	18.8	30	29	31.6	31.0	70	69	101
Kalispell	31.1	22.7	15	12	32.7	32.2	30	24	121
Lewistown	29.2	23.3	24	19	31.0	33.0	100	83	120
Livingston	33.7	26.1	12	9	35.5	35.1	88	75	117
Miles City	27.1	20.3	30	21	32.6	32.9	98	71	138
Missoula	29.2	23.9	27	20	33.2	34.1	84	65	128
Mullan Pass	26.0	20.0	2	2	28.3	28.3	30	69	43
Wolf Point	18.8	15.0			28.5	28.8			22
Glendive	26.3	20.7	26	21	34.4	33.8	52	42	124
Sidney	21.6	19.2	30	31	29.1	32.6	72	74	97
W Yellowst	16.1	10.5	29	31	22.1	22.3	78	80	97

Rankings and Percentiles are 1=coldest, higher numbers=warmer.

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	9.0	11.2			10.9	10.8			22
Billings	13.0	12.6	44	51	12.7	11.6	15	17	85
Belgrade	3.7	4.9	53	98	4.7	5.3	33	60	54
Butte	3.2	5.2	55	98	4.2	5.7	54	96	56
Cut Bank	14.8	14.2	36	46	14.9	13.7	19	24	77
Dillon	8.3	9.2	55	83	9.1	9.1	40	60	66
Glasgow	8.0	9.3	34	44	9.5	9.7	40	53	75
Great Falls	14.3	14.6	48	58	13.1	13.7	57	69	82
Havre	11.0	9.5	30	22	10.9	9.2	13	9	131
Helena	4.8	5.7	125	89	5.7	6.2	120	86	140
Jordan	6.0	7.2	30	83	8.1	7.4	6	14	36
Kalispell	3.3	4.1	78	64	4.3	4.5	113	93	121
Lewistown	10.3	10.3	44	57	9.7	9.9	50	64	77
Livingston	21.7	19.1	10	17	18.7	17.0	13	22	55
Miles City	8.6	9.6	61	47	9.7	9.8	37	28	129
Missoula	2.4	4.3	83	98	3.5	4.6	77	90	85
Mullan Pass	4.7	5.6	29	97	4.9	5.9	28	96	29
Wolf Point	5.9	7.1			7.7	7.4			22
Glendive	8.8	10.1			10.2	10.1			28
Sidney	7.3	9.0	28	90	9.17	9.0	12	38	32
W Yellowst	5.0	5.4			5.50	5.9			7

Rankings and Percentiles are 1=windiest, higher numbers=calmer.

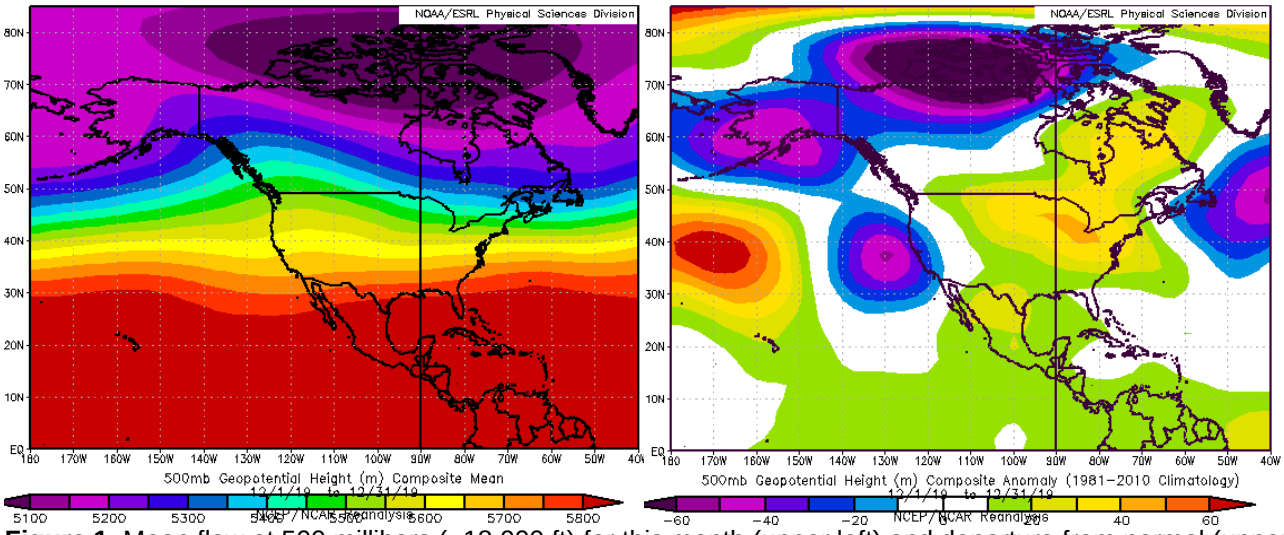
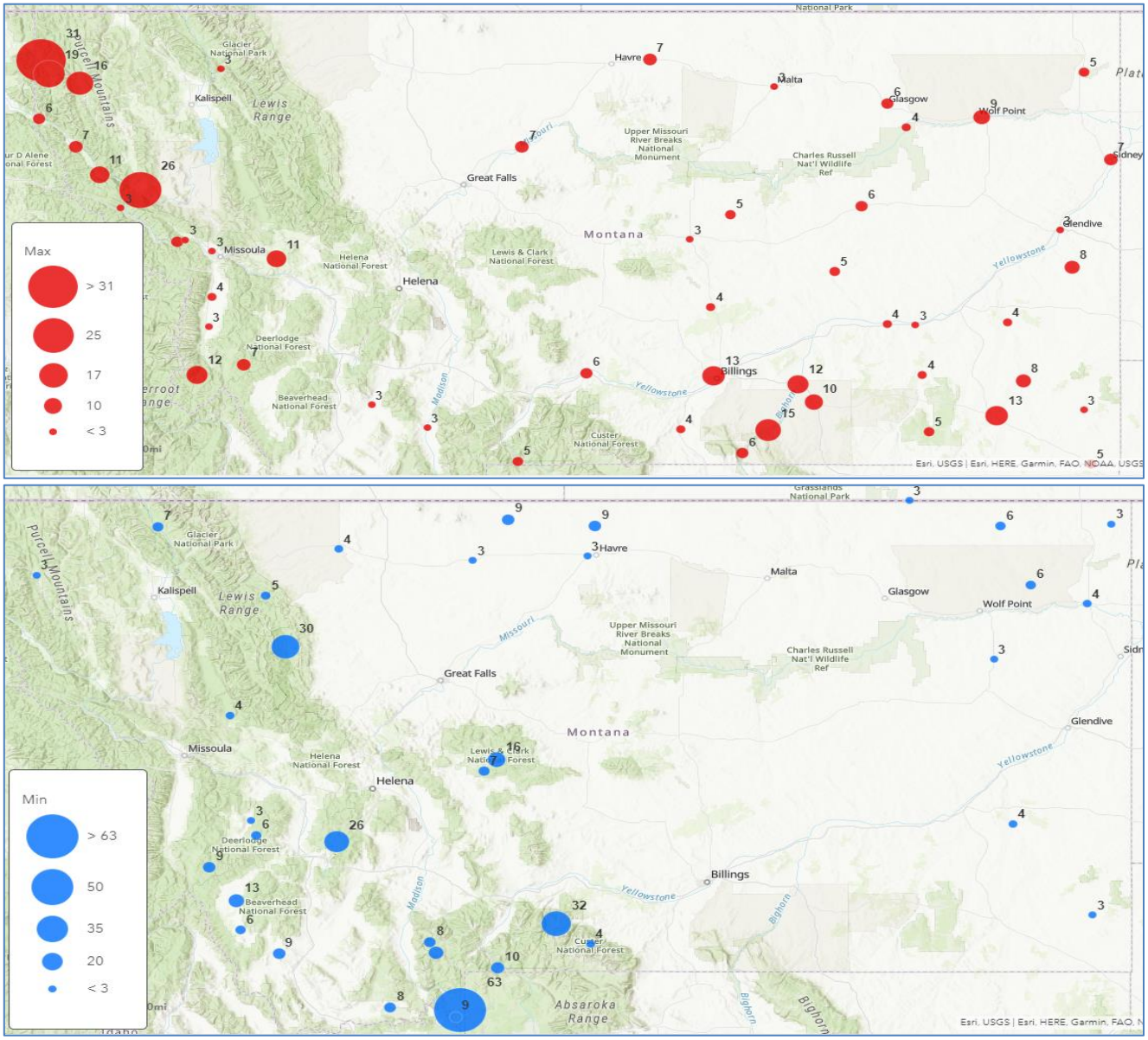


Figure 1. Mean flow at 500 millibars (~18,000 ft) for this month (upper left) and departure from normal (upper right) (from NOAA/ESRL Physical Sciences Division).



Locations and number of times in 2019 that the highest (top) and lowest (bottom) temperature were recorded at that location. At least 3 or more days of the event during the year are necessary to be plotted. There were 63 days for min temperatures at West Yellowstone.

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.