Montana Weather/Precipitation Summary

December 2010 by NOAA's National Weather Service Great Falls Montana

December was a month that brought regular doses of wintry weather. Regular weather disturbances provided ample snowfall and variable temperatures. Temperatures averaged below normal across all but far northwest Montana. The coldest areas were along the Canadian border in eastern Montana (Fig. 2). Precipitation was above normal in most areas (Fig. 3). There were a few areas in the south and southwest that received below average moisture. In some areas of north central Montana, this was one of the wettest Decembers of record. The precipitation fell as snow in eastern Montana and most mountain areas. Great Falls and Glasgow had their snowiest December of record. Locations in the Mission and Swan Ranges picked up three to four feet of snow. Nearly 90 inches of snow were on the ground at the end of the month in these ranges. These values exceed measurements over the past decade. Upper level flow showed a ridge of high pressure area over Montana in December. The ridge is not normal in December over Montana, as Figure 1 shows.

December 1-6

After starting out warm, with above normal temperatures, a strong cold front brought colder air to the state, with below zero temperatures. Heavy snow fell as the cold air moved across the state. Mountains in southern Montana picked up 1.5 feet of snow, while other locations across western and central Montana received from two to six inches.

December 7-19

The warmest period of the month occurred during this period. On the 8th, Stanford recorded a high temperature of 52F, while on the 12th, Yellowtail Dam soared to 56F. Low temperatures in central Montana and areas east of the northern Rocky Mountain Front did not fall below freezing on the 12th through 14th. This was also one of the windier periods. Logan Pass recorded a gust to 93 mph on the 8th, while Cut Bank gusted to 66 mph. With the warmer air overspreading cooler air over northeast Montana, periods of freezing rain occurred on the 10th and 12th. Westerly flow brought moisture from the Pacific Ocean, which fell heavily in the Rockies. Essex picked up 18 inches on the 10th, while Noisy Basin received 21 inches and North Fork Jocko received 1.5 feet. Gusty winds occurred along the east slopes. Deep Creek recorded a gust to 79 mph on the 12th. A cold front and accompanying precipitation produced seven inches at Madison Plateau on the 14th, while 65 mph winds occurred at Bozeman Pass. The weather then turned cooler and more tranquil.

December 20-28

This period started out cold, with below zero temperatures. After some snow fell on the 20th, temperatures gradually warmed. On the 20th, areas of very heavy snow fell. Some of the heavier amounts were 14 inches at Culbertson, 12 inches at Millegan, 11 inches at Fort Peck and Wolf Point, 9 inches at Nashua, 8 inches at Fisher Creek and 7 inches east of Belt in the Highwoods. Once warmer air spread into central Montana, some flooding from ice jams was observed on the Missouri River at Great Falls, and on Beaver Creek near Havre. Temperatures pushed into the 50s over central and parts of southeast Montana. On the morning of the 27th, a streak of 39 days with at least one inch of snow on the ground ended at Billings. This 39-day streak was the longest such streak since 1985. Also accompanying the warmth was strong wind. While gusts to 73 mph occurred at Logan Pass, gusts to 63 mph at Malta and 60 mph at Lustre were produced blizzard conditions in northeast Montana. Snow began falling over western Montana while strong winds continued over the Rockies and east of the divide. Logan Pass recorded a gust to 93 mph on the 28th. A foot of snow fell at Mullan Pass.

December 29-31

The heaviest snow of the month fell during the last three days. A daily snowfall record was set at Great Falls and Havre on the 29th. A foot to three feet of snow fell at scattered locations from western, through central Montana. Again, blizzard conditions occurred in northeast Montana, where up to 11 inches of snow fell.

New Temperature Records for December 2010

None.

Precipitation

Severe convective weather occurred on zero days in December.

Precipitation was largely above normal for the month. Small pockets of below normal precipitation were over the northwest and eastern portions (Fig. 3).

New Precipitation Records for December 2010

Station	Record Type	New Record	Date	Previous Record	Year of Previous Record
Kalispell	High Daily Precip	0.60	12	0.48	1995
Glasgow	High Daily Snow	6.2	20	2.3	1996
Great Falls	High Daily Precip	0.74	29	0.38	1996
Great Falls	High Daily Snow	11.0	29	9.4	1996
Havre	High Daily Snow	9.5	29	7.0	1994
Billings	High Daily Snow	4.1	29	3.6	1973
Billings	High Daily Snow	4.7	30	0.25	1973
Glasgow	High Daily Precip	0.51	29	0.29	1964
Glasgow	High Daily Snow	7.0	29	4.0	2008
Lewistown	High Daily Snow	4.0	8	3.5	1940

Other Information

December's statewide average temperature of 18.0F was 3.6F below normal. This was the 36th coolest December of record. For precipitation, this was the wettest December since 1993. The statewide average was 1.21 inches, and the 16th wettest of record. Lighter than normal winds continued to dominate. December 2010 was the fourth calmest of record.

This was one of the snowiest Decembers of record at many locations. At Great Falls, it was the 5th snowiest of record, with 24.6 inches. At Havre, it was the fourth snowiest with 19.0 inches, and the snowiest since 1989. Glasgow recorded 24.7 inches of snow, or the second snowiest of record. This was 20 inches above normal for December. For the season so far, at Havre and Great Falls it has been the snowiest of record. Havre has measured 38.2 inches, and Great Falls has received 43.8 inches…about two feet more than normal. West of the divide, at Missoula, it has been the snowiest water-year-to-date since 1996.

As a statewide average, 2010 was the wettest year since 1993. With preliminary data from 18 cities, it is the 8th wettest year in Montana (since 1880). Though some areas have received a lot of snow, the statewide average was 63.3 inches, or about 7 inches above normal. This ranked 2010 as the 29th snowiest (since 1881). Statewide average temperatures were about 0.7F below normal. This was the third consecutive year of lower than average annual temperatures. It ranked as the 35th coolest year of record (since 1880). Winds continued to average lighter than normal. This was the eleventh consecutive year with below average wind speeds (1971-2000 average). This ranked as the third calmest year (since 1936), and the lightest average wind speeds since 1942.

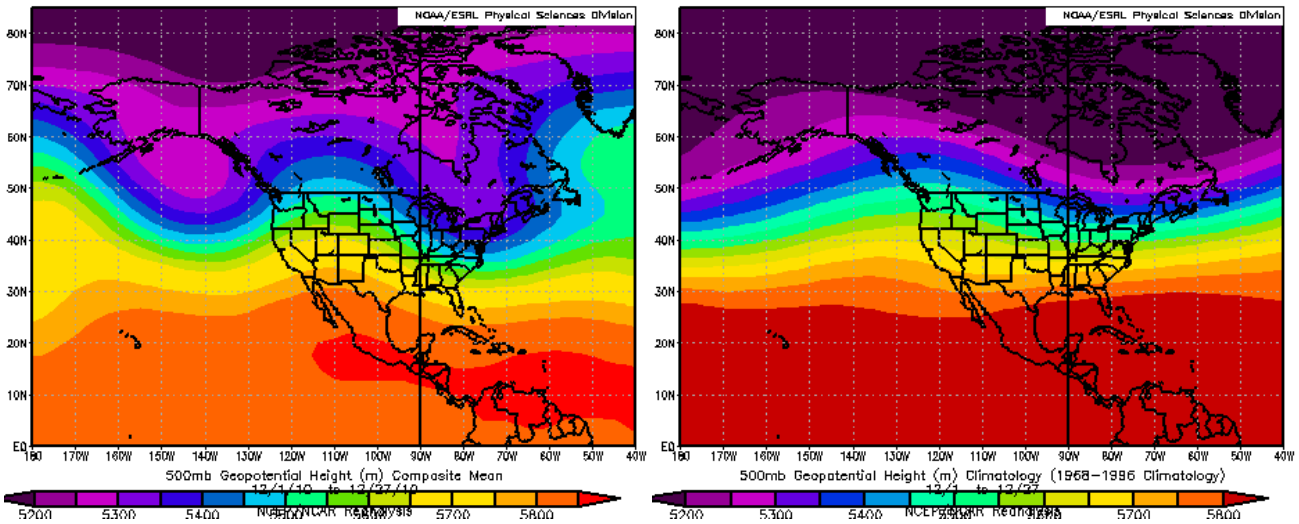
December summary information:

High Temperature	56°F at Yellowtail Dam (12th)	**Greatest Precip**	7.00" at Libby 32SSE (Lincoln)
Low Temperature	-33°F at Wisdom (31st)		13.5" at Poorman Creek SNOTEL (Lincoln)
Warmest Ave Temp	35.5°F at Thompson Falls	**Peak Wind Gust**	93 mph at Logan Pass (1st) 70 mph at Livingston (27th)
Coolest Ave Temp	21.4°F at Dunkirk		
Range of Temp departures	-6.4°F at Shelby to -0.1 °F at Troy	**Highest Ave Wind**	15.9 mph at Norris Hill and 21.9 mph at Logan Pass
18 city mean monthly Temperature/Normal	18.0/21.6; 36th coolest of record (since 1880)	**18 city mean monthly wind speed/Normal**	7.9 mph/9.6 mph; 4th calmest of record (since 1936)
18 city mean monthly precipitation/Normal	1.21"/0.74" – 1.6 times normal; 16th wettest of record (since 1880)		

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

Location	Dec	% of Norm	Rank	Pcntl	Oct 1 – Dec 31	% of norm	Rank	Pcntl	Years
Baker	0.07	30%			1.07	55%			13
Billings	0.95	142%	86	84	3.47	129%	86	84	102
Belgrade	0.46	81%	35	47	2.68	108%	48	65	73
Butte	0.64	121%	75	64	1.80	94%	58	49	117
Cut Bank	M	M			M	M			104
Dillon	0.53	230%	66	93	1.86	151%	56	79	71
Glasgow	0.34	92%	55	48	1.04	71%	31	27	113
Great Falls	1.56	233%	114	95	3.76	172%	113	95	119
Havre	1.03	202%	117	89	2.43	154%	106	81	131
Helena	0.76	165%	93	70	2.55	159%	103	77	133
Jordan	0.63	586%			2.31	153%			14
Kalispell	2.22	135%	51	43	5.28	130%	44	37	117
Lewistown	0.72	87%	67	58	3.29	125%	86	75	115
Livingston	0.49	86%	57	51	1.90	63%	36	33	108
Miles City	0.07	16%	14	10	1.01	48%	30	22	134
Missoula	1.28	111%	91	68	3.86	131%	95	72	131
Mullan Pass	7.81	183%	66	93	17.33	144%	55	77	71
Wolf Point	0.26	144%			1.13	86%			13
Glendive	0.45	115%	69	59	1.72	92%	56	50	112
Sidney	1.14	233%	71	100	3.01	141%	59	84	70
BZN-MSU	0.41	52%	21	15	3.48	99%	72	54	132

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



Figures 1a (left) and 1b (right). Mean flow at 500 millibars (~18,000 ft) for December (left). A mean ridge of high pressure dominated the western mountainous region of the United States (1a). The ridge is normally centered along the west coast (1b).

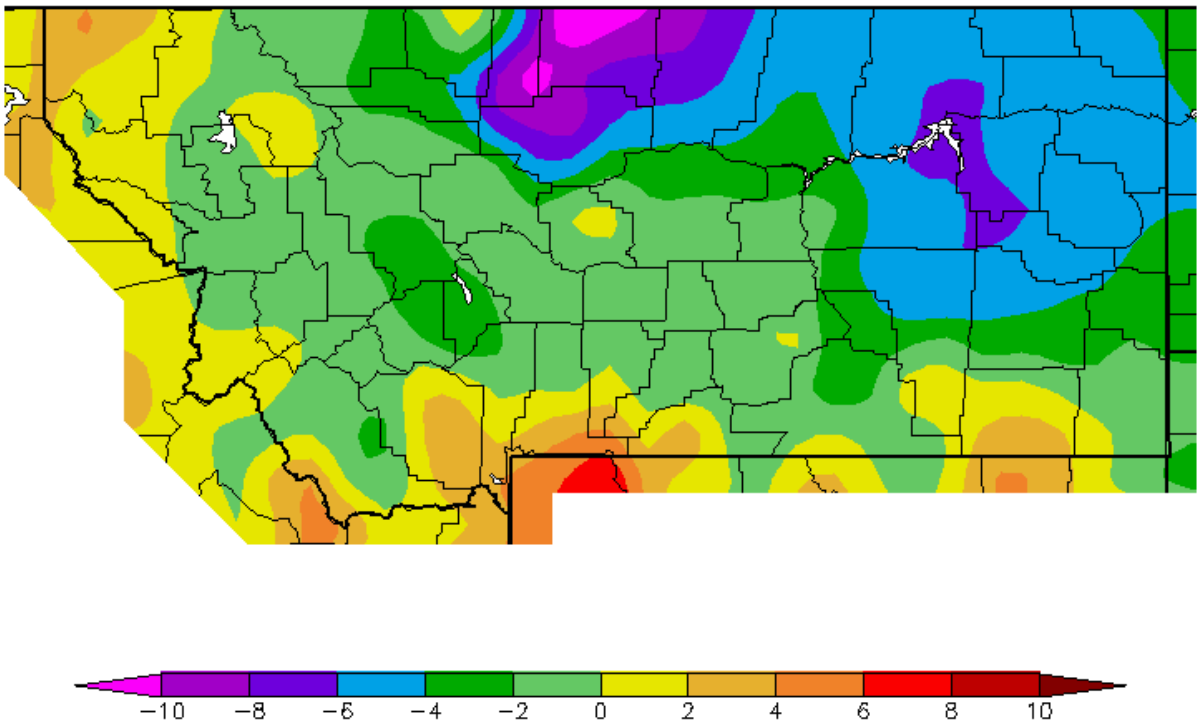


Figure 2. Temperature anomaly for December. Temperatures were below normal across most of the state, with the largest cold anomalies over north central Montana. (Western Region Climate Center).

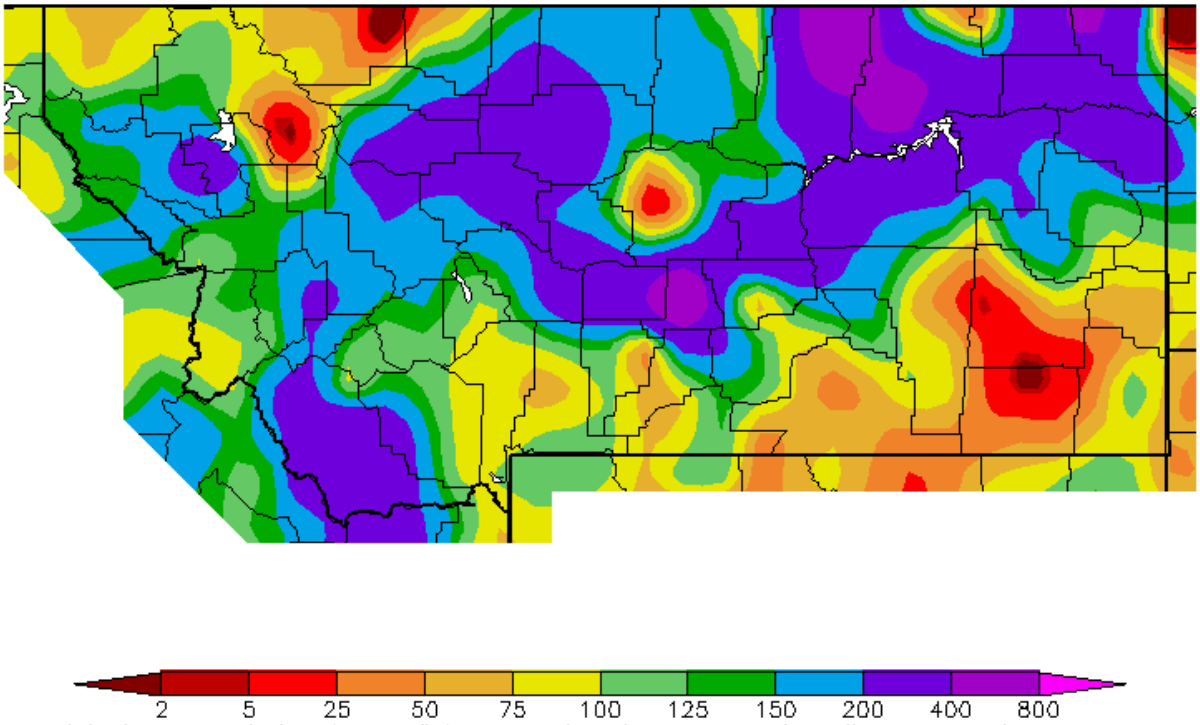


Figure 3. Precipitation anomaly (% of normal) for December. (Western Region Climate Center)

For a state map of % of normal water year precipitation (updated around the 7th of each month), go to: http://www.wrh.noaa.gov/tfx/image.php?wfo=tfx&type=data&loc=hydro&fx=watyr_pcntnorm.png

For the latest information on mountain snow pack from the NRCS, go to: http://www.mt.nrcs.usda.gov/snow/index.html

For the latest U.S. Drought Monitor, issued weekly by the Climate Prediction Center (CPC), go to: http://www.drought.unl.edu/dm/monitor.html

These data are preliminary and have not undergone final QC by NCDC. Therefore, these data are subject to revision. Final and certified climate data can be access at the National Climatic Data Center (NCDC) http://www.ncdc.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