

Montana Weather/Precipitation Summary

March 2011 by NOAA's National Weather Service Great Falls Montana

La Nina continued to weaken slowly in March. Over portions of Montana, March continued the long cold and snowy winter of 2010-11. Westerly flow aloft (Fig. 2) produced regular disturbances with moisture to provide ample snowfall to some portions of the state. Some the heaviest snow fell across the northeast, which was also the coldest area. Temperatures in Montana during March were much below normal northeast, to areas of slightly above normal northwest through south central. Precipitation and snowfall totals varied widely.

Temperatures across the state (Fig. 1) in March averaged 29.6F, over three degrees below average. This produced the 45th coolest March, and the coolest March since 2009. Some areas of the northeast recorded their coolest March since 2002. Temperatures averaged coolest across north central and northeastern portions of the state (Fig. 3).

Precipitation and snowfall amounts for the month were above average (Fig. 1). The statewide average of 0.91 inches was a 0.05-inch surplus or 106 percent of average for the month. This was the 54th wettest of record, and the fifth consecutive month of above normal precipitation. Snow and precipitation were heaviest over the western mountains and portions of northeast Montana. A large portion of central and valleys of western Montana recorded below normal precipitation (Fig. 4). At the end of March, deep snowpack continued across the hi-line east of Havre, with one to two feet of snowpack remaining. At several locations along the Canadian border, this was the deepest snowpack on record for late March. Even over the Rockies, some impressive snowpack values were recorded. Snow-on-ground totals were 140-150 inches at a few locations in the Mission and Swan Ranges.

Wind speeds continued dropped to below average values. Outside normally windy areas, the windiest region was along the North Dakota border and northeast Montana. The March average of 9.1 mph was 0.4 mph below normal, or the 17th calmest March of record.

Soil moisture conditions were a bit below average in March. Some of this is related to the lateness of frost-in-ground at some locations. The soil remains frozen at depths to 20 inches over some of the higher elevations in the west and southwest. Over the northeastern plains, depths range from no frost, to eight inches. At Havre, some the coldest and wettest soil conditions since 1997 existed at the end of March.

March 1-7

Cold temperatures continued during the first week of March. Heavy snow fell across western Montana on the 1st, with 13 inches of snow measured near East Glacier. The coldest

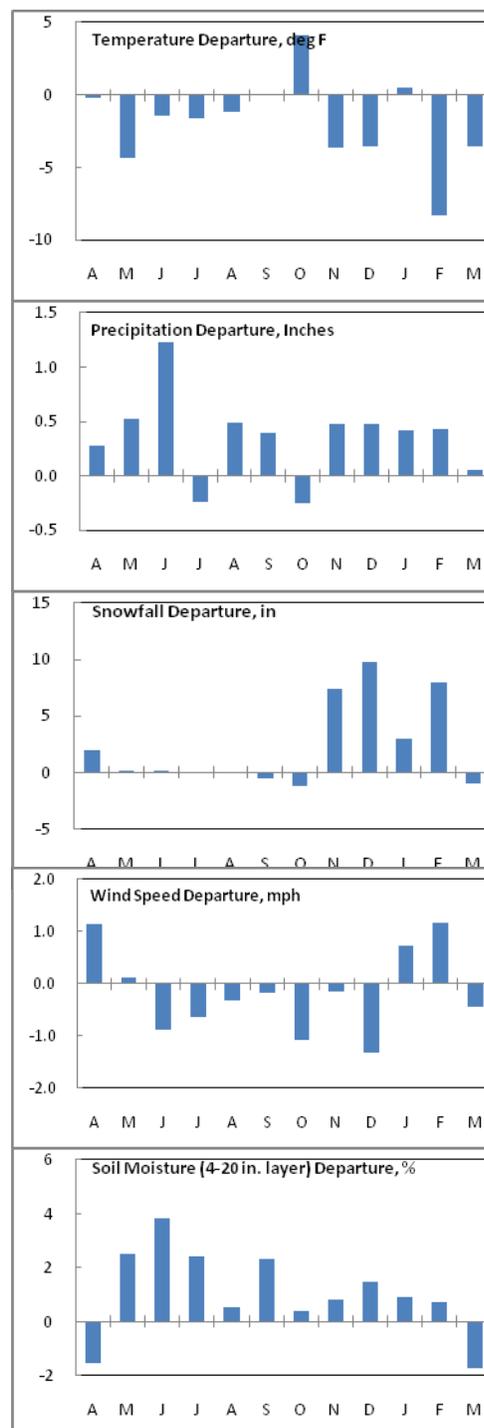


Figure 1. Statewide departures from normal for 18 locations.

temperatures were in the areas of the deepest snow pack in the hi-line. Opheim fell to -29F on the 5th. With some warming by the 6th, another storm system dropped heavy snow across south central Montana, with Livingston and McLeod picking up 9 inches of snow.

March 8-20

Temperatures were closer to seasonal normals during this period. This was also a period with the warmest temperatures, thunderstorms and windy periods. On the 9th, winds along the Rocky Mountain Front gusted to 61 mph west of Bynum. A cold front passing through Montana produced 78 mph winds near Cascade on the 10th. When it passed through the Billings area early on the 11th, thunderstorm winds produced a microburst in the Billings Heights that caused damage to street signs, shingles and siding. Winds gusted to 59 mph at the airport and 67 mph at Aberdeen Hill (southeast of Billings). Snow and blizzard conditions prevailed across the northeast later on the 11th. Another storm system brought snow to western Montana on the 14th. Meanwhile, mild temperatures and gusty winds were felt along the Rocky Mountain Front. A cold front and low-pressure area brought another round of snow to southern Montana on the 16th and 17th. Up to 20 inches of snow fell in the mountains in Park County, with over a foot in the Livingston area.

March 21-31

Colder temperatures and snow started out this period. A significant weather system produced over two feet of snow in the Reed Point area of Stillwater County. Other higher amounts included 9 inches at Sidney, 10 inches at Hinsdale (Valley) and at Cleveland (Blaine). Strong winds caused blizzard conditions in northeastern Montana, with drifts up to six feet deep near Baylor (Valley). After the snow fell, low temperatures dropped to near zero in some of the higher southwest valleys. Elk Park bottomed out at -11F on the 23rd. A slight warm-up preceded the next snowstorm that mainly affected southeast Montana on the 25th and 26th. This system dropped 1.5 feet of snow at Ridgway (Carter) and a foot of snow at Otter (Powder River). While warmer air spread across the state at the end of the month, heavy precipitation fell over portions of the west. Poorman Creek (Lincoln) and Twin Lakes (Ravalli) both recorded 2.20 inches of precipitation on the 30th and 31st. Meanwhile on the 31st in the warmer east, winds gusted to 107 mph at Logan Pass and 62 mph near Silver City (Lewis and Clark).

New Temperature Records for the current month

Station	Record Type	New Record	Date	Previous Record	Year of Previous Record
Dillon	High Daily Min	45	31	44	1939

Precipitation/convection

Severe convective weather occurred on one day in March. Thunderstorms in the Billings area produced strong winds and a microburst early on the 11th.

At Sidney, the 1.14 inches recorded was the 4th wettest March of record, and the wettest since 2003.

New Precipitation Records for the current month

Station	Record Type	New Record	Date	Previous Record	Year of Previous Record
Miles City	High Daily Precip	0.32	11	0.13	1976
Livingston	High Daily Precip	0.29	16	0.15	2003
Glasgow	High Daily Precip	0.36	22	0.33	1987
Glasgow	High Daily Snow	7.2	22	3.2	1987

March summary information:

High Temperature	68°F at Billings (12 th)	Greatest Precip	5.45" at Mullan Pass
Low Temperature	-29°F at Opheim (5 th)		13.0" at Poorman Creek SNOTEL (Lincoln)
Warmest Ave Temp	39.1°F at Thompson Falls	Peak Wind Gust	107 mph at Logan Pass (30 th) 78 mph near Cascade (10 th)
Coollest Ave Temp	15.1°F at Westby		
Range of Temp departures	2.4°F at Drummond to -12.9°F at Wolf Point	Highest Ave Wind	14.9 mph at Livingston and 17.3 mph at Norris Hill
18 city mean monthly Temperature/Normal	29.6/33.2; 45 th coolest of record (since 1880)	18 city mean monthly wind speed/Normal	9.1 mph/9.5 mph; 17 th calmest of record (since 1936)
18 city mean monthly precipitation/Normal	0.91/0.86" – 106% normal; 54 th wettest of record (since 1880)	19 city mean monthly snow/Normal	9.1.6/9.0"; 58 th snowiest (since 1880)

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

Location	Mar	% of Norm	Rank	Pcntl	Oct 1 – Mar 31	% of norm	Rank	Pcntl	Years
Baker	0.38	61%			2.19	71%			13
Billings	0.68	61%	46	45	5.11	98%	73	71	102
Belgrade	0.82	80%	35	46	3.92	84%	32	42	74
Butte	0.61	73%	45	38	3.11	83%	43	36	117
Cut Bank	0.40	73%	54	51	1.80	74%	36	34	104
Dillon	0.47	89%	35	48	2.39	108%	40	56	71
Glasgow	0.52	111%	69	60	5.12	201%	104	93	112
Great Falls	0.42	42%	21	17	6.41	146%	110	92	119
Havre	0.84	120%	105	79	4.73	152%	120	92	131
Helena	0.41	65%	33	24	4.10	131%	86	64	133
Jordan	0.56	156%			4.47	174%			13
Kalispell	1.12	101%	80	68	9.95	128%	17	14	117
Lewistown	1.00	86%	68	58	5.35	102%	70	61	115
Livingston	0.42	44%	24	21	3.15	60%	26	23	108
Miles City	0.49	84%	62	46	2.08	59%	24	17	134
Missoula	0.80	83%	67	50	8.28	145%	116	88	131
Mullan Pass	5.45	174%	63	93	37.60	170%	67	96	70
Wolf Point	0.44	197%			2.14	114%			13
Glendive	0.98	172%	98	85	4.46	133%	98	87	112
Sidney	1.14	204%	69	96	6.02	173%	68	97	70
BZN-MSU	1.83	131%	107	81	6.86	107%	83	63	132

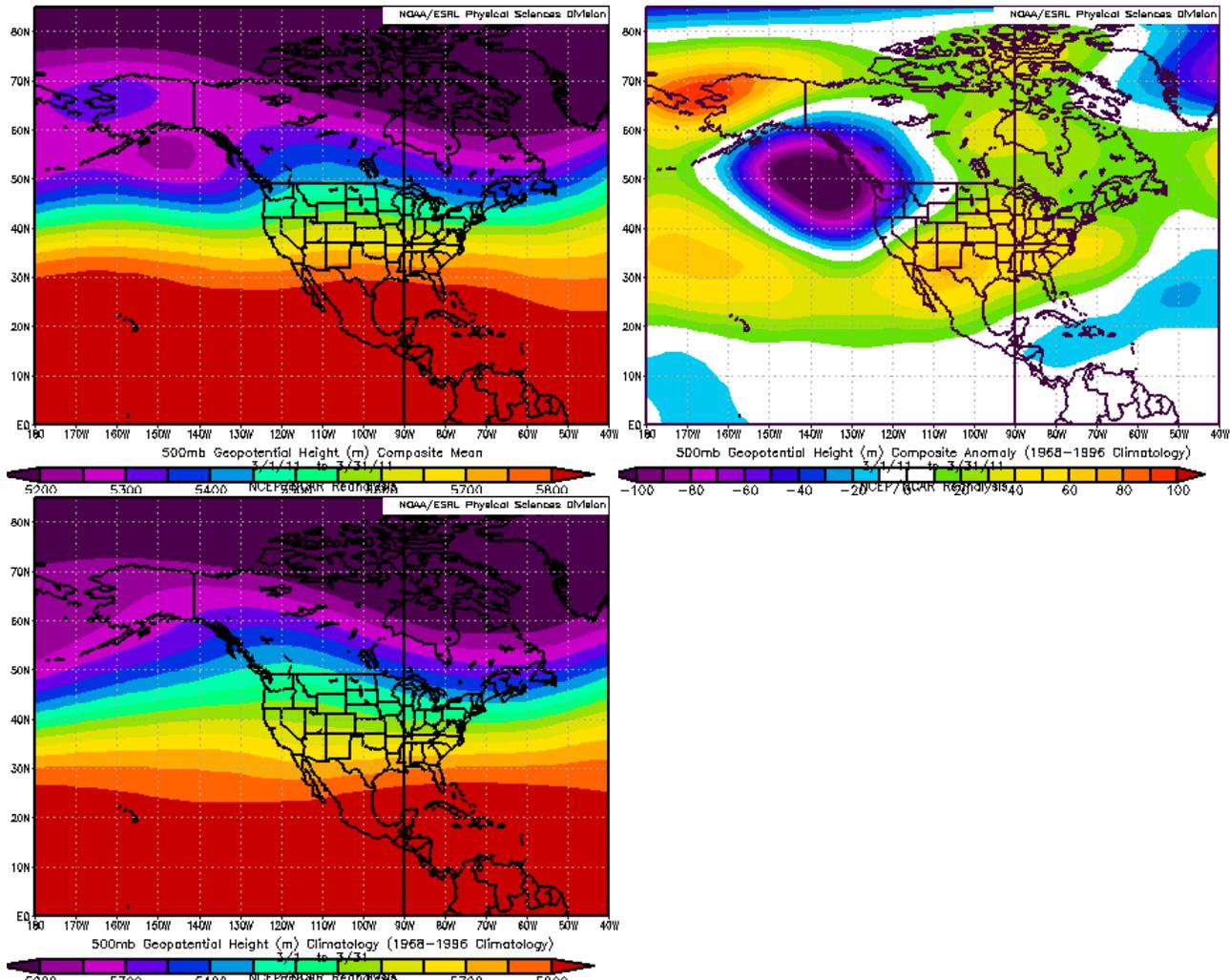
Rankings and Percentiles are 1=driest, higher numbers=wetter.

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>

For the water-year through March, temperatures have averaged below normal. The statewide average temperature was 26.6F, 2.4F below normal. This is the 28th coolest season of record, and the coolest water-year-to-date since 2000-01. The precipitation average of 6.40 inches is 0.33 inches above normal. This is the 52nd wettest water-year-to-date of record, and the wettest since 2006-07. Winds have averaged a bit above normal this water-year. The average of 9.0

mph is 0.2 mph below normal, and the 15th calmest of record. Snow has been a big story this winter. The statewide average of 75.8 inches from October through March is 22.9 inches above normal. This ranks as the sixth snowiest winter season of record, and the snowiest since 2008-09. Many locations across north central and northeast Montana have seen their snowiest winter of record.



Figures 2a (top-left), 2b (top-right) and 2c (bottom-right). Mean flow at 500 millibars (~18,000 ft) for March (top-left). A ridge of high pressure was over Montana (1a). Normally, the ridge is a little farther west (1c). This produced below normal heights across most of Montana in March (1b)

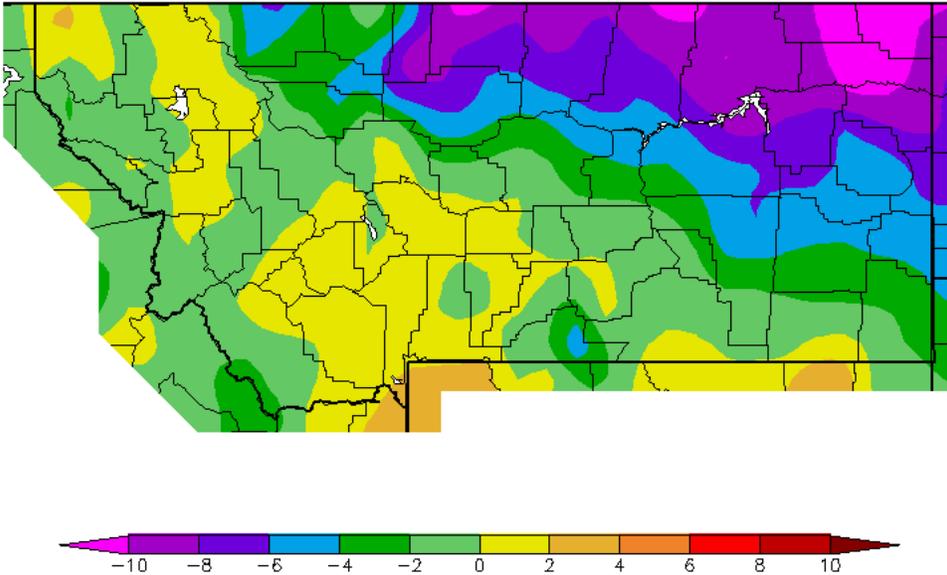


Figure 3. Temperature anomaly for March. Temperatures were much below normal north central and northeast, with areas of slightly above normal from the northwest through south central portions (Western Region Climate Center).

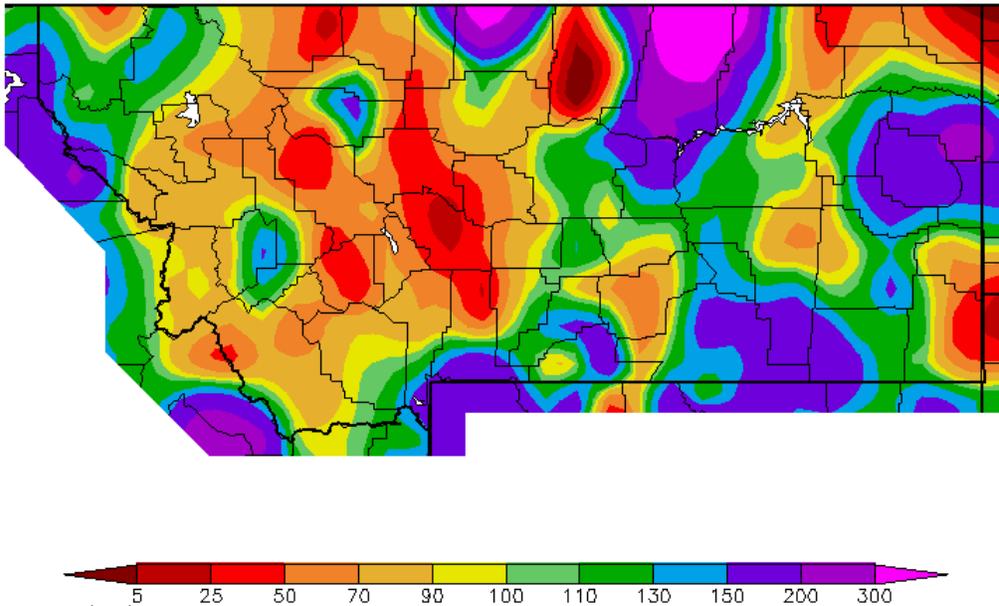


Figure 4. Precipitation anomaly (% of normal) for March. A large portion of western Montana received below normal precipitation portions (Western Region Climate Center).

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=tx&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=tx>. The climatological record for normals is 1971-2000. 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.