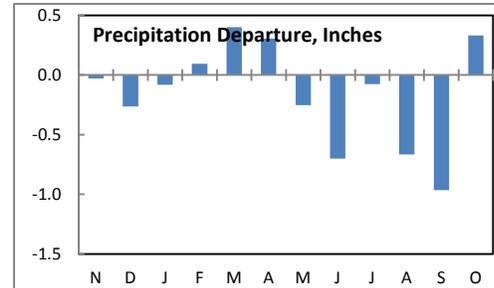
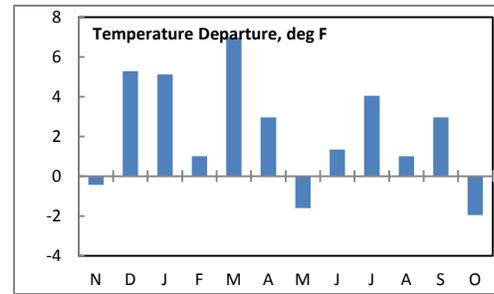


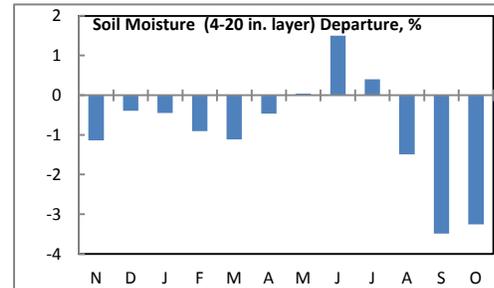
# Montana Weather/Precipitation Summary

October 2012 by NOAA's National Weather Service Great Falls Montana

Northwest flow aloft dominated the weather in Montana during October (Fig. 1). This pattern produced below normal heights aloft, which contributed to below normal temperatures across the state. Temperature anomalies ranged from near normal at Boulder, to six-degrees below normal over north central Montana and the extreme northeast (Fig. 2). This was the first month since May 2012 to record below average temperatures. As a statewide composite, for the past 12-months, there is a 2.2°F warm departure in average temperatures. Only three months in the past 12 have had temperature averages below normal (see temperature figure on right). The precipitation differences in the state, from north to south, is shown in Figure 3; the percentage of normal precipitation for the month. This figure illustrates that much of the south remained dry, with above normal precipitation across the north. The wettest area was in the West Yellowstone area. For the past 12-months, there is a 1.91-inch negative anomaly for the state.



One of the longest periods of record with no precipitation ended early in October. Many areas had received no precipitation since August 16<sup>th</sup>. Billings had 48 days with no measurable precipitation, their third longest period of no measurable precipitation of record. At Great Falls, a 47-day dry period was the second longest of record.



Even through much of northern Montana recorded above normal precipitation, soil moisture deficiencies continued. A composite of 30 locations across Montana shows the soil dryness (soil moisture figure on right). The average volumetric soil moisture value of 14.2% in October is the lowest October value since such records began in May 1995. Refer to NCD's State of the Climate report for the latest monthly discussion: <http://www.ncdc.noaa.gov/sotc/>.

## October 1-10

With the start of October, winds increased across the state. Gusts over 60 mph occurred along the Rocky Mountain Front, with a gust to 86 mph at Logan Pass on the first. The warmest temperatures of the month occurred on the second, ahead of a cold front. Havre and Huntley hit 83F, with Little Bighorn RAWs reaching 84F. Later in the day, up to two inches of snow fell near Condon Mountain (Lake) and a foot at Mount Lockhart (Teton). With this cold front, a lengthy streak of dryness ended across the state on the third. Many areas had no measurable precipitation since August 16<sup>th</sup>. This 47 to 48-day period was discussed earlier. On the second, precipitation began in the west and spread eastward with snow and rain falling across the east. Up to eight inches of snow fell at McLeod (Sweet Grass). Colder air behind the precipitation produced a series of record low temperatures across the state. Dillon set a record low on the fourth, dropping to 16F (old record was 19 in 1985). On the fifth, Missoula tied a record low of 22F (old record was 22 in 1981). Record lows were set at several locations on the sixth. Dillon dropped to 13F (old record 14 in 1974). Wisdom was -1F and Placer Basin, in the Beartooth Mountains, dropped to -7F for the month's lowest temperature. This was the coolest October temperature since 2005, and the earliest of record that Wisdom has recorded a sub-zero temperature. After the long period of little precipitation, a location near Red Lodge (Carbon), received 3.50-inches of precipitation from the third through ninth.

## **October 11-20**

Windy conditions prevailed mid-month, with mild temperatures. Precipitation was a little more scattered, too. Warm air on the 12<sup>th</sup> produced a high temperature of 81F at Huntley. Windy conditions prevailed along the Rocky Mountain Front. Logan Pass recorded a gust to 77 mph on the 12<sup>th</sup>, 72 mph on the 13<sup>th</sup>, and 84 mph on the 14<sup>th</sup>. Very warm air ahead of another cold front caused the temperature to fall to only 51F at Kalispell on the 15<sup>th</sup>. This was the warmest low temperature of record for the date. Meanwhile, heavy rain was falling along the western border. Mullan Pass received about  $\frac{3}{4}$ -inches of precipitation. A strong cold front brought very strong winds and isolated thunderstorms to the state on the 16<sup>th</sup>. The highest gust over lower elevations was 87 mph near Millegan (southern Cascade); Logan Pass had a gust of 90 mph. Winds to 85 mph were recorded south of Malta (Phillips), with gusts over 60 mph across most regions of the state. Bozeman had a gust of 48 mph, their fourth highest October gust of record, and the highest October gust since 1999. Dillon had a gust of 60 mph, which set a new October record. The old record was 55 mph set in 1933 and 2008. Thunderstorm winds blew down trees and blocked US 287 between Sheridan and Alder (Madison), while dime-size hail was reported east of Townsend (Broadwater). Meanwhile, heavy rain fell over parts of west of the divide. Heron (Lincoln) picked up 2.1-inches of rain in a 24-hour period, while one- to two-inch amounts were common at several points west of the divide. Strong winds returned on the 19<sup>th</sup> and produced gusts to 72 mph at Two Medicine (Glacier).

## **October 21-31**

Another significant weather system brought heavy snow to the Rockies and adjacent plains on the 22<sup>nd</sup> and 23<sup>rd</sup>. Nearly a foot of snow fell in the Bitterroots, with nine-inches at Hungry Horse (Flathead) and six-inches near Heart Butte (Pondera). Temperatures remained below freezing across north-central Montana from the 23<sup>rd</sup> through 25<sup>th</sup>. The leading edge of the cold air brought strong thunderstorms to central Montana on the 23<sup>rd</sup>. On the 25<sup>th</sup>, in the cool air, Lewistown reached only 21F, setting a daily record for the coolest maximum temperature (old record 25F in 1951). Sub-zero temperatures were again felt in the state on the 26<sup>th</sup>, when West Yellowstone fell to -1F. Changeable weather conditions brought heavy snow to western Montana on the 27<sup>th</sup>. Condon (Missoula) measured seven-inches, while Essex (Flathead) picked up six-inches of snow. A brief period of freezing rain was observed over portions of north central Montana on the 28<sup>th</sup>. Another round of precipitation occurred in western Montana on the 27<sup>th</sup> and 28<sup>th</sup>. Missoula measured nearly  $\frac{1}{2}$ -inch of precipitation with 1.5-inches of snow. The end of the month brought a wide range in temperatures. A cold front moved into north central Montana, keeping temperatures in the 30s during the day, while southwest portions of the state warmed into the 60s. Some patches of freezing drizzle occurred along the hi-line.

## **Precipitation/convection**

Severe convective weather occurred on one day in October. The normal for the month is zero days.

**October summary information:**

<b>High Temperature</b>	84°F at Little Bighorn (2 <sup>nd</sup> ) (Big Horn)	<b>Greatest Precip</b>	10.81" at Noxon 9NNW (Sanders)
<b>Low Temperature</b>	-3°F at Blackfeet (26 <sup>th</sup> ) (Glacier)		11.00" at Poorman Creek SNOTEL (Lincoln)
<b>Warmest Ave Temp</b>	47.1°F at Thompson Falls (Sanders)	<b>Peak Wind Gust</b>	87 mph at Millegan (16 <sup>th</sup> ) (Cascade) 90 mph at Logan Pass (16 <sup>th</sup> )
<b>Coollest Ave Temp</b>	34.6°F at Wisdom (Beaverhead)		
<b>Range of Temp departures</b>	-6.4°F at Cut Bank (Glacier) to +0.1°F at Boulder (Jefferson)	<b>Highest Ave Wind</b>	14.8 mph at Livingston (Park) 17.8 mph at Deep Creek (Glacier)
<b>21 city mean monthly Temperature/Normal</b>	42.0/44.0F 2.0F below normal. 22 <sup>nd</sup> coolest of record (since 1880) 17 <sup>th</sup> percentile.	<b>20 city mean monthly wind speed/Normal</b>	9.0 mph/8.9 mph; 35 <sup>th</sup> windiest of record. (since 1936) 55 <sup>th</sup> percentile
<b>22 city mean monthly precipitation/Normal</b>	1.42/1.09" – 130% of normal; 20 <sup>th</sup> wettest of record. (since 1880) 84 <sup>th</sup> percentile		

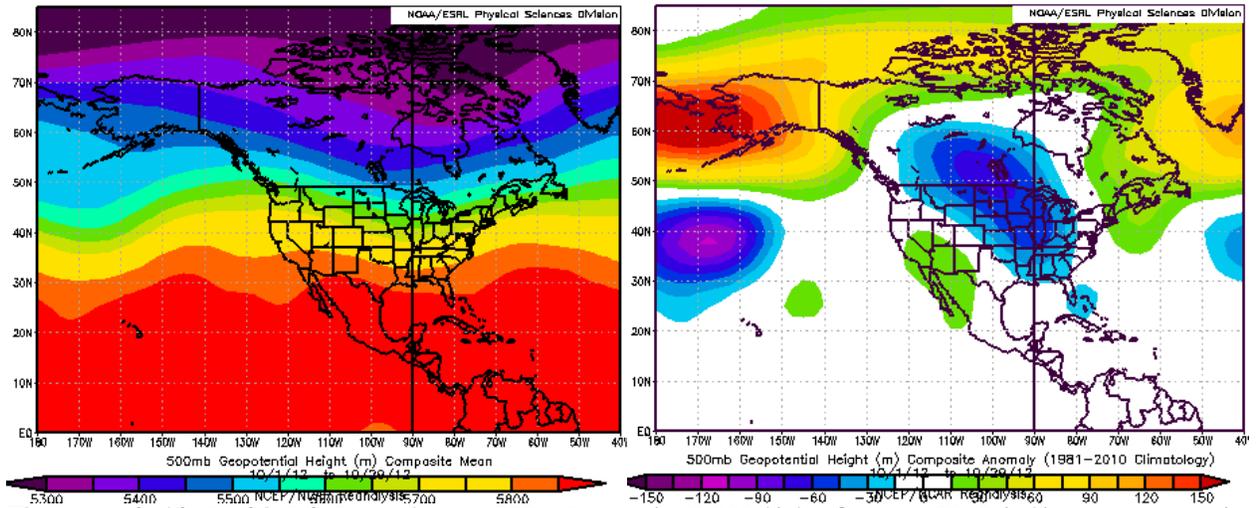
For the calendar-year-to-date, the mean temperature is 49.1, 2-2°F degrees above normal. This is the 9<sup>th</sup> warmest of record, and the warmest such period since 1992. Calendar-year-to-date precipitation has averaged 11.40-inches, 1.63-inches below normal. This is the 22<sup>nd</sup> driest of record, and the driest since 2000. Year-to-date winds have averaged 8.8-mph, 0.2-mph below average. This is the 19<sup>th</sup> calmest.

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

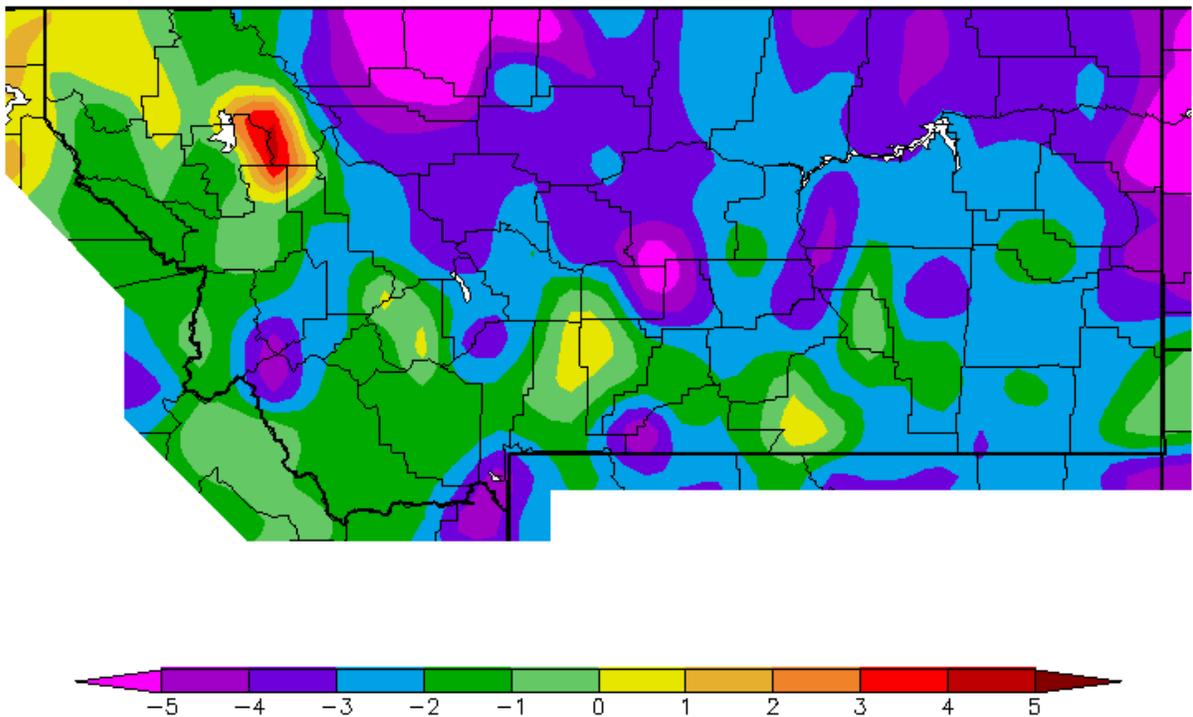
Rankings and Percentiles are 1=driest, higher numbers=wetter.

For an automated version of this chart, updated daily, go to

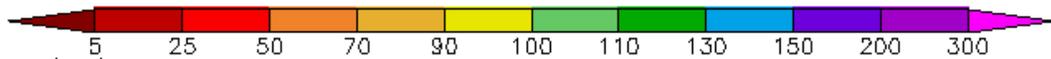
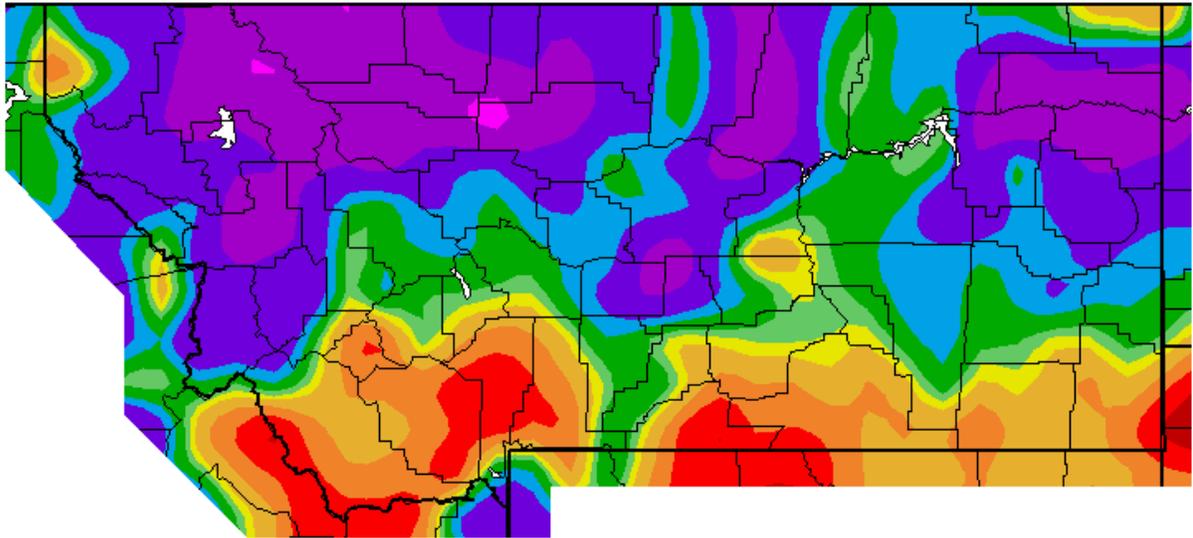
<http://www.wrh.noaa.gov/tfx/dx.php?wfo=tfx&type=&loc=products&fx=PCPNTOTALS>



**Figure 1a (left); 1b (right).** Mean flow at 500 millibars (~18,000 ft) for October 2012 (left) and anomaly (right). Heights across Montana were below normal. This contributed to the cooler than normal temperatures.



**Figure 2.** October 2012 Temperature anomalies (Western Region Climate Center).



**Figure 3.** October 2012 Precipitation anomalies (Western Region Climate Center).

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