Montana Weather/Precipitation Summary

August 2009 by NOAA's National Weather Service Great Falls Montana

The first half of August was very active weather-wise. A series of weather disturbances caused nearly daily thunderstorm activity in some corner of the state. With ample moisture, some of these storms dumped very heavy rainfall with local flooding. By mid-month, the weather settled down and temperatures warmed as high pressure aloft took hold. Some of the warmest temperatures were recorded around the 21st through 23rd.

Temperatures have averaged on the cool side most areas east of the divide, with readings slightly above normal west of the divide (Fig. 1). This was consistent with a ridge of high pressure over the western US, with was slightly stronger than normal for August. A trough of low pressure persisted over the Great Lakes region (Fig. 3).

Precipitation was mostly above average for the month, except in north central Montana (Fig 2). Lambert recorded the greatest amount for the month at lower elevation sites (4.70 inches).

Aug 1-5
From the 1st through 5th, temperatures averaged above normal. During this period, thunderstorms were very isolated. Even so, half-dollar size hail was reported near Acton on the 4th and golf-ball size hail at Eureka on the 5th. The warmest temperatures of the month occurred. Thompson Falls hit 99F on the 1st while Yaak Hill and Libby were 100F.

Aug 6-10
As in July, the 6th brought some of the most widespread severe weather to the state. Very heavy rainfall was the highlight. Over six inches of rain fell in the Little Rockies, with flooding reported. Large hail (up to golf ball size) was reported near Big Timber and Reed Point, with baseball size hail reported at Wise River. Again, heavy rains fell near Browning (2 inches) and Butte (one inch in 30 minutes). Wind gusts to 68 mph were reported near Winston. As this complex moved south of Kings Hill, a microburst occurred flattening trees along US89. The severe weather continued, but was not quite as widespread on the 7th through 9th. On the 7th, golf-ball size hail fell in the Birney and Otter areas, with wind gusts to 58 mph at Miles City. Heavy rain fell near Hysham (2.5 inches), west of Choteau (2.3 inches), and south of Roy (2.25 inches). Locally heavy rain fell across Golden Valley, Musselshell and Yellowstone Counties on the 7th, with 1.25 inch hail at Alzada. Very isolated heavy rains occurred on the 9th. Up to 3.5 inches was reported near Shelby, again with local flooding. Temperatures were cooler than normal during this period.

Aug 11-15
Temperatures started out on the warm side, with Sidney reaching 97F on the 12th, but a cold front brought renewed precipitation and cooler weather by the 13th. With thunderstorms on the 13th and 14th, wind gusts to 65 mph were reported at Weldon. One inch hail fell at several locations, including Mildred, Hoyt and Froid. Heavy rain again accompanied some of the storms. Hillside (Garfield Co) recorded three inches of rain on the 14th. Colder air behind a cold front brought light snow to the higher elevations of Glacier National Park on the 14th. Up to 2 inches of snow fell at Swift Current (north of Logan Pass). Strong thunderstorms in the southwest produced some hail and a new daily precipitation record at Bozeman on the 14th. Very strong winds behind the cold front caused wind gusts to near 50 mph in the Chester area on the 15th.

Aug 16-23
With a cool start, this period produced more tranquil weather and more normal temperatures. Mystic Lake was 22F on the 16th, but with warmer air, thunderstorm became scattered across the area on the 21st-23rd. Ahead of a cold front, Dillon and Bozeman both reached new record high temperatures on the 21st. This same front produced thunderstorm with ping pong ball size hail at Philipsburg and 1.25 inch hail at Drummond. Isolated thunderstorms in central Montana on the 22nd produced 7/8 inch hail near Judith Gap and golf-ball size hail southeast of Lewistown. Severe weather was confined to extreme eastern Montana on the 23rd, with cooler and drier air

across the rest of the state. The Circle area reported hail to 1.5 inches and Sidney reported 1.25 inch hail, along with very heavy rain – nearly 3 inches of rain fell northwest of Sidney in less than 3 hours, producing local flooding.

Aug 24-31

The last week of August brought slightly above normal temperatures, and generally dry conditions. On the last two days, a stronger storm system moved into the area, first bringing a round of thunderstorms to western Montana. Some significant rain fell over the Bitterroot and Sapphire Ranges of western Montana. Up to three-quarters of an inch was reported. Severe thunderstorms occurred over far southern Beaverhead County, with a gust to 58 mph at Monida on the 30th. Again on the 31st, a few thunderstorms developed across southern Montana, but no severe weather was reported. The departure from average greenness map (Fig. 4) showed large portions of Montana having higher than normal greenness values for late August. Comparing July to August, some areas of the state have improved.

New Temperature Records for Aug 2009

Station	Record Type	New Record	Date	Previous Record	Year of Previous Record
Cut Bank	Low Daily Max	63	7	63	1973
Wisdom	Low Daily Max	60	7	61	1974
Missoula	Low Daily Max	64	13	66	1978
Chester	Low Daily Max	58	14	64	2005
Boulder	Low Daily Max	60	15	61	1987
Boulder	Low Daily Max	61	16	61	1960
Big Sky	High Daily Max	88	21	86	1991
Bozeman	High Daily Max	97	21	93	1969
Dillon	High Daily Max	95	21	95	1960
Ennis	High Daily Max	96	21	93	1919
Townsend	High Daily Max	94	21	94	1995

Precipitation

Severe weather was recorded on 12 days in August, the normal is 8 days.
Precipitation was generally above normal across the state. The north central portions came up dry, with Cut Bank recording their 3rd driest August of record with only 0.04" of rain. This was the driest August since 1982. The wettest area was in the Culbertson through Sidney areas, which had over three times their normal August rainfall (Fig. 2). The heavy precipitation in northeast Montana brought improvements to the crop-year precipitation. Even so, some areas remain dry with less than 70 percent of normal across the northwest and north central portions of the state (Fig. 5).

New Precipitation Records for Aug 2009

Station	Record Type	New Record	Date	Previous Record	Year of Prev Record
Bozeman	Daily Maximum Rainfall	0.90 inches	6	0.54 inches	1974
Butte	Daily Maximum Rainfall	0.97 inches	6	0.41 inches	1894
Cascade 20SSE	Daily Maximum Rainfall	1.41	7	0.50	1975
Missoula	Daily Maximum Rainfall	2.03	7	0.44	1999
Bozeman	Daily Maximum Rainfall	0.45	14	0.39	1972

Other Information

As a whole, the state recorded its 7th calmest August of record. At Bozeman, the calmest August of record occurred. The average wind speed was only 5.0 mph. the average is 6.4 mph. For the

water-year-to-date, Butte has also had their calmest period of record. Winds have averaged 5.1 mph while the average is 6.2 mph.

For the summer season just ended, Bozeman recorded their wettest summer since 1997. This summer, 6.09 inches of rain fell from June through August. At Dillon, it was the 7th coolest summer of record and the coolest summer since 1987. At Great Falls, it was the 10th coolest summer and the coolest summer since 2004.

August summary information:

High Temperature	101°F at Yaak and Libby (1st)	**Greatest Precip**	4.70" at Lambert
Low Temperature	22°F at Mystic Lake (16th)		
Warmest Ave Temp	70.5°F at Miles City and Hardin	**Peak Wind Gust**	68 mph at Winston (6th) 75 mph at Logan Pass (10th)
Coolest Ave Temp	56.2°F at West Yellowstone		
Range of Temp departures	-4.8°F at Glendive to +2.2°F at Troy	**Highest Ave Wind**	12.1 mph at McDonalds DOT (northeast)
18 city mean monthly Temperature / Normal	Aug: 62.1/63.0 coolest since 2005. WY: 39.5/39.9 coolest since 2002.		
18 city mean monthly precipitation / Normal	1.68"/1.41" – 119% of normal WY: 12.41/13.27 - 46th driest	**18 city mean monthly wind speed / Normal**	Aug: 7.7 mph/8.5 mph 7th calmest WY: 8.6/9.3 - 6th calmest

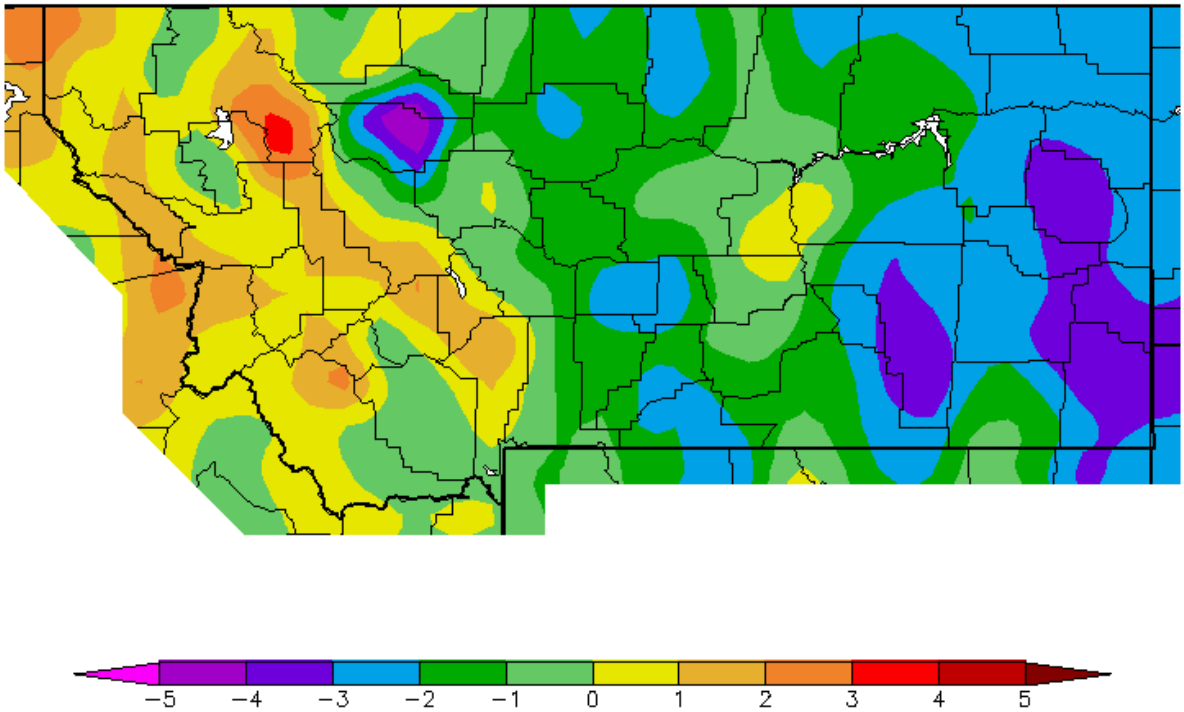

Figure 1. Average temperature departure from normal for August 2009. Temperatures were below normal across most of eastern Montana. Above normal temperatures were mainly west of the continental divide (Western Region Climate Center).

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

Location	Aug	% of Norm	Rank	Pcntl	Oct 1 – Aug 31	% of norm	Rank	Pcntl	Years
Baker	1.91	197%			13.82	132%			11
Billings	1.20	141%	87	86	11.31	84%	57	57	100
Belgrade	2.15	189%	68	93	12.62	95%	35	48	72
Butte	2.88	212%	112	97	12.89	110%	77	67	115
Cut Bank	0.04	2%	6	5	4.79	42%	5	4	101
Dillon	1.08	100%	45	64	9.35	104%	44	63	69
Glasgow	2.21	177%	93	82	11.26	110%	58	53	109
Great Falls	1.01	61%	61	51	13.97	102%	70	59	117
Havre	1.08	90%	73	56	8.26	79%	26	20	129
Helena	1.86	144%	114	88	9.96	97%	59	45	131
Jordan	1.43	96%			11.54	109%			11
Kalispell	1.16	93%	79	68	15.10	94%	54	47	114
Lewistown	1.33	70%	63	55	12.66	77%	24	21	113
Livingston	1.97	146%	91	86	13.57	96%	58	56	103
Miles City	1.93	166%	112	85	11.21	91%	57	43	132
Missoula	3.08	268%	128	98	13.58	107%	82	66	123
Mullan Pass	2.32	153%	56	80	29.78	89%	11	15	67
Wolf Point	1.91	138%			8.80	82%			11
Glendive	3.46	245%	107	94	13.30	108%	65	61	106
Sidney	1.00	76%	29	41	13.24	103%	43	63	68
BZN-MSU	1.74	118%	101	76	18.11	104%	88	71	124

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

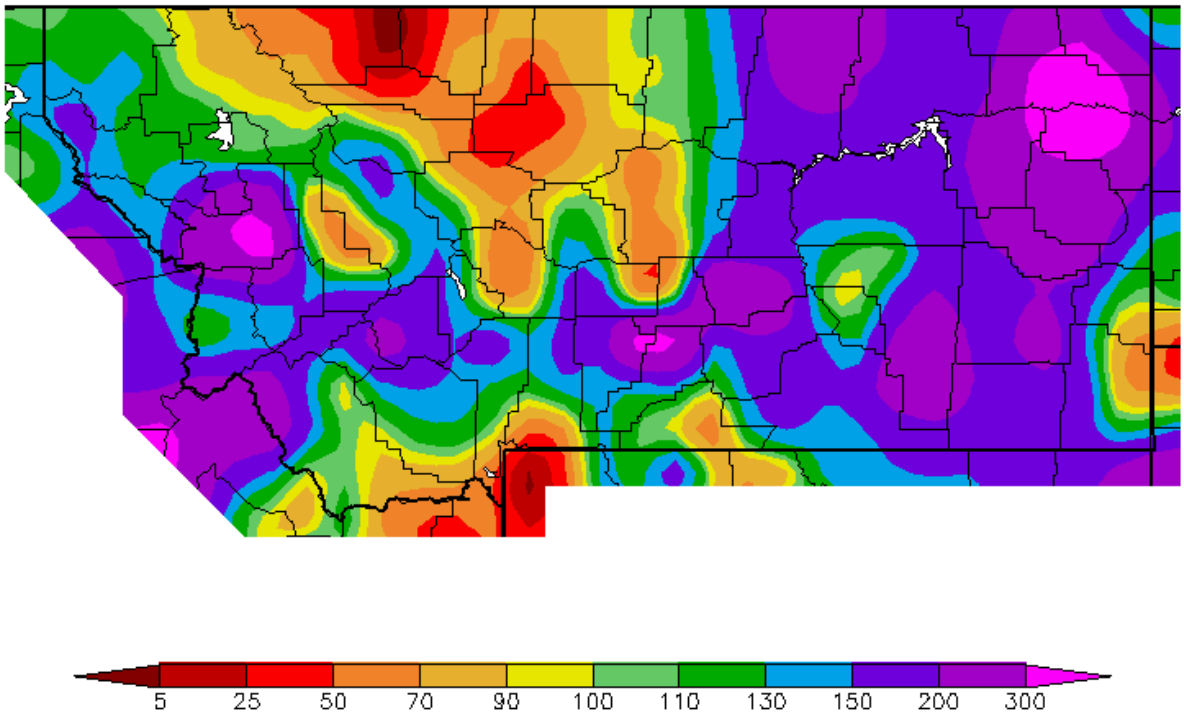

Figure 2. Precipitation anomaly (% of normal) for August. (Western Region Climate Center).

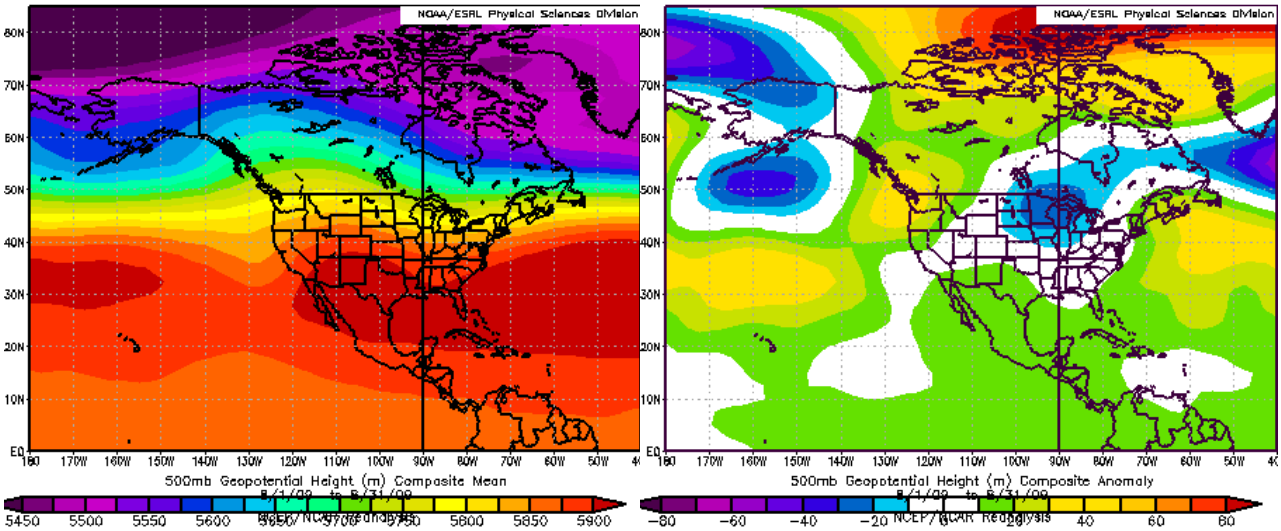

Figure 3. August 2009 mean flow at 500 mb (18000 ft) (left) with the departure from normal (right).

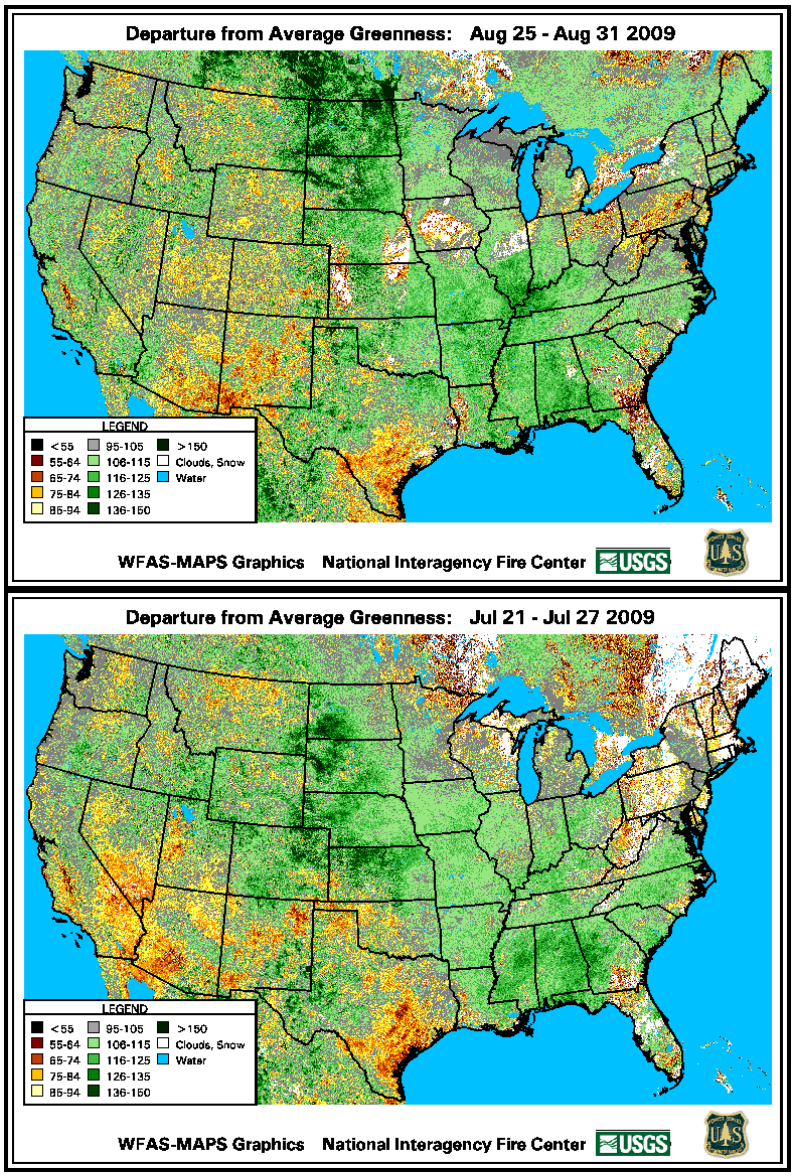

Figure 4. Departure from average greenness. Late August (top), late July (bottom).

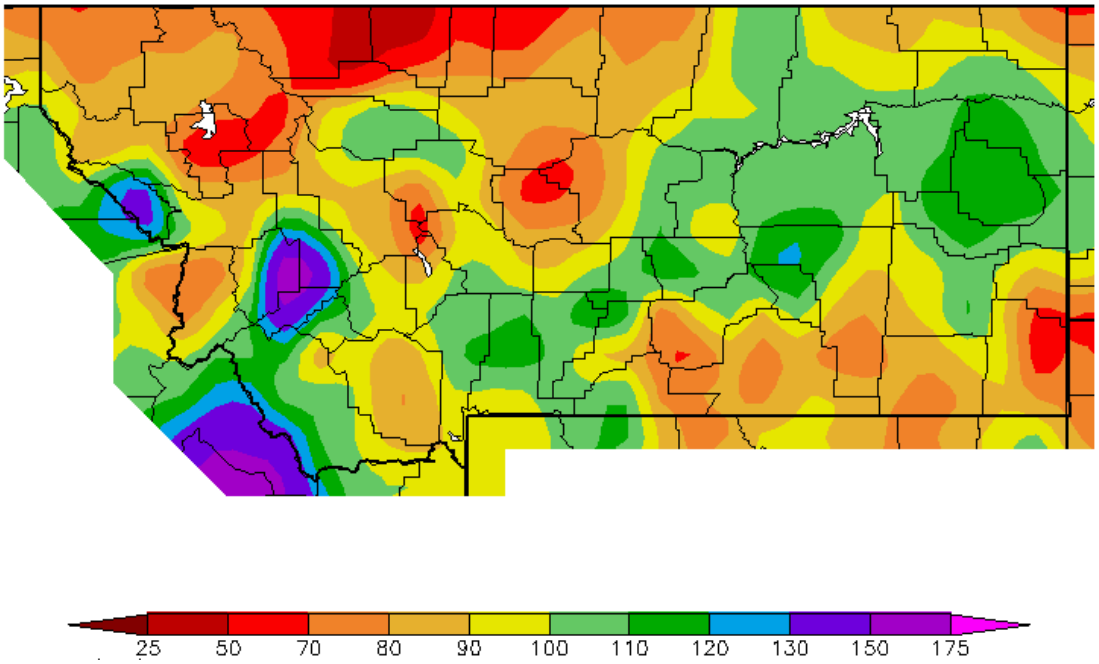

Figure 5. Precipitation percentage of normal for the Crop Year (Apr 1 – Aug 31) (Western Region Climate Center).

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 accessed 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