Montana Weather/Precipitation Summary

July 2007 By NOAA's National Weather Service Great Falls Montana

July in Montana was probably not only the hottest July of record, but also the warmest month of record. Though July 2006 is a memory, it too, was very hot – one of the hottest Julys since 1936. July 2007 was also dry in many areas. Some areas reported little or no precipitation, and one of their driest Julys of record. Many areas ranked as one of the 10 driest Julys (Figure 2). The state remained under a persistent, stronger-than-normal high pressure ridge during the month (Figure 1). This strongly contributed to the record heat.

In reference to the heat, temperatures ranged as high as 11 degrees above normal for the month. Some sort of warmth record was set on over 23 days during July. The list of records set is too long to include here. Some locations reported their warmest all-time temperatures during July. Missoula reached 107, Bozeman Airport hit 106, and Sweet Grass reached 105 on the 6th, their warmest of record. Fort Assinniboine also reached 107 on the 23rd, equaling their all-time high temperature. Neihart reached 97, also equaling their all-time warm temperature. Cut Bank warmed to 106F on the 6th, their first reading over 100F since August 1983. July 6th was likely one of the hottest days in Montana. At the larger cities across the state, high temperatures averaged 102.1F.

Missoula and Bozeman exceeded their record for the number of days over 100F in a year. Missoula recorded 11 days in July and Bozeman Airport had 16 in June and July. Cut Bank also set a record for consecutive days of 90 or higher. A 13 day stretch from the 12th-24th broke the old record of 10 days last set in July 1985. The warmest temperature during July was 111F at Glendive on the 23rd and Wolf Point on the 24th. The 111F at Glendive on the 23rd set a new daily statewide record for the date. The state's warmest temperature was over 100F on 22 of the 31 days. Cool spells were rare. The state's coolest temperature was 31F at Placer Basin on the 3rd and at Gates Park on the 4th.

Severe weather occurred on 16 days. The average for July is 10 days. Severe thunderstorms brought hail and strong winds to central and northeast Montana on the 1st and 2nd. Baseball-size hail fell in the Lewistown vicinity on the 2nd. Severe thunderstorms with locally heavy rain and high winds occurred on the 7th and 8th. Major flooding occurred in the Billings area, along with 85 mph winds on the 7th. On the 9th, a strong Canadian cold front swept down along the Rocky Mountain front, producing gusts to 70 mph at Farmington. With another system along the North Dakota border, baseball size hail fell near Baker. From the 16th through 20th, daily severe thunderstorms brought wind damage to some spot in eastern Montana. On the 18th, a series of severe thunderstorms ripped across the Flathead Lake area causing major wind damage. The occasional thunderstorm produced lightning that started several fires across the state. On the 23rd, a line of severe thunderstorms produced the strongest wind gust for the month, Mud Lake (near Havre) recorded a gust to 89 mph. On the 30th, small collapsing thunderstorms produced fires and strong gusty winds in the Great Falls vicinity. Smoke from fires across western Montana blew eastward and significantly reduced visibilities in central Montana on the evening of the 31st. See Figure 3 for the smoke plumes.

With temperatures much above normal, the statewide average was around 75.6F, about 8 degrees above normal, and the warmest July of record. The previous record was in July 1936. Montana did stand out as much warmer than normal when compared with the western US (Figure 4). Winds were on the lighter side, many locations recorded average wind speeds among their 10 calmest Julys of record. Helena did record their calmest July of record (records began in 1880). Underscoring the intense heat and dryness of the month, in western Montana, some rivers were at or near record low flows at the end of the month.

In spite of the wet conditions of this spring, soil conditions did warm and dry faster than in previous years. Figure 5 shows that the soil moisture and temperature conditions have warmed much faster and dried much faster than an average of the past 4 years. The warmth of the year, especially July shows up in the average January through July air temperature over Great Falls at 10000 feet above sea level. This year has the warmest average since records began in 1948 (Figure 6).

Month's summary information:

High Temperature	111°F at Glendive (23rd) and Wolf Point (24th)	**Greatest Precip**	4.62" at Rapelje
Low Temperature	31°F at Placer Basin (3rd) and Gates Park (4th)		
Warmest Ave Temp	81.5°F at Glendive and Miles City	**Peak Wind Gust**	89 mph at Mud Lake (23rd)
Coolest Ave Temp	65.3°F at Big Sky		
Range of Temp departures	5.0°F at Culbertson to 11.2°F at Missoula	**Highest Ave Wind**	11.3 mph near Livingston
Average Monthly Temperature of 14 cities	75.7°F	**Average Monthly wind of 14 cities**	7.2 mph
Normal temp	67.0°F	**Normal wind**	8.6 mph

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

Location	Jul	% of Norm	Rank	Pcntl	Oct 1 – Jul 31	% of norm	Rank	Pcntl	Years
Baker	0.99	70%			13.42	141%			9
Billings	1.63	127%	80	81	15.07	120%	85	87	98
Belgrade	0.11	9%	3	4	11.89	98%	44	67	66
Butte	0.58	39%	31	27	10.62	103%	62	55	112
Cut Bank	0.08	5%	7	7					99
Dillon	1.78	156%	59	87	10.50	133%	56	84	67
Glasgow	0.68	38%	28	25	14.11	157%	95	89	107
Great Falls	0.13	9%	6	5	10.85	90%	45	39	114
Havre	1.22	81%	66	52	10.99	119%	86	68	127
Helena	0.31	23%	21	16	8.93	99%	57	44	129
Jordan	0.97	58%			13.31	146%			7
Kalispell	0.60	43%	33	29	10.98	74%	65	58	113
Lewistown	2.03	97%	70	63	16.13	111%	79	71	111
Livingston	1.11	82%	55	53	14.32	112%	78	77	101
Miles City	0.11	7%	4	3	11.04	99%	70	54	130
Missoula	0.03	3%	4	3	10.84	94%	48	39	122
Mullan Pass	0.02	1%	4	6	41.53	129%	54	83	65
Wolf Point	1.15	57%			11.83	126%			9
Glendive	1.63	90%	60	54	10.56	97%	48	46	104
Sidney	0.98	46%	18	27	8.87	77%	17	26	66
BZN-MSU	0.63	44%	32	25	21.54	135%	119	96	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

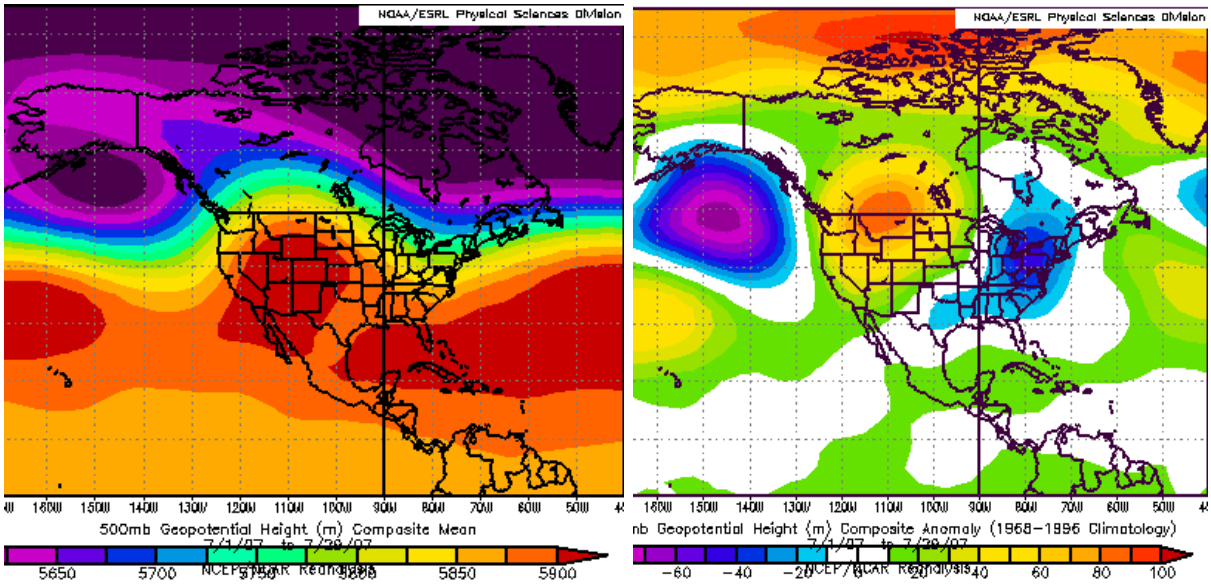

Figure 1. Mean flow at 500 millibars (~18,000 ft) July 2007 (left). The ridge was anchored over the intermountain area, with above normal heights centered over Montana.

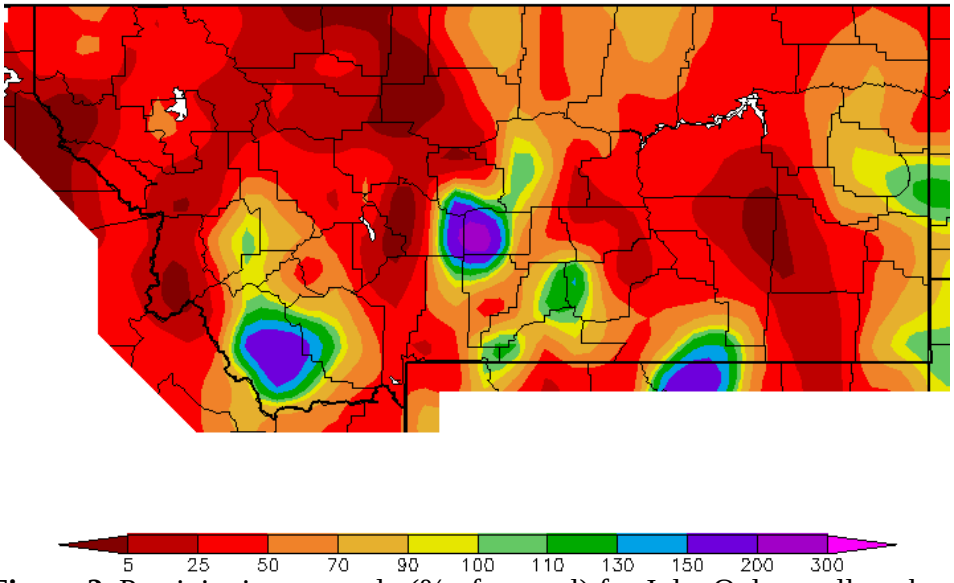

Figure 2. Precipitation anomaly (% of normal) for July. Only small pockets of above normal precipitation occurred. Most of the state was below to much below average (courtesy Western Region Climate Center).

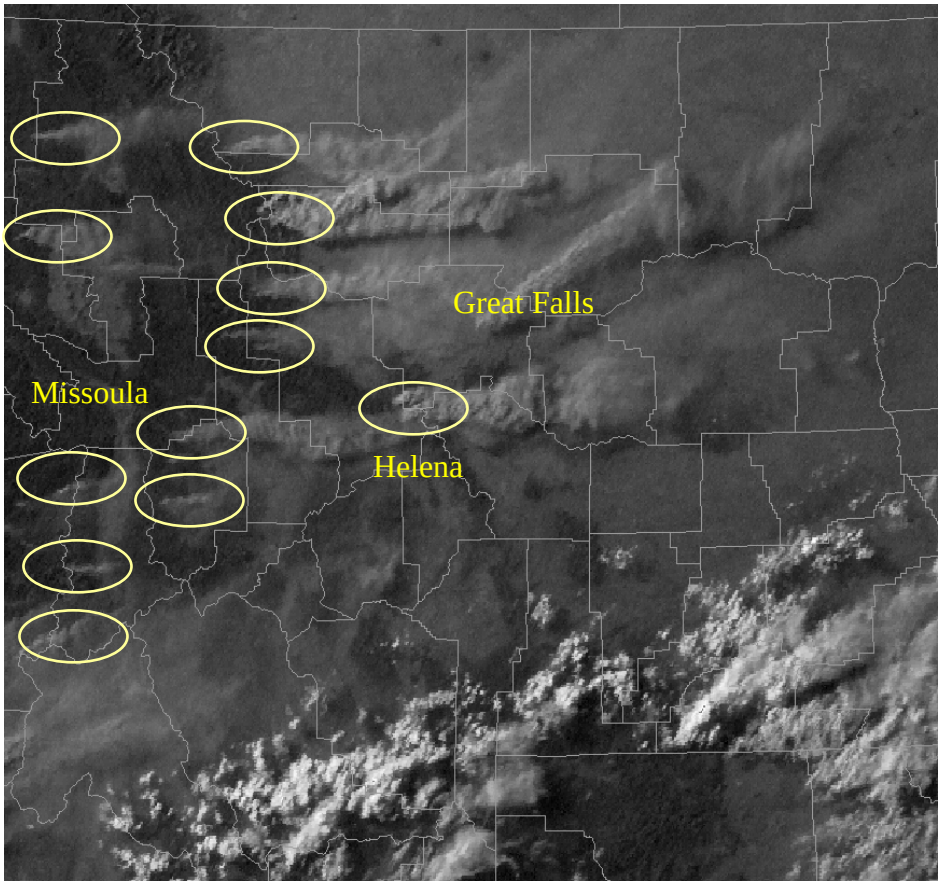

Figure 3. Visible satellite image from July 31 2007 at 716 pm MDT. Note the many smoke plumes and their spread across western and central Montana. Yellow ovals show locations of several fires across western Montana.

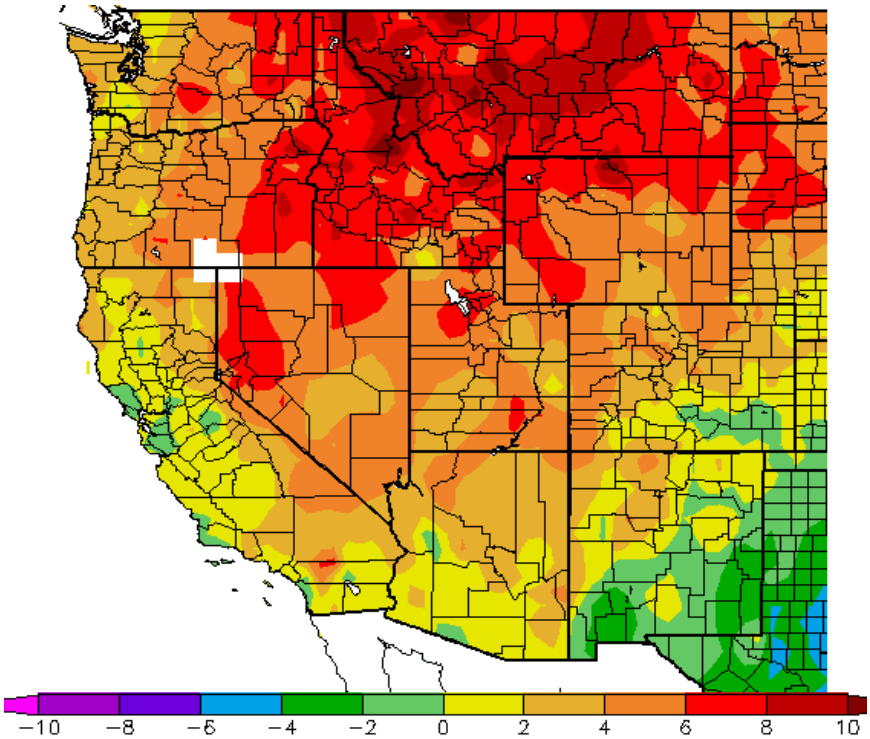

Figure 4. Mean July temperature departure from normal for the western United States. (courtesy Western Region Climate Center).

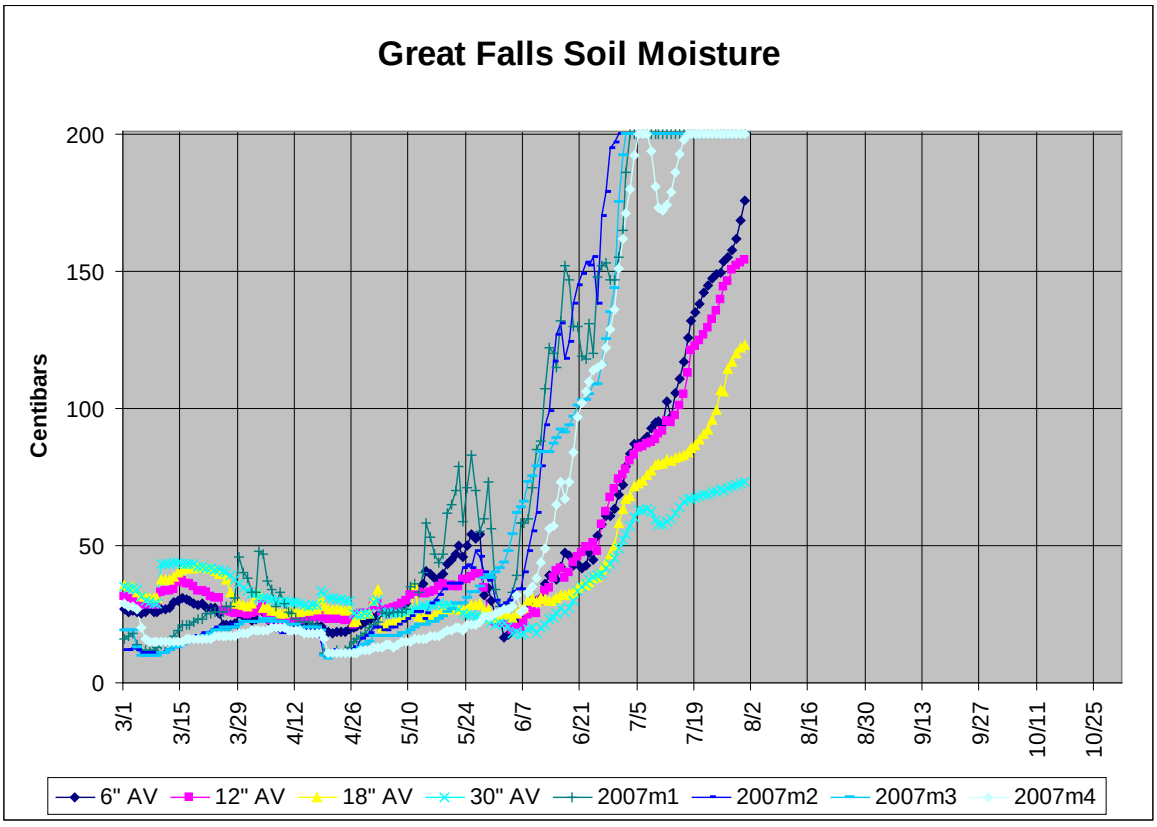

Figure 5. Plot of measured and average (4 year) soil moisture at Great Falls. The thicker lines are the average conditions, while the thinner lines are the values for 2007. Note how the moisture dried out even at the 30 inch depth by July 4. The shallower layers even dried out about one month earlier than the 4-year average.

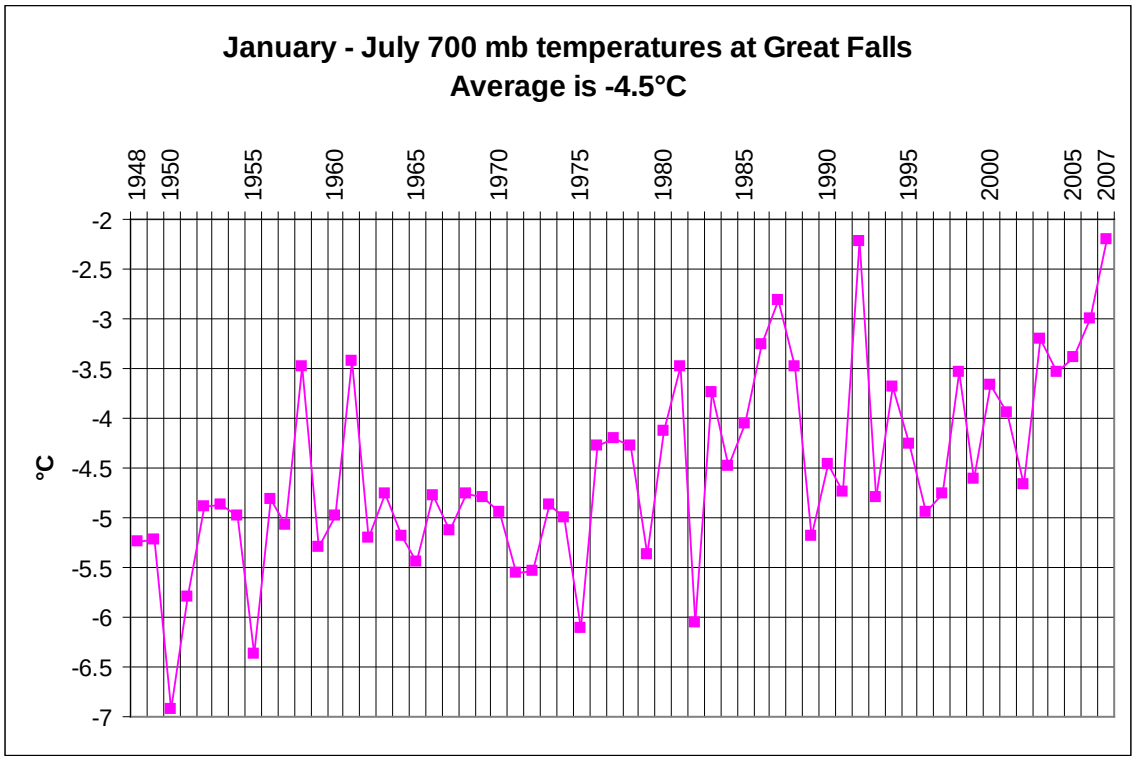

Figure 6. 700 mb (10000 feet above sea level) air temperature at Great Falls. Records began in 1948. 2007 has the warmest average at -2.2°C.

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

All reported data is preliminary. 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