



727 Hardin Hall
 3310 Holdrege Street
 Lincoln, NE 68583-0997
 402 472-6706
 Fax 402 472-8763
<http://hprcc.unl.edu>



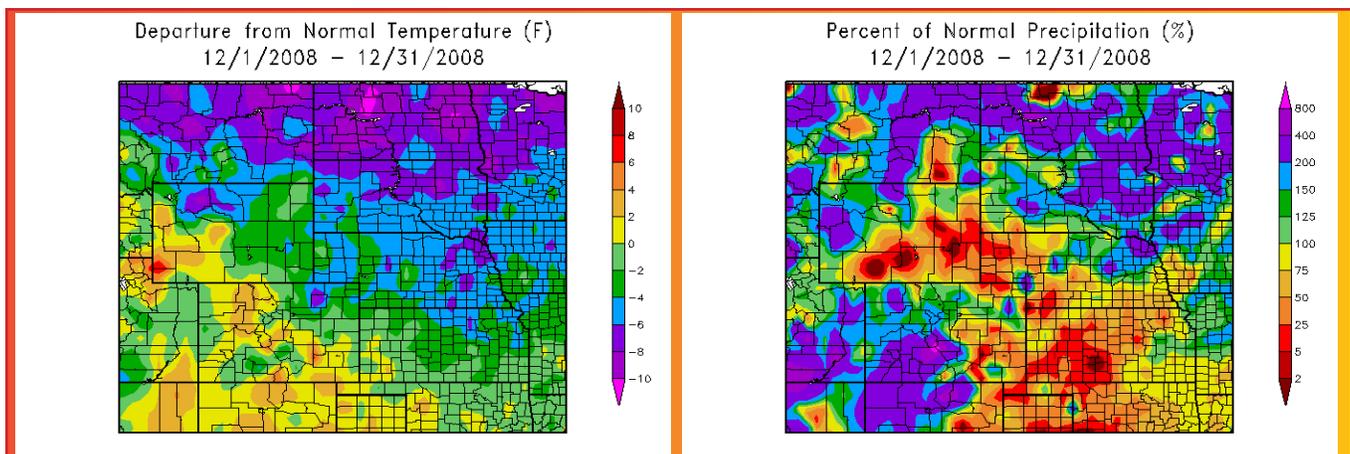
The view just after sunset, December 15, 2008, from Hardin Hall. - Photo by Ken Dewey
<http://www.nebraskaweatherphotos.org>

December 2008 Climate Summary

Region Breakdown

While November was warmer than normal across the region, December was below normal for most of the region. The monthly average temperature departures from normal generally ranged from -2°F to -6°F , however several locations exceeded 8°F below normal. Many stations recorded average temperatures that ranked in the top 10 for coldest Decembers on record. Record setting locations include Grand Forks International Airport, ND, Redfield, SD, Cody Municipal Airport, WY, and Lincoln, NE. With the 4th coldest December on record, Grand Forks International Airport had an average temperature of 5.1°F . Redfield had an average temperature of 9.8°F which was the 5th coldest December on record. Cody Municipal Airport recorded its 8th coldest December on record with an average temperature of 18.5°F and Lincoln recorded its 9th coldest December with an average temperature of 23.0°F .

Areas that have been experiencing an ongoing drought had little relief this month, however other locations across the region received record snowfall.



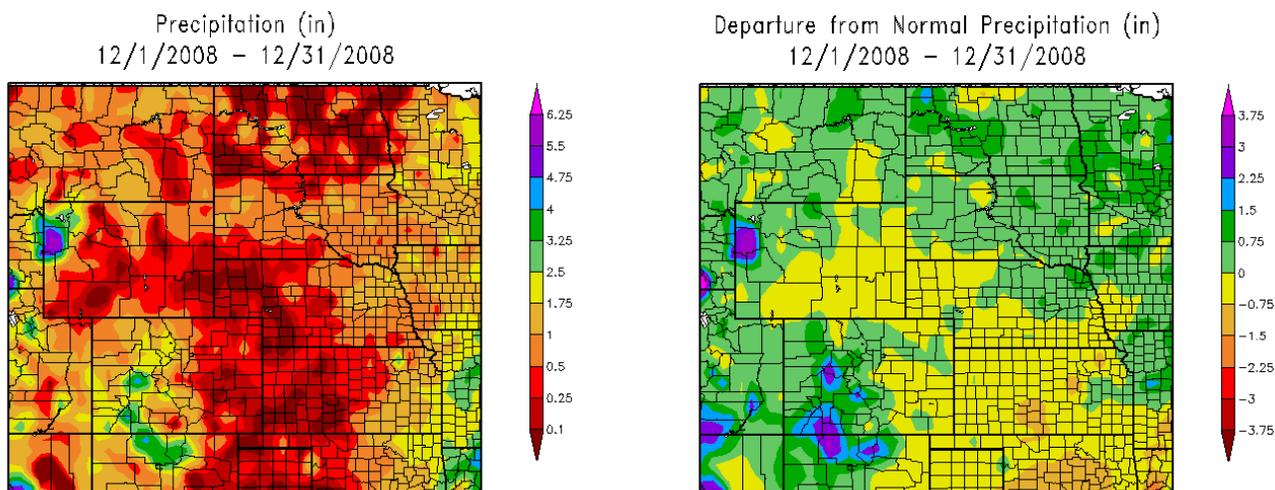
Departure from 1971-2000 Normal Mean Average Temperature (left) and Percent of 1971-2000 Normal Total Precipitation (right) for December 2008 in the High Plains Region. Map by High Plains Regional Climate Center. Available at: <http://hprcc.unl.edu/maps/current>

Precipitation Summary

Precipitation varied quite a bit across the region this month as there were widespread areas of both above and below normal precipitation. Dry locations which received less than 50% of normal precipitation included much of Wyoming, Colorado, Nebraska, and Kansas and pockets of eastern South Dakota and north central North Dakota. The Rawlins Municipal Airport in Wyoming recorded no precipitation and tied the record for driest December (last set in 2001).

Areas that received at least 150% of normal precipitation include North Dakota, South Dakota, the western half of Colorado, the northwestern part of Wyoming, and small pockets of Nebraska. Extreme locations in North Dakota and Colorado received above 400% of normal precipitation.

Many locations in North Dakota broke December snowfall records*. Most interestingly, Bismarck not only recorded the record December snowfall, but also the total snowfall for any one month. Bismarck recorded 33.3 inches of snow in December breaking the previous record of 21.7 inches set in 1916. Bismarck December snowfall also set the record snowfall for any month by beating the previous record of 31.1 inches set in March 1975.



Above: Total precipitation (in inches) (left) and Departure from Normal Precipitation (right) (using 1971-2000 Normals) for December 2008 in the High Plains Region. These maps are produced by HPRCC and can be found on the Current Climate Summary Map page at: <http://hprcc.unl.edu/maps/current>.

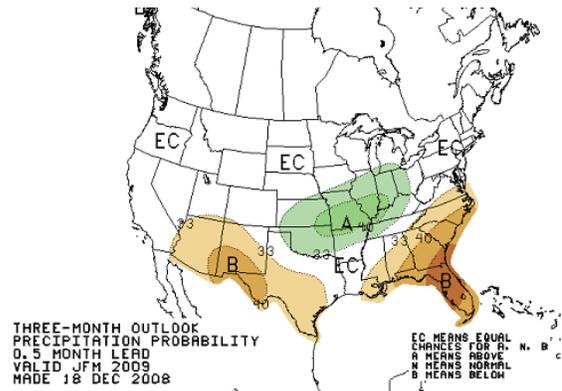
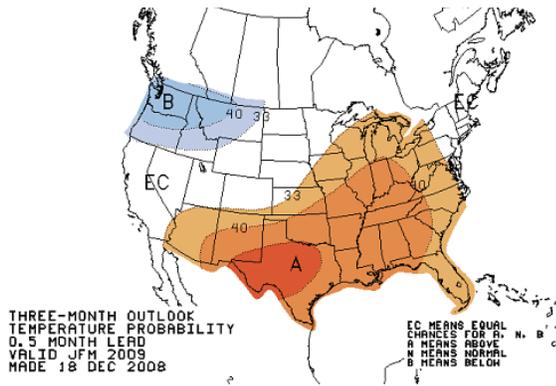
Highlights of Records Broken during December 2008*			
Precipitation Amounts in Inches			
Record	Location	Old Record	New Record
December Snowfall	Grand Forks, ND	27.6/1918	30.1
December Snowfall	Bismarck, ND	21.7/1916	33.3
Snowfall for a single month	Williston, ND	30.9/March 1975	31.5
Snowfall for a single month	Bismarck, ND	31.1/March 1975	33.3
Tie - Driest December	Rawlins Muni AP, WY	0.0/2001	0.0

*Records are preliminary, and are taken from local National Weather Service Office Record Event Reporter summaries. For records information updated on a daily basis from the National Weather Service, please see: <http://www.weather.gov/climate>

*Some records may be missing from this report

Climate Outlook

ENSO conditions remained neutral, however ENSO-neutral or La Niña conditions are equally likely though early 2009. NOAA forecasters are predicting chances of above normal temperatures for much of Kansas, southeast Nebraska, and extreme southern Colorado. Equal chances of above, near, or below normal temperatures are predicted for the remainder of the region. Equal chances of above, near, or below normal precipitation exist for all but a large portion of Kansas where there are chances for above normal precipitation. This outlook is produced by scientists at the NOAA Climate Prediction Center. More information can be found here: <http://www.cpc.ncep.noaa.gov/>.



Above: 3-Month Outlook Maps Courtesy the NOAA Climate Prediction Center - <http://www.cpc.ncep.noaa.gov>

(left) The Three-Month Temperature Probability Outlook showing a higher probability of above normal temperatures for a portion of the southern High Plains region.

(right) The Three-Month Precipitation Probability Outlook showing equal chances of above, near, or below normal precipitation for most of the High Plains region except for Kansas where a higher probability of above normal precipitation exists.

Drought Watch

The U.S. Drought Monitor remains largely unchanged since last month. Moderate drought (D1) persists in southwest North Dakota, southwest Wyoming, and southeast Colorado. Forecasts indicate that while the drought in Wyoming may improve, the drought in North Dakota and Colorado is expected to continue. Meanwhile, abnormally dry conditions in southwest Colorado have ceased and now the central portion of the state is experiencing abnormally dry conditions.

U.S. Drought Monitor
High Plains
December 30, 2008
Valid 7 a.m. EST

	Drought Conditions (Percent Area)						
	None	D0-D4	D1-D4	D2-D4	D3-D4	D4	
Current	64.3	35.7	7.0	0.0	0.0	0.0	
Last Week (12/23/2008 map)	61.1	38.9	7.8	0.0	0.0	0.0	
3 Months Ago (10/07/2008 map)	60.8	39.2	11.6	3.5	1.6	0.0	
Start of Calendar Year (01/01/2008 map)	46.8	53.2	29.4	11.8	0.3	0.0	
Start of Water Year (10/07/2008 map)	60.8	39.2	11.6	3.5	1.6	0.0	
One Year Ago (01/01/2008 map)	46.8	53.2	29.4	11.8	0.3	0.0	

Intensity:
 D0 Abnormally Dry
 D1 Drought - Moderate
 D2 Drought - Severe
 D3 Drought - Extreme
 D4 Drought - Exceptional

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

<http://drought.unl.edu/dm>

Released Wednesday, December 31, 2008
Author: Brian Fuchs, National Drought Mitigation Center

U.S. Seasonal Drought Outlook
Drought Tendency During the Valid Period
Valid December 31, 2008 - March, 2009
Released December 31, 2008

KEY:
 Drought to persist or intensify
 Drought ongoing, some improvement
 Drought likely to improve, impacts ease
 Drought development likely

Depicts large-scale trends based on subjectively derived probabilities guided by short- and long-range statistical and dynamical forecasts. Short-term events – such as individual storms – cannot be accurately forecast more than a few days in advance. Use caution for applications – such as crops – that can be affected by such events. "Ongoing" drought areas are approximated from the Drought Monitor (D1 to D4 intensity). For weekly drought updates, see the latest U.S. Drought Monitor. NOTE: the green improvement areas imply at least a 1-category improvement in the Drought Monitor intensity levels, but do not necessarily imply drought elimination.

The U.S. Drought Monitor is produced as a joint effort of the U.S. Department of Agriculture (USDA), National Drought Mitigation Center, U.S. Department of Commerce and the National Oceanic and Atmospheric Administration (NOAA). Real-time data provided through ACIS from the NOAA Regional Climate Centers is often used by the agencies involved in the U.S. Drought Monitor when determining the area and intensity of drought conditions, although the product itself is not produced by HPRCC. For current Drought Monitor information, please see: <http://www.ndmc.unl.edu/dm/monitor.html>
Portions of this Drought Watch are courtesy the Drought Monitor Text Discussion found on the Drought Monitor webpage.

State Summaries

Colorado	Temperatures (degrees F)								Precipitation (inches)		
	Averages				Extremes				Totals		
	Max	Min	Mean	Depart	High	Date	Low	Date	Obs	Depart	% Norm
Alamosa San Luis Airport	35.4	3.7	19.6	2.5	57	12/02	-11	12/24	0.48	0.15	145
Akron Washington County Airport	40.6	13.9	27.3	-1.4	66	12/02	-15	12/15	0.17	-0.23	42
Colorado Springs Municipal Airport	43.3	17.0	30.1	1.1	65	12/02	-8	12/15	0.15	-0.27	36
Grand Junction Walker Field Airport	36.1	15.9	26.0	-2.2	53	12/01	-4	12/27	0.86	0.34	165
Pueblo Memorial Airport	45.9	14.9	30.4	0.1	71	12/02	-9	12/15	0.29	-0.10	74

Kansas	Temperatures (degrees F)								Precipitation (inches)		
	Averages				Extremes				Totals		
	Max	Min	Mean	Depart	High	Date	Low	Date	Obs	Depart	% Norm
Concordia Municipal Airport	37.7	15.3	26.5	-3.7	64	12/26	-6	12/22	0.49	-0.37	57
Dodge City Regional Airport	45.9	19.4	32.6	-0.5	72	12/02	1	12/15	0.15	-0.62	19
Goodland Renner Field	42.5	13.8	28.2	-1.4	72	12/02	-10	12/15	0.19	-0.21	48
Topeka Municipal Airport	42.0	18.1	30.0	-1.3	67	12/26	-2	12/22	1.48	0.06	104
Wichita Mid-Continent Airport	44.6	21.5	33.1	-0.5	69	12/26	4	12/22+	1.26	-0.09	93

Nebraska	Temperatures (degrees F)								Precipitation (inches)		
	Averages				Extremes				Totals		
	Max	Min	Mean	Depart	High	Date	Low	Date	Obs	Depart	% Norm
Chadron Municipal Airport	34.9	6.4	20.7	-4.4	58	12/02	-16	12/15	0.05	-0.37	12
Grand Island Airport	33.1	11.3	22.2	-3.4	61	12/02	-9	12/22+	0.68	0.02	103
Lincoln Municipal Airport	35.2	10.9	23.0	-3.5	61	12/26	-12	12/22	0.80	-0.06	93
Omaha Eppley International Airport	32.6	11.8	22.2	-3.4	58	12/13	-9	12/22	0.79	-0.13	86
Norfolk Karl Stefan Airport	29.3	7.9	18.6	-5.1	59	12/02	-18	12/22	1.27	0.62	195
North Platte Regional Airport	36.1	7.5	21.8	-3.9	61	12/02	-16	12/21	0.24	-0.16	60
Valentine Miller Field	31.7	5.9	18.8	-4.8	58	12/02	-14	12/21+	0.24	-0.09	73

North Dakota	Temperatures (degrees F)								Precipitation (inches)		
	Averages				Extremes				Totals		
	Max	Min	Mean	Depart	High	Date	Low	Date	Obs	Depart	% Norm
Bismark Municipal Airport	18.1	-4.2	7.0	-8.2	42	12/10	-25	12/31	1.4	0.96	318
Dickinson Municipal Airport	19.0	-0.8	9.1	-9.1	43	12/02	-25	12/15	0.15	-0.19	44
Fargo International Airport	16.1	-4.4	5.9	-6.6	41	12/02	-24	12/31+	1.8	1.23	316
Grand Forks International Airport	12.1	-8.8	1.6	-9.6	38	12/02	-24	12/24	0.97	0.42	176
Williston International Airport	15.8	-5.3	5.3	-7.7	46	12/01	-27	12/22+	2.46	1.89	432

All Data are Preliminary and Subject to Change.

Source: National Weather Service Cooperative Observation Network Data

Data are retrieved through the Applied Climate Information System (ACIS).

These data are available for the entire period of record through the CLIMOD system. For more information please see <http://hprcc.unl.edu/services>.

December 2008 Climate Summary

South Dakota	Temperatures (degrees F)								Precipitation (inches)		
	Averages				Extremes				Totals		
	Max	Min	Mean	Depart	High	Date	Low	Date	Obs	Depart	% Norm
Aberdeen Regional Airport	20.3	-2.7	8.8	-7.2	42	12/10	-24	12/31	0.88	0.50	232
Huron Regional Airport	23.3	2.0	12.7	-5.9	47	12/02	-15	12/22	0.88	0.49	226
Rapid City Regional Airport	29.8	5.7	17.8	-6.9	56	12/07	-19	12/15	0.37	-0.04	90
Sioux Falls Joe Foss Field Airport	25.5	5.0	15.3	-3.0	49	12/02	-13	12/22	0.70	0.18	135

Wyoming	Temperatures (degrees F)								Precipitation (inches)		
	Averages				Extremes				Totals		
	Max	Min	Mean	Depart	High	Date	Low	Date	Obs	Depart	% Norm
Casper Natrona County International AP	33.2	5.2	18.8	-5.0	56	12/02	-20	12/15	0.38	-0.24	61
Cheyenne Airport	36.6	12.3	24.5	-2.6	59	12/02	-13	12/15+	0.34	-0.12	74
Lander Hunt Field Airport	34.4	8.8	21.6	0.3	59	12/06	-13	12/15	0.54	-0.07	89
Laramie Regional Airport	31.4	8.7	20.0	-1.3	53	12/02	-20	12/04	0.22	-0.24	48
Rawlins Municipal Airport	31.2	12.5	21.8	-2.3	51	12/02	-9	12/04	0.0	-0.29	0
Sheridan County Airport	29.1	4.6	16.8	-5.6	61	12/01	-18	12/20+	0.66	-0.02	97

All Data are Preliminary and Subject to Change.

Source: National Weather Service Cooperative Observation Network Data

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These data are available for the entire period of record through the CLIMOD system. For more information please see <http://hprcc.unl.edu/services>.

State Spotlight - Nebraska

Al Dutcher - State Climatologist

Nebraska State Climate Office, University of Nebraska - Lincoln

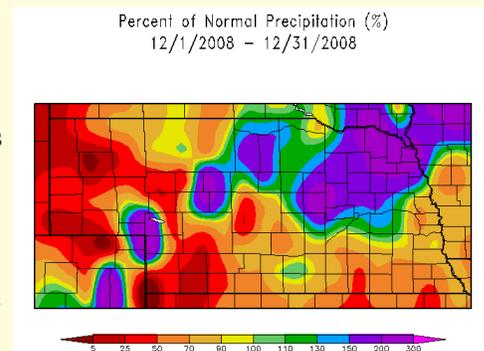
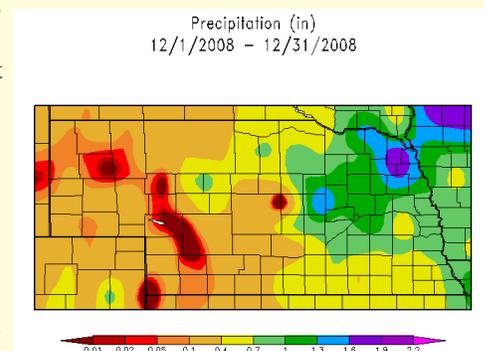
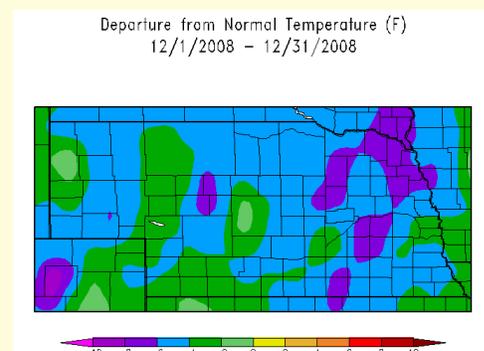
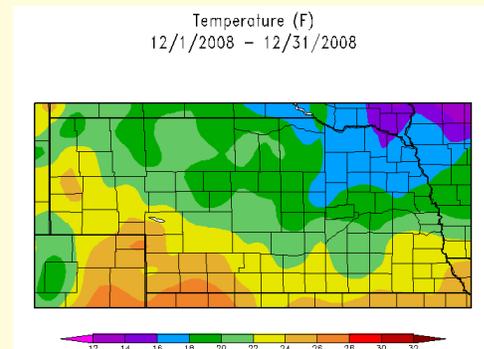
December 2008 brought significant temperature variability to the state of Nebraska. Normal to below normal temperatures were common during the first 6 days of the month, followed by above normal temperatures from the 7th through 13th. The coldest air of the season invaded the central Plains during the 14th through 25th with average temperature departures running 20 F to 30 F below normal between the 14th and 17th. From the 26th through the 31st, daily average temperature departures were up to 20 F above normal on the 26th and 29th.

The coldest minimum temperature recorded during December was -23 F at Gordon on the 15th, with the warmest maximum temperature being 71 F at Benkelman and Merna on the 3rd. Thus, there was a 94 F difference between the warmest and coldest readings recorded during the month of December. Every temperature recording site had at least one sub-zero minimum reading during December. Of the 159 temperature sites across the state, 10 recorded at least one -20 F or lower minimum temperature, 67 reached at least -15 F, and 131 reached at least -10 F.

Average temperatures for the month of December ranged from 16-20 F across the northern Panhandle, north central, and northeast climate districts. Average temperatures ranged from 20-24 F across the southern Panhandle, central, south central, and east central climate districts. The warmest locations were the southwest and southeast climate districts with average temperatures ranging from 24-28 F. Most of the state saw average temperature departures ranging from 4 to 8 F below normal. The exceptions were small areas of the Panhandle, southwest, west central, and southeast Nebraska where departures were 2-4 F below normal.

Most of the precipitation events recorded during the month of December fell between the 14th and 24th in association with an active western U.S. upper air trough that continually shot pieces of energy into the central U.S. Most moisture events were light in nature, with individual snow event totals generally under three inches. The heavier moisture was confined to areas north, south, and east of the state. The most significant snow event of the month brought 4-12 inches on the 19th in an area running from Imperial north-northeast to Ainsworth.

The greatest monthly liquid equivalent moisture during December was 2.12 inches at Wakefield, with Walthill recording the greatest 24-hour precipitation total of 1.15 inches on the 19th. The western half of Nebraska saw monthly precipitation totals under 0.40 inches, while most of eastern Nebraska received 0.40 to 1.00 inches of moisture. The exception was northeastern Nebraska where 1.00 to 2.00 inches was common. Only northeast, north central, and a small area centered in the southeast corner of the Panhandle received above normal moisture during December.



State Spotlight - North Dakota

Barb Mullins

North Dakota State Climate Office, North Dakota State University



Precipitation:

The total liquid equivalent precipitation for December ranged from approximately 0.1 to 2.1 inches. The precipitation percent of normal ranged from about 50% to over 300% (Figure 1, High Plains Regional Climate Center). Fargo, Grand Forks, and Bismarck received record December snowfall. Grand Forks had a record December snowfall of 30.1 inches which broke the previous record of 27.6 inches set in 1918. Grand Forks December snowfall is the second highest monthly total with the highest monthly total being 31.5 inches in January 1989. Fargo recorded 33.5 inches of snow in December which broke the previous record of 29.2 inches set in 1927. Fargo December snowfall was also a record snowfall for any month by beating the previous 31.5 inches set in January 1989. Bismarck recorded 33.3 inches of snow in December breaking the previous record of 21.7 inches set in 1916. Bismarck December snowfall was also a record for any month by beating the previous record of 31.1 inches set in March 1975. In addition, Bismarck total seasonal snowfall through December 2008 is 45.7 inches breaking the previous record of 44.4 inches of measured seasonal snow through December 1993.

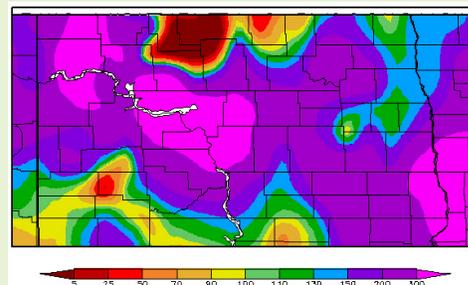


Figure 1. Precipitation Percent of Normal in December 2008 for North Dakota (High Plains Regional Climate Center)

Temperature:

December was a cold month with average air temperatures ranging from -1°F in the northeast to 11°F in the southwest corner of the state. The average monthly temperatures were below normal across the State. The departure from normal temperature ranged from -10 in the north central to -6 in the south central part of the State. (Figure 2, North Dakota State Climate Office) The National Weather Service recorded record low maximum air temperatures on the 15th at Minot with -15°F , Dickinson with -13°F , and Bismarck with -10°F . Jamestown had a record low temperature of -22°F on the 16th of December. The coldest daily minimum air temperatures from the North Dakota Agricultural Weather Network (NDAWN) were Mohall on the 22nd with -33.8°F , Bottineau on the 24th with -33.3°F and on the 22nd with -32.9°F , Hofflund on the 22nd with -32.7°F and on the 21st with -32.1°F , Harvey on the 22nd with -31.1°F , Crosby on the 15th with -30.9°F , and Karlsruhe on the 22nd with -30.7°F .

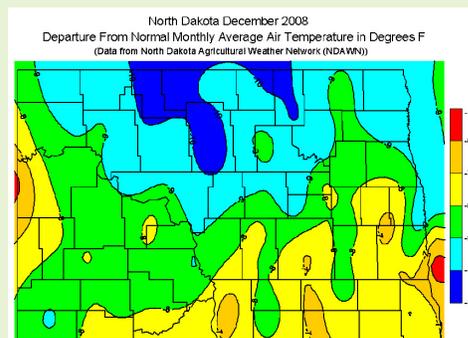


Figure 2. Temperature Departure from Normal in December 2008 for North Dakota (North Dakota State Climate Office)

For more information about the North Dakota State Climate Office: <http://www.ndsu.edu/ndsco>

For more information on the North Dakota Agricultural Network: <http://www.ndawn.ndsu.nodak.edu>

The North Dakota Agricultural Network is a part of the Automated Weather Data Network (AWDN).

State Spotlight - South Dakota

Dennis Todey and Chirag Shukla
South Dakota State Climate Office, South Dakota State University



December started with fairly moderate temperatures. But the state saw several Arctic outbreaks and winter storms throughout the month dropping temperatures well below 0 F frequently across the state with extremely cold wind chills. A few daily temperature records were tied. No new records were set. But overall the month was one of about the top 15 coldest on record because of consistently cold temperatures in the middle of the month. Individual stations ranked somewhat around 10th coldest to around 20th coldest. The lowest temperature of these reporting stations in December was -26 F in Britton. The highest temperature was 60 F in Porcupine. Monthly average temperatures ranged from 3 – 8 F below average across the state.

Several storms dropped frequent snowfalls across the state causing travel problems and creating a significant snow pack in the northeast. Many daily precipitation/snowfall records were set across the state. For the month, total snowfall amounts were near record amounts at many locations. Brookings and Milbank had the second snowiest Decembers on record. Total precipitation was lightest in the southwest part of the state. Porcupine reported 0.17” for the month. Britton had the highest total at 1.64” of liquid equivalent precipitation. The 1.53” reported in Yankton is the 5th wettest December on record.

Most of the state has at least some snow cover. The deepest snow pack is northeast of a Mobridge to Sioux Falls line where generally more than 6” is on the ground with over 12” in the far northeast corner.

Drought (D0) conditions continued over the far southwest corner of the state. Edgemont continues to be much drier than average. Edgemont (in this area) has had its third driest Sept-Dec. on record at 1.86” of precip (or about half average during this time). This seems very isolated as other stations north and east are dry but closer to average over the time.

Dec. 13-14 blizzard

Blizzard conditions developed on 13th and 14th. Visibility was down to less than 1/4 mile on the western part. Deadwood estimated 3” of new snow by 5 pm on 13th with visibility near zero. Custer and Edgemont reported near-zero visibility with blizzard conditions. The blizzard continued east. Roscoe estimated 8” of snow and blizzard conditions. Brookings received 5” of snow with drifts over 2 feet. The Interstate I-29 was closed from Brookings to the Canadian border. Wind chills were in the range of -30 to -50F. I-90 was also closed for a period of time.

Dec. 16-17 storm

Another round of snowfall hit the eastern central and southeastern part of the state on the 16th and 17th. Mitchell received 4.5” of snow whereas Brookings received about 2” on 17th.

The southeastern corner received even more snow on the 19th with Sioux City and surrounding areas receiving 5-8” of snow and Sioux Falls area receiving 1-4 inches of new snow.

The following day (20th) brought blizzard conditions to central and eastern part of the state.

Faulkton reported blizzard conditions with near zero visibility. Blowing snow caused difficulties in traveling in Watertown and surrounding areas.

Northcentral parts reported wind chills of -35 to -45F on 21st and 22nd. Brookings hit -16F for overnight low. Many parts of the state received snow on the 23rd but the heaviest snow of around 6” was received in Harding county. Scattered snow reports were received from the Black Hills area on the 26th. On the 29th and 30th, wind gusts in the western part of the state ranged from 50 to 70 mph, especially in Lawrence, Custer and Pennington counties.

Records-storm events

Sioux Falls recorded nine consecutive days of snow – longest on record is 14. Records set in the month are as follows:

Yankton 5th wettest December, Victor 4 NNE 4th wettest December, Brookings 2nd snowiest December 20.9 – record 22”

For more information about the South Dakota State Climate Office: <http://climate.sdstate.edu>

The SDSU's AWDN is a part of the High Plains Automated Weather Data Network (AWDN). Data is available through SDSU or the High Plains Regional Climate Center.

State Spotlight - South Dakota continued

South Dakota Records Broken during December 2008			
Precipitation Amounts in Inches/Temperature in Degrees F			
Station	Type	Record	Previous Record
Watertown	Daily Precipitation	0.29/December 3	0.16/1957
Rapid City AP	Snowfall	2/December 3	1.9/1955
Huron	Daily Precipitation	0.38/December 8	0.17/1924
Huron	Snowfall	2.1/December 8	2.1/1961 and 1995
Pierre	Daily Precipitation	0.31/December 9	0.16/1995
Watertown	Daily Precipitation	0.4/December 9	0.3/1961
East Rapid City	Snowfall	2.5/December 14	2.3/1937
East Rapid City	Minimum Temperature	-19/December 15	14/1901
Pierre	Daily Precipitation	0.48/December 15	0.23/1996
Pierre	Snowfall	4/December 15	2.3/1996
Watertown	Snowfall	6/December 15	5.2/1955
Sisseton	Snowfall	4.3/December 15	4/1973
Sioux Falls	Maximum Temperature	-4/December 15	Tied with 1951
Watertown	Snowfall	4/December 20	2.1/1990
Sisseton	Snowfall	6/December 20	3/1990
Sisseton	Minimum Temperature	-22/December 22	Tied with 1983

South Dakota Temperature Rankings December 2008		
Station	Rank	Period of Record (Years)
Cottonwood	23	100
Bison	11	63
Dupree	15	84
Milesville	12	64
Lemmon	17	95
Lead	10	98
Ft. Mead	14	72
Kennebec	21	103
Pierre	9	72
Timber Lake	14	86
McIntosh	14	83
Ipswich	14	85
Aberdeen	12	106
Milbank	10	89
Brookings	8	108
Clark	12	104
Huron	18	109
Forestburg	19	108
Watertown	11	105
Centerville	11	101
Vermillion	12	100

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About the High Plains Regional Climate Center

The High Plains Regional Climate Center (HPRCC) operates out of the University of Nebraska - Lincoln (UNL) in Lincoln, Nebraska. As one of 6 regional climate centers operated under the National Oceanic and Atmospheric Administration (NOAA), HPRCC works closely with other organizations such as the National Climatic Data Center (NCDC), Local and Regional National Weather Service (NWS) Offices, and other climate services organizations such as the National Drought Mitigation Center (also located at UNL) to provide climate data services and specialized climate products.

For More Information Online

High Plains Regional Climate Center: <http://hprcc.unl.edu>

High Plains Regional Climate Services: <http://hprcc.unl.edu/services>

CLIMOD: <http://climod.unl.edu>

NOAA Regional Climate Centers and ACIS: <http://www.rcc-acis.org>

National Weather Service: <http://www.weather.gov>

National Climatic Data Center: <http://ncdc.noaa.gov>

University of Nebraska - Lincoln: <http://www.unl.edu>

National Drought Mitigation Center: <http://drought.unl.edu>

Climate Prediction Center: <http://www.cpc.noaa.gov>

NOAA Storm Prediction Center: <http://www.spc.noaa.gov>



Photo of the Nebraska Sandhills by Bill Sorensen - Senior Programmer - HPRCC

Author Information

For questions, comments, or suggestions, please contact:

Natalie Umphlett - Service Climatologist - High Plains Regional Climate Center

(402) 472-6764 - numphlett2@unl.edu

714 Hardin Hall

3310 Holdrege Street

Lincoln, NE 68583-0997

