

KANSAS CLIMATE SUMMARY AND DROUGHT REPORT

Current Conditions, Drought Impacts and Outlook

December 2008

Continued Dry in Central and Western Kansas

The dry conditions experienced during November 2008 persisted throughout December in central and western Kansas. Total precipitation averaged only 0.09 inches in the southwest during the month, with some locations being shut-out entirely. A storm late in the month boosted totals to near or above normal in some eastern locations.

While December was generally cooler than normal, temperatures behaved in the roller coaster fashion common during winter. A spread of 96 degrees was experienced across the state, ranging from 84°F at Liberal and Wilmore down to 12 degrees below zero at St. Francis. The 10 below reading at Goodland on December 15th was a record daily low.

CURRENT COUNTY DROUGHT STAGES

No declarations are presently in effect. The overall moisture situation across the state will be assessed early next spring, including the need for any county drought stage declarations.

DROUGHT MONITORING AND INDICES

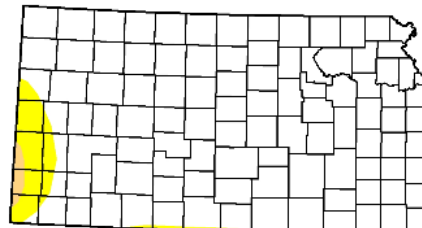
The U.S. Drought Monitor is perhaps the most widely recognized drought monitoring tool in the nation. The Monitor ([current map](#)) is a composite of several observed weather variables and drought indices that is updated weekly. The December 30th map (see below) shows lingering abnormally dry or moderate drought conditions across part of far-western Kansas, identical to the situation one month ago. Also, a sliver of abnormally dry conditions is now indicated along the Oklahoma border in south central Kansas. This is the northern extremity of an abnormally dry - drought area extending across central Oklahoma into Texas. The table accompanying the map compares the percentage of the state currently affected by drought conditions with several points during the past year.

In the Kansas county drought stage scheme, a Drought Watch equates to moderate drought in the U.S. Drought Monitor, while a Drought Warning is the equivalent of severe drought. A Drought Emergency is reserved for extreme or exceptional drought.

U.S. Drought Monitor Kansas

December 30, 2008
Valid 7 a.m. EST

	Drought Conditions (Percent Area)					
	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	94.4	5.6	0.7	0.0	0.0	0.0
Last Week (12/23/2008 map)	91.8	8.2	0.7	0.0	0.0	0.0
3 Months Ago (10/07/2008 map)	84.6	15.4	7.7	1.1	0.0	0.0
Start of Calendar Year (01/01/2008 map)	65.1	34.9	5.4	0.0	0.0	0.0
Start of Water Year (10/07/2008 map)	84.6	15.4	7.7	1.1	0.0	0.0
One Year Ago (01/01/2008 map)	65.1	34.9	5.4	0.0	0.0	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

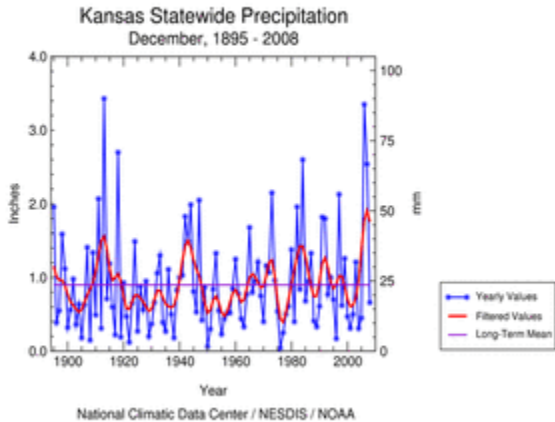
<http://drought.unl.edu/dm>



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

Palmer Drought Severity Index - The Palmer Index (PDSI) is an indicator used in the U.S. Drought Monitor. The statewide average PDSI for the week ending December 27th was 3.51 (very moist), down somewhat from the November 29th value of 4.01 (extremely moist). Divisional PDSI values ranged from 5.22 (extremely moist) in north central Kansas and 5.02 (extremely moist) in the southeast down to 1.83 (moist spell) in the west central division and 2.05 (unusually moist) in the southwest.

December Conditions



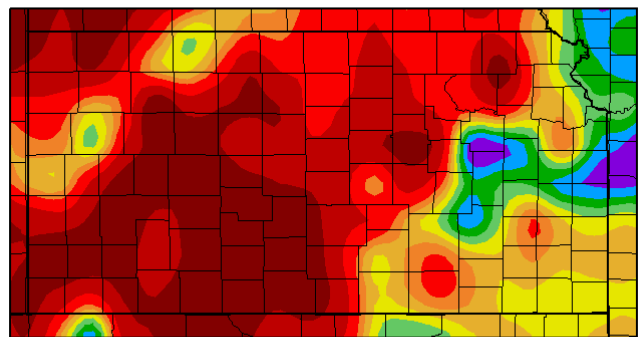
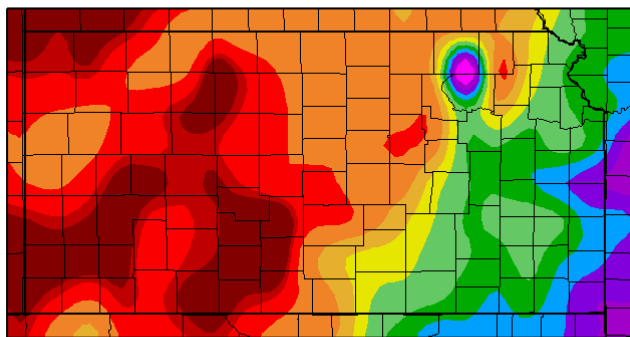
December 2008 ranks as the 54th driest December on record (1895-2008) in Kansas with a statewide average total precipitation of 0.66 inches (see Table 1). This is 67 percent of normal. The graph at the left shows December precipitation in this long-term perspective. The monthly statewide [moisture status](#) graphs and rankings are available from the National Climatic Data Center.

Based on preliminary reports from National Weather Service COOP network stations, the greatest total precipitation received in December was 3.07 inches at Perry Lake in Jefferson County. Tops for the Community Collaborative Rain, Hail and Snow Network (CoCoRaHS) was 2.80 inches at Pittsburg

0.7 WSW in Crawford County. Several COOP and CoCoRaHS stations reported no precipitation during December. Total snowfall averaged about 3.5 inches across Kansas during December. The greatest total monthly snowfall at COOP stations was 9.6 inches at Clifton in Washington County, while Manhattan 0.5 NE (Riley County) and McLouth 2.0 NW (Jefferson County) topped the CoCoRaHS stations with 7.5 inches. The maps below show total precipitation received and the percent of normal across the state in December.

Precipitation (in)
12/1/2008 – 12/31/2008

Percent of Normal Precipitation (%)
12/1/2008 – 12/31/2008



Generated 1/2/2009 at HPRCC using provisional data.

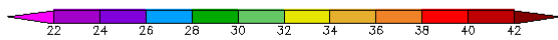
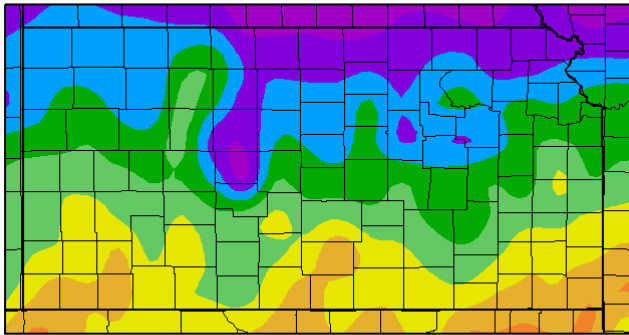
NOAA Regional Climate Center Generated 1/2/2009 at HPRCC using provisional data.

NOAA Regional Climate Centers

The following maps show average monthly temperature and the departure from normal across Kansas during December. The monthly average temperature was generally colder than normal everywhere except for the southwest; the statewide average temperature of 29.3^oF was 2.6 degrees below normal. Kansas experienced a 96-degree range of temperature during December. Liberal and Wilmore 16 SE reported the state's highest temperature during the month with 84^oF on December 3rd, while the cool-spot was St. Francis with a low of -12^oF on December 15th. By way of comparison, state record temperature extremes for December are 90^oF at Ashland in 1955 and -34^oF at Atwood in 1989.

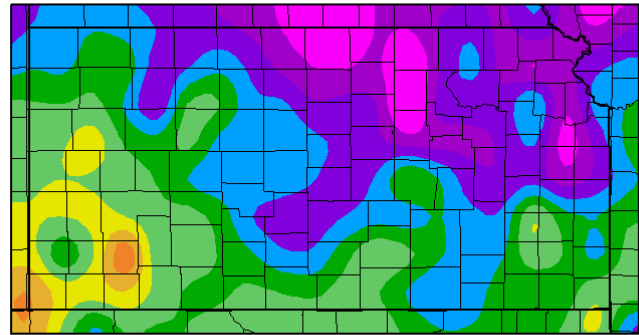
Temperature (F)
12/1/2008 – 12/31/2008

Departure from Normal Temperature (F)
12/1/2008 – 12/31/2008



Generated 1/2/2009 at HPRCC using provisional data.

NOAA Regional Climate Centers



Generated 1/2/2009 at HPRCC using provisional data.

NOAA Regional Climate Centers

Table 1 summarizes December temperature and precipitation conditions by climate division while Appendix A provides a December summary for principal reporting locations within and adjacent to Kansas. Please note that the data used in compiling Tables 1 and 2 and in Appendix A is preliminary and comes from different sources. This may result in slight differences in the average or extreme values presented.

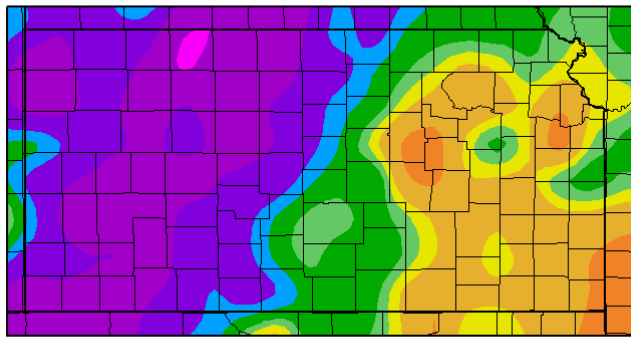
Division	Precipitation (inches)						Temperature (°F)			
	December			January-December 2008			Average	Dep. ¹	Monthly Extreme	
	Total	Dep. ¹	% Norm	Amount	Dep.	% Norm			Highest	Lowest
Northwest	0.18	-0.27	40	25.52	5.26	126	26.5	-2.8	78	-12
West Central	0.16	-0.29	36	20.80	1.07	105	28.6	-1.5	75	-6
Southwest	0.09	-0.37	20	17.73	-1.62	92	32.6	0.2	84	-1
North Central	0.35	-0.37	49	35.15	8.21	130	25.8	-3.0	68	-10
Central	0.37	-0.49	43	33.47	4.80	117	28.3	-2.9	70	-7
South Central	0.56	-0.42	57	38.46	10.11	136	31.1	-1.7	84	-2
Northeast	1.02	-0.16	86	37.76	2.60	107	26.6	-2.9	69	-9
East Central	1.21	-0.13	90	43.06	6.30	117	28.9	-2.5	69	-5
Southeast	1.63	0.07	103	55.43	16.99	144	32.3	-1.6	73	1
STATE	0.61	-0.28	69	34.19	6.18	122	29.0	-2.1	84	-12

1. Departure from 1971-2000 normal value
Source: KSU Weather Data Library

Longer-Term Precipitation Trends

The following two maps show the percentage of normal precipitation received across Kansas during the past three months (October - December 2008) and during the past 12 months (January – December 2008). Persistent dryness in southwest Kansas during 2008 stands-out on the 12-month map.

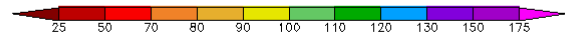
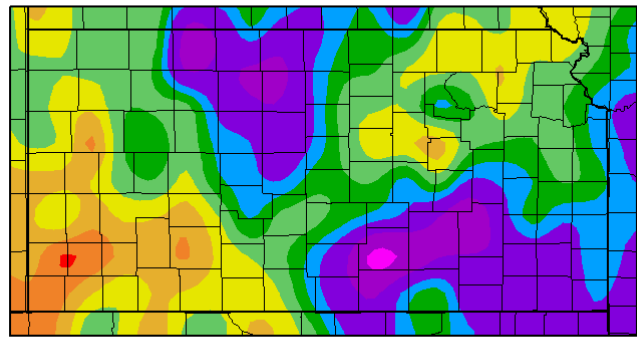
Percent of Normal Precipitation (%)
10/1/2008 – 12/31/2008



Generated 1/2/2009 at HPRCC using provisional data.

NOAA Regional Climate Centers

Percent of Normal Precipitation (%)
1/1/2008 – 12/31/2008



Generated 1/2/2009 at HPRCC using provisional data.

NOAA Regional Climate Centers

Radar-based [precipitation estimate maps](#) covering multiple time periods are available from the National Weather Service. These maps are updated daily. Monthly and annual individual station and county average [precipitation data](#) is available from the Weather Data Library at Kansas State University.

Table 2 provides additional perspective on Kansas statewide temperature and precipitation trends over the past 12 months.

Month	Temperature (°F)		Precipitation (inches)		
	Monthly Average	Departure ¹	Monthly Total	Departure ¹	Percent Normal ¹
January 2008	29.9	1.1	0.43	-0.34	56
February 2008	32.0	-2.5	1.48	0.57	163
March 2008	42.8	-1.0	1.56	-0.69	69
April 2008	50.1	-3.5	2.71	0.12	105
May 2008	62.7	-0.6	5.53	1.35	132
June 2008	73.7	0.3	5.00	1.12	129
July 2008	78.4	-0.4	3.70	0.09	102
August 2008	75.0	-1.9	4.22	1.06	134
September 2008	66.0	-2.0	4.06	1.38	151
October 2008	55.1	-1.1	4.60	2.42	211
November 2008	43.8	2.0	0.95	-0.78	55
December 2008	29.3	-2.6	0.66	-0.32	67
Past 3 Months	---	---	6.21	1.32	127
Past 6 Months	---	---	18.19	3.85	127
Past Year	---	---	34.90	5.98	121

1. Departure from 1971-2000 normal value
Source: NOAA National Climatic Data Center

DROUGHT IMPACTS AND RESPONSE

Agriculture

The [Kansas Crop and Weather Report](#) is updated weekly during the growing season. Included is information about crop conditions and progress, soil moisture conditions, range and pasture conditions, hay and pasture supplies and stock water supplies.

The most recent Report, dated January 5th, rated statewide topsoil moisture as 19 percent short-very short, 74 percent adequate and 7 percent surplus. Subsoil moisture was rated 16 percent short-very short, 80 percent adequate and 4 percent surplus.

Statewide, hay and forage supplies were rated 83 percent adequate, while feed grain supplies were rated 86 percent adequate.

Streamflow and Reservoir Levels

The U.S. Geological Survey [Kansas Drought Watch](#) provides information on 7-day average streamflow measured at long-term gaging stations and how they compare to normal flows. Most of these gages are located in central and eastern Kansas. A map (click on National Drought Map and then on Kansas) identifies river basins experiencing below normal flows and hydrologic drought.

Seven-day average streamflow was below normal at 4 percent of Kansas' long-term gaging stations on December 31st, the same as one month ago. Normally about 25 percent of gages are below normal at any given time.

As of December 30, 2008, no streams were under minimum desirable streamflow (MDS) administration by the Kansas Department of Agriculture - Division of Water Resources. Flow in most streams is well above the MDS target level. Currently, it does not appear that the criteria for MDS administration at either Concordia or Clay Center will be met until late January at the earliest. Stream gages at both Concordia and Clay Center (and elsewhere) have been affected by ice during the latter half of December.

Table 3 summarizes federal reservoir pool elevations on December 31, 2008 in terms of departure from the top of the conservation/multipurpose pool and pool elevation change since December 1st. All reservoirs were near or above the top of their conservation/multi-purpose pool with the exception of Norton and Cedar Bluff reservoirs which are 10.4 and 16.5 feet down, respectively.

Table 3 Kansas Federal Reservoir Pool Elevation Summary					
Reservoir	Top MP/C Pool ¹	Pool Elevation (Feet MSL)		12/31/2008	
		12/01/08	12/31/08 ³	Departure from Top ²	Change from 12/01/2008 ²
Kansas River Basin					
Norton	2304.3	2293.7	2293.9	-10.4	0.2
Harlan County, NE	1946.0	1946.1	1946.1	0.1	0.0
Lovewell	1582.6	1581.4	1581.1	-1.5	-0.3
Milford	1144.4	1147.1	1143.3	-1.1	-3.8
Cedar Bluff	2144.0	2127.6	2127.5	-16.5	-0.1
Kanopolis	1463.0	1467.0	1463.6	0.6	-3.4
Wilson	1516.0	1516.6	1516.1	0.1	-0.5
Kirwin	1729.3	1726.5	1727.3	-2.0	0.8
Webster	1892.5	1889.4	1890.5	-2.0	1.1
Waconda	1455.6	1456.7	1454.6	-1.0	-2.1
Tuttle Creek	1075.0	1079.9	1078.2	3.2	-1.7
Perry	891.5	893.8	891.5	0.0	-2.3
Clinton	875.5	877.1	876.4	0.9	-0.7
Pomona	974.0	975.8	973.7	-0.3	-2.1
Melvorn	1036.0	1037.5	1035.2	-0.8	-2.3
Hillsdale	917.0	918.4	918.4	1.4	0.0
Arkansas River Basin					
Cheney	1421.6	1421.8	1421.8	0.2	0.0
El Dorado	1339.0	1339.1	1339.4	0.4	0.3
Toronto	903.5	904.0	908.3	4.8	4.3
Fall River	950.5	951.2	953.5	3.0	2.2
Elk City	796.0	805.0	805.5	9.5	0.5

Big Hill	858.0	858.1	858.4	0.4	0.3
Council Grove	1274.0	1274.1	1274.3	0.3	0.2
Marion	1350.5	1351.1	1350.0	-0.5	-1.1
J. Redmond	1041.0	1039.8	1044.0	3.0	4.2
1. Seasonal pool operation at El Dorado, Toronto, Fall River, Elk City, Council Grove and John Redmond reservoirs. 2. All values are in feet. Negative departures or changes are shown in red. 3. 12/30/08 for Arkansas Basin reservoirs Source: U.S. Army Corps of Engineers					

Public Water Systems

No drought-related public water system impacts are currently being reported.

Several publications provide guidance regarding drought preparedness and response. The [2007 Municipal Water Conservation Plan Guidelines](#) replace previous guidelines dating back to 1990. These guidelines cover drought response in addition to long-term water conservation.

The [Drought Vulnerability Assessment Report](#) identifies those systems most likely to first be impacted by drought and the reason for their vulnerability. It was updated in 2007 to reflect system conditions as of 2006.

[Responding to Drought: A Guide for City, County and Water System Officials](#) provides an overview of Kansas county drought stage declarations, local planning and coordination, disaster declarations, and available state and federal assistance.

Vegetation Conditions

The Kansas Applied Remote Sensing Program (KARS) at the University of Kansas produces a [Kansas Green Report](#) each week during the growing season. This report consists of a set of five interactive maps derived from satellite and historic data that illustrate vegetation conditions and crop progress across the state.

A Vegetation Condition Index Map, included in the Green Report, illustrates vegetation health and levels of plant stress based on current and historic vegetation greenness and surface temperatures. The next map will be available in March 2009.

Fire

No major wildfires (300 acres or more) was reported to the Kansas Forest Service in December.

The [Wildland Fire Outlook](#) issued by the National Interagency Fire Center on January 5th foresees a near normal significant wildfire potential in Kansas during January and during the following three months (February – April 2009). Increasing fire potential is foreseen in the panhandles of Oklahoma and Texas during the February-April period. Significant fire potential is defined as the likelihood that a wildfire will require mobilization of additional resources from outside the area in which the fire originated.

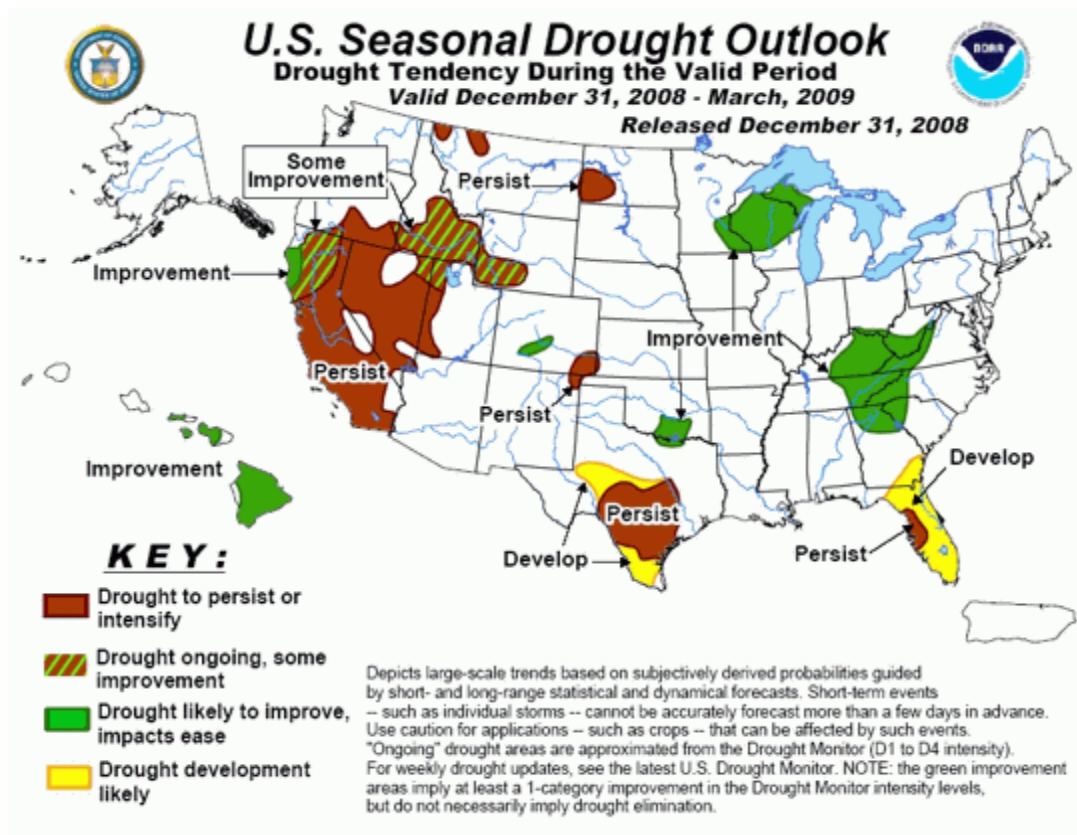
The National Weather Service provides a full range of fire weather products and services for Kansas. Included are the Rangeland Fire Danger Index, Fire Weather Forecasts, Red Flag Watches/Warnings, and Spot Forecasts. Each NWS office serving Kansas has these products available on its website. These websites may be accessed from this [county warning and forecast area](#) map. Clicking on one of these areas takes you to that NWS Office's home page. Look for "Fire Weather" in the menu on the left margin of the page.

[Fire weather](#) links are also available from the Weather Data Library at Kansas State University, as are prescribed burning guidance publications.

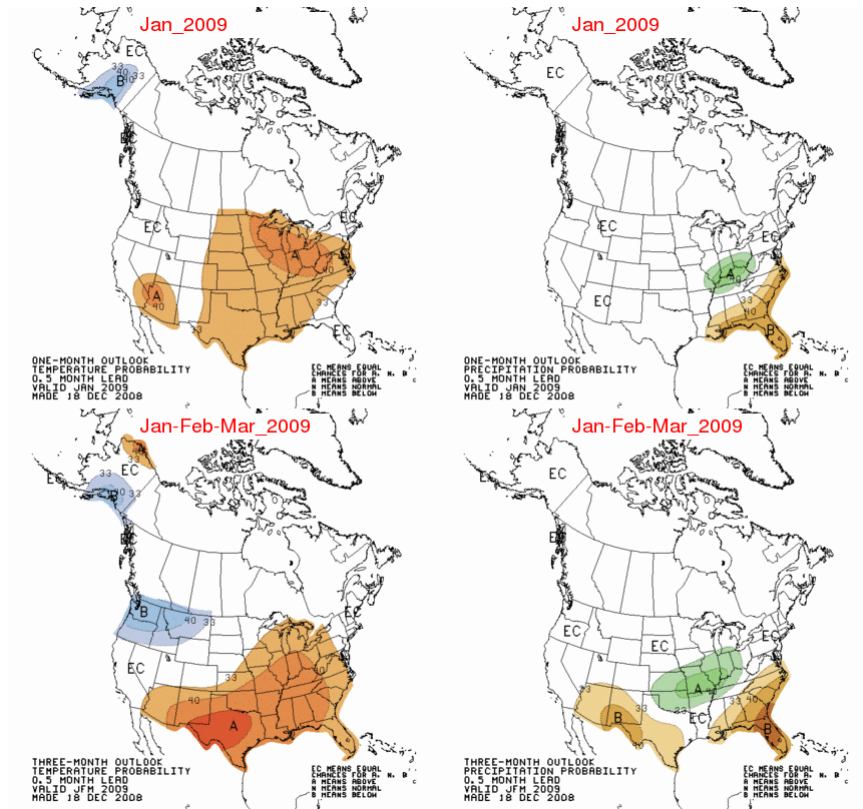
LOOKING AHEAD

The [Seasonal Drought Outlook](#), developed by the NOAA Climate Prediction Center (NOAA CPC), assesses the likelihood for improvement, persistence or deterioration in drought conditions for areas currently experiencing drought as identified by the U.S. Drought Monitor. The Outlook released December 31st for the period through March 2009 (see below) shows the likelihood for current drought conditions in far-southwest Kansas to persist. The Drought Outlook is updated on the first and third Thursday of each month.

Two additional NOAA CPC products, the [One Month Outlook](#) and the [Three Month Outlook](#), assess the chances for above normal, normal or below normal precipitation and temperatures for the upcoming month and for the upcoming three-month period. Maps depicting these Outlooks are shown below. The Outlook for January 2009 indicates the likelihood for above normal temperatures throughout Kansas. Above normal temperatures and precipitation are likely across all but northwest Kansas during the upcoming three months.



January 2009 and January – March 2009 Precipitation and Temperature Outlooks



ADDITIONAL INFORMATION

The Kansas Climate Summary and Drought Report is compiled by the Kansas Water Office from various federal, state, local and academic sources. The report summarizes conditions at the end of the month indicated. Some data used is preliminary and is subject to change when final data is available at a later date.

The Kansas Water Office web site, [KWO Drought](#), contains additional drought information including links to other agencies with drought information and past issues of the Kansas Climate Summary and Drought Report. The Operations Plan for the Governor's Drought Response Team is also available here.

Please contact Tom Lowe at the KWO (785/296-0874) or tom.lowe@kwo.ks.gov, should you have any questions or suggestions.

**Appendix A
December 2008
Kansas Climate Summary**

Station (West)	Precipitation (inches)			Temperature (°F)			
	Total	Departure ³	Percent Normal	Mean	Departure ³	Extreme (Date)	
						Highest	Lowest
Colby ²	0.16	-0.20	44	28.0	-0.5	71 (2)	-8 (15)
Dodge City ¹	0.15	-0.62	19	32.6	-0.5	72 (2)	1 (15)
Garden City ¹	0.01	-0.44	2	32.9	1.1	73 (2)	1 (15)
Garden City ²	0.02	-0.39	5	31.7	0.1	72 (2)	-1 (15)
Goodland ¹	0.19	-0.21	48	28.2	-1.4	72 (2)	-10 (15)
Hill City ¹	0.28	-0.23	55	29.4	-0.7	71 (2)	-2 (15)
Tribune ²	0.02	-0.35	5	31.0	1.2	71 (2, 7)	-8 (14)
(Central)							
Concordia ¹	0.54	-0.32	63	26.5	-3.7	64 (26)	-6 (22)
Hays ²	0.07	-0.58	11	28.0	-2.5	70 (26)	-7 (21)
Hesston ²	0.29	-0.87	25	30.9	-1.6	67 (8)	2 (15, 17, 21)
Hutchinson ²	0.20	-0.80	20	31.7	-0.3	70 (8)	0 (16)
Medicine Lodge ¹	0.22	-0.65	25	34.5	1.2	75 (8)	6 (15, 21)
Russell ¹	0.23	-0.63	27	29.3	-1.9	66 (2, 26)	-4 (21)
Salina ¹	0.23	-0.71	24	28.7	-3.9	67 (26)	-5 (21, 22)
Scandia ²	0.23	-0.50	32	25.0	-4.2	63 (26)	-9 (22)
Smith Center ¹	---	---	---	M	---	69 (26)	-10 (21)
St. John ²	0.11	-0.80	12	32.0	-2.2	68 (26)	-1 (18)
Wichita (ICT) ¹	1.26	-0.09	93	33.1	-0.5	69 (26)	5 (15, 22)
(East)							
Chanute ¹	1.23	-0.66	65	34.2	-0.3	70 (26)	5 (21, 22)
Johnson Co. Exc. Apt. ¹	0.66	-1.10	38	29.1	-4.0	66 (26)	1 (22)
Manhattan ²	0.82	-0.24	77	28.3	-3.1	68 (26)	-6 (17, 21, 22)
Ottawa ²	1.95	0.21	112	32.0	-2.3	69 (26)	2 (22)
Parsons ²	2.18	0.15	107	34.2	-0.4	70 (26)	5 (21, 22)
Powhattan ²	1.29	-0.02	98	26.7	-1.7	65 (26)	-10 (22)
Rossville ²	1.52	0.27	122	28.3	---	68 (26)	-7 (22)
Silver Lake ²	1.06	-0.36	75	29.5	-1.9	66 (26)	-6 (22)
Topeka (TOP) ¹	1.48	0.06	104	30.0	-1.4	67 (26)	-2 (22)
(Neighbouring States)							
Burlington, CO ¹	0.16	-0.18	47	28.5	-0.5	71 (2)	-10 (15)
Lamar, CO ¹	0.10	---	---	30.6	---	71 (2)	-2 (14)
Springfield, CO ¹	0.21	---	---	34.6	---	72 (7)	2 (14, 15)
Falls City, NE ¹	1.11	0.08	108	25.3	-2.9	66 (26)	-9 (22)
Hebron, NE ¹	T	-0.93	0	24.8	-2.5	63 (26)	-10 (22)
McCook, NE ¹	0.10	-0.43	19	26.7	-2.4	70 (2)	-10 (15)
Bartlesville, OK ¹	1.75	-0.31	85	36.8	-1.7	76 (26)	7 (22)
Guymon, OK ¹	0.25	-0.09	74	37.2	1.9	76 (2)	7 (15, 21)
Ponca City, OK ¹	1.16	---	---	36.4	-0.7	75 (26)	7 (21)
Joplin, MO ¹	2.08	-0.88	70	36.4	-0.3	71 (14, 26)	4 (21)
Kansas City (MCI), MO ¹	1.83	0.19	112	28.7	-2.6	66 (26)	-3 (22)
St. Joseph, MO ¹	1.68	0.24	117	24.8	-5.7	65 (26)	-11 (22)
1. Airport Automated Observation Stations (NWS/FAA) 2. Kansas State University Experiment Station Network 3. Departure from 1971-2000 normal value T – trace; M – missing data; - - - no normal value from which to calculate departure or percent of normal Source: : National Weather Service Daily and Monthly Climate Summaries and KSU Weather Data Library							