KANSAS CLIMATE SUMMARY AND DROUGHT REPORT
Current Conditions, Drought Impacts and Outlook

November 2009

Mild and Dry November

Following a near-record cool October, November 2009 goes into the record books as the seventh mildest November in the state's 115-year (1895-2009) climate record. The statewide average temperature of 47.2^{0}F was 5.4 degrees above normal and only 1.2^{0}F cooler than the October average. Normally, November in Kansas averages 14.4 degrees cooler than October.

The statewide average total precipitation during November was 1.10 inches, which was 64 percent of normal. Northeast Kansas was the only region to see near to above normal precipitation during November. Monthly totals ranged from 0.08 inches at Sterling in Rice County to 3.68 inches At Rossville in Shawnee County. Based upon preliminary reports, Galesburg in Neosho County had received 77.73 inches of precipitation through the first 11 months of 2009! If confirmed, this and any additional precipitation in December would establish a new Kansas record for most precipitation during a calendar year. Hiawatha holds the present record with 71.99 inches in 1973.

The U.S. Drought Monitor does not presently show drought or abnormally dry conditions anywhere in the state.

CURRENT COUNTY DECLARATIONS

No county drought stage declarations issued by the Governor are presently in effect.

Presidential major disaster declarations affecting Kansas in 2009 are:

- FEMA-1848-DR (Severe winter storm; March 26 -29, 2009)
- FEMA-1849-DR (Severe storms, flooding, high winds and tornadoes; April 25 to May 16, 2009)
- FEMA-1847-DR (Severe storms, tornadoes and flooding; May 8 and May 16, 2009)
- FEMA-1853-DR (Severe storms, tornadoes and flooding; June 5 - 26, 2009)
- FEMA-1860-DR (Severe storms and flooding; July 8-14, 2009).

Up-to-date information regarding designated counties and assistance available due to these declarations is available here: http://www.fema.gov/dhsusda/index.jsp.

U.S. Secretary of Agriculture Tom Vilsack has made the following Primary Natural Disaster Area designations in Kansas:

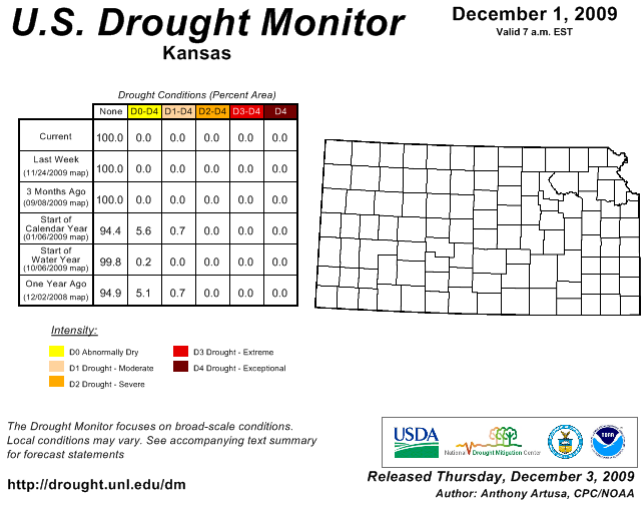
- July 22, 2009 (8 counties) for losses due to excessive rain, flash flooding, flooding, high winds and freeze from March 27 – May 31, 2009, and
- August 29, 2009 (20 counties) for losses caused by heavy rain, flash flooding, high winds and hail from April 27 – July 8, 2009.
- November 6, 2009 (3 counties) for losses caused by high winds and hail from July 17 – September 3, 2009.

For additional information regarding these USDA designations, please see: http://www.rurdev.usda.gov/rd/disasters/.

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. It is important to note that the Monitor is intended to provide a "big picture" perspective of conditions across the nation. It is not designed to show local conditions or to replace state and local-level monitoring efforts.

As was the case on November 3rd, the December 1st Monitor does not indicate the presence of drought or abnormally dry conditions anywhere in Kansas. 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 roughly 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.

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 November 28th was 4.06 (extremely moist), similar to the October 31st value of 4.38. Divisional PDSI values ranged from 3.07 (very moist) in the northeast to extremely moist values of 5.41 and 5.31 in the northwest and southeast, respectively.

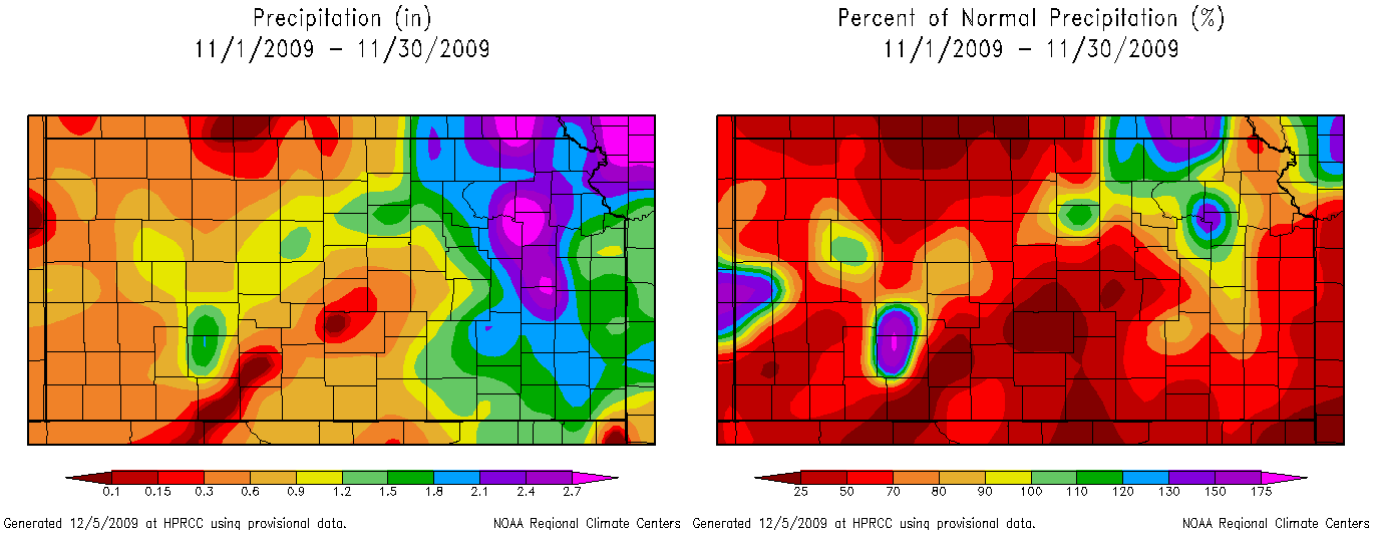
November Conditions

November 2009 ranks as the 59th driest November on record (1895-2009) in Kansas with a statewide average total precipitation of 1.10 inches. This is 64 percent of normal.

Based on preliminary reports, the greatest total precipitation received in November at National Weather Service COOP network stations, was 3.68 inches at Rossville (Shawnee County). Tops for the Community Collaborative Rain, Hail and Snow Network (CoCoRaHS) during November was 3.41 inches at Toronto 0.2 N in Woodson County.

On the low end, Sterling (Rice County) received only 0.08 inches of precipitation during November, the least reported by the state's NWS COOP observers. The driest among CoCoRaHS observers during November was Ashland 14.6 SSE (Clark County) where 0.10 inches fell.

The maps below show total precipitation received and the percent of normal across the state in November.



The following maps show average monthly temperature and the departure from normal across Kansas during November. The statewide average temperature of 47.2^0 F was 5.4 degrees above normal. This was the 7th warmest November of record (1895-2009) for Kansas. November 1999 was the warmest with a statewide average temperature of 50.4^{0}F.

Average monthly temperatures at individual reporting locations ranged from 40.4^{0}F at Goodland 19 SW (Sherman County) to 52.9^{0}F at Pittsburg (Crawford County). The highest temperature recorded in Kansas during November was 88^{0}F on the 7th at Liberal (Seward County). The coolest reading observed in the state during November was 14^{0}F at Goodland 19 SW on the 17th. Kansas' statewide all-time record high temperature for November is 96^0 F at Kingman in 1909; the record low temperature is -20^0 F at Monument (Logan County) in 1887.

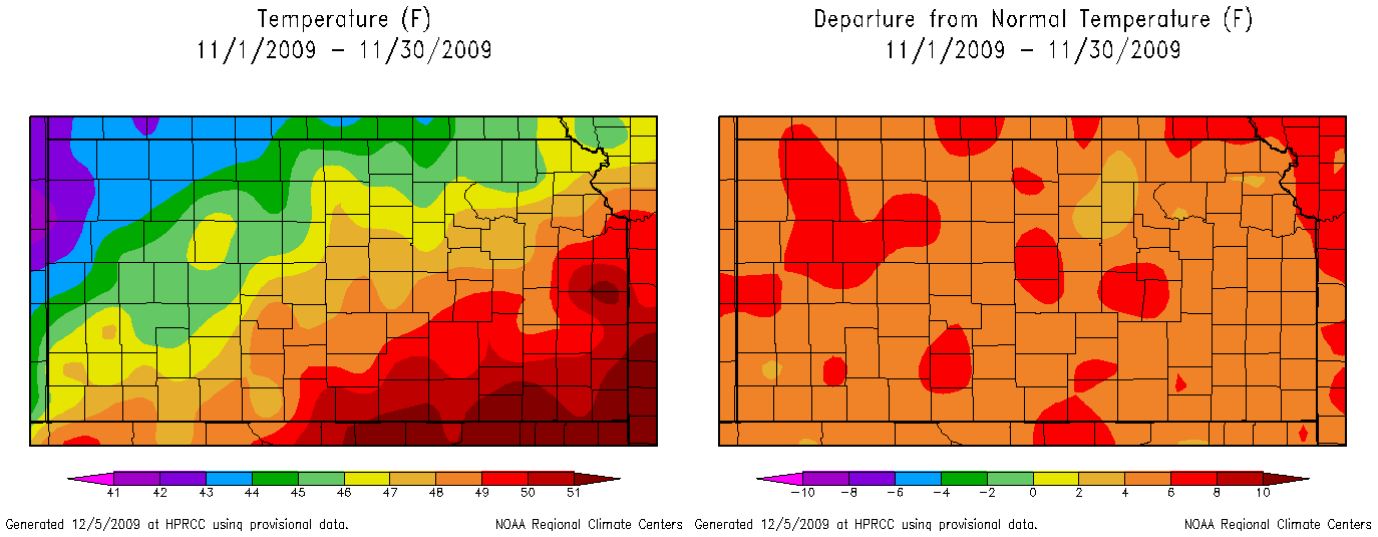


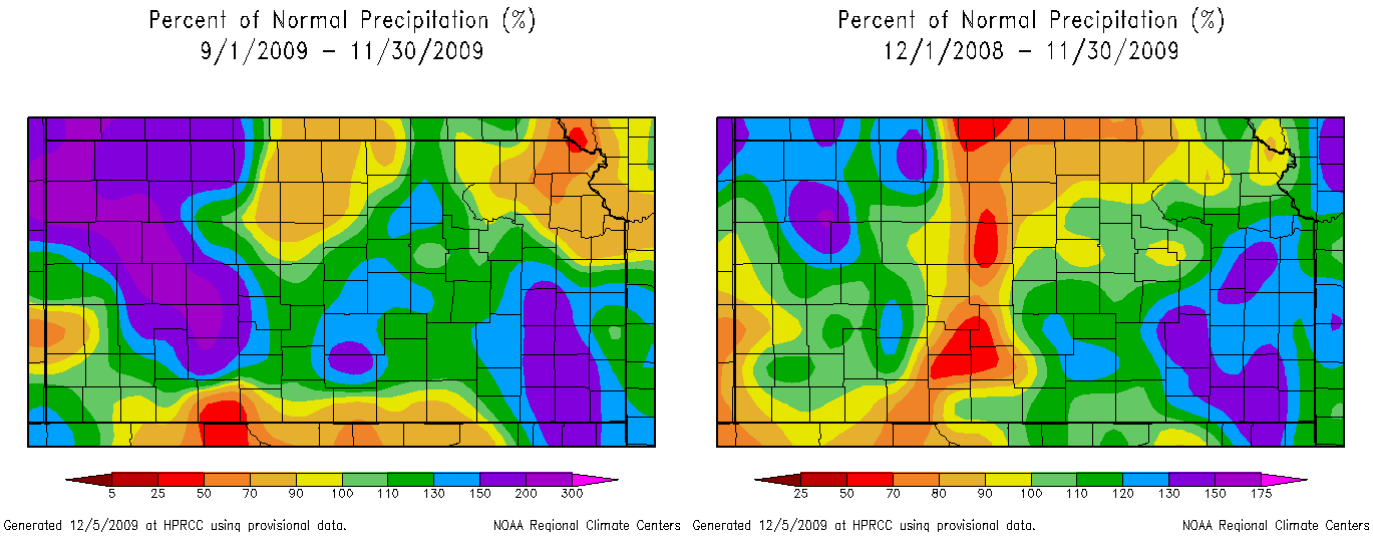
Table 1 summarizes November temperature and precipitation conditions by climate division while Appendix A provides a November summary for principal reporting locations within and adjacent to Kansas. Please note that the data used in compiling Table 1 and Appendix A is preliminary and comes from different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

Table 1
November 2009
Kansas Climate Division Summary

	Precipitation (inches)						Temperature (^{0}F)			
	November 2009			2009 Through November 30					Monthly Extreme	
Division	Total	Dep.[1]	% Norm	Total	Dep.[1]	% Norm	Average	Dep.[1]	Highest	Lowest
Northwest	0.53	-0.28	65	26.20	6.41	132	43.0	3.2	81	14
West Central	0.71	-0.12	86	22.46	3.21	117	44.2	3.7	86	16
Southwest	0.56	-0.26	68	20.54	1.67	109	46.6	3.7	88	18
North Central	1.10	-0.14	88	24.47	-1.71	93	45.7	4.3	80	19
Central	0.90	-0.52	63	29.99	2.22	108	47.1	3.8	84	18
South Central	0.74	-0.84	47	32.83	5.50	120	48.7	4.1	86	17
Northeast	2.00	0.17	109	36.49	2.57	108	46.8	4.1	77	21
East Central	1.55	-0.63	71	40.17	4.82	114	48.8	4.6	79	22
Southeast	1.87	-0.81	70	50.36	13.56	137	50.4	4.2	80	22
STATE	1.06	-0.42	72	31.47	4.39	116	46.8	4.0	88[2]	14[3]

1. Departure from 1971-2000 normal value
2. State highest temperature reported from Liberal (Seward County) on the 7th.
3. State lowest temperature reported from Goodland 19 SW (Thomas County) on the 17th.
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 (September 2009 - November 2009) and during the past 12 months (December 2008 – November 2009).



So-far during 2009 (January through November), total precipitation received across Kansas has ranged from 14.58 inches (94% of normal) at Syracuse in Hamilton County to 77.73 inches (198% of normal) at Galesburg in Neosho County. If confirmed, Galesburg has broken the state record for most precipitation in a calendar year, which was 71.99 inches recorded at Hiawatha in 1973.

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.

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 Report released November 30th rated topsoil moisture as 5 percent short-very short, statewide, compared with 2 percent short-very short one month ago and 7 percent short-very short at this time last year. Topsoil moisture was shortest in the southwest district where 23 percent short-very short conditions were reported. Subsoil moisture was rated 7 percent short-very short, 84 percent adequate and 9 percent surplus, statewide.

Statewide, hay and forage supplies were rated 83 percent adequate, while feed grain supplies were rated 89 percent adequate. Stock water supplies were rated as 96 percent adequate-surplus.

Statewide crop conditions were summarized as follows for the week ending November 29th:

- Cotton – 19 percent poor-very poor; 34 percent fair; 47 percent good-excellent
- Winter Wheat – 5 percent poor-very poor; 27 percent fair; 68 percent god-excellent

Range and pasture conditions were rated 12 percent poor-very poor, 30 percent fair and 58 percent good-excellent.

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 (<25th percentile) at 2 percent of Kansas' long-term gaging stations on November 30th; the October 31st value was 7 percent. Normally about 25 percent of gages are below normal at any given time.

As of December 2, 2009, no streams were under minimum desirable streamflow (MDS) administration by the Kansas Department of Agriculture - Division of Water Resources. Flow in most streams was well above the MDS target level. While not of immediate concern, flows in the Republican River at Concordia and Clay Center and in the Little Arkansas River at Alta Mills are being closely monitored.

Table 2 summarizes federal reservoir pool elevations on November 30, 2009 in terms of departure from the top of the conservation/multipurpose pool and pool elevation change since October 30th.

Table 2
Kansas Federal Reservoirs
End-of-Month Pool Elevation Summary

		Pool Elevation (Feet MSL)		11/30/2009	
Reservoir	**Top MP/C Pool[1]**	**10/30/09**	**11/30/09**	**Departure from Top[2]**	**Change from 10/30/2009[2]**
Kansas River Basin					
Norton	2304.3	2294.2	2294.4	-9.9	0.2
Harlan County, NE	1946.0	1944.1	1945.2	-0.8	1.1
Lovewell	1582.6	1578.6	1579.1	-3.5	0.5
Milford	1144.4	1146.6	1146.6	2.2	0.0
Cedar Bluff	2144.0	2127.3	2127.5	-16.5	0.2
Kanopolis	1463.0	1462.7	1462.1	-0.9	-0.6
Wilson	1516.0	1516.9	1516.7	0.7	-0.2
Kirwin	1729.3	1730.5	1730.0	0.7	-0.5
Webster	1892.5	1894.3	1893.9	1.4	-0.4
Waconda	1455.6	1455.9	1456.1	0.5	0.2
Tuttle Creek	1075.0	1078.0	1079.1	4.1	1.1
Perry	891.5	892.8	893.8	2.3	1.0
Clinton	875.5	877.9	876.9	1.4	-1.0
Pomona	974.0	976.4	976.2	2.2	-0.2
Melvern	1036.0	1038.8	1037.7	1.7	-1.1
Hillsdale	917.0	919.0	917.9	0.9	-1.1
Arkansas River Basin					
Cheney	1421.6	1422.0	1421.7	0.1	-0.3
El Dorado	1339.0	1339.6	1339.4	0.4	-0.2
Toronto	903.5	915.0	908.9	5.4	-6.1
Fall River	950.5	959.5	956.4	5.9	-3.1
Elk City	796.0	801.5	798.5	2.5	-3.0
Big Hill	858.0	859.0	858.2	0.2	-0.8
Council Grove	1274.0	1275.3	1274.2	0.2	-1.1
Marion	1350.5	1350.6	1350.7	0.2	0.1
J. Redmond	1040.9	1041.4	1041.1	0.2	-0.3

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.

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.

The 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. Production of this map will resume in March 2010.

The Vegetation Drought Response Index (VegDRI) provides another perspective on vegetation conditions across the state. VegDRI attempts to isolate the impact of drought or other moisture conditions from other factors that influence vegetation condition.

The VegDRI map is updated on a bi-weekly basis; it is currently out-of-season for Kansas.

Wildfire

No large wildfires were reported to the Kansas Forest Service in November. Wildfires burning at least 300 acres in grass or 100 acres in timber are considered large.

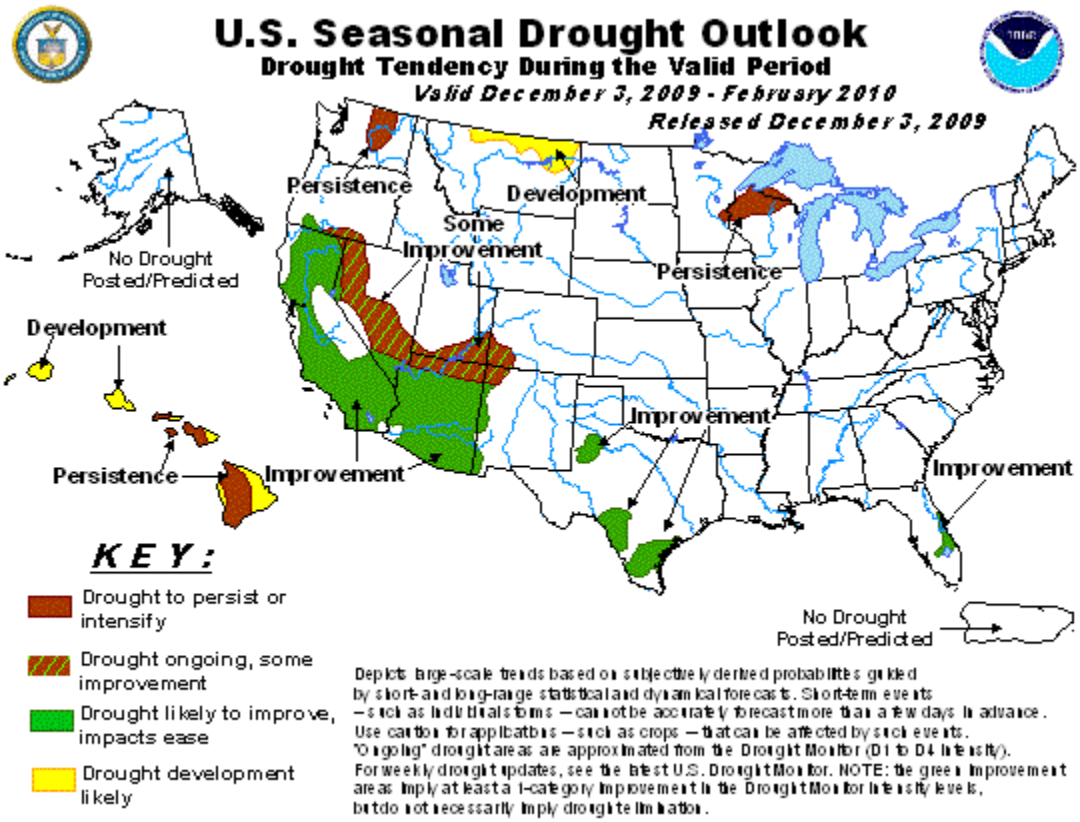
The Wildland Fire Outlook issued by the National Interagency Fire Center on December 1st foresees near normal significant wildfire potential across Kansas during December 2009 and during the January-March 2010 period. Significant fire potential is defined as the likelihood that a wildfire will require 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 3rd for the period through February 2010 (see below) indicated that development of drought conditions in Kansas is unlikely.



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 Susan Metzger at the KWO (785/296-1007) or susan.metzger@kwo.ks.gov, should you have any questions or suggestions.

Appendix A
November 2009
Kansas Regional Climate Summary

	Precipitation (inches)			Temperature (^{0}F)			
						Extreme (Date)	
Station[1]	Total	Departure[2]	Percent Normal	Mean	Departure[2]	Highest	Lowest
(West)							
Burlington, CO	0.12	-0.46	21	42.1	5.2	78 (5, 6)	16 (17)
Dodge City	0.66	-0.35	65	46.7	4.3	83 (6)	22 (18)
Garden City	0.35	-0.53	40	45.5	4.6	83 (6)	20 (18, 30)
Goodland	0.58	-0.24	70	42.8	5.4	79 (6)	17 (17)
Guymon, OK	0.34	-0.27	56	48.5	4.0	88 (6)	22 (18, 30)
Hill City	0.56	-0.60	48	45.2	5.8	82 (6)	17 (18)
Lamar, CO	0.28	---	---	42.7	---	82 (6)	14 (17, 18)
McCook, NE	0.24	-0.85	22	43.7	5.7	78 (6)	19 (18)
Springfield, CO	0.20	---	---	45.2	---	83 (6)	19 (17)
(Central)							
Concordia	0.79	-0.66	54	46.3	5.5	73 (7, 8)	23 (19, 26)
Hebron, NE	0.26	-1.35	16	45.1	7.1	74 (8)	19 (30)
Medicine Lodge	0.79	-1.05	43	50.4	6.9	80 (6)	23 (26)
Ponca City, OK	0.56	---	---	53.2	5.8	80 (6, 7)	25 (26, 30)
Salina	0.86	-0.73	54	48.0	5.0	75 (6, 8)	23 (30)
Wichita (ICT)	0.56	-1.26	31	50.3	6.1	76 (7)	26 (26)
(East)							
Bartlesville, OK	1.46	-1.75	46	52.8	4.0	82 (7)	25 (30)
Chanute	2.12	-0.94	69	50.8	5.7	78 (6)	24 (30)
Falls City, NE	2.98	0.64	127	46.2	6.2	76 (7)	20 (30)
Johnson Co. Exec. Apt.	0.88	-2.09	30	49.3	5.0	74 (6)	25 (30)
Joplin, MO	0.61	-3.45	15	52.1	5.3	79 (7)	25 (30)
Kansas City (MCI), MO	2.25	-0.05	98	49.9	7.2	75 (1)	24 (30)
St. Joseph, MO	2.24	0.08	104	47.0	4.7	76 (7)	22 (30)
Topeka (TOP)	2.23	-0.08	97	48.8	6.2	78 (1)	23 (30)

1. Airport Automated Observation Stations (NWS/FAA)
2. 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 F-6 Climate Summaries