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

May 2009

Dry and Cool in Most Areas

May 2009 was the 22nd driest May of record with a statewide average precipitation of 2.59 inches. Despite this general dry pattern, many locations in the northwest and the southeast saw above normal rainfall for the month.

Abnormally dry conditions were indicated at month's end by the U.S. Drought Monitor in much of north central Kansas as well as a narrow strip along the Oklahoma border. This was little changed from the situation one month ago. The NOAA Seasonal Drought Outlook does not foresee the development of widespread drought across Kansas this summer.

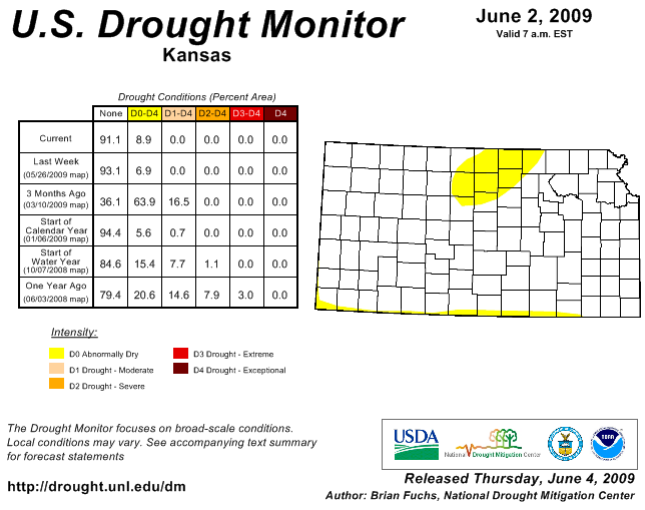
May temperatures were generally near normal across Kansas. The coolest conditions relative to normal were in the south central, while many locations in the far west and northwest were somewhat warmer than normal. The statewide average temperature for the month was 62.7^{0}F, some 0.6 degrees below normal. Temperature extremes in Kansas during May ranged from 30^{0}F at Goodland 19SW on the 14th to 96^{0}F at Medicine Lodge on the 30th and Newton 2SW on the 31st.

CURRENT COUNTY DROUGHT STAGES

No gubernatorial declarations are presently in effect.

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.



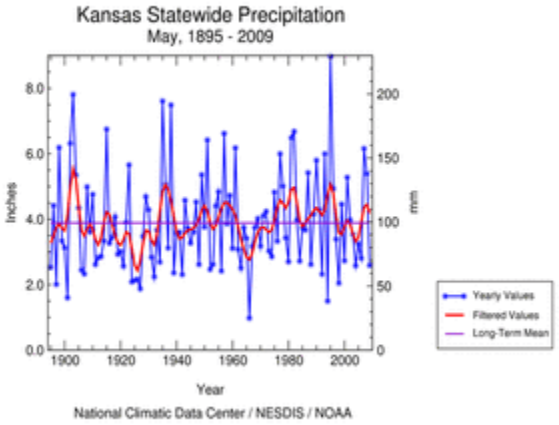
The June 2nd map shows a pocket of abnormally dry conditions in north central Kansas and an abnormally dry strip along the Oklahoma state line.

The table accompanying the map compares the percentage of the state currently affected by drought conditions with several points during the past year. Abnormally dry conditions affect some 9 percent of the state currently, similar to the situation one month ago.

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 May 30th was 2.47 (unusually moist), as compared with 3.66 (very moist) on May 2nd. Divisional PDSI values ranged from extremely moist in the southeast (4.30), down to 0.97 (incipient moist spell) in the southwest.

May Conditions

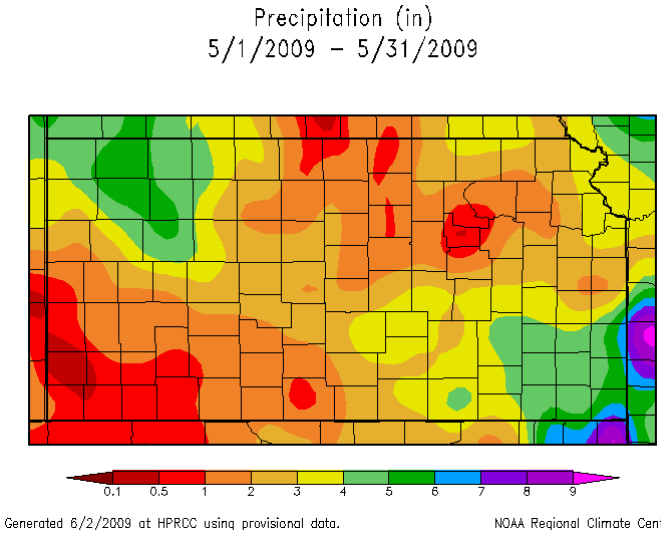


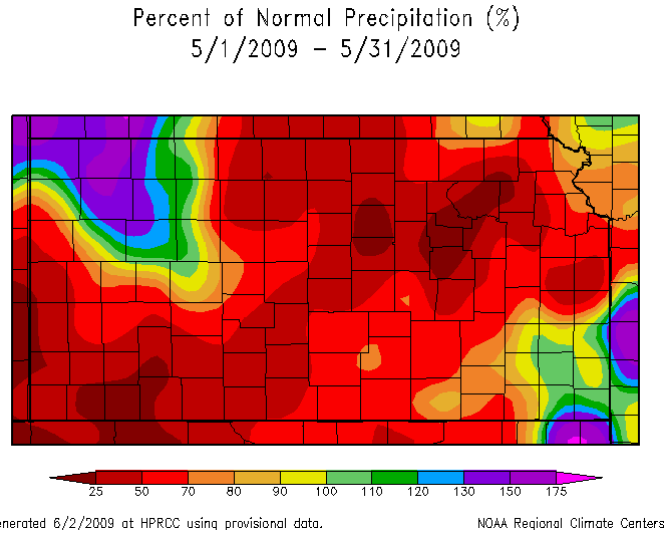
May 2009 ranks as the 22nd driest May on record (1895-2009) in Kansas with a statewide average total precipitation of 2.59 inches (see Table 1). This is 62 percent of normal. The graph at the left shows May precipitation in this long-term perspective. The monthly statewide moisture status graphs and rankings are available from the National Climatic Data Center.

Based on preliminary reports, the greatest total precipitation received in May at National Weather Service COOP network stations, was 7.33 inches at Oswego 1N in Labette County. Pittsburg picked-up 7.26 inches during May while in the opposite corner of the state, Atwood 2 SW (Rawlins County) reported 6.37 inches. Tops for the Community Collaborative Rain, Hail and Snow Network (CoCoRaHS) was 8.35 inches at Fort Scott 0.6SW in Bourbon County. Several other CoCoRaHS observers in Bourbon, Crawford, Osage and Sumner counties also reported 7.00 inches or more total precipitation in May. In northwest Kansas, the CoCoRaHS tops was recorded at Atwood 11N in Rawlins County with 7.07 inches for the month.

Oakley 22S ((Logan County) reported no precipitation during May, the least reported by the state's NWS COOP observers. Twenty-three other COOP stations, mostly in north central and far western Kansas also reported less than one inch of precipitation during May. CoCoRaHS observers in 12 counties in southwest, central and northeast Kansas also reported 1.00 inches or less total precipitation in May. The driest was Moscow 9.7 ESE (Seward County) where only 0.16 inches fell.

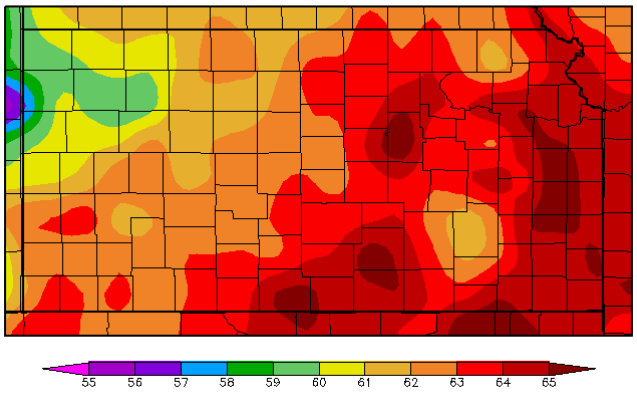
The maps below show total precipitation received and the percent of normal across the state in May.





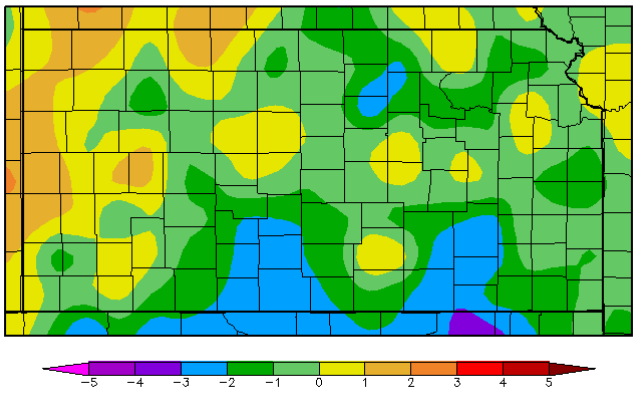
The following maps show average monthly temperature and the departure from normal across Kansas during May. The statewide average temperature of 62.7^0 F was 0.6 degrees below normal. Average monthly temperatures ranged from 56.4^{0}F at Goodland 19SW (Sherman County) to 66.4^{0}F at Abilene 1W. The highest temperature recorded in the state during May was 96^{0}F at Medicine Lodge on the 30th and Newton 2SW on the 31st. Goodland 19SW was the May cold spot with a low of 30^{0}F on the 14th. The only other Kansas station to hit the freezing mark in May was Brewster 4W (Sherman County) with 32^{o}F, also on the 14th. Kansas record temperature extremes for May are 108^0 F at Ellsworth (Ellsworth County) in 1939 and 14^0 F at Wallace (Wallace County) in 1909.

Temperature (F)
5/1/2009 – 5/31/2009



Generated 6/2/2009 at HPRCC using provisional data. NOAA Regional Climate Centers

Departure from Normal Temperature (F)
5/1/2009 – 5/31/2009



Generated 6/2/2009 at HPRCC using provisional data. NOAA Regional Climate Centers

Table 1 summarizes May temperature and precipitation conditions by climate division while Appendix A provides a May 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.

Table 1
May 2009
Kansas Climate Division Summary

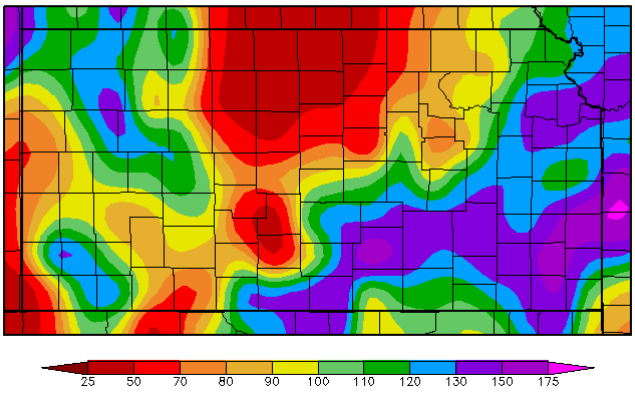
	Precipitation (inches)						Temperature (^{0}F)			
	April 2009			2009 January 1 - May 31					Monthly Extreme (Day)	
Division	Total	Dep.[1]	% Norm	Total	Dep.[1]	% Norm	Average	Dep.[1]	Highest	Lowest
Northwest	4.38	0.87	125	8.34	0.86	111	59.8	-0.5	94 (19)	30 (14)
West Central	2.51	-0.64	80	7.00	0.01	100	60.8	-0.3	92 (19)	34 (14)
Southwest	1.17	-1.83	39	6.08	-0.67	90	62.5	-0.6	95 (31)	34 (17)
North Central	1.34	-2.61	34	5.45	-4.05	57	62.6	-0.3	93 (30)	36 (4)
Central	1.97	-1.85	52	8.95	-1.00	90	63.3	-0.6	95 (31)	37 (11)
South Central	2.52	-1.25	67	11.99	2.06	121	63.5	-1.4	96 (31*)	35 (17)
Northeast	2.10	-2.52	45	11.94	0.28	102	63.5	-0.4	93 (31)	36 (17)
East Central	2.57	-2.10	55	13.95	1.38	111	63.8	-0.7	93 (30)	39 (17)
Southeast	4.27	-0.76	85	18.04	4.26	131	63.7	-1.8	93 (31)	40 (17)
STATE	2.51	-1.41	65	10.23	0.42	104	62.6	-0.7	96 (31*)	30 (14)

1. Departure from 1971-2000 normal value
* 96^{0}F also occurred on May 30th
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 (March - May 2009) and during the past 12 months (June 2008 – May 2009).

Percent of Normal Precipitation (%)
3/1/2009 – 5/31/2009



Precipitation totals received across Kansas this spring varied widely from normal as shown on the map at left. The pocket of much below normal conditions in north central Kansas began developing late in 2008. In sharp contrast are the east central, south central and southeast parts of the state were most areas received at least 120 percent of normal. A 12-month perspective (see map below) starting in June 2008 shows generally drier than normal conditions along an axis extending between the southwest and northeast corners of the state. Wetter than normal conditions covered roughly the southeast one-quarter of Kansas as well as much of the northwest during the past year.

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.

Percent of Normal Precipitation (%)
6/1/2008 – 5/31/2009

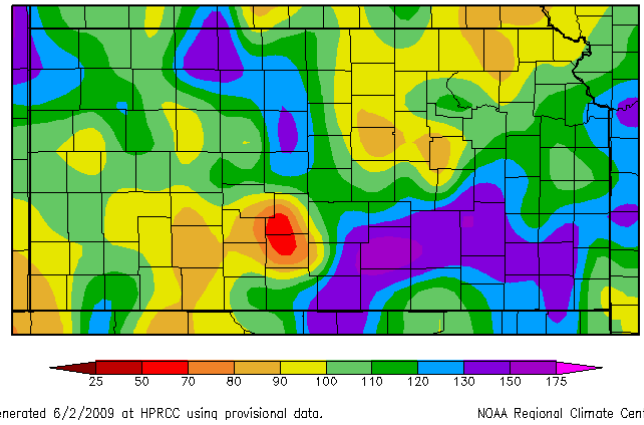


Table 2
Kansas Climate Summary - Past 12-Months

	Temperature (°F)		Precipitation (inches)		
Month	**Monthly Average**	**Departure[1]**	**Monthly Total**	**Departure[1]**	**Percent Normal[1]**
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
January 2009	30.9	2.1	0.08	-0.69	10
February 2009	39.5	5.0	0.50	-0.41	55
March 2009	44.0	0.2	1.97	-0.28	88
April 2009	51.6	-2.0	4.70	2.11	181
May 2009	62.7	-0.6	2.59	-1.59	62
Past 3 Months	---	---	9.26	0.24	103
Past 6 Months	---	---	10.50	-1.18	90
Past Year	---	---	33.03	4.11	114

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 Report released June 1st rated topsoil moisture as 24 percent short-very short, statewide, compared with only 1 percent short-very short one month ago and 14 percent short-very short at this time last year. Topsoil moisture was shortest in the north central district with 58 percent short-very short conditions being reported. Subsoil moisture was rated 16 percent short-very short, 77 percent adequate and 7 percent surplus, statewide.

Statewide, hay and forage supplies were rated 87 percent adequate, while feed grain supplies were rated 90 percent adequate. Stock water supplies were rated as 93 percent adequate-surplus.

Wheat condition was rated 20 percent poor-very poor, 34 percent fair, 39 percent good and 7 percent excellent. Corn conditions were rated 83 percent fair-good and soybeans 93 percent fair-good. Range and pasture conditions were rated 81 percent fair-good.

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 13 percent of Kansas' long-term gaging stations on May 31st; the April 30th value was 4 percent. Normally about 25 percent of gages are below normal at any given time.

As of June 3, 2009, 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. Flows in the Republican River at Concordia and Clay Center briefly fell below their MDS targets at the end of May, but heavy rains on June 1st and 2nd brought the flows up significantly above the target levels.

Table 3 summarizes federal reservoir pool elevations on May 31, 2009 in terms of departure from the top of the conservation/multipurpose pool and pool elevation change since April 30th.

Table 3
Kansas Federal Reservoirs
End-of-Month Pool Elevation Summary

		Pool Elevation (Feet MSL)		05/31/2009	
Reservoir	Top MP/C Pool[1]	04/30/09	05/31/09	Departure from Top[2]	Change from 04/30/2009[2]
Kansas River Basin					
Norton	2304.3	2294.6	2294.8	-9.5	0.2
Harlan County, NE	1946.0	1946.9	1947.2	1.2	0.3
Lovewell	1582.6	1582.1	1583.3	0.7	1.2
Milford	1144.4	1144.7	1145.7	1.3	1.0
Cedar Bluff	2144.0	2127.5	2127.5	-16.5	0.0
Kanopolis	1463.0	1467.2	1466.7	3.7	-0.5
Wilson	1516.0	1516.5	1516.9	0.9	0.4
Kirwin	1729.3	1729.4	1730.0	0.7	0.6
Webster	1892.5	1894.1	1894.7	2.2	0.6

Waconda	1455.6	1455.0	1455.4	-0.2	0.4
Tuttle Creek	1075.0	1080.7	1079.8	4.8	-0.9
Perry	891.5	899.9	891.8	0.3	-8.1
Clinton	875.5	883.1	877.3	1.8	-5.8
Pomona	974.0	984.1	976.5	2.5	-7.6
Melvern	1036.0	1042.4	1038.1	2.1	-4.3
Hillsdale	917.0	920.1	918.8	1.8	-1.3
Arkansas River Basin					
Cheney	1421.6	1423.7	1422.8	1.2	-0.9
El Dorado	1339.0	1344.7	1340.5	1.5	-4.2
Toronto	901.5	922.3	908.0	6.5	-14.3
Fall River	948.5	963.3	958.0	9.5	-5.3
Elk City	794.0	812.1	800.3	6.3	-11.8
Big Hill	858.0	861.2	858.1	0.1	-3.1
Council Grove	1274.0	1279.0	1274.2	0.2	-4.8
Marion	1350.5	1352.3	1350.5	0.0	-1.8
J. Redmond	1039.0	1053.1	1056.0	17.0	2.9

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.

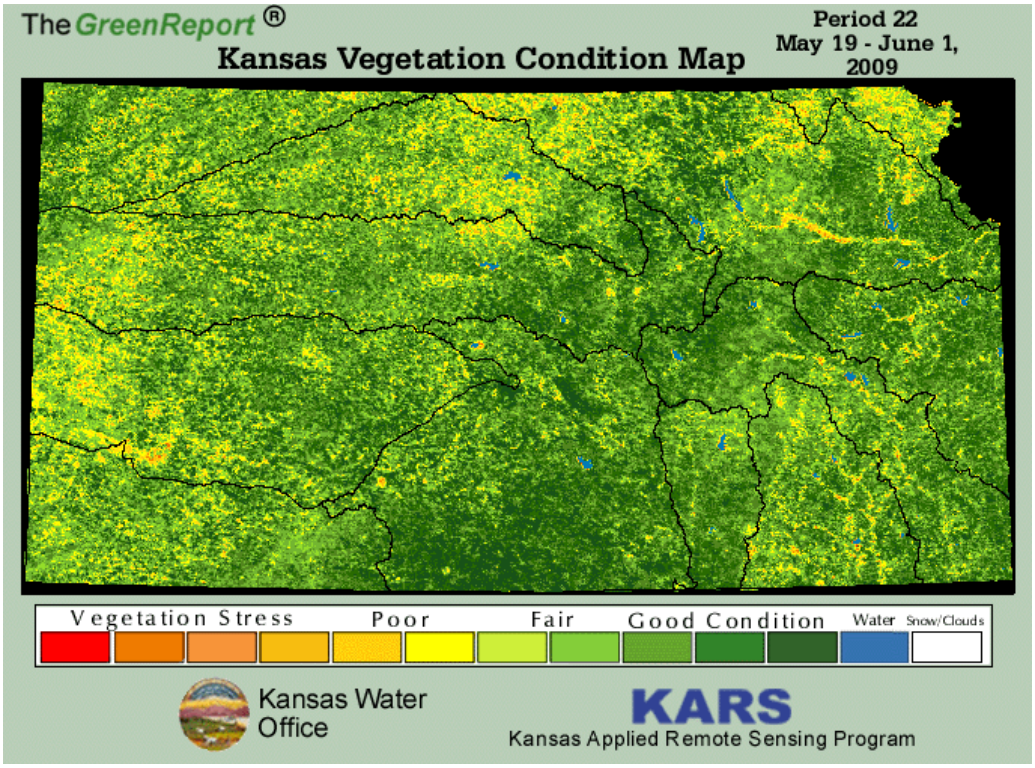
The Drought Vulnerability Assessment Report identifies those systems most likely to first be impacted by drought and the reason for their vulnerability. It was updated in 2007 to reflect system conditions as of 2006.

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.

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 map for the period ending June 1st (see below) shows generally good vegetation conditions statewide.



Fire

No large wildfires were reported to the Kansas Forest Service in May, the most recent such fire having been reported on April 24th. Wildfires burning at least 300 acres in grass or 100 acres in timber are considered large.

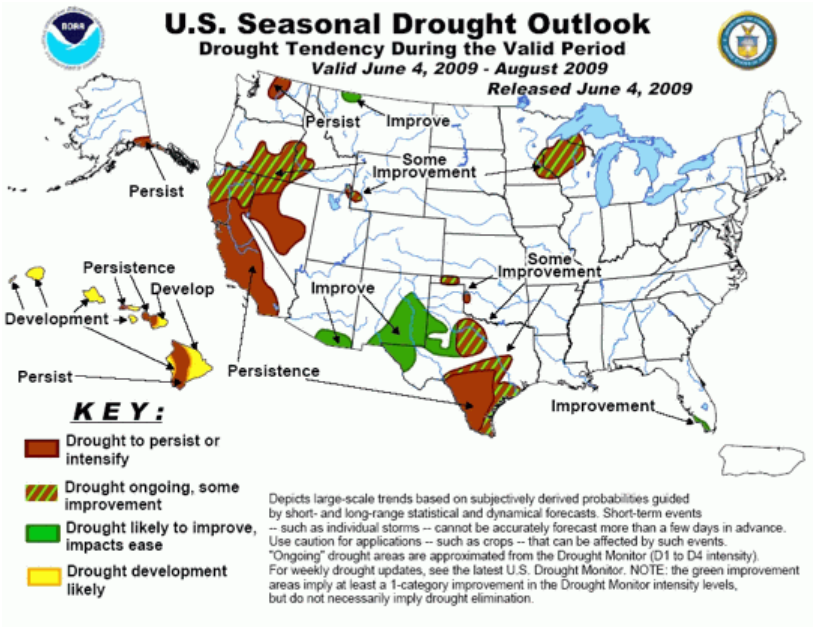
The Wildland Fire Outlook issued by the National Interagency Fire Center on June 1st foresees normal significant wildfire potential across Kansas during June. Significant fire potential is defined as the likelihood that a wildfire will require mobilization of additional resources from outside the area 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.

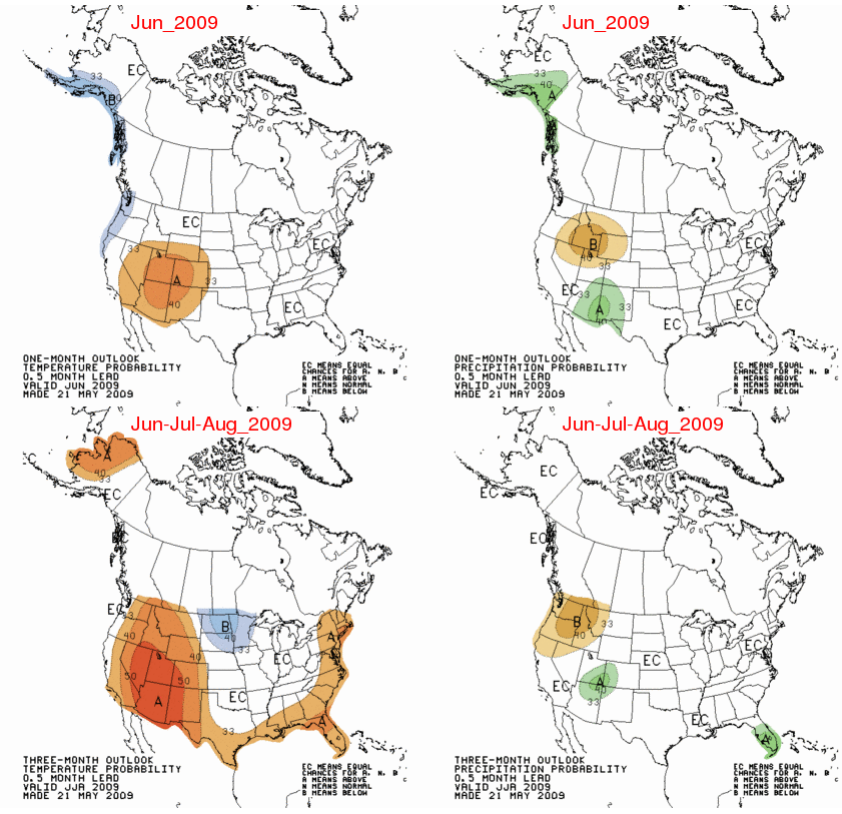
LOOKING AHEAD

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 June 4th for the period through August 2009 (see below) does not indicate the likelihood for drought development in Kansas during this period.



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 following three-month period. Maps depicting these Outlooks are shown below. The Outlook released May 21st does not indicate a strong likelihood for either above or below normal temperatures or precipitation across Kansas during June or during the summer, but the likelihood of warmer than normal conditions this summer is indicated for Colorado and most of the West.

June 2009 and June – August 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
May 2009
Kansas and Regional Climate Summary

	Precipitation (inches)			Temperature (^{0}F)			
						Extreme (Date)	
Station	Total	Departure[4]	Percent Normal	Mean	Departure[4]	Highest	Lowest
(West)							
Ashland[2]	1.34	-2.30	37	63.1	-1.8	95 (31)	34 (17)
Atwood 2SW[2]	6.37	2.63	170	60.8	0.5	94 (19)	37 (14, 15)
Burlington, CO[1]	1.55	-1.33	54	59.2	1.6	93 (19)	33 (14)
Dodge City[1]	1.29	-1.71	43	62.8	-1.0	95 (30)	39 (4)
Elkhart[2]	0.69	-2.06	25	62.8	-0.6	94 (13)	43 (2, 4, 17)
Garden City[1]	1.48	-1.61	48	62.1	-0.9	92 (31)	38 (17)
Goodland[1]	3.12	-0.34	90	59.7	1.0	91 (19)	33 (14)
Guymon, OK[1]	1.35	-1.79	43	64.0	-0.2	95 (12)	41 (4)
Healy[2]	2.75	-0.58	83	62.3	1.0	92 (19)	37 (4, 11)
Hill City[1]	2.89	-0.74	80	62.0	1.1	89 (19, 31)	34 (11)
Lamar, CO[1]	1.46	---	---	62.0	---	95 (19)	34 (14)
Liberal[2]	0.55	-2.57	18	63.0	-0.6	95 (31)	40 (17)
McCook, NE[1]	3.92	0.66	120	61.8	1.3	94 (18, 19)	35 (14)
Ness City[2]	2.85	-0.24	92	61.9	-0.9	90 (31)	35 (11)
Oakley 4W[2]	4.55	1.28	139	58.7	-0.9	90 (19, 20)	37 (4, 14)
Springfield, CO[1]	0.35	---	---	61.9	---	91 (31)	41 (11, 27)
Tribune 1W[2]	1.00	-1.76	36	61.0	1.7	91 (20)	35 (14)
Ulysses 3NE[2]	0.78	-1.87	29	61.4	-1.4	93 (31)	40 (17)
Wray, CO[2]	4.53	1.51	150	58.5	-1.4	94 (20)	37 (2, 11, 14)
(Central)							
Concordia[1]	1.01	-3.19	24	63.5	0.5	93 (31)	40 (14)
Ellsworth[2]	2.03	-3.08	40	62.8	-0.2	89 (30, 31)	40 (11)
Hays 1S[2]	2.21	-0.94	70	63.0	0.2	91 (30)	37 (11)
Hebron, NE[1]	0.72	-3.74	16	63.5	2.8	94 (31)	38 (14)
Hutchinson[3]	3.08	-1.28	71	63.6	-0.1	96 (30)	41 (17)
McPherson[2]	2.41	-2.45	50	63.6	-0.1	95 (31)	41 (11, 12)
Medicine Lodge[1]	1.12	-2.81	28	65.0	-0.6	96 (30)	41 (17)
Ponca City, OK[1]	2.03	---	---	66.4	-1.8	94 (30)	43 (27)
Salina[1]	1.20	-3.91	23	65.0	0.1	94 (31)	41 (11, 17)
Smith Center[2]	1.16	-2.73	30	61.9	-1.7	90 (20, 30)	39 (11)
St. John - Sandyland[3]	2.32	-1.75	57	62.8	-3.2	90 (29, 31)	39 (11)
Wichita (ICT)[1]	2.94	-1.22	71	65.6	0.6	94 (30, 31)	46 (17, 28)
(East)							
Bartlesville, OK[1]	2.83	-1.93	59	65.4	-3.3	93 (30)	43 (18)
Cassoday[2]	1.03	-3.34	24	61.7	-1.5	86 (30)	42 (11, 12)
Chanute[1]	5.68	0.39	107	64.8	-0.5	91 (30)	40 (17)
Emporia 3NW[2]	3.17	-1.90	63	63.8	-0.2	89 (30, 31)	46 (11, 12)
Falls City, NE[1]	2.33	-2.00	54	64.1	0.1	89 (30, 31)	40 (17)
Holton 7SE[2]	1.12	-3.63	24	62.1	-1.3	89 (30)	36 (17)
Howard 5NE[2]	3.88	-0.98	80	63.0	-2.3	93 (31)	43 (18)
Johnson Co. Exc. Apt.[1]	2.31	-3.10	43	64.8	-0.5	91 (30)	42 (17)
Joplin, MO[1]	4.43	-0.64	87	64.7	-1.4	89 (30)	42 (17)
Kansas City (MCI), MO[1]	2.86	-2.53	53	64.7	0.4	89 (29)	42 (17)
Manhattan KSU[2]	0.97	-4.11	19	63.5	-1.5	93 (31)	40 (12, 19)
Ottawa[3]	1.60	-3.83	29	66.1	-0.2	94 (31)	42 (17)
St. Joseph, MO[1]	3.75	-1.20	76	64.2	-0.6	89 (29, 30)	40 (17)
Topeka (TOP)[1]	1.44	-3.42	30	65.7	1.3	93 (30, 31)	41 (17)
Winfield[2]	4.40	-0.99	82	63.0	-2.4	91 (31)	44 (17)

1. Airport Automated Observation Stations (NWS/FAA)
2. National Weather Service COOP Network Stations
3. Kansas State University Experiment Station Network
4. 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 and NOW Climate Summaries and KSU Weather Data Library